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Do Microfinance Profits Converge? Pan-African Evidence

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Abstract
Microfinance competition has been transformed over the past two decades by forces such as regulation, increased commercialization, technological changes and competition from the formal banking sector. These developments have implications on microfinance institutions (MFIs) profitability. This study examined the persistence and convergence of MFIs profitability in thirty two Africa economies, between 1997 and 2008, using a dynamic panel model. Estimation results shows evidence of persistence of excess profit from one year to the next. It is plausible that if there is a shock to profitability level in the current year, about 30% of the effect will persist into the following year. This finding is consistent with literature that considers persistence of profitability as a signal of barriers to competition reflecting either impediments to market competition or informational asymmetry. Government policies that prioritise MFIs financial stability over competition may therefore introduce new barriers to competition by insulating incumbent MFIs from rivalry. On average MFI profitability is higher for MFIs that are highly capitalized and efficient, but lower for MFIs with increased exposure to credit risk
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1. Introduction

Microfinance competition has been transformed over the past two decades by forces such as regulation, increased commercialization of microfinance, technological changes and competition from the formal financial sector (Cull et al 2009c). These developments have implications on MFIs profitability. Theoretical literature has established conditions under which intense competition leads to the poorest borrowers dropping out of the microfinance market (see e.g. McIntosh and Wydick 2005). Additionally, competition undermines the dynamic incentives at the root of microfinance loan contracts (Guttman 2008; Chowdhury 2007). To a large extent, competition in microfinance has gone under-studied due to lack of data. Recent improvements in the data enabled us to undertake this analysis.

The primary goal of this study is to test for the persistence of profits by combining a dataset on the performance of microfinance providers with industry specific, macroeconomic and location specific factors. This will enable us to offer evidence on whether microfinance industry in Africa is competitive by employing alternative method in the empirical analysis. Pertinent questions concern whether one observes convergence to the mean, moderate/high persistence or explosive paths.

To achieve this objective, the study used system GMM dynamic model to test the hypothesis that entry and exit are sufficiently free to eliminate any supernormal profits quickly, so that MFI profit rates converge rapidly towards their long-run equilibrium values. The alternative hypothesis is that the structural characteristics of microfinance industry in particular countries, specialist knowledge or regulatory advantages enjoyed by incumbent MFIs, renders entry into these regions sufficiently costly. It can be argued that the slower is the speed of adjustment, the longer is the period over which supernormal profits may persist, and the greater is the extent of the potential departure from the competitive ideal.

To date, academic research on microfinance competition is limited to; whether the competition with conventional banks affects the profitability and outreach of MFIs (Cull, et al 2009b), whether microfinance competition worsens outreach and financial self-sufficiency (Hisako 2009), whether microfinance competition lowers interest rates (Porteous 2006), whether competition affects the incumbent village bank's ability to attract new clients (De Janvry and Sadoulet, 2005), whether competition affects the effort and lending decisions of the incumbent, deposit growth, loan portfolio composition, repayment rates, and other effort (Park, Brandt, and Giles 2003). These studies however do not answer the research question "are microfinance profits persistent?" This is perhaps because; (i) their focus is not MFI profitability and (ii) they employ static analytical framework which is only relevant when identifying causal relationships between variables when markets are in equilibrium (Geroski, 1990). Cross-sectional data usually does not contain sufficient information on which to base reliable policy decisions to promote competitive outcomes. Moreover, any abnormal profit realized in one period may disappear in the subsequent period which renders intervention by government unnecessary.

The study therefore seeks to answer two principal research questions (i) Are microfinance profits persistent in Africa? (ii) Does the level of persistence converge to the mean, or do we observe explosive paths? While the competitive environment hypothesis predicts that profit differentials across firms should disappear in

the long run, the empirical evidence tends to give little support to this theory. Answers to these questions are important empirically as well as from a policy perspective for the evolving microfinance industry in Africa. To date, there has been relatively little discussion, at least within academic circles, and almost no empirical analysis of persistence of MFIs profits.

