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Impact of Credit and Training on Enterprise Performance: Evidence from Urban Ethiopia

Abdelkrim Araar
Yesuf Awel
Jonse Boka
Hiywot Girma
Ajobush Sha
Eleni Yitbarek
Mulatu Zerihun

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Abstract

This study evaluates the impact of business-development-support programs (credit, training, and a combination of both) on the performance of micro- and small enterprises (MSEs) in Ethiopia. Using 2015 Ethiopian urban survey data and employing endogenous-switching regressions for multiple treatments, we document a positive and significant effect of credit, training, and a combination of training and credit on MSEs. Our results highlight the heterogeneity in treatment effects between women- and men-owned MSEs: women-owned businesses do not benefit from access to treatments. Our results suggest that improving the performance of MSEs requires fine-tuned interventions that meet the specific needs of men and women who own small businesses rather than one-size-fits-all programs.

Key words: Treatment effects, MSEs, Ethiopia

JEL classification: C31; J16; M21

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Authors

Abdelkrim Araar

Université Laval
Québec, Canada

Araar.Abdelkrim@ecn.ulaval.ca

Yesuf Awel

United Nations Economic Commission for Africa
Addis Ababa, Ethiopia

yesufm@gmail.com

Jonse Boka

Addis Ababa University
Addis Ababa, Ethiopia

jonseboka@yahoo.com

Hiywot Girma

University of Johannesburg
Johannesburg, South Africa

nunumqzt@gmail.com

Ajebush Shafi

Tshwane University of Technology
Pretoria, South Africa

ajutinaa47@gmail.com

Eleni Yitbarek

University of Pretoria
Pretoria, South Africa

eleni.yitbarek@up.ac.za

Mulatu Zerihun

Tshwane University of Technology
Pretoria, South Africa

zerihunmulatufekadu606@gmail.com

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I. Introduction

Two-thirds of all jobs worldwide are created by small and medium enterprises (ILO, 2015), representing about 60% of the GDP in developing countries (Deijl, de Kok & Essen, 2013). The role of small and medium enterprises in creating jobs, innovation and adoption of technology, broadening of the tax base, and risk-diversification is well recognized (Vijverberg, 1991; McPherson, 1996; Daniels & Mead, 1998; Mead & Liedholm, 1998). One of the main characteristics of a flourishing economy is a vibrant micro- and small enterprise (MSE) sector. Among other roles, MSEs are engines of growth in transitional economies as evidenced by China's recent development (Anderson et al., 2003; Wang, 2016). Supporting MSEs is becoming a popular policy option in developing countries where unemployment and population growth is high and economic growth is low.

In Ethiopia in specific, creating vibrant and competent MSEs is the focus of the country's ambitious development plans. The Micro and Small Enterprises Development Strategy, the Industrial Development Strategy, and the Growth and Transformation Plan, GTP I and GTP II, are such efforts. The second and current development plan, (GTP II, 2016 to 2020), for example, emphasizes the importance of MSEs in the manufacturing sector and aims to expand access to credit through micro-financing. With the objective of creating a capable labor force, the government is implementing a variety of interventions to integrate MSEs into the Technical and Vocational Educational Training (TVET) system.

A number of theoretical and empirical studies have discussed the role of finance in firm growth and compared the results of MSEs to those of large firms. Stiglitz and Weiss (1981), De Meza and Webb (1987), and Evans and Jovanovic (1989) gave theoretical explanations for the financial constraints experienced by small enterprises. Demirguc-Kunt and Maksimovic (1998); Ayyagari, Demirguc-Kunt and Maksimovic (2008); Bigsten et al. (2003); and Fafchamps (2003) showed that MSEs often faced financial constraints during start-up and expansion and suggested that relaxing those financial constraints would enable firms to grow faster. Beck and Demirguc-Kunt (2006) noted that improving access to finance resulted in relatively better growth in small firms than in large ones. Other studies (e.g., Nichter & Goldmark, 2009; Love, 2003; Wurgler, 2000) showed that access to finance is key to enhanced enterprise performance because finance improves the level of revenue/profit and allows firms to employ more workers. Nichter and Goldmark (2009) found that access to bank credit was the main factor determining growth in MSEs, a result similar to those of Love (2003) and Wurgler (2000) who reported the significant contribution of finance to the performance of MSEs.

Lashitew (2011) demonstrated that credit access had a significant negative effect on the cost of capital, confirming that access to credit allowed firms to employ more capital to boost their performance. The authors additionally suggested that a reduction in operating costs could come directly from investments in more productive capital equipment, thereby allowing increased demand to stimulate and improve performance. Access to external finance may allow firms to acquire the working capital and technical inputs that could increase

the profitability of MSEs. More specifically, the Lashitew study illustrated that access to finance, particularly through bank credit, had a strong positive effect on a firm's profitability. Badia, Sloomakers, and Van Beveren (2008) also showed that financial constraints lowered firm performance.

In contrast, standard models of investment also predict that credit-constrained firms grow faster when given additional capital (Fafchamps et al., 2011). This view was partially responsible for the decision of microfinance institutions (MFIs) to lend more credit to MSEs because small firms can earn high returns on capital given access to finance. The evidence of high marginal returns to capital from MSEs raised doubts on the grounds of empirical credibility, however. Works by Banerjee et al. (2015) and Tarozzi, Desai, and Johnson (2015) concluded that, while access to finance, mainly from MFIs, helped MSEs reduce fluctuations in revenue, it did not lead to improvement in performance.

Karlan and Valdivia (2011) also doubted the "poor but rational" presumption behind microfinance interventions focused on providing credit and savings to micro-entrepreneurs. Because most micro-entrepreneurs have no formal business training or lack capability, they may fail to manage their businesses optimally despite access to finance. Evidence from studies based on randomized control trials by Fafchamps et al. (2011), De Mel, McKenzie, and Woodruff (2008), and Karlan and Zinman (2009) further confirmed this doubt. Fafchamps et al. (2011) found that in-kind grants had a large and positive impact on men and women entrepreneurs in urban Ghana. They reported almost zero gain in profit for women with initial profit below the median, however. Similarly, De Mel, McKenzie, and Woodruff (2008) reported a high, positive return to capital for microenterprises in Sri Lanka, with no positive return for women-owned enterprises. Karlan and Zinman (2009) reported shrinkage in business investment size and scope and only some gains in profit for borrowers who were men.

Upgrading the knowledge-base and skills of workers and managers of all types is also central to improving enterprise performance (McKenzie & Puerto, 2017). Education usually teaches entrepreneurs about new production processes and product designs and provides specific technical knowledge appropriate to enterprise growth. Panjaitan-Drioadisuryo and Cloud (1999) and Singh and Belwal (2008) argued that entrepreneurial skill, which can be acquired through training, was a major driver of performance in MSEs. Training enables MSE owners and participants to change behavior and perceptions about their activities that are directly associated with performance. Other empirical studies have shown that enterprises with better-educated owners and managers tend to be more productive (Little, Mazumdar & Page, 1987; Burki & Terrell, 1998). McKenzie and Puerto (2017) also documented a positive impact of business training on performance (profits, sales, and business survival) in women-owned MSEs in Kenya.

The performance of MSEs is affected by the capabilities of the entrepreneur and enterprise as well as by market opportunities. Enterprises with skilled workers, resources, and technology would be expected to perform better than those without. Growth in the MSE sector can be achieved through both factor accumulation and productivity. Economic theory

on enterprise performance shows a positive relationship between productivity and enterprise growth or performance. Accordingly, providing MSEs with training and access to financing, among other resources, could increase the capabilities of owners and employees and lead MSEs to adopt or create practices that increase productivity. An increase in efficiency can be gained through optimal uses of resources by utilizing scale effects as well as by increasing the technical efficiency of factors. Expansion in the credit available to MSEs enables them to invest in productive capacity whereas training provides operators with technical knowledge, information regarding new production processes and product designs, and flexibility.

In Ethiopia, a national survey conducted by the Ministry of Urban Development, Housing and Construction (MoUDHC) asked MSEs to identify the major constraints on their businesses. Access to finance topped the list (Assefa, Zerfu & Tekle., 2014; Ali et al., 2016). Other studies also identified finance as the main obstacle for enterprises in Ethiopia (World Bank, 2015). The current development plan, the second Growth and Transformation Plan (GTP II: 2016-2020), therefore emphasizes the importance of MSEs in the manufacturing sector and aims to disburse ETB 21 billion (USD 904 million) in loans through MFIs and to stimulate the creation of 8.4 million jobs (EEA, 2015).

