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Cost efficiency and outreach of microfinance institutions in Ethiopia:
Do they contrast with financial cooperatives?

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Cost efficiency and outreach of microfinance institutions in Ethiopia: Do they contrast with financial cooperatives?

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Abstract

Using a stochastic frontier approach, we analyse the imposition of financial sustainability requirement on the traditional social mission of microfinance –outreach to the poor. We also address whether the way ownership is organised and practiced affects the costs of microfinance delivery. Based on a disaggregated 107 sample microfinance providers in Ethiopia, the results suggest that outreach to the poor and achieving financial sustainability (as measured by cost efficiency) are contradictory objectives. Microfinance providers that are closer to the best practicing cost frontier are those with higher average loan sizes and lower proportion of women borrowers. The results also indicate that financial cooperatives are better in cost containment compared to specialised microfinance institutions.

Keywords

Microfinance, financial cooperatives, cost efficiency, outreach, trade-off, Ethiopia

JEL codes

Q12, Q13, Q16

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1. Introduction

Providing financial services tailored to the needs of small borrowers is a high cost business, as it requires considerable monitoring and enforcement efforts. Due to the cost it entails, conventional banks in most of developing countries often exclude small borrowers from accessing financial services. Microfinance emerged as institutional innovation to overcome prevailing costs of market contracts and constraints in credit markets of low income communities where such costs are substantial. While their innovative loan terms and lending practices enable them to secure unusual high repayment rates in lending the poor, translating high repayment rates into profit and perpetuating financial services to the poor on cost covering basis have been a challenge remain for most microfinance. The efforts of microfinance institutions to expand financial services to the poor are often backed by a steady flow of subsides, owing to their poverty focus (Morduch, 1999).

Recently, however, the growing commercialization and competition[1] in microfinance coupled with withdrawal of subsidies standout the need for financial sustainability and efficiency in the industry. These recent developments in turn results in a shift in focus from outreach per se to outreach and financial self-sufficiency –from single to double bottom-lines. While it can have long term imperatives in sustaining financial services to the poor, strive for achieving financial self-sufficiency can have a short term implication on their traditional social mission and ways of doing business.

Theoretically, achieving financial viability together with serving the poor can be either conflicting or complementary[2]. On the one side, the two bottom-lines can be in harmony if the impositions of financial sustainability requirements improve efficiency in resource allocations and attract commercial funds (including voluntary deposits) that can be used to expand outreach (Rosengard, 2004; Rhyne and Otero, 2006; Frank, 2008). On the other side, the pursuit of financial sustainability can crowed out small size loans that are demanded by the poor, as they are costly to service (Hulme and Mosley, 1996; Conning, 1999; Weiss and Montgomery, 2005). Moreover, pressure to achieve financial sustainability can also lead to anti-social contract enforcement methods (Galariotis et al. 2011).

Despite growing concerns on the impositions of pursuing profitability on traditional social mission of microfinance (outreach to the poor), systematic empirical analysis on outreach financial sustainability trade-off is limited and the evidence emerged from the existing few works is mixed. Studies by McIntosh et al. (2005) and Hermes, Lensink and Meesters (2011) found tension between serving the poor and achieving efficiency and they indicated that wealthier clients benefits from the strife for financial sustainability. A global analysis of micro lenders by Cull et al. (2007) also corroborated the presence of potential trade-off between outreach and financial performance, which in their case varies by lending terms. They found that for larger individual

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[1] Commercialization refers to the transformation of microfinance institution from heavily donor dependent sector of subsidised operation into financially self-sufficient and sustained microfinance that are part of the mainstream finance, which provides a wider range of financial services, that are saving, insurance, remittance, money transfer and so forth, in addition to credit. The competition on the other hand includes ex ante competitions from money lenders, competition among microfinance themselves and between microfinance and commercial banks (Christen, 2001; Kapper, 2007; Banerjee and Duflo, 2011).

[2] See Robinson (2001) and Roy (2010) for a full accounts on the debates between the poverty lending approach (i.e., welfarists view) and the financial systems approach (i.e., institutionalists view) on outreach financial sustainability trade-off.

lenders the quest for improved financial performance considerably reduces outreach to the poor compared to other lending terms. In contrast, another recent study by Quayes (2012) documented a positive complementary relationship between serving the poor and improved financial performance in microfinance.

Building on prior works, our study aims to understand whether and to what extent focus on financial performance have imposition on outreach of microfinance providers in Ethiopian context. Is there evidence of a trade-off between financial sustainability and outreach to the poor? The information is useful for policy intervention, as microfinance institutions in Ethiopia are promoted to expand financial services to the unbanked poor and hence failure to achieve wider breadth and deeper outreach in the pursuit of financial sustainability can have a policy concern (Amha, 2007). The data set also allow us to compare and contrast the cost efficiency or containment levels of specialised microfinance institutions and financial cooperatives (the two dominate microfinance providers in Ethiopia) with the purpose of understanding the effects of organizational design (that is, the way ownership is organised and practiced) on costs of microfinance delivery.

Our study is distinctive compared to existing empirical works in two important aspects. First, we use disaggregated data that include both social oriented (financial cooperatives) and economic oriented (private-for-profit microfinance institutions) microfinance of varying size, which potentially reduces the large commercial firm and self-selection biases seen in prior studies[3]. Second, we used cost efficiency as indicator of financial sustainability and applied Stochastic Frontier Approach (SFA), a method that has not been widely applied in microfinance. The SFA is used to estimate cost efficiency scores, which are used for comparing efficient use of available resources by organizational design, and to correlate outreach indicators with cost efficiency estimated at a microfinance level.

The rest of the paper is organised as follows: Section 2 briefly reviews the evolution and the major players of the microfinance industry in Ethiopia. Section 3 describes the data used in the study, definition of variables and results from the summary statistics. Section 4 presents the analytical approach followed to estimate and correlate cost efficiency with outreach indicators. The results and discussions are presented in Section 5. The last section concludes by summarizing the main findings.