This study makes four contributions both to literature and policy as follows; (i) to the best of the author's knowledge there is no empirical evidence on whether MFI predicted to earn a high long-run profit would in fact earn a high profit rate in subsequent periods. Previous studies examine the convergence of profitability to a long-run mean value, either for industries or for the economy as a whole; but the evidence for the microfinance industry is clearly lacking. The issue under investigation is highly relevant because if profits persistence is only a short-term phenomenon among the MFIs, then its anti-competitive implication would be limited. (ii) Profits are also an important source for equity. If reinvested, this should lead to more stable MFIs which could promote financial stability in the microfinance sector. (iii) At the policy level, the existence of profit persistence may imply that shocks to profitability persist indefinitely and that competitive pressures never erode differences in profitability.

The rest of this study is organized as follows. Section 2 provides a brief literature review on persistence of firm profits. Section 3 describes the model specification. Data description and measurement is provided in section 4. Section 5 discusses econometric methodology. Section 6 presents the empirical findings. The final section spells out some concluding remarks and policy suggestions.

2. Previous literature

Since the seminal work of Mueller (1977, 1986), there is a growing empirical literature focused on the persistence of firm profits. Mueller (1977), points that the average firm's profit comprises both permanent and short-run components, which converge over time. However, the direction of such effect is unclear; thus so far it is not possible to determine profit persistence in the microfinance industry *a priori*.

Most of the existing empirical literature on persistence of profit is based on manufacturing data, with only a handful of studies investigating persistence of profit in banking. The pioneering contribution by Mueller (1977), and subsequent Mueller (1986) used a stochastic approach, modelling profitability as a first order autoregressive (AR (1)) process[1]. Glen and Singh (2003) test profitability persistence in seven leading developing countries and conclude that both short and long-term persistence of firm profit rates for the developing economies are lower than those for advanced economies which he attributes to lower sunk cost to enter markets, faster growth rates of firms, weaker role of governmental regulations, and the existence of many large business groups. This is however inconsistent with theoretical predictions since it implies there is a higher level of competition in emerging markets, but the findings confirm Waring (1996) and Geroski and Jacquemin (1988) on a sample of industrial firms in three European countries.

Consistent with theoretical postulation that innovations play the outmost key role in profit persistence, (Cefis, 2003) finds that firms that are persistent innovators and earn above-average profits have a high propensity to continue doing both while earning above normal profits which corroborates previous findings by (Mueller 1990). However, extra profit due to innovations can only be temporary, vanishing when competitors start to imitate the products or processes of the innovative leading firm.

A wave of studies in the banking sector has emerged consistently showing that the sector is not perfectly competitive. Using a dynamic panel model, Goddard, et al (2010) investigates the convergence of bank profitability in eight European Union member countries, between 1992 and 2007. Their results show evidence of persistence of excess profit from one year to the next, which was lower in 1999-2007 than it was in 1992-98 in all the eight countries. Their findings are consistent with Flamini et al (2009) who in a cross-country study for Sub-Saharan Africa, finds modest persistence. Athanasoglou, et al. (2008) applies a dynamic panel data model to study the performance of Greek banks over the period 1985-2001 and find profit persistence. This result confirms those reported in Carbo and Fernandez (2007) who document persistence in bank spreads in Europe.

Goddard, et al. (2004a) shows persistence of profit to be higher for savings and co-operative banks than for commercial banks whose profit levels tend to adjust fairly fast to their average level which corroborates Yurtoglu (2004) among Turkish banks. On the contrary Goddard, et al. (2004b) finds in both sets of their estimations that there are quite large differences between countries in the magnitudes of the persistence coefficients. On a similar vein Berger et al. (2000) conclude that profit converges to its long-run average value more slowly in U.S. banking than in manufacturing, and market power plays a significant role in enabling

1 He concluded that there is significant variability in the speed with which profits adjust to their firm-specific permanent value across different sectors and countries. Moreover, difference in convergence patterns might be associated with steady flow of resources through the persistence of both higher market power and profits above or below average levels over time. The potential influence of initial profit rates (See e.g. Mueller, 1990; Goddard and Wilson, 1999) has also been the subject of research

abnormal profit to persist. On the contrary, Bektas, (2007) uses the panel data method to test for unit roots of profitability for 28 surviving banks in Turkey between 1989 and 2003 and their persistence. He concludes that persistence of profits does not exist in the long run. One of the central conclusions in the literature is that rivalry alone does not therefore erase persistent asymmetries among firms.