Addressing skills shortages was also considered a high priority for under-performing MSEs. Ali et al.(2016) and other studies have shown that a poor supply of skilled labor is a major obstacle to improving the competitiveness in the manufacturing sector in Ethiopia. Productivity is strongly and positively correlated with worker education and training in Ethiopia, where a one-year increase in the average education of a worker is associated with an increase of 33%-41% in labor productivity in the manufacturing sector (Moller, 2015). Educated or trained enterprise operators can read instructions or operate machines properly, and the MSEs' output can be of higher quality and more competitive in the marketplace. The demand for training or education is well recognized and, as a result, the Ethiopian government has been implementing these programs extensively. A national survey conducted by the Ministry of Urban Development and Construction on MSEs showed that around 76% of enterprise owners had received formal training in production technologies and business management (Assefa, Zerfu & Tekle, 2014).

Although a growing body of literature addresses the impact on MSEs of access to financing and of upgraded entrepreneurial skill, not enough is known about the joint effects of the two development-support programs, and this warrants further research. We evaluate the impact of access to credit, business training, and the combination of both on the performance of women- and men-owned owned MSEs in urban Ethiopia. Understanding the impact that these interventions have on the performance of MSEs would support either extending them to other MSEs in similar settings (if the impact is positive) or developing complementary interventions.

We used an endogenous switching regressions model for multiple treatments to evaluate the impacts of credit, training, and combined credit and training on the monthly revenue of MSEs after controlling for such firm and firm-owner characteristics as firm size, sector, age, risk appetite, and owner experience, among others. According to our results,

credit, training, and the combination of credit and training have positive and significant effects on the monthly revenue of MSEs. In line with the scant empirical evidence on heterogeneity by gender, however, our results highlight the heterogeneity of treatment effects between women- and men-owned MSEs. Women-owned MSEs do not seem to benefit from access to any of the treatments (credit only, training only, or both). On the other hand, access to credit, to training, and to credit and training leads to higher monthly revenue in firms owned by men. Men in business benefited the most from simultaneous access to credit and training. The results for men-owned MSEs clearly highlight the complementary nature of the treatments and shed light on the need for fine-tuned interventions to meet the specific requirements of women-owned MSEs.

II. Data

2.1 Definition and context

Micro-, small, and medium enterprises (MSMEs) in Ethiopia cover a wide range of businesses that can be broadly classified into industry and service sectors. The industry sector is composed of manufacturing, construction, and mining, while the service sector includes retail, transportation, hotels and tourism, and ICT and maintenance services (CSA, 2015). Two types of definitions have generally been used by the Ethiopian Ministry of Trade and Industry (MoTI) and the Ethiopian Central Statistics Authority (CSA). The MoTI definition (1997) classifies MSMEs based on firms' levels of capital investment, while the CSA classifies enterprises based on total full-time employees and level of automation. With the objective of reflecting the current situation of the country and harmonizing the Ethiopian definition of MSMEs with an international one, the Micro- and Small Enterprise Development Strategy of MoTI (2011) makes a clear classification of MSMEs based on total assets and labor force.¹ Table 2.1 summarizes the current definition of MSMEs in the country with their respective sectors.

Table 2.1 - Classification of Enterprises in Ethiopia

Level of the Enterprise	Sector	Employees	Total Asset
Micro Enterprise	Industry	< 5	< Birr 100,000 (\$6,000)
	Service	< 5	< Birr 50,000(\$3,000)
Small Enterprise	Industry	6-30	<Birr 1.5million (\$90,000)
	Service	6-30	< Birr 500,000 (\$30,000)

¹ When ambiguity is encountered between labor force and total assets as explained above, total assets is taken as a primary yardstick.

Medium and large scale	Industry	> 50	>Birr 1.5 million (\$90,000)
	Service	> 50	>Birr 500,000 (\$30,000)

Source: MoTI (2011).

In Ethiopia, MSEs occupy the lion's share of private-sector employment: an estimated 88%. In the manufacturing sector, MSEs have created job opportunities for about 1.1 million youth and women, reducing the national unemployment rate from 18% in fiscal year 2010-2011 to 17.5% in FY 2011-2012 (Esubalew & Raghurama, 2017).² As in other developing countries, Ethiopia could benefit hugely from the development of MSEs, the significance of which becomes clearer in light of the country's employment profile. The overall urban employment-to-population ratio is 49.4% (the rate for women is 40%) (CSA, 2011). Significant proportions of the urban employed population are self-employed, accounting for 39%, followed by government employees at 21%. The informal sector contributes about 37% of total employment in urban areas, and women dominate this sector (CSA, 2011). The unemployment rate in Ethiopia was 17% in 2015 but was higher for youth (15-29) at about 24%. The unemployment rate was more than double for women (25%) vs. men (11%) (CSA, 2015).

Traditionally, development initiatives in Ethiopia have focused on the agricultural sector. Agricultural productivity remains low, however, and large population growth coupled with limited arable land limits the sector from providing employment for a significant proportion of the population. A number of micro-level studies (Tassew, 2000; Dercon, 2006; Bekele & Muchie, 2009) support this claim.

Cognizant of these facts, the Government of Ethiopia has paid particular attention to the development of the MSE sector in the last two decades. The country has also launched many initiatives, development policies, and plans to achieve economic growth, reduce unemployment, and promote industrial development. The Micro- and Small Enterprises Development Strategy, the Industrial Development Strategy, and the Growth and Transformation Plans (GTP I and II) are all efforts that include MSE development targets.³

Despite government efforts, MSEs in Ethiopia face many bottlenecks. According to a survey on the urban informal sector, the six major problems faced by MSE entrepreneurs are a lack of sufficient capital, inadequate skills, lack of working spaces, lack of technology transfer, low access to markets, and lack of market information (CSA, 2004). To address these constraints, GTP I and GTP II emphasized the importance of providing capital to MSEs, often in the form of microcredit from MFIs, and the integration of MSEs with the TVET system to provide necessary skills and education to MSE entrepreneurs. The current five-year Ethiopian development plan, GTP-II, for instance, emphasizes the importance of sustaining broad-

² The economic significance of MSEs in terms of their contribution to GDP, export, and total output is largely unknown.

³ The national MSE Development Strategy was formulated in 1997. In order to address the implementation gap in the first strategy, the 2010-2011 revision included more ambitious targets for enterprise and employment numbers (EEA, 2015; Assefa, Zerfu & Tekle, 2014).

based economic growth in order to eradicate poverty and *create employment*. In order to achieve this, the government has focused on strengthening small manufacturing enterprises because they provide a foundation for the establishment and expansion of medium and large-scale industries, *open opportunities for employment generation*, expand urban development, and provide close support for additional agricultural development.

Recently, the government restructured the Federal Micro and Small Enterprise Development Agency (FeMSEDA) at the federal, regional, and city level. FeMSEDA is responsible for formulating the overall support framework for the MSE sector. The regional bodies and the one-stop facilities at the city level are responsible for ensuring proper implementation of strategy at the micro level. Currently, there are 1,097 one-stop centers throughout the country that provide comprehensive support services to MSEs. To alleviate financial constraints, for instance, the government established a credit guarantee fund and savings programs to allow entrepreneurs to lease machinery.

Both the restructuring of FeMSEDA and the government's credit and savings programs aim to resolve the constraints MSEs experience on capital and assets and enable access to credit without collateral. According to NBE (cited in Esubalew & Raghurama, 2017), 271,519 MSEs accessed a total of 6.5 billion Birr in loans from MFIs between 2008 and 2015. The government has also emphasized training in entrepreneurship, skills development, and business management. Currently, there are more than 300 TVET centers in the country that provide capacity-development training to MSE entrepreneurs (Bank, 2015). The development of the MSE sector is justified on the grounds of promoting inclusive growth, creating sustainable employment (especially for youth and women), providing a foundation for large manufacturing enterprises, and promoting exports. Accordingly, access to any of the treatments (credit, training, or both) should enhance revenue, profit, and job creation, among other factors, in MSEs.

