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Scale economies and input price elasticities in microfinance institutions

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ABSTRACT

We evaluate the efficiency of microfinance institutions (MFIs) using a structural approach which also captures these institutions' outreach and sustainability objectives. We estimate economies of scale and input price elasticities for lending-only and deposit-mobilizing MFIs using a large sample of high-quality panel data. The results confirm conjectures that improvements in efficiency can come from the growth or consolidations of MFIs, as we find substantial increasing returns to scale for all but profitability-focused deposit-mobilizing MFIs. Our results support the existence of a trade-off between outreach and sustainability. All inputs are inelastic substitutes, but we find differences in own-price elasticities in lending-only and deposit-mobilizing MFIs.

1. Introduction

Microfinance is the supply of financial services to microenterprises and poor families. Considerable public recognition of microfinance as a development tool has resulted from the United Nations' Year of Microcredit in 2005 and the awarding of the Nobel Peace Prize to Mohammad Yunus and the Grameen Bank in 2006. More recently, microfinance has attracted private investors because it offers a new class of assets and can improve portfolio diversification. Outreach by microfinance institutions (MFIs) has grown tremendously during the past decade, and microfinance now reaches more than 150 million borrowers.[1]

Despite such achievements, microfinance reaches only a fraction of the world's poor, with perhaps $200 billion more needed to meet worldwide demand (Swanson, 2008). Most MFIs are small, reach only a few thousand clients, remain costly to operate and risk drifting toward better-off clients (Daley-Harris, 2009; Mersland and Strøm, 2010). Therefore, an efficiency analysis focused on estimating the economies of scale in the industry and how MFIs mix inputs to offer financial services to the world's poor is timely and important.

Numerous studies on scale economies of commercial banks use the structural approach to efficiency, in which cost or profit functions are estimated (Hughes and Mester, 2008a). Surprisingly, in microfinance, most studies use a non-structural approach and analyze efficiency and productivity using ratios developed by the MicroBanking Bulletin (MBB) in the 1990s (e.g., Cull et al., 2007).[2]

Scale efficiency has not been the focus of the few applications of a structural approach, which have studied MFIs' governance, evolution in time, or mission drift (Caudill et al., 2009; Hartarska and Mersland, 2012; Hermes et al., 2011). Such studies include stochastic frontier (SFA) analysis, which measures an individual MFI's efficiency as the distance to an optimal frontier defined by the best performers in the sample, or data envelopment analysis (DEA), which does not make behavioral assumptions (e.g., cost minimization) about the objectives of MFIs (Gutierrez-Nieto et al., 2007; Balkenhol, 2008; Nawaz, 2009). Another line of recent efficiency work estimates scope economies from the joint provision of microsavings and microloans (Hartarska et al., 2010, 2011) by MFIs worldwide.

However, there are no published studies focused on scale efficiency in MFIs and on analyzing the elasticities of substitution among inputs to illuminate how MFIs combine inputs to provide financial services to clientele not served by typical banks. We

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[1] *Source*: MicrocreditSummit.org.

[2] See Berger andMester (1997, 2003) and Berger (2007) for surveys of the literature.

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present the first such estimates and discuss elasticities of substitution among inputs. We use the classical seemingly unrelated regressions (SURs) on a system of equations consisting of cost function and cost share equations and high-quality panel data from MFIs operating in 69 countries.[3] We apply a modified production approach employed in efficiency analyses of banks and financial institutions to better capture the objectives of MFIs, following recent cost function specifications in microfinance (Caudill et al., 2009; Hartarska and Mersland, 2012; Hartarska et al., 2011).

Our approach captures MFIs' sustainability goal through the assumption of cost minimization as well as their outreach goal of serving as many poor clients as possible. The latter is achieved by measuring outputs within the cost function by the number of active clients served (borrowers only or borrowers and savers).[4] We compare these results with results where outputs are loan portfolios (and deposits) measured in dollars to determine how serving poorer borrowers with smaller loans and collecting smaller savings may affect efficiency estimates. We also split the sample by MFI type – lending-only and savings-collecting (which also lend) – to determine whether efficiency estimates differ by business model. Efficiency differences along this dimension provide insights into the industry's push toward realizing scope economies by transforming MFIs into deposit-collecting institutions.

Our empirical evidence confirms previous conjectures that microfinance growth potential can be achieved by realizing economies of scale. The results show that MFIs can generate sizable cost savings though growth or consolidation. We find that all inputs are inelastic substitutes, indicating that very large changes in the price of one input are needed to induce substitution away from this input. We find differences in own-price elasticities by business model with inelastic labor and elastic physical and financial capitals in lending-only MFIs. In savings-collecting MFIs, physical capital is unit elastic, whereas labor and financial capital are elastic.

The rest of this paper is organized as follows: Section 2 briefly describes the MFI industry-specific characteristics. Section 3 presents the empirical approach. Section 4 discusses the data, Section 5 discusses the empirical results, and Section 6 concludes.