Turning to regulatory policies as a control variable, Cull, et al[1] (2011) finds supervision to be negatively associated with profitability which confirms previous findings by Hartarska (2005). This is however inconsistent with Mersland and Strøm (2009), who using an endogenous equations approach establish that regulation does not have a significant impact on financial performance. Hartarska and Nadolnyak (2007) similarly find that regulation does no matter on financial performance, after controlling for the endogeneity of regulation. Barth et al, (2008; 2004) similarly finds cross-country evidence that regulation has no impact on the performance of conventional banks. Clearly this issue remains contestable.

Table 1 show that the empirical evidence to date focuses on a relatively small number of countries, and identifies positive autocorrelation in firm profit rates observed over time. The persistence of firm profit is driven by firm-specific, industry-specific and macroeconomic context. Moreover, literature lacks formal verification of the persistence on microfinance profitability, which might be relevant for the constantly evolving microfinance industry. The main objective of this study is therefore to fill this gap in the existing literature. This study therefore formulates a dynamic model of the determinants of MFIs profitability, while controlling for other factors that are expected to influence profitability.

Table 1: Summary of profit persistence studies

Author	Country	Sample period	Observation per firm	Speed of adjustment
Muller (1990)	US	1950-1972	23	0.183
Cubbin and Geroski (1987)	UK	1948-1977	30	0.482
Geroski and Jacquemin, (1988)	UK	1947-1977	29	0.488
	France	1965-1982	18	0.412
	Germany	1961-1981	21	0.410
Waring (1996)	US	1970-1989	20	0.540
Goddard and Wilson, (1999)	UK	1972-1991	20	0.590
Berger et al (2000)	US banks	1969-1997	29	0.900
Glen and Sign (2003)	Emerging countries	1980-1994	10	0.01-0.42
Cefis (2003)	UK-with patent	1978-1991	14	0.187
	UK-no patent	1978-1991	14	0.813
Goddard, et al. (2004a)	EU-Savings banks	1992-1998	7	0.299
	EU-Commercial banks	1992-1998	7	-0.149*
Goddard, et al. (2004b)	EU-Banks	1992-1998	7	0.260
Yurtoglu (2004)	Turkish banks	1985-1998	14	0.430
Bektas, E (2007).	Turkish banks	1989-2003	15	0.030
Galbreath and Galvin (2008).	Japan	1991-2001	11	0.560
Athanasoglou, et al. (2008)	European Banks	1995-2001	7	0.350
Flamini et al (2009)	Sub-Sahara Africa	1998-2006	Cross country	0.210
Goddard, et al. (2010)	European Banks	1992-2007	Cross country	0.333

*Insignificant

3. Design of the model

The persistence of profit approach is based on empirical investigation of the dynamics of firm level profit. Much of the existing literature is based on the structure conduct performance paradigm which is based on the static, cross-sectional methodology. An alternative to conduct-based measure of competition uses *H-statistic* and

1 Investigates implications and trade-offs of regulation for the world's largest MFIs, by examining impact on profitability and outreach to small-scale borrowers and women, drawing on a financial data of 245 MFIs from the MIX database that allows for within-country variation regarding MFI regulation and supervision.

reports evidence of monopolistic competition (Carbo et al. 2009; Goddard and Wilson, 2009). There is no certainty that conduct or performance measures observed at any point in time represent equilibrium values. For example, an empirical association between high concentration and high profitability that is the standard in structure conduct performance models may simply appear by chance, from observations taken during a period when the relevant market is in a state of disequilibrium (Goddard and Wilson, 2009).

Rather than the standard linear regression model and to infer the speed at which abnormal profits above or below the normal tend to dissipate, a dynamic model is specified which enables the author to derive the rate of adjustment that is most consistent with the observed panel data. Thus, to examine profit persistence, while controlling for other covariates in a rather simplified way, the econometric model is specified as follows:

$$\Pi_{ict} = \alpha + \eta\Pi_{ict-1} + \sum_{j=1}^{J}\beta_j X_{ict}^{j} + \sum_{m=1}^{M}\beta_m X_{ct}^{m} + \sum_{n=1}^{N}\beta_n X_{ct}^{n} + \sum_{l=1}^{L}\beta_l X_{ct}^{l} + \delta D_r + \varepsilon_{ict} \quad \text{.....(3.1)}$$