2.2 Sampling Strategy

We used firm-level data collected in 2015 by Addis Ababa University and the Addis Ababa City Administration Micro- and Small Enterprise Development Bureau. The objective of the survey was to obtain information on the major constraints and challenges facing MSEs in Addis Ababa as well as to build a panel of MSE data that tracked changes in firms' performance over time. These data would allow, for example, impact assessments of government support programs.⁴ Sampling was done using the database of the Addis Ababa City Administration Micro and Small Enterprise Development Bureau, which included micro- and small firms in such sectors as manufacturing, construction, trade, and urban agriculture.

With the objective of ensuring representation of every sub-sector, we applied a two-

⁴ Addis Ababa is the largest city in Ethiopia and represents the country's greatest center of MSEs (World Bank, 2015).

stage stratified sampling procedure. First, MSEs were categorized into one of two sectors: manufacturing or nonmanufacturing. Each sector was then classified into non-overlapping sub-sectors using MoTI classifications. A proportional stratified sample based on available sub-sectors was drawn. Then, within each sub-sector or the strata, the sample was taken randomly.

The sample size was 1,445 MSEs operating in Addis Ababa. The survey collected information on firms' characteristics (age, size, owners' gender, education, experience, and workforce composition); access to business support services (finance, training, land, and other support services); licensing status (formality and legality); performance measures (annual sales and employment); distribution by sector; and challenges faced by MSEs. The survey also provided details of firms' activities and use of inputs as well as the value of outputs and inputs over the twelve months prior to the survey. The dataset enabled us to answer the proposed research questions and provided a good picture of MSE sector in the urban area of the country.

III. Empirical Strategy

Standard models of investment predict that financially constrained enterprises grow quickly when given additional financing (Fafchamps et al., 2011). The type of finance should not affect investment decisions or consumption of capital. Similarly, De Mel, McKenzie, Woodruff (2008) showed that an undeveloped financial market (both credit and insurance) resulted in a high marginal return to capital. In contrast, Karlan and Valdivia (2011) called into question microfinance interventions. In this study, we tested *whether relaxing financial constraints resulted in growth of MSEs, and whether business training or a combination of credit and training had an impact on the performance of MSEs.*

To find the treatment effects of access to credit and training on enterprise performance, we applied a multinomial endogenous switching regression for multiple treatments. Moreover, for checking robustness, we applied propensity score estimation for multiple treatments following Imbens (2000) and Lechner (2001).⁵ In our context, however, it was plausible that unobserved characteristics of MSE entrepreneurs such as motivation to work, entrepreneurial ability, and the aspirations of MSE owners to expand business might have influenced self-selection. Hence, our preferred treatment effect estimates were the result of a multiple endogenous switching regression.

⁵ Refer to Appendices A and B for detailed discussions of identification and the methodology we followed to estimate treatment effects for multiple treatments using a propensity score matching approach.

3.1 Notation and Definitions

In the micro-econometric evaluation, an individual faces two states of the world— participation or non-participation in a program—and two potential outcomes exist for each state. The causal effect is defined as the difference between these potential outcomes. This is commonly known as Roy-Rubin Model (Rubin, 1974).

Let there be $(M+1)$ mutually exclusive treatments in which the potential treatments are denoted as (Y^0, Y^1, \dots, Y^M) . For each individual, only an element of the potential treatments is observable and the remaining elements are counterfactuals. Participation in a particular treatment is indicated by the variable $T \in \{0, 1, \dots, M\}$. Each individual has $M+1$ potential outcomes, but only one state corresponding to the observed treatment (T_i) is directly observed. That is, if for a given unit i , $T_i = t$, then $Y_i = Y_i[t] = \mu_t$. In the multiple-treatments framework, the definition of the average treatment effect (ATE) and the average treatment effect on the treated (ATT), developed for binary treatments, must be adjusted. Here the focus is on the relative effectiveness of all possible pairs of treatments.

Average treatment effect (ATE): The ATE of treatment t' relative to t'' is the comparison of mean outcomes had the entire population been observed under one treatment t' versus had the entire population been observed under another treatment t'' (Wooldridge, 2010; McCaffrey et al., 2013).

Formally, ATE (denoted by $\tau_{ate}^{t' t''}$) is:

$$\tau_{ate}^{t' t''} = \mu_{t'} - \mu_{t''} \quad (1)$$

Average treatment effect on the treated (ATT): In the multiple-treatments case, the ATT focused on the pairwise comparison of the effects of treatments t' and t'' for one of the participants in either t' or t'' . Formally, the multiple treatments version of ATT is:

$$\tau_{att}^{t' t''} = \mu_{t' t''} - \mu_{t' t'} \quad (2)$$

The ATT of treatment t' among those treated with t'' (stated as the ATT of t' relative to t'') is the comparison of those who were treated with t'' , of their mean outcome when treated with t' with the mean outcome they would have had if they had instead been treated with treatment t' (Wooldridge, 2010).

In the multiple-treatments case, several quantities of interest exist, and the choice depends on the research question the study addresses. When the interest is to offer treatment to all the members of MSEs, estimating the ATE would provide more relevant information. For instance, if the interest were to provide training to every MSEs operator, we would need to estimate and know the ATE.

If the interest were to understand the relative effectiveness of an intervention versus another intervention, the ATT would provide appropriate information. Moreover, if the

interest were also to know the appropriateness of an intervention on a particular group, the ATT would provide relevant quantities of the treatment effect. In this study, we proposed to estimate both ATE and ATT, as shown in Table 3.1.

Table 3.1 - ATE and ATT of Multiple Treatments*

	ATE		ATT	
	Credit (cr)	Training (tr)	Both (crtr)	
Credit vs. Training	$\mu_{cr} - \mu_{tr}$	$\mu_{cr, tr} - \mu_{cr, cr}$	$\mu_{tr, cr} - \mu_{tr, tr}$	§
Credit vs. both	$\mu_{cr} - \mu_{crtr}$	$\mu_{cr, crtr} - \mu_{cr, cr}$	§	$\mu_{crtr, cr} - \mu_{crtr, crtr}$
Training vs. Both	$\mu_{tr} - \mu_{crtr}$	§	$\mu_{tr, crtr} - \mu_{tr, tr}$	$\mu_{crtr, tr} - \mu_{crtr, crtr}$

*It is possible to compute the ATE in comparison to the groups that received no treatment. §These are nonsensical cases to estimate the ATT.

Treatment Effect Model for Multiple Treatments: Multinomial Endogenous Switching Regression Approach

An entrepreneur's choice among finance, training, or a combination of both could be endogenous due to self-selection because such decisions are influenced by both observable and unobservable factors. To address possible selection biases, we used the multinomial endogenous switching regression approach originally proposed by Dubin and McFadden (1984).⁶ The approach allowed us to obtain consistent and efficient estimates of the selection process and provided a reasonable correction for the outcome equations, even when the assumption of the independence of irrelevant assumptions was not achieved. In the first stage, we modelled the selection/treatment decision (choice of credit, training, a combination of these, or neither) using a multinomial logit selection model that recognized the interrelationship among them. In the second stage, the effects of each treatment on Performance of MSEs were evaluated using OLS corrected for selectivity.

3.1.1 Multinomial Logit Selection Model

In a random utility framework, it is assumed that a representative entrepreneur chooses the alternative that is most useful. Formally, a latent model (T_{ji}) describes entrepreneur i 's choice for treatment j over another alternative m .

$$T_{ji} = \gamma_j z_i + \varepsilon_{ji} \quad (3)$$

⁶ Bourguignon, Fournier, and Gurgand (2007) presented a survey of methods to address selection bias, when selection is specified as a multinomial logit model, and compared the underlying assumptions of these methods. They concluded that the approach proposed by Dubin and McFadden (1984) was preferable and further proposed a variant of this method. Accordingly, we followed the suggestions of the Bourguignon group in addressing selection bias.

z_i is the vector of observable characteristics that affect choice of treatment and ε_i is the unobservables. The utility of choosing an alternative is not observed, while the actual choice of the alternative is observed. An entrepreneur's choice of an alternative j over another alternative m is given as follows:

$$T_{ji}^* = \begin{cases} 0 & \text{if } T_{ji}^* > \max_{m \neq 1} T_{mi}^* \text{ or } \omega_{0i} < 0 \\ \cdot & \cdot \\ \cdot & \cdot \\ \cdot & \cdot \\ J & \text{if } T_{ji}^* > \max_{m \neq j} T_{mi}^* \text{ or } \omega_{ji} < 0 \end{cases} \quad (4)$$

where $\omega_{ji} = \max_{m \neq j} (T_{mi} - T_{ji}) < 0$ (Bourguignon, Fournier & Gurgand, 2007). Equation 4 implies that entrepreneur i chooses alternative j over m as far as the utility derived from j is greater than that derived from m for $m \neq j$.