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[3] The analysis of works by Cull et al. (2007), Hermes et al. (2011) and Quayes (2012) are largely based on microfinance institutions that self-select to voluntarily supply data to organizations like MIX Market and are united by their strong commitments to achieving financial self-sufficiency. Whereas, our data encompass both microfinance that are committed to achieving either economic viability or social visibility or both and the institutions are selected following stratified random sampling for financial cooperatives and census based for NBFIs.

2. The microfinance landscape in Ethiopia

In Ethiopia, mainstream commercial financial institutions are not only unwilling, but they also lack the capacity to serve the needs of the poor (Amha, 2007). Financial services to the poor are largely delivered by the microfinance industry, which is mainly made up of services rendered by financial cooperatives, non-governmental organizations (NGOs) and NBFIs. Financial cooperatives are the forerunners in delivering financial services for the poor excluded by conventional financial institutions. Financial cooperatives in Ethiopia are notable both in lending small uncollateralized loans, saving mobilization, and in inculcating the importance of financial services in the society at large (Degefe and Nega, 2000). Despite a weakening of cooperative activities in the country during the economic reforms in the early1990s, financial cooperatives were also among the most resilient cooperative institutions and generally survived the reform and have grown steadily subsequently.

As shown in Figure 1, the spread of financial cooperatives has grown over the period since 1974. It grows sharply from 2003 onwards, right after the establishment of the Federal Cooperative Commission, a public body organised with the aim of revitalizing cooperative businesses in the country. Currently, about 42 saving and credit unions and over 7,000 primary saving and credit cooperatives reportedly are providing microfinance services (i.e., saving, loan and insurance) for about one million members in the country (Federal Cooperatives Agency, 2012: Unpublished).

Figure 1 - Number of microfinance and volume of loan outstanding by organizational form
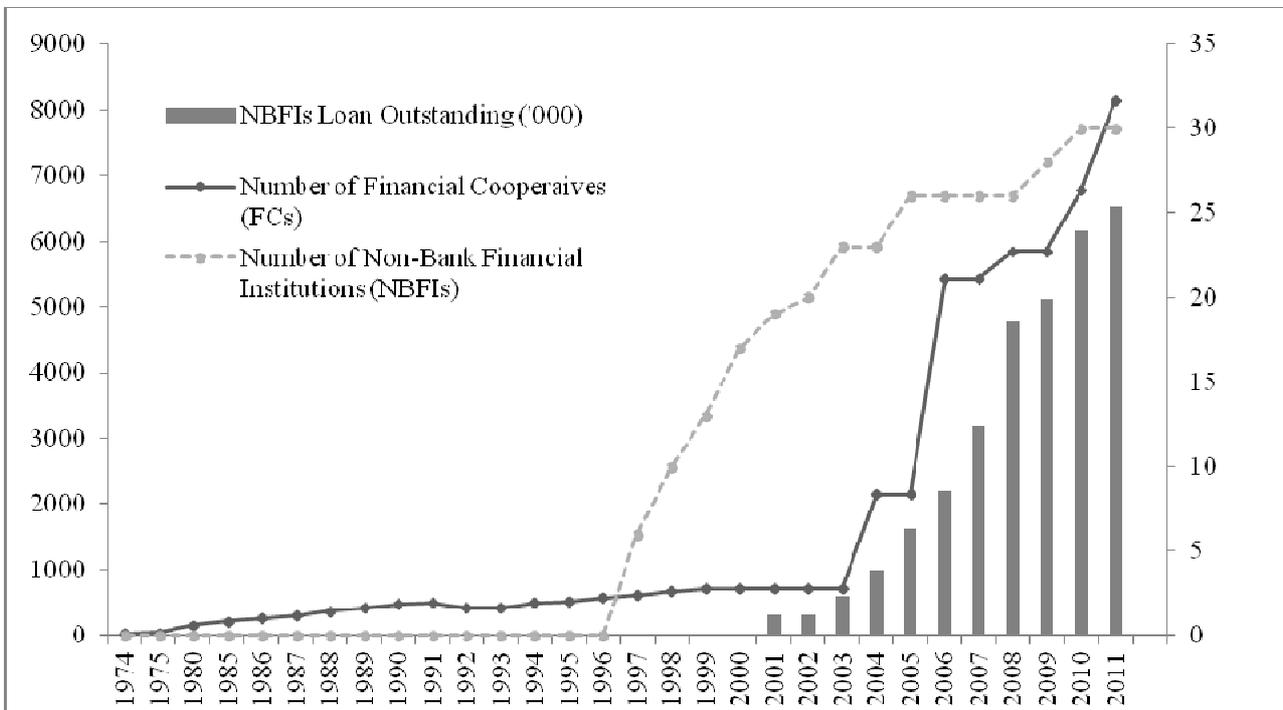
Source: Degefe and Nega (2000); Association of Ethiopian Microfinance Institutions (2012: Unpublished); Federal Cooperative Agency (2012: Unpublished).

Note: The left hand axes represent number of financial cooperatives and volume of loan outstanding by NBFIs. The right hand axes stands for number of financial cooperatives.

Similar to most credit cooperatives elsewhere, financial cooperatives in Ethiopia are organised by individuals (i.e., farmers, laborers, employees, etc.) working or living in the same localities. They mainly use standard bilateral lending contracts between the cooperative and a member borrower. Liability for repaying the loan rests with the individual borrower and the co-signer, who is also a member of the same cooperative. In most cases, the savings of the borrower and the co-signer serve as a guarantee – these financial cooperatives are savings-led in their approach.

Besides the role played by financial cooperatives, the development of microfinance in Ethiopia also counts on efforts made by international NGOs, local NGOs, and government credit programs that integrate credit services in their development and relief schemes to bring sustainable improvement to the welfare of their beneficiaries. History teaches us that the involvements of the government and NGOs in credit delivery have been encouraging in terms of poverty reduction. Nevertheless, poor financial discipline and distorted resource allocation by NGOs and government credit programs have been equally substantial. Interest rate subsidies, debt write-off, and equating loans with humanitarian assistances by the NGOs were among the distortions which have indoctrinated a bad credit culture – a culture of entitlement –that undermines the development micro-credit markets in Ethiopia today (Degefe and Nega, 2000; Amha, 2007).