More formally, Π_{ict} is the profitability of MFI *i* located in country *c*, at time *t*, with i=1, . . .,N, t=1, . . ., T; α is the regression constant, X_{ict}^{j} is a vector of MFI-specific characteristics (*j*) of MFI *i* in country *c* during the period *t*; X_{ct}^{m} is a vector of macroeconomic country-specific variables (*m*) in country *c* during the period *t;* X_{ct}^{n} is a vector of institutional development indicators (*n*) in country *c* during the period *t*; X_{ct}^{l} refers to industry-specific factors (*l*) and $\varepsilon_{ict} = \upsilon_i + \gamma_t + \mu_{ict}$ is the disturbance; γ_t is the unobservable time effects, υ_i is the unobserved complete set of individual MFI-specific effect which controls for all cross-sectional (or 'between MFIs'), and μ_{ict} is the idiosyncratic error. Augmenting the model with unobservable time effects modifies the specification into an unbalanced two-way error component model. *D* is a binary for the location-specific dummy variables. η, β, δ are the coefficients to be estimated.

Π_{ict-1} is the one-period lagged profitability and η is the speed of adjustment to equilibrium which gives us some information about the structure of the market. A value of η between 0 and 1 implies that any shock to profits will persist but will nevertheless return to their normal level. In competitive firms, we expect this to occur quickly, while in less competitive industries we might anticipate high persistence and a value of η closer to 1. If η lies between 0 and -1, then profits revert to normal in an oscillating manner. This might occur in periods of rapid change in the structure of the microfinance sector which can cause MFI profitability to become highly volatile.

4. Data and measurement

4.1 Data description

The data for this study comprises 210 MFIs across 32 developing economies in Sub-Sahara Africa for the period 1997-2007 with 2,310 observations. These spans across four different regions that include West (81), East (63), Central (23) and South Africa 43. The dataset was assembled from three sources the principal being the MIX Market database, World Development Indicators (WDI) and the Heritage Foundation. Persistence of profits is evaluated by using the return on assets (ROA) as the dependent variable.

4.2 Control variables

Given that the MFI data are collected from MIX Market, the MIX Market definitions of key variables are used. *Capital* (CAP) is the ratio of equity capital to total assets[1]. *Gearing ratio* (GR) defines the MFI capital structure which is measured by the ratio of debt and debt-like instruments to capitalization namely short term debt+long term debt divided by total shareholders' equity or simply the debt/equity ratio.

To capture the relationship between MFI *size* (S) and profitability, the logarithm of real MFIs' total assets in period t is used for each MFI. Age (Ag*)* is denoted by the number of years MFI has been in operation in order to capture learning effect in MFI performance. The credit risk exposure (CR) is measured by the sum of the level of loans past due 30 days or more and still accruing interest namely Portfolio at Risk (PAR>30).

Efficiency (EFF) in the management of operating expenses*:* The total MFI costs (net of interest payments) can be split into operating and other expenses (such as taxes, depreciation etc). We regard operating

1 While Basel II addresses fewer concepts than the Standards in terms of direct application to MFI financial management, internal controls, and management reporting, it does outline three "pillars" that are relevant to microfinance

expenses as the only direct outcome of MFI management. We thus measure efficiency in expenses management by the ratio of Adjusted operating expense/adjusted average gross loan portfolio and in robustness tests, we use cost per borrower (CB).

We use two proxies for the macroeconomic environment; inflation and real GNI per capita growth. We use growth of GNI per capita at current US Dollars (GNI) to control for different levels of economic development in each country and year. Arguably, this is the most informative single indicator of progress in economic development, while inflation expectation is measured at time *t-1* annual % change of the GDP deflator at market prices for each country where the MFI is located for each year.

To control the impact on performance by institutions development, we use *Property rights* (PR) Index which ranges from 10 where private property is rarely protected to 100 where private property is guaranteed. *Freedom from corruption* is a quantitative measure that is derived from Transparency International's Corruption Perceptions Index (CPI). This measures the level of corruption in 179 countries. It is based on a 10-point scale where a score of 10 indicates little corruption and a score of 0 indicates a corrupt government.