Assuming that ε is an identically independent Gumbel distribution, the probability that an entrepreneur i will choose a treatment j given characteristics z can be given as a multinomial logit model (McFadden, 1973).

$$p_{ji} = pr(\omega_{ji} < 0 | z) = \frac{\exp(\gamma_j z_i)}{\sum_{m=1}^J \exp(\gamma_m z_i)} \quad j = 1, 2, \dots, J \quad (5)$$

3.2 Multinomial Endogenous Switching Treatment Regression

To estimate the impact of each treatment on the performance of MSEs, we specified the following multinomial endogenous switching regressions as in Equations 6a-6d:

$$y_{ni} = \beta_{nxi} + u_{ni} \quad \text{if } T = 0 \quad (6a)$$

$$y_{cri} = \beta_{crxi} + u_{cri} \quad \text{if } T = 1 \quad (6b)$$

$$y_{tri} = \beta_{trxi} + u_{tri} \quad \text{if } T = 2 \quad (6c)$$

$$y_{crtri} = \beta_{crtrxi} + u_{crtri} \quad \text{if } T = 3 \quad (6d)$$

Because of the possible correlation between the unobservable factor in the outcome Equation 6a-6d and the selection equation, however, estimating Equations 6a-6d using OLS yielded biased results.

As Bourguignon, Fournier, and Gurgand (2007) indicated, consistent estimates of the parameters in Equations 6a-6d required correction for selectivity. They showed that consistent estimates of the parameters could be obtained by introducing a correction term, into Equations 6a-6d as given in Equations 7a-7d and applying OLS.

$$y_{ni} = \beta_{nxi} + \sigma n \lambda_n + \xi_{ni} \quad \text{if } T = 0 \quad (7a)$$

$$ycr_i = \beta_{cr}x_{ji} + \sigma_{cr}\lambda_{cr} + \xi_{cr_i} \quad \text{if } T = 1 \quad (7b)$$

$$ytr_i = \beta_{tr}x_{ji} + \sigma_{tr}\lambda_{tr} + \xi_{tr_i} \quad \text{if } T = 2 \quad (7c)$$

$$ycrtri = \beta_{crtr}x_{ji} + \sigma_{crtr}\lambda_{crtr} + \xi_{crtri} \quad \text{if } T = 3 \quad (7d)$$

where σ_u is the covariance between ε and u ; λ is the correction term derived based on estimated probabilities from Equation 5; and the correlation (ρ) between ε and u .

3.2.1 Estimating Conditional Expectations and Treatment Effects

After consistently estimating Equations 6a-7b, we computed the conditional expectations of each equation when the dependent variable was observed and its counterfactual as given in Equations 8a-9b

Expected value of MSE revenue for Untreated entrepreneurs:

$$E(y_{ni}|T = 0) = \beta_n x_i + \sigma_n \lambda_n \quad (8a)$$

Expected value of MSE revenue for Treated entrepreneurs:

$$E(ycr_i|T = 1) = \beta_{cr} x_i + \sigma_{cr} \lambda_{cr} \quad (8b)$$

$$E(ytr_i|T = 2) = \beta_{tr} x_i + \sigma_{tr} \lambda_{tr} \quad (8c)$$

$$E(ycrtri|T = 3) = \beta_{crtr} x_i + \sigma_{crtr} \lambda_{crtr} \quad (8d)$$

Counterfactuals for untreated entrepreneur: Expected value of MSE revenue for the untreated had they received the treatment:

$$E(y_{ji}|T = 0) = \beta_j x_i + \sigma_j \lambda_n \quad (9a)$$

Counterfactuals for treated entrepreneur: Expected value of MSE revenue for those who received j had they not received any support:

$$E(y_{ni}|T = j) = \beta_n x_i + \sigma_n \lambda_j \quad (9b)$$

The ATE and the ATT could be computed as in Equations 10a-10b and 11a-11b, respectively. t' and t'' are treatments in j .

$$ATE_j = E(y_{ji}|T = j) - E(y_{ni}|T = n) = \beta_j x_{ji} + \sigma_j \lambda_j - \beta_n x_{ni} + \sigma_n \lambda_n \quad (10a)$$

$$ATE_{t'0,t''00} = E(y_{t'0}|T = t') - E(y_{t''00}|T = t''00) = \beta_j x_i + \sigma_j \lambda_j - \beta_n x_{ni} + \sigma_n \lambda_n \quad (10b)$$

$$ATT_j = E(y_{ji}|T = j) - E(y_{ni}|T = j) = (\beta_j x_i + \sigma_j \lambda_j) - (\beta_n x_i + \sigma_n \lambda_j) \quad (11a)$$

$$ATT_{t0} = E(y_{t00}|T = t^0) - E(y_{t0}|T = t^0) = (\beta_{t0} x_i + \sigma_{t0} \lambda_{t0}) - (\beta_t x_i + \sigma_t \lambda_{t0}) \quad (11b)$$

IV. Results

4.1. Descriptive results

Table 4.1 provides descriptive statistics for the key variables used in the analysis, disaggregated by treatment status. Lack of access to finance and lack of qualified human resources and business premises are the most pressing problems that MSEs in Ethiopia face (Amha & Ageba, 2006; CSA, 2004). Accordingly, the Ethiopian government has implemented a variety of interventions to boost the contribution of the MSE sector to the economy.⁷ We examined the impact of the two main government interventions; namely, credit and training.

FeMSEDA designed a national micro credit and savings directive that primarily focused on alleviating financial constraints on MSEs through access to microcredit from MFIs. Our credit treatment therefore measured access to micro-loans. FeMSEDA also provides entrepreneurs in the MSE sector with various kinds of training. In our sample, for example, among firms whose personnel had received training, about 45% of owners/managers had received formal training in business and finance management, bookkeeping, marketing and salesmanship, entrepreneurship, human resource management, and taxation. In addition, the government strengthens and supports MSEs through TVETs by producing skilled workers. In our sample, among the firms whose personnel stated they had received training, about 55% of operators received the training from TVET colleges.

Table 4.1 shows that the average annual revenue in the sample was Birr 55,586.⁸ Overall, treated MSEs had higher monthly revenues than did untreated counterparts. The difference in monthly revenue between treated and untreated firms was statistically significant at 1%. Because MSEs were constrained in terms of lack of access to credit and to a trained and skilled workforce, firms that received both treatments (credit and training) had the highest monthly revenues, followed by MSEs whose personnel received training only and those that had access to credit only (see Table 4.1). MSEs with any of the treatments had, on average, more employees and incurred lower materials costs, suggesting that pathways to higher revenue may reduce costs (through improved efficiency) or increase hiring.

⁷ According to the National Bank of Ethiopia, the achievements of the policy intervention include disbursement of credit amounting to 9.87 billion Ethiopian Birr through MFIs, providing 16,753 business premises (shades and buildings), and making technical and management training available to 5,087,358 MSE operators by the end of the 2014-2015 fiscal year.

⁸ This is 1% trimmed mean.

The majority of MSEs (38%) were engaged in the manufacturing sector, and the average age of the firms was 4.76 years. MSEs in the sample reported an average initial capital of Birr 35,635.84 (USD 1,500.00) and had, on average, three employees. The majority of employees (65%) had less than or had completed a high school education, 26% had a diploma after completing high school, and 9% had a first university degree. Overall, younger firms, firms with more employees, firms with higher initial capital, firms with higher human capital (more educated employees), firms that prepared regular financial reports, firms that used IT systems, firms engaged in manufacturing, and those in the construction sectors had higher access to treatments (credit, training, or both) than did comparison MSEs (see Table 4.1). This descriptive result shows that MSEs that received the treatments differed from those who did not receive the treatments in a number of ways, suggesting that access to the treatments might depend on the observable characteristics of firms and their owners. The majority of firms with access to any of the treatments were formally registered. Twelve percent of the firms in our sample were not registered, out of which about 6%, 25%, and 6%, respectively, had access to credit, training, and both training and credit.