Following the economic reform in 1991, some of the NGO and government pilot credit programs engaged in financial intermediation transformed into formal (specialised or non-bank) microfinance institutions. The transformation was made mainly to reverse the bad credit culture instituted by NGOs and state credit programs. This was done through establishing efficient microfinance institutions that adhere to the market mechanism while serving the poor. Nonetheless, the involvement of regional governments and mother NGOs as contributors of ownership equity that impacts decision-making powers is still prevalent. In addition to the NBFIs evolved from prior NGOs and government credit programs, the industry also witnessed new start-ups of investor-owned microfinance providers. They account for about 40 percent of the total. As of 2011, a total of 30 NBFIs in Ethiopia reported reaching over 2.3 million clients, with total loans outstanding of 6.5 billion birr –about US$365 million (Figure 1).

NBFIs in Ethiopia are share companies that are registered and regulated by the National Bank of Ethiopia (NBE). They are owned by individuals, public bodies, or mother NGOs or by a combination of the three. Most of them are commercial lenders that aim at achieving financial self-sufficiency while serving the poor. Unlike credit unions or financial cooperatives, which are confined to specific locations, NBFIs cover wider areas of operation, such as entire regions. NBFIs use both bilateral individual lending contracts and contracts based on joint liability. In the case of group lending, which is the main lending contract of NBFIs in Ethiopia, loans are made to individuals, but the group that is formed by the borrowers shoulder responsibility for a loan if one among the group members defaults.

In spite of the prominence and wide prevalence of both types of microfinance institutions in the country, empirical work on their cost efficiency and ability of serving the poor together with cost financial sustainability is scarce. To our knowledge there is only one study by Kebede and Berhanu (2012) that compare the cost-efficiency levels between microfinance institutions and commercial banks. While the samples used in this study overlooked financial cooperatives, they systematically

documented that specialised microfinance are less cost efficient compared to commercial banks. With the purpose of expanding the body of knowledge on the effects of the way ownership is organised and practiced on costs of financial service delivery, our study compare and contrast specialised non-bank microfinance providers with financial cooperatives on their levels of cost efficiency.

3. Data and variable description

3.1. Data source

We used primary data collected from 107 microfinance providers in Ethiopia between April and June 2012[4]. After dropping institutions with missing data points, we have retained 107 microfinance institutions. This includes the whole NBFIs in Ethiopia, which are 30 in number and 77 financial cooperatives that account for about nine per cent of the whole financial cooperatives. In the case of financial cooperatives the dataset is thus not representative of all. Together with NBFIs, however, the institutions in the dataset serve the majority of microfinance clients in the country. The selection of financial cooperatives were mainly based on audit status of the institution, as most of the financial cooperatives are not audited continuously every year due to limited capacity of the supervisory authority[5]. For this reason, the institutions selected are those audited during 2011 and have audit report of the preceding year (2010). The availability of the audit reports for prior year enables us to get reliable historical financial data for calculating some of our variables of interest.

As noted above, in our sample we include both specialised microfinance institutions and financial cooperatives with varying degree of social and economic motives. Considering both microfinance institutions with social and economic orientation offers substantial variations in institutional structure, size, loan terms, prices, costs, and risk taking strategies. It considerably reduces uniformity of products and lending terms which often make it difficult for researchers to systematically portray effects of products, loan terms and institutional changes on social and economic outcomes of microfinance (Morduch, 1999; Cull et al., 2007). Moreover, as our sample includes both small and large microfinance providers, it also potentially reduces the large firm bias of prior studies, which relies on microfinance institutions that self-select to supply data and are united by their size and strong commitments to achieving financial sustainability (see Cull et al. (2007), Hermes et al. (2011) and Quayes (2012).

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[4] The data is collected afresh using a structured interview with the help of European Research Institute on Cooperatives and Social Enterprises (EURICSE), International Food Policy Research Institute (IFPRI), Association of Ethiopian Microfinance Institutions (AEMFIs) and Federal Cooperative Agency (FCA) of Ethiopia.

[5] The cooperative promotion office audits financial cooperatives in Ethiopia, a public body organised to promote and supervise the cooperative businesses, or by a person assigned by this office. They are not allowed to independently arrange auditing services from the market (Federal Democratic Republic of Ethiopia: Proclamation No. 147/1998).

3.2. Variable definitions

Total costs and output

We follow the 'financial intermediation' approach suggested by Sealey and Lindley (1977) to measure the total costs. The approach define the production process of financial institutions as borrowing of funds from surplus spending actors and lending those funds to deficit spending actors. We use this approach with the assumption that an efficient microfinance institution would minimise the total operating expenses and interest expenses involved in the intermediation for any given output. The total cost is therefore measured as the sum of operating expenses and interest expenses by microfinance.

In selecting a microfinance product that measures output, we consider financial activities that produce a flow of services linked with the use of capital and labor expenses and other material inputs. Based on this criterion, loan and deposit are the potential measures of output for microfinance, as it is difficult to measure earning asset which is often used to measure the output of banks[6]. We use only one output measure that is loan to customers, which include all loans outstanding of microfinance, as deposit is not produced by all microfinance institutions in our sample. While loan to customer is produced by all microfinance, the quality of the loan might not be comparable. For instance, the loans can vary by size, repayment schedule, risk, collateral requirement and contracts to be enforced. We include loan loss expense and loan loss reserve over gross loan portfolio in our estimation of cost-efficiency to account for potential differences in output quality.

Input prices

We include three input prices, one for labor, one for financial capital and the other for physical capital. Salary, a price of unit of labor for a period, is used to measure labor input price. It is measured as a ratio of total employee costs faced by microfinance to total number of employees for a period under consideration. Interest rate paid for borrowing and deposit is used to account for the price of financial capital, as the amount of financial capital hold based on the institution level of risk preference can have varying effect on total costs[7]. Total amount of deprecation for a period is used to proxy the third input price, which is a portion of physical capital involved in the production process.