Industry specific factors are characteristics that are unique to the microfinance sector. In order to control for the differences in profitability arising from the charter that establishes the MFIs, we use (i) *Prof* as a dummy variable indicating MFIs formal profit status[1] (equal to one if the organization is for-profit and zero otherwise). Again, the markers are drawn from MIX data set. MFIs with not-for-profit charters tend to have objectives and funding arrangements that are different from those of more commercially-oriented MFIs (such as banks or credit unions). Not-for-profit MFIs place more emphasis on outreach while at the same time relying relatively more on donated funds to subsidize those efforts (Cull, et al, 2009a). (ii) *Region* is a dummy variable for each of the four regions in Sub-Sahara Africa to capture location impacts. The nature and composition of microfinance business may be such that certain locations are favoured while others are avoided. (iii) *REG* is a binary variable indicating regulation status equal to one if regulated and zero otherwise[2]. Table 2 lists the variables used to proxy profitability and its determinants (including notation and the predicted effect of the determinants as established in the literature).

1 See Robinson (2001) for more discussion on the objectives of commercial microfinance

2 To the extent that reserve requirements are not remunerated or remunerated at less-than market rates, MFI regulation may impose a burden on these institutions. Moreover, regulation of MFIs may lead to a mission drift if the regulatory requirements such as capital adequacy divert resources away from serving the poor to serving better off borrowers in order to improve capital adequacy ratios with implications on profitability.

Table 2: Summary of variables and measurement

Variable	Notation	Measure	Predicted effect	Source of data
Dependent variable				
Profitability	ROA	Net profits after taxes/Assets		The MIX
Control variables				
MFI-specific				
Capital	CAP	Equity/Assets	Positive	The MIX
Credit risk				
Portfolio at Risk	PAR-30	Outstanding balance, portfolio overdue>30 Days + renegotiated portfolio/Adjusted Gross Loan Portfolio	Negative	The MIX
Write off Ratio	WOR	Value of loans written-off/Adjusted Average Gross Loan Portfolio		
Loan Loss Reserve Ratio	LLR	Loan loss reserve/Value of loans outstanding		
Risk Coverage Ratio	RC	Adjusted Impairment Loss Allowance/PAR > 30 Days		
Other factors				
Efficiency	Eff	Adjusted Operating Expense/Adjusted Average Gross Loan Portfolio	Negative	The MIX
Gearing	GR	Debt/equity ratio	Negative	The MIX
Age	Ag	Age of the MFI in years	Indeterminate	
Size	S	Log of total assets	Indeterminate	
Loan size	LS	Adjusted Average Loan Balance per Borrower/GNI per Capita	Positive	
Industry-specific				
For-profit dummy	Prof	Dummy variable equal to one for profit and zero otherwise	Indeterminate	The MIX
Regulated	REG	Dummy variable equal to one for regulated and zero otherwise	Indeterminate	
Region	WA	Dummy variable equal to 1 for West Africa and 0 otherwise	Indeterminate	The MIX
	CA	Dummy variable equal to 1 for Central Africa and 0 otherwise		
	SA	Dummy variable equal to 1 for South Africa and 0 otherwise		
	EA	Dummy variable equal to 1 for East Africa and 0 otherwise		
Institutional development				
Property rights	PR	Composite Index ranging from 10 (Private property is rarely protected) to 100 (Private property is guaranteed by the government)	Positive	Heritage Foundation
Freedom from corruption	COR	Composite Index 10-point scale Corruption Perceptions Index (CPI) in which a score of 100 indicates very little corruption and a score of 0 indicates a very corrupt government		
Macroeconomic environment				
Inflation expectations	INF	Previous annual % change of the GDP deflator	Indeterminate	World Bank (WDI)
Per capita Income	GNI	GNI per capita, Atlas method (current US$)	Positive	

5. Empirical methodology

We begin this section by first estimating and testing for the time effects. We tested the joint significance of the

unobservable time effects by the $H0:\gamma 2=\gamma 3=.....\gamma T=0$ at the 95% confidence level. We experimented with many year dummies and it turns out that none of the time dummies is significant.

Table 3: Tests for time and country-specific effects

Model	LM test	P-value
$D_2=D_3=.....D_C=0$	$\chi 2$ (30) = 126.20	0.8200
$\gamma_2=\gamma_3=.....\gamma_T$	$\chi 2$ (11) = 4.19	0.7990
$D_2=D_3=.....D_C=\gamma_2=\gamma_3=\gamma_t=0$	$\chi 2$ (41) = 35.44	0.8910

Where D_c represent country dummies and γ_t time dummies.