With regard to ownership characteristics, 30% of the owners of MSEs were women. They had an average of eleven years of schooling and had been engaged in the MSE sector for an average of seven years. The mean estimate of relative risk aversion was 0.015, indicating that the owners of MSEs in Ethiopia were risk-averse.⁸

⁸ The coefficient of relative risk aversion is calculated using the moment-based approach of Antle (1987).

Table 4.1 – Descriptive statistics by treatment type

	Credit		Training		Credit and Training		Untreated		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Outcome indicator:										
Monthly sales revenue (in log)	5.33	5.54	8.25	4.46	8.98	4.24	4.81	5.05	6.69	5.11
Firm characteristics										
Age of the enterprise	4.77	3.95	4.42	3.3	4.73	3.6	5.02	4.5	4.76	3.95
Total initial capital of the enterprise (in Birr)	43 746.62	130 095.00	41 609.12	183 338.00	59 904.61	149 912.80	19 625.75	69 092.04	35 635.84	135 183.90
Total number of employee	3.06	8.21	3.6	6.36	4.79	8.18	1.96	5.98	3.07	6.8
Financial reports (1 if MSE prepare financial reports)	0.37	0.48	0.36	0.48	0.46	0.5	0.21	0.41	0.32	0.47
Monthly labor cost	5652.03	25 326.98	5 790.70	26 135.41	10 430.30	28 086.89	34 369.09	807 101.40	18 765.88	526 972.60
Monthly material costs	34367.45	99 629.88	24 330.13	44 387.17	27 555.22	34 502.83	18 041.28	89 521.28	22 954.16	70 144.88
Employees Education										
High school*	0.32	0.47	0.38	0.49	0.35	0.48	0.45	0.5	0.4	0.49
Below high school	0.32	0.47	0.2	0.4	0.16	0.37	0.32	0.47	0.25	0.43
Diploma	0.22	0.41	0.32	0.47	0.37	0.48	0.17	0.38	0.26	0.44
First degree and above	0.15	0.36	0.1	0.3	0.12	0.32	0.07	0.25	0.09	0.29
Sector										
Manufacturing*	0.32	0.47	0.51	0.5	0.4	0.49	0.27	0.45	0.38	0.48
Service	0.07	0.26	0.09	0.28	0.07	0.26	0.18	0.39	0.12	0.33
Construction	0.16	0.37	0.27	0.44	0.31	0.47	0.14	0.35	0.21	0.41
Trade	0.44	0.5	0.13	0.34	0.21	0.41	0.4	0.49	0.28	0.45
Registered (1 if registered)	0.90	0.30	0.90	0.29	0.95	0.20	0.82	0.38		
Owners characteristics										
Gender of entrepreneur	0.37	0.48	0.25	0.43	0.23	0.42	0.35	0.48	0.3	0.46
Experience in MSEs (Years)	6.13	5.05	6.55	5.53	6.85	5.58	6.41	5.97	6.51	5.69
Relative risk premium	0.1	0.05	0.11	0.06	0.1	0.03	0.11	0.05	0.11	0.05

Note: 1 USD is equivalent to 26.96 Birr since October 11, 2017.

* Represent the comparison group

Disaggregating access to treatments by owners' gender suggests that women-owned firms had reduced access to all treatments. The difference in access to training and combined capital and training was significant at 1%. This first observation is in line with the findings of Asiedu et al. (2013), who documented the fact that women entrepreneurs had less access to credit in most parts of Africa (see Table 4.2).

Table 4.2 - Summary Statistics by Gender of Entrepreneur

	Women		Men	
	Mean	SD	Mean	SD
Outcome indicator:				
Monthly sales revenue (in log)	4.822	4.894	7.475	4.993
Firm characteristics				
Age of the enterprise (in years)	4.864	3.938	4.713	3.959
Initial capital of the enterprise (in Birr)	19249.52	68802.63	42506.48	154280.8
Total number of employees	1.768	5.062	3.614	7.338
Financial reports	0.2	0.4	0.365	0.482
Monthly labor cost	3006.23	15541.71	25373.76	627696.6
Monthly Material costs	11186.81	45245.22	27636.58	77393.86
Education of employees				
High school	0.432	0.496	0.382	0.486
Below high school	0.35	0.477	0.212	0.409
Diploma	0.178	0.383	0.291	0.455
First degree and above	0.04	0.196	0.115	0.319
Sector				
Manufacturing	0.286	0.453	0.414	0.493
Service	0.192	0.395	0.095	0.294
Construction	0.075	0.264	0.274	0.446
Trade	0.446	0.498	0.217	0.412
Owners' characteristics				
Experience in MSEs (Years)	5.885	5.195	6.769	5.873
Relative risk premium	0.0176	0.030	0.0136	0.031
Treatments				
Credit	0.235	0.424	0.261	0.439
Training	0.406	0.492	0.535	0.499
Capital and training	0.138	0.346	0.192	0.394

Table 4.2 shows that, on average, the women who owned MSEs were older, were engaged in the service and trade sector, had fewer employees who possessed lower educational attainment, and had less experience in the MSE sector than did men who owned businesses. Women entrepreneurs in our sample were more risk averse (the difference in the relative risk premium was significant at 5%). The significant difference in the characteristics of firms owned by men vs. women and their access to treatments could indicate that the MSE development agency and its partners were more willing to provide the treatments when the MSEs had such characteristics as engagement in a high-return sector (manufacturing and construction sector), higher capital, and sufficient prior experience, which could potentially encourage self-selection of men entrepreneurs into treatments.

Table B.1 disaggregates the characteristics of women-owned MSEs that had access to any of the treatments (credit or training or both). Women-owned firms with access to both credit and training had average higher monthly revenues than did their peers who received either credit only or training only. Overall, firms owned by young woman entrepreneurs, women-owned firms with higher initial capital, women-owned MSEs with more employees, and women-owned firms that prepared monthly financial reports had greater access to both credit and training simultaneously than did those who received credit only or training only. On the other hand, women-owned firms in the manufacturing sector whose owners were more risk-averse had greater access to training than to the other treatments. Credit access was higher among firms owned by older entrepreneurs, those with lower educational attainment, and those in the trade sector.

4.2. Econometric Results

In this section, we address evaluation questions: What is the impact of access to credit, access to training, and access to the combination of both on the performance of MSEs using a multinomial endogenous switching regression (MESR) model? First, we present multiple treatment effects estimates for the whole population and for men- and women-owned MSEs. Second, we provide an assessment of the heterogeneity in impacts by gender of the entrepreneurs.

4.2.1. Multiple Treatment Effects Estimates

Tables 4.3 and 4.4 present the estimated treatment effects for all MSEs in our sample. The ATE shows the difference in revenue for all entrepreneurs who had received a specific treatment and for the comparison group had they received another treatment or been untreated. We computed the ATE by comparing treated with untreated MSEs and then computed the ATE by comparing one treatment to another.

Table 4.3 - ATE of Multiple Treatments-All

Outcome variable - Monthly sales revenue, ALL – ATE

Credit vs. Untreated	0.281*	Credit vs. Training	-0.780**
Training vs. Untreated	1.061***	Credit vs. Both	-1.733***
Both vs. Untreated	2.014***	Training vs. Both	-0.954***

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

The ATE for all entrepreneurs who received treatments, in comparison to untreated entrepreneurs, was an increase of about 28% in log revenue per month. The large average return to capital is in line with previous studies in Ghana and Sri Lanka; in Ghana, a one-time capital grant was found to increase monthly profits by about 26% and, in Sri Lanka, the

average return to capital was estimated to be 6% per month (Fafchamps et al., 2011; De Mel, McKenzie & Woodruff, 2008). The ATE of entrepreneurs who went from being untreated to receiving training or to training and credit simultaneously doubled the monthly revenue of treated MSEs; both impacts were significant at 1% (see Table 4.3). These results suggest that credit, training, or a combination of the two positively affected the performance of MSEs compared to those that received no treatment.

In comparing the impact of one treatment versus another, the ATE of MSEs that went from training to credit was a decline in monthly revenue of about 78%. Moving from both credit and training to credit only resulted in a decline in monthly revenue of about 1.73 log points, and the ATE of moving from both credit and training to training was a decline in monthly revenue of about 95%. The negative effects of changing treatments highlight the difference in the effectiveness of each treatment in improving the performance of MSEs. Overall, the ATE results suggest that access to credit and training improves the performance of MSEs more than does treating them with only one of the treatments (credit or training). Likewise, treating MSEs with training alone led to better performance than did treating them with credit alone.