Cost in/efficiency correlates

According to theoretical and empirical works on efficiency analysis of financial institutions by Berger and Mester (1977) and Sealey and Lindley (1997) the difference in efficiency across financial institutions can be associated with a set of factors. Such factors encompass identity and ownership structure of the institution (for example, holding vs. independent vs. member-based), market structure or concentration, market power, asset size, experience, level of capitalization and size of CEO's stock ownership in the institution. By the same token, in our estimation we

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[6] Ideally, the output of financial institutions is viewed as a services flow and the physical units of this flow are measured by earning assets, which is essentially a stock variable and consistent with the idea of profit maximization or cost minimization (Sealey and Lindley, 1997).

[7] See Berger and Mester (1997) for the implications of financial capital in cost-efficiency measurement of financial institutions.

include ownership structure of microfinance, as cost efficiency or containment often vary by organizational forms and lending terms in micro lending (Morduch, 1999). Our analysis contrasts two forms of microfinance ownerships, which vary in their identity: financial cooperatives vs. specialised or non-bank microfinance institutions.

We also include age and size of microfinance, as they are major drivers of operational expense in microfinance provisions (Gonzalez, 2007). They are measured in number of years and volume of assets, respectively. Besides the common in/efficiency correlates suggested in finance literature, we include two measures of microfinance outreach, average loan size and proportion of women borrowers, as correlates of microfinance in/efficiency. The assertion is that lending small size loans and more to women borrowers, which implies greater depth, entails higher costs in microfinance. Incorporating these outreach measures in our estimation also enable us to understand the potential trade-off between outreach to the poor and cost efficiency in microfinance, which is the primary focus of this paper.

3.3. Summary statistics

Table 1 summarises the descriptive statistics of the main variables used in our analysis. It reports the sample mean and standard deviation by organizational form (NBFIs vs. financial cooperatives), for the outcome and explanatory variables.   The summary statistics comparison shows significant variations in total cost, output, input prices and outreach between financial cooperatives and NBFIs. The mean total cost of NBFIs is found to be significantly higher as compared to financial cooperatives. Such a difference is as expected, as the volume of output and associated input costs are comparatively higher for NBFIs. Whereas, as shown in Table 1, the volume of output, as measured by gross loan portfolio and outreach breadth, and input prices of financial cooperatives are significantly lower. It can be because financial cooperatives are small in size and constrained by local resources to expand breadth which at the same time affects costs and output. Additional measures of cost at the bottom of the summary table, labor and capital cost over assets also indicated variation in cost containment between the two microfinance lenders.

The outreach indicators in Table 1 suggest that NBFIs cater more poor borrowers relative to financial cooperatives. On average NBFIs offer relatively lower loan sizes and serve higher proportion of women clients. The difference on loan sizes, however, can be due to differences in breadth of outreach. As shown at the middle of the same table, financial cooperatives are characterized by limited breadth, but have repeated interaction with their borrowers. Financial cooperatives in the sample serve a small set of members compared to NBFIs, which are 247 to 70,397[8], respectively. This difference on breadth of outreach is as expected, as financial cooperatives in Ethiopia are confined to a particular location or communities by their nature. And their breadth can be further constrained by local resources, since they have limited sources of

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[8] It should be noted that the figure on average breadth of NBFIs is influenced by three to four big microfinance institutions that are partly owned by regional public bodies. The median size of active borrowers is rather 10,592 and there are NBFIs with less than 200 active borrowers.

capital compared to NBFIs, they heavily rely on member's equity and deposit for lending. NBFIs, on the other hand, are at an advantage in attracting various sources of capital and cover wider areas of operation.

Table 1 - Summary statistics by organizational form

Indicator	Non-Bank Financial Institutions (NBFIs) (n=30)		Financial cooperatives (n=77)		Sig. mean difference
	Mean	Std. Dev.	Mean	Std. Dev.	
Total cost (in millions of birr)	22.230	43.561	0.140	0.298	*Yes*
Gross Loan Portfolio (in millions of birr)	232.808	537.477	1.564	3.267	*Yes*
Salary (per personnel)	17325	6047	6803	6272	*Yes*
Depreciation (in millions of birr)	0.624	1.041	0.003	0.011	*Yes*
Interest expenses	0.084	0.048	0.051	0.039	*Yes*
Loan loss reserves over loan portfolio	0.080	0.160	0.035	0.035	*Yes*
Loan loss expenses (in millions of birr)	1.891	3.290	0.002	0.019	*Yes*
Average Loan Size (ALS)	0.464	0.340	1.135	1.224	*Yes*
Total number of active borrowers	70397	149377	247	600	*Yes*
% of women borrowers	0.581	0.168	0.395	0.233	*Yes*
Labor cost to asset	0.067	0.054	0.021	0.031	*Yes*
Capital cost to asset	0.076	0.076	0.021	0.048	*Yes*
Cost per unit of currency lent	0.263	0.157	0.099	0.074	*Yes*
Age of the institution	10.8	4.3	11.5	7.4	*No*
Asset size	2.6	0.674	1.42	0.637	*Yes*

Source: Authors' calculations, based on primary data collected between April and June 2012.

Note: Birr is currency unit of Ethiopia. US$1 was officially exchanged for Birr17.2941 on December 30, 2011.

4. Empirical approach

We use stochastic cost[9] frontier approach to measure efficiency of microfinance institutions. In this approach cost efficiency is measured in terms of how close a microfinance costs lie to the efficient cost frontier for a given technology (similar outputs and working conditions). The efficient frontier is determined by two conditions: minimum use of inputs (technical efficiency) and optimal mix of inputs (allocative efficiency), Battese and Coelli (1995) and Kumbhakar and Lovell (2000). The absence of either technical or allocative efficiency or both inevitably results in excess costs that make institutions deviate from cost minimization frontier and creates inefficiency.

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[9] There are three main concepts in measuring financial institutions level of efficiency; that are cost, profit and alternative profit efficiency. Considering the heterogeneity in underlying objectives (for instance, services motive, profit motive and so forth) of microfinance institutions in our sample, we deployed cost-efficiency concept, which relatively suites for either institutions with either social or economic objectives or both (Berger and Mester, 1997).