The fact that the year dummy variables are insignificant suggests that there may be no additional aggregate macroeconomic effects influencing MFI returns in Sub-Sahara Africa other that those we have explicitly controlled for in the estimation model. Since Lagrange Multiplier (LM) tests show that time effect is not significant, we proceed with the estimation of the following model;

$$\Pi_{ict}=\alpha+\eta\Pi_{ict-1}+\sum_{j=1}^{J}\beta_j X_{ict}^{j}+\sum_{m=1}^{M}\beta_m X_{ct}^{m}+\sum_{n=1}^{N}\beta_n X_{ct}^{n}+\sum_{l=1}^{L}\beta_l X_{ct}^{l}+\delta D_r+\varepsilon_{ict}.....(3.2)$$

$$\varepsilon_{ict}=\upsilon i+\mu_{ict}$$

Static panel estimates, as do the OLS models, omit dynamics causing the problem of dynamic panel bias and as such do not allow us to study the dynamics of adjustment (Baltagi, 2008). Omitted dynamics means that such models are mis-specified, because they omit the entire history of the right-hand-side variables (Greene, 2008).

When estimating equation (3.2), several econometric problems may arise. First is endogeneity: more profitable MFIs may be able to increase their equity more easily by retaining profits. They could also pay more for marketing their products and increase their size, which in turn may affect profitability. However, the causality could also run in the opposite direction, as more profitable MFIs may hire more personnel (as per the expense preference theorem), reducing their operational efficiency.

The dynamic structure of the model makes the OLS estimator biased upwards [1] and inconsistent, since the lagged level of profitability is correlated with the error term. The within transformation does not solve the problem, because of a downward bias (Nickel, 1981) and inconsistency. We tackle these problems by moving beyond the methodology currently in use in the empirical literature of bank profitability of mainly fixed or random effects[2].

A possible solution on the endogeneity problem is represented by the Generalized Method of Moments (GMM) technique. GMM developed by Hansen (1982), and the first-differenced GMM estimators for the AR (1) panel data that was later developed by Arellano and Bond (1991) provides a convenient framework for obtaining asymptotically efficient estimators in this context. With a fixed number of years panel and a substantial number of observations, Arellano and Bond (1991) suggests estimating equation (3.2) with GMM in first-differences, by first differencing the initial equation, which removes the time invariant υ_i. This renders the equation estimable by instrumental variables as;

$$\pi_{it}-\pi_{it-1}=\alpha_i(\pi_{it-1}-\pi_{it-2})+\beta(x_{it}-x_{it-1})+\upsilon(\upsilon_i-\upsilon_i)+(\mu_{it}-\mu_{it-1}).....(3.3)$$

Arellano and Bond estimator has however been criticized when applied to panels with very small *T*, on the premise that under such conditions this estimator is inefficient if the instruments used are weak (Arellano and Bover 1995; Blundell and Bover 1998; Phillipsa and Donggyu 2007). Blundell and Bond (1998) for example shows that when η approaches 1, so that the dependent variable follows a path close to a random walk, the differenced-GMM (Arellano and Bond, 1991) has poor finite sample properties, and it's downwards biased, especially when *T* is small. Therefore, Blundell and Bond (1998) proposed the System-GMM which is derived from the estimation of a system of two simultaneous equations, one in levels (with lagged first differences as instruments) and the other in first differences (with lagged levels as instruments).

We thus resort to the system GMM[3] since there is a gain in efficiency, and the instrument set is valid.

1 The estimation methods based on the OLS principle are vulnerable to the omitted variable bias if some important determinants of MFI profitability are not included among the regressors.

2 Recent studies in the banking literature that use fixed or random effects include for example Flamini et al (2009); Sufian and Habibullah (2009), Kosmidou (2008), Hsiu-Ling et al (2007)

3 There are two types of GMM estimators that have been frequently used. The first one is the first-difference GMM estimator,

The system GMM estimator also controls for unobserved heterogeneity. Moreover, it's more suited to estimate MFI profitability equations in the empirical framework, than the first-differenced GMM estimator used by some previous authors (see for example Flamini et al, 2009). MFIs profitability outcomes may be highly persistent so their lagged levels might be very weak instruments for the first differenced equations. We instrument for all regressors except for those which are clearly exogenous.