For MSEs that received credit, the ATT of moving from credit to training was not significant. Moving from credit to both credit and training, however, led to a significant increase in monthly revenue (by 2.40 log points) compared to receiving credit alone. This suggests that MSEs that received credit alone could have improved their revenue had they received both credit and training simultaneously. For those that received training, the ATT of the shift from training to credit was about a 32% decline in monthly revenue, though the result was not significant. The ATT of moving from training to both credit and training, conversely, was a decline in monthly revenue of about 1.27 log points. Focusing on those MSEs that received both credit and training, training alone decreased average monthly revenue, suggesting that a combination of training and credit was more effective in enhancing the performance of MSEs than was training alone (see Table 4.4). In contrast, firms that received credit only or training only would have achieved better performance had they have received the joint treatment.

Table 4.4 - ATT Estimates of Multiple Treatments-All

Outcome variable – Monthly sales revenue	Credit	Training	Both
Training vs. Credit	1.010	-0.320	§
Both vs. Credit	2.268***	§	-1.273***
Both vs. Training	§	0.998***	-1.033***

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

§These are nonsensical cases to estimate the ATT.

4.2.2. Treatment Effect Heterogeneity by Gender

Table 4.5 presents the heterogeneity in treatment effects based on entrepreneurs' gender. As expected, women- and men-owned firms benefited differently from the treatments (credit, training, and combined credit and training). As in Sri Lanka and Ghana, access to credit alone did not appear to be sufficient to improve the performance of women-owned MSEs (Fafchamps et al., 2011; De Mel, McKenzie & Woodruff, 2008). In terms of gain in the log of monthly revenue, men-owned MSEs benefited from all the treatments, but women-owned MSEs did not benefit from any of the treatments. Access to credit, training, and both credit and training led to higher monthly revenue among men-owned firms vs. receiving none of these treatments. For credit, training, and a combination of both, the actual gain in monthly revenue for men-owned firms was about 1.6, 1.1, and 1.9 log points, respectively; all effects were significant at 1%. It is important to mention that, in our context, women-owned MSEs had more limited access to all the treatments than did their men-owned counterparts (see Table 4.2), which is in line with empirical evidence that women-owned firms have less access to credit (Asiedu et al., 2013). On the other hand, our findings regarding treatment effects is consonant with the results of Fafchamps et al. (2011) and De Mel, McKenzie, and Woodruff (2008), who documented no effect of access to credit on the profits of women-owned firms in Ghana and Sri Lanka, respectively. Comparing the ATE of a treatment relative to the other treatments by gender of entrepreneurs, we found no significant difference in treatment effects.

Two main implications emerge from these results. First, our evidence highlights the heterogeneous effects of the treatments on women- and men owned MSEs and provides insights regarding the effectiveness of business-development programs in improving the performance of MSEs. Second, the results make clear the complementary nature of the treatments in improving the performance of MSEs owned by men, while women-owned firms either need different treatments or should be targeted in alternative ways. Policy efforts should perhaps be directed to re-thinking business-development support for women-owned MSEs that would take women entrepreneurs from low-return sectors and develop the skills they need to create and sustain successful business ventures.

Table 4.5 – ATE of Multiple Treatments by Gender

Outcome variable - Monthly sales revenue	Women	Men
Credit vs. Untreated	0.808	1.684***
Training vs. Untreated	0.182	1.058***
Both vs. Untreated	0.338	1.922***
	Women	Men
Credit vs. Training	0.626	0.625
Credit vs. Both	0.470	-0.238
Training vs. Both	-1.156*	-0.848

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

V. Robustness Checks

Below are treatment-effects estimates using a propensity score matching approach for multiple treatments and OLS (assuming random assignment of treatments) as a robustness check. First, we considered the ATE on revenue for entrepreneurs who received a treatment versus those who received another treatment or were untreated. Both OLS and PS estimates showed that the ATE of receiving credit vs. being left untreated was not significant. At the same time, the ATE of moving from untreated to training or from untreated to both credit and training significantly improved monthly revenue. These results confirm that training or a combination of credit and training for the whole MSE population positively affected performance compared to being untreated (see Table 5.1).

Table 5.1 - ATE of Multiple Treatments-OLS and PS

Outcome variable - Monthly sales revenue, All-ATE		
	PS estimates	OLS estimates
Credit vs. Untreated	0.070	0.078
Training vs. Untreated	1.446***	0.765***
Both vs. Untreated	2.434***	-2.131***

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

Table 5.2 presents the treatment effects on MSEs that received the treatments (the ATT) based on a propensity score approach. The ATT results show that only firms that received both credit and training were effectively targeted because their outcomes would have declined had they received credit only or training only. MSEs that received credit only or training only could have improved performance, however, if they had been treated with both credit and training. Overall, the result highlights the effectiveness of both credit and training in improving MSE revenue.

Table 5.2 - ATT of Multiple Treatments-All, Using PS

Outcome variable-Monthly sales revenue	Credit	Training	Both
Training vs. Credit	1.714	-0.733**	§
Both vs. Credit	2.380***	§	-1.550***
Both vs. Training	§	1.003***	-0.962

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

Comparing treatment effect estimates based on OLS, PS, and MESR, we found a qualitatively similar positive impact of treatments (training or combined credit and training) for MSEs in urban Ethiopia. In addition, we noted qualitatively similar results in both ATE and ATT estimates relative to other treatments, suggesting that improving the performance of MSEs would require simultaneous credit access and training.

VI. Conclusion and Policy Recommendations

Our results suggest that access to credit, training, or a combination of the two positively affected MSE performance compared to being left untreated. Comparing the relative effectiveness of each treatment for the MSE population in our sample, we found that a combination of credit and training was most effective for improving the revenues of MSEs. The ATT results reveal that firms that received either credit only or training only could have improved their performance had they received both credit and training simultaneously, implying that single treatments are not effective.

Disaggregating the treatment effect by gender, the ATE of the treatments on women-owned MSEs was insignificant. On the other hand, access to credit, training, and combined credit and training led to higher monthly revenues in men-owned firms compared to their untreated peers. MSEs owned by men benefited most from simultaneous access to credit and training, highlighting the complementary nature of the treatments for men-owned MSEs. On the other hand, women-owned firms did not benefit from these interventions.

The finding that the interventions led to higher monthly revenue indicates that the policies of the Government of Ethiopia to improve access to credit and to provide technical assistance or training to MSE owners should be strengthened. Similarly, improving access to treatments should be the first step for improving the performance of women-owned firms. The interventions should be fine-tuned to meet MSEs' specific needs and demands, however. The lack of a treatment effect on the performance of women-owned MSEs suggests that promoting women entrepreneurship requires more than creating access to credit and/or training. Policies that encouraged women entrepreneurs to diversify into high-return sectors (manufacturing or construction, e.g.) and to develop skills and capabilities could have longer-lasting effects.