Thus, cost inefficiency in our case measures the reduction in cost that could have been achieved if the microfinance were both technically and allocatively efficient. In other words, it measures the magnitude of cost that could be reduced to enable the microfinance institutions achieve both technical and allocative efficiency. As cost functions are not directly observable, inefficiencies are measured relative to an efficient cost frontier that is estimated from the data. Thus, microfinance cost inefficiency is defined as the difference between observed costs and predicted minimum costs for a given output, input prices and other institution specific variables.

There are non-parametric and parametric methods to measure efficiency of units (for example, individual institutions, households and so forth). The non-parametric approach is often criticised because of its ignorance to the possible influence of measurement errors and other statistical noises in the data, it does not allow for random error caused, for instance, by luck (Coelli et al., 2005). Within the parametric approach, which accounts for random error caused by data problem and measurement errors, there are again two approaches, namely stochastic frontier approach (SFA) and distribution free approach (DFA), which vary in their treatment of random shocks on the production process that are not in the control of, for example, a microfinance institution (Aigner et al., 1977; Kumbhakar and Lovell, 2000).

We use SFA, as it allows composite error terms that control both for measurement errors and other random effects that are not within the control of microfinance. Specifically, we follow the one step SFA proposed by Battese and Coelli (1995), which estimates the cost frontier and inefficiency correlates simultaneously. The two steps SFA, on the other hand, involves a contradiction of assumptions and the inefficiency depends on the explanatory variables that could be partly affected by institution input choices based on knowledge of their level of inefficiency (see Wang and Schmidt, 2002 for detailed discussion).

The estimation of a microfinance relative efficiency using cross-sectional data is performed by estimating a stochastic cost function of the general form suggested by Battese and Coelli (1995) and Berger and Mesters (1997), as follow:

$$\ln C_i = C(y_i, w_i, z_i; \beta) + u_i + v_i \qquad (1)$$

where C is the observed total cost faced by microfinance institution i; $C(.)$ is suitable functional form; y_i is output measured by loan to customers; w_i is the vectors of input prices; z_i microfinance specific control variables; and β is vectors of unknown parameters to be estimated. The error term u_i is a non-negative random variable reflecting cost inefficiency ($u_i \sim N^+(\mu_i, \sigma_u^2)$), which may increase costs above the best practice level. It specifically captures the effects of expenses on inefficiency, either on technical or allocative inefficiencies or on both (Kumbhakar and Lovell, 2000). v_i is the symmetric error component, which is assumed to be independently and identically distributed as $v_i \sim iidN(0, \sigma_v^2)$. It accounts random variations in cost due to measurement errors and other statistical noises.

As indicated above, the cost efficiency is defined as the proportion of the minimum possible costs that can be obtained for specific inputs under using similar technology, in our case, if microfinance i were as efficient as microfinance in the sample operating at the efficient cost frontier (Battese

and Coelli, 1995; Berger and Mesters, 1997). Thus, the cost efficiency of microfinance *i*, adjusted by random error facing the same variable *y*, *w*, and *z* can be represented as follow:

$$CE^i = \frac{\hat{C}^{\min}}{\hat{C}^i} = \frac{\exp\left[\hat{f}\left(y^i, w^i, z^i\right)\right] \times \exp\left[\ln \hat{v}_C^{\min}\right]}{\exp\left[\hat{f}\left(y^i, w^i, z^i\right)\right] \times \exp\left[\ln \hat{v}_C\right] \times \exp\left[\ln \hat{u}_C^i\right]} \quad ; \quad CE_i = \exp\left[-\hat{u}_C\right] \quad (2)$$

The cost efficiency (CE^i) ratio indicates the proportion of costs or resources that are used efficiently. It can be also thought as the amount of cost that would have been saved if microfinance *i* had been technically and allocatively efficient (that is, equivalent to $1 - CE_i$).

The inefficiency term (that is, the excess costs incurred from not operating within a minimum cost possible) is modelled as a linear function of a set of microfinance specific variables. Specifically, the inefficiency term μ_i are assumed to be a function of a set of explanatory institution specific variables, z_n, and vectors of coefficients to be estimated, delta. Its general form is specified as follows:

$$\mu_i = \alpha + \sum_n \delta_{n,i} z_{n,i} \quad (3)$$

As mentioned above, equation (1) and (3) are estimated simultaneously in one-step SFA suggested by Battese and Coelli (1995), using maximum likelihood estimation method.

For the empirical specification of the cost function we use some of the output and input measures of financial institutions suggested by Berger and Mester (1977), Sealey and Lindley (1997), Fries and Taci (2005), and Hermes et al. (2011). Specifically, we use loan to customers as a measure of output based on the value-added criterion applied by Fries and Taci (2005), and total expense per unit of labour and interest expense per unit of deposit as input prices following Sealey and Lindley (1977) and Hermes et al. (2011), which are consistent with the 'intermediation approach' to modelling the production of financial institutions. Besides output and input prices, we include microfinance specific variables to account for potential heterogeneity in output quality. The specification of the cost function estimated is given as follows:

$$\ln(TC_i) = \alpha + \beta_1 \ln(Salary_i) + \beta_2 \ln(IntExp_i) + \beta_3 \ln(LLP_i) + \beta_4 \ln(GLP_i)$$
$$+ \beta_6 \ln(LLR\_GLP_i) + \beta_7 \ln(Depreciation_i) + u_i + v_i \quad (4)$$

where TC_i is the sum of interest and operating expense of microfinance institution *i*; *Salary* is the price of a unit of labour for the period, which is average salary per unit of labour per annum; *IntExp* is the interest expense faced by a microfinance per unit of borrowing and deposit held; *LLP* is loan loss provision expense for the period; *GLP* is gross loan portfolio; *LLR_GLP* is loan loss provision over gross loan portfolio which measures an microfinance risk taking strategies; and *Depreciation* is financial losses as a result of obsolescence of physical capital.