We are also confronted with the choice of using one-step or two-step estimation. The one-step estimator assumes homoscedastic errors while the two-step estimator uses the first-step errors to construct heteroscedasticity-consistent standard errors which imply that the one-step estimators are less efficient than the two-step estimators even in the presence of homoscedastic error terms (Arellano and Hahn, 2007). Although two-step estimators are asymptotically more efficient, they present standard errors estimates that are severely downward biased. However, it is possible to solve this problem using the finite-sample correction to the two-step covariance matrix derived by Bond and Windmeijer (2002), which can make two-step robust GMM estimates more efficient than one-step robust ones, especially for system GMM (Roodman, 2009).

The last challenge is the risk of omitted variables. To that end, we follow a general to specific strategy by estimating an equation with all possible regressors according to the existing literature. We, then, test through a Wald test the joint hypothesis that the coefficients of the variables that are not significant individually are equal to zero. If not rejected, we re-estimate the model only with the controls which were significant in the general regression. Otherwise, we test a less restrictive hypothesis but still trying to reduce the number of non-significant regressors to the maximum extent possible. We stop reducing the number of regressors when we can reject that the remaining set of coefficients of the control variables is equal to zero. The coefficients obtained in this way are even more efficient as the number of regressors is reduced to the minimum.

Finally, to confirm the validity of the instruments, we perform Hansen's or Sargan test of over-identifying restrictions, which is asymptotically distributed as $\chi^2(k)$ where k denotes the number of over-identifying restrictions and a test of serial correlation among the residuals. We test whether Arellano-Bond orthogonality conditions are fulfilled. If there is no autocorrelation in the levels equation, then the error term in the first-difference equation has negative first-order autocorrelation and zero second order autocorrelation (Baltagi 2008). If we reject the hypothesis that there is zero second order autocorrelation in the residuals of the first-difference equation, then we also reject the hypothesis that the error term in the levels equation is not autocorrelated which indicates that the Arellano-Bond orthogonality conditions are not valid no matter the number of lags used as instruments.

One limitation of using GMM estimator is that the differencing removes any time invariant explanatory variable along with the panel level effect, which does not allow us to introduce the main policy control variables of interest for regulatory status, diversity in regional distribution and for profit status into the main estimation. The same effect would arise by estimating a linear model with fixed effects (FE), since this doesn't control for factors which differ across MFIs but are constant through time and which we cannot measure directly known as unobserved MFI heterogeneity[1]. A random effect model seems to be the natural choice. We therefore re-estimate model *3.2* in a linear fashion by assuming random effects (RE).

6. Empirical findings

6.1 Descriptive statistics

Table 4 and 5 presents summary statistics. When descriptive statistics are broken down by region, we observe some interesting regional differences. All the regions report an average negative profitability. Although West Africa has the oldest MFIs on average, the region has the highest number of MFIs reporting average loan default rate and the most inefficient on the management of operational expenses. This may partly be explained by the fact that MFIs in some West Africa economies face interest rate ceilings, such as the West African Monetary Union usury law that caps MFI interest rates at 27 percent and bank interest rates at 18 percent (Lafourcade, et al

developed by Arellano and Bond (1991), which uses first-differenced equations with suitable lagged levels as instruments. The second one is the system GMM estimator, developed by Arellano and Bover (1995) and Blundell and Bond (1998), which augments the former by addition of equations in levels with lagged first-differences as instruments. The system GMM estimator uses the levels equation (e.g. equation 4.1) to obtain a system of two equations: one differenced and one in levels. By adding the second equation, additional instruments can be obtained. Thus the variables in levels in the second equation are instrumented with their own first differences.

1 In micro-econometrics the unobserved firm heterogeneity means unobserved firm characteristics such as corporate governance and firm structure. Time variant explanatory variables, however, may be correlated with this unobserved firm heterogeneity. Managers may for instance opt to work for unregulated MFIs depending on their preferences for autonomy in decision making, desire and ability to implement microfinance innovations and therefore MFI regulation may limit the manager's ability to innovate. The significant heterogeneity of MFIs suggests that corporate governance may be correlated with MFI characteristics including regulatory status.