References

- Ali, M., Godart, O., Görg, H. & Seric, A. (2016). Cluster development programs in Ethiopia: Evidence and policy implications. Kiel, Germany: Kiel Institute for the World Economy (IfW). Available from <https://EconPapers.repec.org/RePEc:zbw:ifwebk:141418>.
- Amha, W. and Ageba, G. (2006). Business Development Services (BDS) in Ethiopia: Status, Prospects and Challenges in the Micro- and Small Enterprise Sector. *International Journal of Emerging Markets*, 1(4), 305-328.
- Anderson, A. R., Li, J.-H., Harrison, R. T., and Robson, P. J. (2003). The Increasing Role of Small Business in the Chinese Economy. *Journal of Small Business Management*, 41(3), 310-316.
- Antle, J. M. (1987). Econometric Estimation of Producers' Risk Attitudes. *American Journal of Agricultural Economics*, 69(3), 509-522.
- Asiedu, E., Kalonda-Kanyama, I., Ndikumana, L., and Nti-Addae, A. (2013). Access to Credit by Firms in Sub-Saharan Africa: How Relevant Is Gender? *American Economic Review*, 103(3), 293-97.
- Assefa, B., Zerfu, A., and Tekle, B. (2014). Identifying key success factors and constraints of Ethiopia's MSE development: An exploratory research. Ethiopian Development Research Institute. Addis Ababa, Ethiopia.
- Ayyagari, M., Demircuc-Kunt, A., and Maksimovic, V. (2008). How Important Are Financing Constraints? The Role of Finance in the Business Environment. *The World Bank Economic Review*, 22(3), 483-516.
- Banerjee, A., Duflo, E., Glennerster, R., and Kinnan, C. (2015). The Miracle of Microfinance? Evidence from a Randomized Evaluation. *American Economic Journal: Applied Economics*, 7(1), 22-53.
- Beck, T. and Demircuc-Kunt, A. (2006). Small and Medium-Size Enterprises: Access to Finance as a Growth Constraint. *Journal of Banking and Finance*, 30(11), 2931-2943.
- Bekele, E. and Muchie, M. (2009). Promoting Micro, Small and Medium Enterprises (MSMES) for Sustainable Rural Livelihood. DIIPER & Department of History, International and Social Studies, Aalborg University, Denmark.
- Bigsten, A., Collier, P., Dercon, S., Fafchamps, M., Gauthier, B., Gunning, J. W., and Teal, F. (2003). Credit constraints in manufacturing enterprises in Africa. *Journal of African Economies*, 12(1), 104-125.
- Bourguignon, F., Fournier, M., and Gurgand, M. (2007). Selection Bias Corrections Based on the Multinomial Logit Model: Monte Carlo Comparisons. *Journal of Economic Surveys*, 21(1), 174-205.
- Burki, A. A. and Terrell, D. (1998). Measuring Production Efficiency of Small Firms in Pakistan. *World Development*, 26(1), 155-169.
- CSA (Central Statistics Authority) (2004). Report on Urban Informal Sector Sample Survey. Technical Report. Addis Ababa, Ethiopia.
- CSA (Central Statistics Authority) (2011). The 2011 Urban Employment Unemployment Survey. Technical Report. Addis Ababa, Ethiopia.

- CSA (Central Statistics Authority) (2015). Report on Small Scale Manufacturing Industry Survey. Technical Report. Addis Ababa, Ethiopia.
- Daniels, L. and Mead, D. C. (1998). The Contribution of Small Enterprises to Household and National Income in Kenya. *Economic Development and Cultural Change*, 47(1), 45-71.
- De Mel, S., McKenzie, D., and Woodruff, C. (2008). Returns to Capital in Microenterprises: Evidence from a Field Experiment. *The Quarterly Journal of Economics*, 123(4), 1329-1372.
- De Meza, D. and Webb, D. C. (1987). Too Much Investment: A Problem of Asymmetric Information. *The Quarterly Journal of Economics*, 102(2), 281-292.
- Deijl, C., de Kok, J., & Essen, V. V. (2013). Is small still beautiful? Literature review of recent empirical evidence on the contribution of SMEs to employment creation. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
- Demirguc-Kunt, A. and Maksimovic, V. (1998). Law, Finance, and Firm Growth. *The Journal of Finance*, 53(6), 2107-2137.
- Dercon, S. (2006). Economic Reform, Growth and the Poor: Evidence from Rural Ethiopia. *Journal of Development Economics*, 81(1), 1-24.
- Dubin, J. A., & McFadden, D. L. (1984). An econometric analysis of residential electric appliance holdings and consumption. *Econometrica: Journal of the Econometric Society*, 52(2), 345-362.
- EEA (Ethiopian Economic Association) (2015). Small and Micro Enterprises (SMES) Development in Ethiopia: Policies, Performances, Constraints and Prospects. Research Brief 5. Addis Ababa, Ethiopia.
- Esubalew, A & Raghurama, A. (2017) Micro, Small and Medium Enterprises (MSMEs) Development Strategies in Ethiopia: Retrospective and Prospective Analysis. *IJCBM* 6(1), 2319–2828.
- Evans, D. S. and Jovanovic, B. (1989). An Estimated Model of Entrepreneurial Choice under Liquidity Constraints. *Journal of Political Economy*, 97(4), 808-827.
- Fafchamps, M. (2003). *Market Institutions in Sub-Saharan Africa: Theory and Evidence*. Cambridge, MA: MIT Press.
- Fafchamps, M., McKenzie, D., Quinn, S. R., and Woodruff, C. (2011). When Is Capital Enough to Get Female Microenterprises Growing? Evidence from a Randomized Experiment in Ghana. Technical report. Cambridge, MA: National Bureau of Economic Research.
- Frölich, M. (2004). Programme Evaluation with Multiple Treatments. *Journal of Economic Surveys*, 18(2), 181-224.
- ILO (International Labour Organization) (2015). *Small and Medium-Sized Enterprises and Decent and Productive Employment Creation*. Technical Report. Geneva, Switzerland
- Imbens, G. W. (2000). The Role of the Propensity Score in Estimating Dose-Response Functions. *Biometrika*, 87(3), 706-710.
- Karlan, D. and Valdivia, M. (2011). Teaching entrepreneurship: Impact of business training on microfinance clients and institutions. *Review of Economics and Statistics*, 93(2), 510-527.

- Karlan, D. and Zinman, J. (2009). Expanding Microenterprise Credit Access: Randomized Supply Decisions to Estimate the Impacts in Manila. Technical Report. Department of Economics. New Haven, USA: Yale University.
- Lashitew, A. A. (2011). Does Access to Finance Lower Firms' Cost of Capital? Empirical Evidence from International Manufacturing Data (No. GD-120). University of Groningen, Groningen Growth and Development Centre.
- Lechner, M. (2001). Identification and estimation of causal effects of multiple treatments under the conditional independence assumption. In M. Lechner and F. Pfeiffer, Eds., *Econometric Evaluation of Labour Market Policies*. Heidelberg: Physica, 43-58.
- Little, I., Mazumdar, D., and Page, J. M. Jr. (1987). *Small Manufacturing Enterprises: A Comparative Analysis of India and Other Economies*. Washington, DC: The World Bank.
- Love, I. (2003). Financial Development and Financing Constraints: International Evidence from the Structural Investment Model. *The Review of Financial Studies*, 16(3), 765-791.
- McCaffrey, D. F., Griffin, B. A., Almirall, D., Slaughter, M. E., Ramchand, R., and Burgette, L. F. (2013). A Tutorial On Propensity Score Estimation for Multiple Treatments Using Generalized Boosted Models. *Statistics in Medicine*, 32(19), 3388-3414.
- McFadden, D. (1973). Conditional logit analysis of qualitative choice behavior. In P. Zarembka, Ed., *Frontiers in Econometrics*. New York: Academic Press, 105-142.
- McKenzie, David J. and Puerto, Susana (2017). Business training for female microenterprise owners in Kenya grew their firms without harming their competitors. *Finance & PSD Impact Evaluation Note No. 42*. Washington, DC: World Bank Group.
- McPherson, M. A. (1996). Growth of Micro- and Small Enterprises in Southern Africa. *Journal of Development Economics*, 48(2), 253-277.
- Mead, D. C. and Liedholm, C. (1998). The Dynamics of Micro- and Small Enterprises in Developing Countries. *World Development*, 26(1), 61-74.
- Miranda, V., Badia, M. M. and Van Beveren, I. (2012). Globalization drives strategic product switching. *Review of World Economics*, 148(1), 45-72.
- Moller, Lars Christian (2015). *Ethiopia's great run: the growth acceleration and how to pace it*. Washington, DC: World Bank Group.
- MoTI (Ministry of Trade and Industry) (1997). *Micro- and Small Enterprises Development Strategy of Ethiopia*. Technical Report. Addis Ababa, Ethiopia.
- MoTI (Ministry of Trade and Industry) (2011). *Micro- and Small Enterprise Development Strategy, Provision Framework and Methods of Implementation*. Technical Report. Addis Ababa, Ethiopia.
- MoUDH (Ministry of Urban Development and Housing), *Micro and small Enterprise Development Policy and Strategy*. Addis Ababa, Ethiopia. Available at: <https://www.cmpethiopia.org/page/2074>.
- Nichter, S. and Goldmark, L. (2009). Small Firm Growth in Developing Countries. *World Development*, 37(9), 1453-1464.
- Panjaitan-Drioadisuryo, R. D. and Cloud, K. (1999). *Gender, Self-Employment and Microcredit*