Besides estimating cost efficiency level of each microfinance institutions, describing the correlates of inefficiency is the rationale behind using a two step SFA. Towards this end, the inefficiency component of the error term denoted by μ_i (that is, the first moment of the inefficiency distribution for microfinance *i*) is specified as a function of a set of outreach and microfinance

specific explanatory variables in order to understand the trade-off between outreach to the poor and cost efficiency. We also introduced organizational dummy to understand the effect of the way ownership is organised and practiced (NBFIs vs. financial cooperatives) on cost containment. The complete lists of specifications of the inefficiency function estimated are as follows:

$$\mu_i = \alpha + \delta_1 LoanSize \tag{5a}$$

$$\mu_i = \alpha + \delta_1 Woman \tag{5b}$$

$$\mu_i = \alpha + \delta_1 OrgForm \tag{5c}$$

$$\mu_i = \alpha + \delta_1 LoanSize + \delta_2 Woman + \delta_3 OrgForm \tag{5d}$$

$$\mu_i = \alpha + \delta_1 LoanSize + \delta_2 Woman + \delta_3 OrgForm + \delta_4 Age + \delta_5 Size \tag{5e}$$

μ_i represents the inefficiency component of an MFI *i*, as defined above. *LoanSize* is one of the generally accepted measures of outreach omnipresent in the microfinance literature. It is the ratio of total loan outstanding and total number of active borrowers. The lower the ratio the more the depth of outreach and *vies versa*. *Women* is another accepted measure of outreach, which measures the proportion of female active borrowers. Higher percentage of women borrowers indicates greater depth of outreach. *OrgForm* denotes organizational form dummy (that is, 1 if the microfinance is financial cooperatives and 0 otherwise). The proposition here is that the inefficiency of microfinance may depend on the type of organizational designs, as some organizational forms are more effective in reducing or internalizing costs of market contracts and market constraints.

Besides outreach variables and organizational dummy, we introduced *Age* and *Size*, as they are also major drivers of operational expense in microfinance provisions (Gonzalez, 2007). *Age* controls for the effect of experience and learning on cost efficiency. The presumption is that the older the microfinance institution, the more the experience to overcome excess costs and optimise mix of inputs. However, as far as age is concerned, the other way round can also hold, as more recently established microfinance institutions have the opportunity to learn from the existing knowledge accumulated by their antecedents. *Size* is measured in total assets of microfinance, and controls for scales of operation. It allows us to test the hypothesis that large microfinance institutions are more efficient, as they could benefit from economies of scales or from the potential intensity of fixed costs over a large client bases and hence risk diversification.

5. Estimation results and discussions

5.1 Input prices and output

As indicated before, because of the cost differentials, providing small and tailored loan terms to the needs of the small borrowers is a costly business. One of the greatest challenges for microfinance providers is lowering their costs of lending in serving the poor[10]. The evidence emerged from our estimation of cost efficiency also marked that operating at the efficient cost frontier is an objective not yet achieved by the majority of microfinance providers in Ethiopia. The predicted cost efficiency scores[11] suggest that most of the microfinance in our sample could have reduced their costs by half had they been technically and allocatively efficient. The average cost efficiency score for the whole sample is 63 per cent[12], which implies 58.7 per cent efficiency gap between the average microfinance and microfinance operating at the frontier (that means, what costs 1 *Birr* for the efficient microfinance, costs 1.587 *Birr* for microfinance with average efficiency level, to produce similar outputs).

Panel A of Table 2 summarises the estimation results of total costs with respect to output and input price variables from the cost frontier. The directions of relationships for the cost function are as expected in all cases. The estimated elasticity for the measures of input prices (salary and interest expenses) and output (gross loan portfolio) have statistically significant relationship with total cost. For a percentage fall in total cost, output falls by 0.76 to 0.84 per cent, labour cost by 0.20 to 0.32 per cent, cost of capital by 0.22 to 0.28 per cent and cost of physical capital by 0.01 to 0.03 per cent. In all, these positive coefficients denote higher costs, reflecting that salary, interest expenses and volume of gross loan portfolio are significant shares of the total costs of microfinance institutions in our sample. The elasticity of loan loss provision expense to total costs that accounts for output quality is also positive and statistically significant, indicating that the lower the quality of output (loan to customer), the higher the operating and interest expenses faced by the institutions. This can be due to high costs of contract enforcement in case defaults.

5.2 Outreach and cost efficiency: Is there a trade-off?

Following the growing transformation of microfinance, outreach–financial performance trade-off is a topic debated by both academic scholars and policy makers from all corners of the world and yet uncorroborated. The fundamental issue is that whether and to what extent the quest for achieving financial viability has implication on the traditional social mission of microfinance – outreach to the poor. This section presents the results from cost efficiency frontier analysis that estimate efficiency scores and correlate estimated inefficiency with observed microfinance specific outreach variables in order to understand the impositions of serving the poor on cost efficiency of microfinance providers.

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[10] Cost containment is preferred approach compared to high enough interest prescription to gain efficiency and profitability, as it can reduce cost of services and improve repayment rates of financial institutions (Gonzalez, 2007).

[11] Cost efficiency score is defined as the ratio of the best practice cost to the actual observed costs, resulting in a score ranging from 0 to 1 representing the continuum between 100 per cent inefficient and 100 per cent efficient firms, respectively.

[12] This result is comparable with what has been recently found by Kebede and Berhanu (2012). In their comparative studies of MFIs and Commercial Banks efficiency in Ethiopia they found a 64.7 per cent cost efficiency score for microfinance institutions.