2. Brief overview of microfinance institutions

Microfinance institutions (MFIs) provide banking services to the poor. The objective of an MFI is to improve outreach (i.e. serving as many poor customers as possible) while remaining financially sustainable (i.e. covering its costs). Most MFIs only lend, but more recently, many have obtained banking licenses and are able to mobilize deposits. The most recent data show that approximately one-quarter of MFIs collect savings (i.e. are deposit-mobilizing MFIs), with three quarters remaining lending-only (mixmarket.org).

MFIs can be organized as banks, non-bank financial institutions (NBFIs), non-governmental organizations (NGOs), or cooperatives (credit unions or co-ops), depending on a country's laws and an MFI's background. These MFIs compose an industry because all offer small loans (and savings products in the case of deposit-collecting institutions) to marginal clients who are normally not served by banks or other financial institutions.

Because lending to poor people is costly, MFIs use a variety of innovative lending methodologies – individual lending without collateral or with non-traditional collateral (with low market value but high personal value, e.g., TV sets, bikes, etc.), group lending methodologies such as solidarity groups and village banking, where the group of borrowers assume responsibility for screening, monitoring and contract enforcement and thus substantially lower the costs of service delivery. Typical in microlending is the requirement of frequent repayment as a means of encouraging and enforcing repayment discipline. Diligent borrowers gain access to larger amounts of loans in the future, which serves as an additional repayment enforcement mechanism.

Historically, MFIs were created with donor funds or with funds by institutional investors (e.g., the World Bank) or private charities (e.g., Opportunity International), which continue to remain engaged in the MFIs by providing loans, sometimes at below-market rates, and grants under special circumstances. Increasingly, however, private investors attracted to MFIs' returns on investment have become involved as investors or as creditors, and generally the international influence in the microfinance industry is high (Mersland et al., 2011). Several microfinance studies have reported that MFI performance is not affected by the type of organization (lending-only vs. deposit-collecting) and financial banking regulations; therefore, efficiency studies analyze all MFIs as an industry (Hartarska and Nadolnyak, 2007; Mersland and Strøm, 2009).

3. Estimation approach

A structural approach to efficiency in financial institutions involves estimating a profit or cost function to determine the optimal scale and input price elasticities. For the microfinance industry, cost functions are estimated for several reasons. First, the cost function assumes exogenous output and uses input prices, whereas the profit function uses input and output prices, which is problematic for a study on MFIs because detailed price data (interest rates charged) on loans are not collected. Furthermore, from a theoretical perspective, the cost function is more appropriate when firms are price takers in the input markets (labor and capital) and have some market power in the output market (Varian, 1984). MFIs have some market power in serving the poor, as other lenders avoid them. In the input market, MFIs are price takers because they pay competitive salaries for relatively skilled labor, compete with peers worldwide for access to financial capital (loans and donations), and participate in a competitive market for physical capital. Finally, some MFIs operate as for-profit entities, but the majority remain not-for-profit; although not all MFIs maximize profits, all strive to minimize cost.

Therefore, we estimate a typical translog cost function

$$\begin{aligned}\ln C = {} & \alpha_0 + \sum \alpha_j \ln q_j + \sum \beta_k \ln p_k + \frac{1}{2}\sum \alpha_{ij} \ln q_i \ln q_j \\ & + \frac{1}{2}\sum \beta_{lk} \ln p_l \ln p_k + \sum \delta_{jk} \ln q_j \ln p_k + z_m \\ & + \frac{1}{2}\sum \gamma_{mn} z_m z_n + \sum \gamma_{km} \ln p_k z_m + \sum \gamma_{qm} \ln q_i z_m + \ln v \end{aligned} \quad (1)$$

where C is total cost; q_j are output(s); p_k are input prices; z_m are control variables; α, β, δ, and γ are parameters to be estimated; and $\ln v$ is the standard error term. Homogeneity in input prices requires $\sum \beta_k = 1$, $\sum \beta_{lk} = \sum \beta_{kl} = 0$ over l and k, $\sum \delta_{jk} = 0$ for any q_j and $\sum \gamma_{km} = 0$ for any z_m. These restrictions are imposed in the estimation by normalizing (dividing) all input prices and total cost by the price of physical capital. The data are mean-scaled (divided by their means) to facilitate calculation of scale economies.

Estimating financial institutions' cost functions must also consider credit risk, which is typically measured by non-performing loan ratios. This consideration is needed because lower asset quality (or higher non-performing loan ratio) requires more resources to manage the higher risk, and if asset quality is not accounted

[3] Recent work has demonstrated that the joint estimation of the equivalent production function and first-order conditions with normalization (which is our approach) is superior to single equation modeling, which is prevalent in banking studies (León-Ledesma et al., 2010).

[4] A similar approach appropriate for other financial industries is used by Van Cayseele and Wuyts (2007).