- Programs: An Indonesian Case Study. *The Quarterly Review of Economics and Finance*, 39(5), 769-779.
- Singh, G. and Belwal, R. (2008). Entrepreneurship and SMEs In Ethiopia: Evaluating the Role, Prospects and Problems Faced by Women in This Emergent Sector. *Gender in Management: An International Journal*, 23(2), 120-136.
- Stiglitz, J. E. and Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, 71(3), 393-410.
- Tarozzi, A., Desai, J., & Johnson, K. (2015). The impacts of microcredit: Evidence from Ethiopia. *American Economic Journal: Applied Economics*, 7(1), 54-89.
- Tassew, W. (2000). Economic Analysis and Policy Implications of Farm and Off-Farm Employment. A Case Study in the Tigray Region of Northern Ethiopia (Doctoral dissertation). Wageningen University, Agricultural Economics and Rural Policy Group, Wageningen, Netherlands. Available from <https://library.wur.nl/WebQuery/wurpubs/67022>.
- Vijverberg, W. P. (1991). Profits from Self-Employment: The Case of Cote d'Ivoire. *World Development*, 19(6), 683-696.
- Wang, Y. (2016). What Are The Biggest Obstacles to Growth of SMES in Developing Countries? An Empirical Evidence from an Enterprise Survey. *Borsa Istanbul Review*, 16(3), 167-176.
- Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.
- World Bank (2015). *SME Finance in Ethiopia: Addressing the Missing Middle Challenge* (English). Washington, DC: World Bank Group.
- Wurgler, J. (2000). Financial Markets and the Allocation of Capital. *Journal of Financial Economics*, 58(1/2), 187-214.

Appendix A

Identification

Estimating treatment effects is challenging because counterfactuals are unobservable. Identification, however, is obtained by untestable assumptions. These are the Common Support Condition and the Conditional Independence Assumption (CIA). It is important to understand the implications of these assumptions and assess their plausibility in the context of each evaluation through the use of observational data. Their plausibility depends upon the available data and the economic questions the study aims to address.

Common Support Condition: Each individual has a positive probability of receiving each treatment. This implies that there are no values of covariates that could occur only among units receiving one of the treatments. There is sufficient overlap between groups receiving different treatments. Formally, the common support condition is:

$$0 < p(T_i = m|X) < 1 \text{ for all } \mathbf{X} \text{ and } m \quad (12)$$

Conditional Independence Assumption (CIA): Treatment participation and treatment outcome are independently conditional on a set of observable attributes. This implies that the set of observed covariates \mathbf{X} are rich enough to include all variables that directly influence both T_i and Y_i . Imbens (2000) showed that the multiple-treatments version of the *Conditional Independence Assumption* identifies the parameters of interest. Formally, the CIA is:

$$Y^0, Y^1, \dots, Y^M \perp\!\!\!\perp T | \mathbf{X} = x \quad \text{for all } x \quad (13)$$

Imbens (2000) also showed that properties similar to the propensity score property hold in a multiple-treatments framework. That is, instead of conditioning on the attributes, it is possible to condition on the participation probability (propensity score). Under the two assumptions, we can, in principle, estimate the treatment effects in Table 3.1. Empirically, this involves including a large set of regressors in the propensity score model thorough review of literature to ensure that the two assumptions are met.

Appendix B

Estimating the Propensity Score

There are several approaches to estimating the propensity score in the case of multiple treatments. Lechner (2001), for example, used a multinomial probit. It is also possible to use multinomial logit or other machine-learning methods. This study estimated the propensity score using multinomial logit (MNL). In practice, this involved constructing a multinomial treatment variable as a dependent variable and estimated an MNL regression of the treatment variable on a set of regressors.

Estimating the Weighted Mean of Potential Outcomes for Each Treatment and Treatment Effects

In order to estimate the treatment effects in Table 3.1, we needed to estimate the means of potential outcomes. A problem in estimating mean outcomes is the possibility that samples that received different treatments differ in the distribution of covariates that likely also differ in observed outcomes not attributable to treatment. Hence, it is important to ensure that the distribution of covariates for the samples under different treatments is as similar as possible except in the treatment they received.

One approach for achieving this is to reweight the treatment sample so that the distributions of covariates match those of any other treatment group. Several studies (Frölich, 2004; Wooldridge, 2010) have shown that, under CIA and common support, reweighting the treatment sample using the reciprocal of the probability that an individual received the treatment usually gave the best estimation, particularly in a small sample. This approach of weighting to estimate the mean outcome and, ultimately, treatment effects is known as the inverse probability weight (IPW). The means of potential outcomes are estimated using an inverse probability weighted regression adjustment approach.

To estimate pairwise ATEs (E.g., $\mu_t - \mu_{t0}$), consistent estimates of the population means of the potential outcomes for each of the treatments (μ_t and μ_{t0}) were required. Given the propensity score, $p_t(X)$, the probability that an individual with pretreatment characteristics X received treatment t ($p_t(X) = pr(T[t] = 1|X)$). A consistent estimate of μ_t is given by the weighted mean in Equation 14, where the weights satisfy $w_i[t] = \frac{1}{p_t(X)}$.

$$\mu_t = \frac{\sum_{i=1}^n T_i[t] Y_i w_i[t]}{\sum_{i=1}^n T_i[t] w_i[t]} \quad (14)$$

Then, ATE for $\mu_t - \mu_{t'}$ is $\tau_{ate}^{tt'} = \mu_t - \mu_{t'}$.

To estimate pairwise ATTs for one of the treatments t' (E.g., $\mu_{t0,t'00} - \mu_{t0,t'0}$), consistent estimates for the mean of the potential outcomes for MSEs like those who received the treatment t' had they received the other treatment conditions t'' . If the above two assumptions hold, a consistent estimate of $\mu_{t',t''}$ and $\mu_{t',t'}$ will result, respectively, in the weighted and unweighted means in Equations 15a and 15b.

$$\mu_{t',t''} = \frac{\sum_{i=1}^n T_i[t''] Y_i w_i[t', t'']}{\sum_{i=1}^n T_i[t''] w_i[t', t'']} \quad (15a)$$

$$\mu_{t',t'} = \frac{\sum_{i=1}^n T_i[t'] Y_i}{\sum_{i=1}^n T_i[t']} \quad (15b)$$

The weight in Eq. (15a) is $w_i[t', t''] = p_{t'}(X)/p_{t''}(X)$. Taking the difference between Equation 15a and 15b, we can estimate the ATT for $\mu_{t',t''} - \mu_{t',t'}$ as $\tau_{att}^{t't''} = \hat{\mu}_{t',t''} - \hat{\mu}_{t',t'}$.

Table B.1 – characteristics of female treated firms by treatment type

	Female - credit		Female training		Female credit and training	
	Mean	SD	Mean	SD	Mean	SD
Outcome indicator:						
Monthly sales revenue (in log)	3.534	4.781	6.721	4.658	7.188	4.826
Firm characteristics						
Age of the enterprise (in years)	5.488	3.613	4.693	3.782	4.678	3.844
Initial capital of the enterprise (in Birr)	26668.9	45549.31	22731.75	43082.95	43410.93	162665.2
Total number of employee	1.366	3.706	2.14	3.991	3.407	6.767
Financial reports (yes=1)	0.22	0.419	0.211	0.409	0.322	0.471
Monthly labor cost	1970.371	9587.353	6137.733	26259	6029.413	17221.65
Monthly Material costs	5701.429	11375.3	13297.18	27625.8	18611.15	24013.33
Education of employees						
High school	0.293	0.461	0.447	0.499	0.407	0.495
Below high school	0.439	0.502	0.298	0.46	0.271	0.448
Diploma	0.195	0.401	0.211	0.409	0.271	0.448
First degree and above	0.073	0.264	0.044	0.206	0.051	0.222
Sector						
Manufacturing	0.244	0.435	0.412	0.494	0.356	0.483
Service	0.098	0.3	0.193	0.396	0.153	0.363
Construction	0.073	0.264	0.123	0.33	0.169	0.378
Trade	0.585	0.499	0.272	0.447	0.322	0.471
Owners characteristics						
Experience in MSE Sector (Years)	6.22	4.252	5.675	4.507	5.661	5.141
Relative risk premium	0.112	0.029	0.118	0.079	0.105	0.034