Cost function	Dependent variable: Total Cost in Birr (logged)				
Panel A: Input and output variables	(1)	(2)	(3)	(4)	(5)
Ln (Salary (per personnel))	0.272	0.323	0.248	0.223	0.201
	(3.51)***	(4.12)***	(3.06)***	(3.16)***	(2.86)***
Ln (Interest expenses (per unit of deposit))	0.236	0.220	0.236	0.272	0.278
	(5.28)***	(5.25)***	(5.27)***	(6.37)***	(6.65)***
Ln (Gross loan portfolio)	0.835	0.760	0.793	0.839	0.856
	(18.79)***	(19.72)***	(19.18)***	(21.61)***	(23.66)***
Ln (Loan loss reserve over gross loan portfolio)	-0.006	-0.011	-0.002	0.001	0.004
	(0.23)	(0.40)	(0.07)	(0.05)	(0.18)
Ln (Loan loss provision expenses)	0.046	0.070	0.055	0.050	0.044
	(2.76)***	(4.63)***	(3.15)***	(3.12)***	(3.05)***
Ln (Depreciation)	0.022	0.029	0.023	0.007	0.020
	(1.00)	(1.33)	(1.02)	(0.36)	(1.13)
Constant	-2.365	-1.967	-1.621	-1.438	-1.507
	(3.61)***	(3.07)***	(2.31)**	(2.37)**	(2.62)***
Panel B: Cost inefficiency correlates					
Average loan size	-0.001			-0.003	-0.004
	(1.67)*			(2.86)***	(2.25)**
% of women borrowers		1.896		4.802	1.129
		(2.44)**		(1.68)*	(0.30)
Financial cooperatives			-1.034	-0.865	-4.770
			(1.91)*	(0.87)	(2.09)**
Age of the institution					-0.018
					(0.13)
Size of the institution (in total assets)					-2.099
					(2.33)**
Constant	-0.237	-1.702	-0.082	0.360	8.791
	(0.74)	(2.84)***	(0.22)	(0.20)	(2.24)**
Number of observation	107	107	107	107	107
Wald chi^2 test	3059.29	3047.94	1972.25	2697.22	3038.35
Prob > chi2	0.000	0.000	0.000	0.000	0.000
Log likelihood function	-78.511	-76.976	-78.446	-70.672	-67.614

Source: Authors' calculations, based on primary data collected between April and June 2012.

Note: *** significant at 1%, ** significant at 5% and * significant at 10%.

As shown in Panel B of Table 2, the results we found across columns with different specifications suggest the presence of trade-off between cost efficiency and outreach to the poor, as measured by loan size and proportion of women borrowers. The estimated coefficient for average loan size is negative and statistically significant, even after controlling for organizational form, experience and scales of operation. This signifies that microfinance with higher average loan size are more cost efficient than microfinance with lower average loan balance, that is often demanded by the poor. The results from the specification in column (2) and (4) for proportion of women borrowers

in the loan portfolio has a positive and statistically significant coefficients, indicating that microfinance providers who cater more to women borrowers are less cost efficient.

Besides the evidences that emerge from inefficiency correlates, the results from unreported simple OLS regression that associate estimated cost efficiency scores with our outreach indicators (that are, average loan size and proportion of women borrowers) also substantiate the tension between serving the poor and achieving cost efficiency. We found a statistically significant positive and negative relationship between cost efficiency scores and average loan size and fraction of women borrowers, respectively, after accounting for age, asset size, donation over loan, average length of borrowing relationship and ownership. This result further marked that serving the poor and more to women borrowers is not in harmony with the pursuit of achieving cost efficiency.

Over all, the results that emerged from the cost frontier analysis correspond to the findings of prior studies by Cull et al. (2007) and Hermes et al. (2011) and are consistent with general theoretical predictions that claims the presence of cost differential between serving poor and less poor or unbanked wealthier clients (Conning, 1999; Armendáriz and Szafarz, 2009). The difference in costliness of lending small size loans relative to larger loans can be even more significant in low income communities where most of the microfinance institutions operate. For instance, in countries like Ethiopia, such a trade-off between cost efficiency and outreach to the poor can easily arise due to additional costs linked with difficulty of access to poor rural clients and monitoring and follow up efforts required from credit agents or microfinance institutions to deal with less educated borrowers.

5.3   Do specialised microfinance contrast with financial cooperatives in cost-efficiency?

Another issue we sought to analyse in this paper is the difference in cost efficiency among microfinance institutions in our sample by organizational form. The question we put forward is whether or not the way ownership is organised and practiced has implication on cost efficiency or containment in microfinance. According to agency theory, organizations that are owned by agents with pecuniary incentives are more able to reduce agency costs (Jensen and Meckling, 1976). Moreover, when it comes to microfinance, organizations that are closer or owned by their customers are more able to reduce costs of market contracts and market constraints (Hansmannn, 1996). While pecuniary incentives can be at a play for both organizational forms in our sample, if this conjectures are true, financial cooperatives should be cost efficient as compared to specialised microfinance institutions, as they possess a better position to overcome costs of market contracts which are higher in low income communities where both institutions operate.

Consistent with theoretical predictions, the results from the summary statistics of predicted cost efficiency levels show that on average financial cooperatives are cost efficient than NBFIs. The mean efficiency score of financial cooperatives and NBFIs is 66 and 56 per cent, respectively. This denotes that what costs 1.0 *Birr* for financial cooperatives, costs 1.178 *Birr* for NBFIs to produce similar outputs. In other words, financial cooperatives in our sample are 17.8 per cent more efficient than NBFIs and the efficiency gap is statistically distinguishable from zero. Concurrently, as shown in Figure 2, about 41 per cent of financial cooperatives have an efficiency score closer to

the efficient cost frontier. On the other hand, more than 35 per cent of the NBFIs operate at higher costs compared to the best practicing microfinance providers in the sample.

Figure 2 - Frequency distribution of cost efficiency scores by organizational form
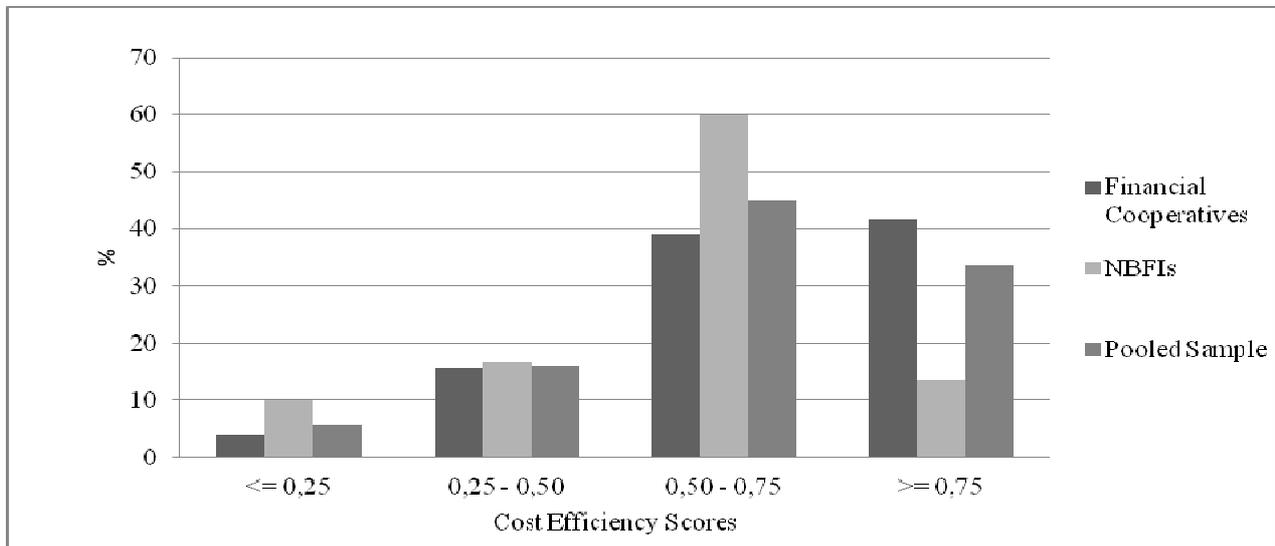
Source: Authors' calculations, based on primary data collected between April and June 2012.

Besides the average cost efficiency scores, the financial cooperatives dummy included as the correlates of inefficiency in our cost efficiency estimation indicates relative cost containment among financial cooperatives. As shown in Panel B of Table 2, the estimated coefficient for financial cooperatives dummy is negative and statistically significant, implying that financial cooperatives are more cost efficient. They better reduce technical and allocative inefficiencies in microfinance delivery compared to NBFIs. This can be due to the fact that financial cooperatives benefit from better information and cheaper enforcement mechanisms available to them, as the owners are providers of both the demand for and supply of loanable funds. In other words, it can be due to that financial cooperatives better mitigate cost of market contracts, which account significant fraction of operating costs in microfinance, as they are embedded to the community where they operate. Whereas, specialised microfinance institutions are top down in their approaches and serve wider client bases and the extent of knowing each other, which serves as enforcement mechanism is relatively imperfect.

6. Conclusions

In this paper we analyse the implications of financial sustainability endeavour, a phenomena driven by the recent commercialization and competition in microfinance, on the traditional social mission of micro lenders, outreach to the poor. The results from the study conclude that serving poor clients and achieving financial sustainability, as measured by levels of cost efficiency, are contradictory objectives. We found that providing small size loans and catering more women borrowers, which implies greater depth of outreach, are positively and negatively linked with level of cost efficiency, even after controlling for ownership structure, experience and scale of

operation. It implies that microfinance providers that are closer to the best practicing cost frontier are those with higher loan sizes and lower proportion of women borrowers. Hence, to achieve complementarities, striving for financial self-sufficiency should focus on cost containments or reduction of excess costs. For instance, relying on commercial funds as a major source of loanable funds could be one among the creditable incentive or compulsion for improved cost efficiency in microfinance.

The results also indicate the presence of a wider cost efficiency gaps between financial cooperatives and specialise d microfinance institutions, the second issue we sought to address in this paper. The mean cost efficiency score of financial cooperatives and specialised microfinance institutions is 66 and 56 per cent, respectively, implying a 17.8 per cent efficiency gap between financial cooperatives and specialised microfinance institutions. This cost efficiency gaps can be due to the inherent ability of financial cooperatives to dispense with information and enforcement costs compared to specialised microfinance institutions. Financial cooperatives are relatively at an advantage to effectively utilise social collaterals as contract enforcement mechanisms ,which potentially reduces cost of microfinance delivery, as members are providers of both the demand for and the supply of loanable funds (Banerjee et al., 1994; Guinnane, 2001). On the other side, the commitment to expand outreach through increasing branches, reliance on non-commercial funds and lack of pecuniary incentives in some of multi-stakeholder owned NBFIs may have also resulted in this efficiency gaps.

While institutional diversification and resulting competitions can benefit clients by lowering costs and improving services, based on the findings, financial cooperatives should enable the microfinance industry to deliver improved financial services at lower costs compared to specialise non-bank microfinance institutions, as they are found to be relatively better in cost containment and efficient in resource allocation.

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APPENDIX

Appendix A1 - Correlations of major variables considered in the efficiency – outreach estimations

	Total costs	Salary	Interest paid	Gross loan portfolio	Equity over assets	LLR over GLP	Loan loss expenses	Deprec-iations	Financial coops	Average loan size	% of women clients	% of rural clients	Age	Size
Total costs	1													
Salary	0.256*	1												
Interest paid	0.010	0.181*	1											
Gross loan portfolio	0.911*	0.187*	-0.039	1										
Equity over assets	-0.048	-0.232*	-0.921*	0.016	1									
LLR over GLP	0.007	0.199*	0.139	-0.033	-0.187*	1								
Loan loss expenses	0.769*	0.290*	0.109	0.774*	-0.166*	0.370*	1							
Depreciations	0.858*	0.293*	0.037	0.876*	-0.089	0.042	0.672*	1						
Financial coops	-0.400*	-0.609*	-0.247*	-0.348*	0.318*	-0.225*	-0.443*	-0.457*	1					
Average loan size	-0.089	0.059	-0.070	-0.062	0.071	-0.021	-0.094	-0.111	0.245*	1				
% Of women clients	-0.006	0.267*	0.154	-0.026*	-0.169	0.150	-0.030	0.045	0.359*	-0.202*	1			
% Of rural clients	0.112	-0.028	0.087	0.085	-0.112	-0.029	0.128	0.122	-0.099	-0.372*	-0.181*	1		
Age	0.144	0.075	-0.056	0.154	0.032	0.048	0.114	0.143	0.048	0.476*	-0.044	-0.269	1	
Size	0.372*	0.679*	0.131	0.328*	-0.237*	0.251*	0.410*	0.420*	-0.634*	0.183*	0.202*	-0.164*	0.424*	1

Source: Authors' calculations, based on primary data collected between April and June 2012.

Note: LLR refers to Loan Loss Reserve and GLP refers to Gross Loan Portfolio.

* significant at below 10%.