2006). Although South Africa region has the highest capital adequacy ratio, it also reports the lowest return on assets (at an average of -2.5%) while Central Africa has the most mature MFIs based on age. East Africa has the largest MFIs in terms of average assets. It also offers the smallest loan size. Perhaps this explains why the region has a higher depth of outreach than other regions. The region dominates in terms of outreach with 52 percent of all savers and 45 percent of all borrowers in Sub-Sahara Africa (Lafourcade, et al 2006). With respect to gearing ratio, MFIs from Central Africa region use more of debt relative to equity in terms of choice of financing compared to other regions. There seems to be no regional patterns with respect to macroeconomic variables in the raw data.

We present a correlation test matrix in Table 6. Although most correlation coefficients among variables of interest are low, they are nevertheless significant but not perfectly linear. Most notably, regulation status, credit risk measure, efficiency, age, size, gearing ratio are all significantly correlated with profitability measure which is perhaps an indication that MFIs with higher ROA are those that are regulated, larger in size, older, efficient and with lower loan default rates. Age may reflect survivor bias but it is also positively and significantly correlated with size, gearing and regulation, an indication that as MFIs matures, they also become larger, use more of debt in their financing options and become regulated over time.

The significant correlation between ROA and gearing ratio implies that higher debt relative to equity mat be driving profitability. Interestingly none of the quality of institutions indices or regional dummy variables are significantly correlated with profitability. Both security of property rights and freedom from corruption are nevertheless significantly and positively related with Central and South Africa dummies but not collinear. To uncover the impact that these summary statistics may have on MFIs profitability requires rigorous econometric analysis which we pursue in the next section.

Table 4: Regional/location summary statistics

		South Africa						Central Africa					
Variable	Notation	Obs	Mean	Median	Std Dev	Min	Max	Obs	Mean	Median	Std Dev	Min	Max
Return on assets	ROA	194	-0.025	0.00	0.103	-0.458	0.226	113	-0.007	0.00	0.082	-0.342	0.195
Age	AG	223	7.543	7	4.104	3	28	121	9.612	8	8.186	3.00	40
Capital	CAP	222	0.465	0.51	0.495	-1.366	1.000	121	0.313	0.235	0.244	-0.024	1.000
Gearing	GR	196	1.231	0.63	1.486	0.000	9.090	91	2.325	2.382	1.595	0.000	5.650
Efficiency	EFF	163	0.776	0.59	0.643	0.080	4.150	87	0.293	0.235	0.315	0.000	2.580
Portfolio at Risk	PAR	223	0.103	0.04	0.156	0.000	1.050	121	0.081	0.03	0.109	0.000	0.500
Log Size	S	223	14.488	14.46	1.549	9.720	19.756	121	13.862	13.81	2.156	7.268	18.802
Loan size	LS	224	1.1085	0.541	1.604	0.000	9.038	89	1.267	0.632	2.403	0.00	16.48
Lagged Inflation rate	INF	404	0.045	0.00	0.063	-0.006	0.340	252	0.026	0.000	0.056	-0.139	0.299
Per capita income	GNI	165	0.073	0.06	0.106	-0.188	0.289	92	0.076	0.083	0.079	-0.167	0.242

Table 5: Regional/location summary statistics

		East Africa						West Africa					
Variable	Notation	Obs	Mean	Median	Std Dev	Min	Max	Obs	Mean	Median	Std Dev	Min	Max
Return on assets	ROA	353	-0.015	0.00	0.099	-0.866	0.324	442	-0.0064	0.00	0.0886	-0.409	0.100
Age	AG	382	9.199	7	6.807	3	33	437	9.78	9	5.78	3	31
Capital	CAP	382	0.410	0.37	0.292	-1.140	0.994	431	0.318	0.27	0.303	-0.983	1.000
Gearing	GR	328	1.603	1.151	1.479	0.000	6.100	353	2.082	1.597	1.921	0.000	11.000
Efficiency	EFF	307	0.434	0.34	0.736	0.000	12.250	379	2.211	0.230	11.149	0.000	121.000
Portfolio at Risk	PAR	381	0.050	0.022	0.077	0.000	0.790	452	0.719	0.027	0.585	0.000	0.748
Log Size	S	377	14.793	14.51	1.929	8.412	20.541	421	14.299	14.36	2.433	7.102	19.063
Loan size	LS	429	1.007	0.523	1.88	0.000	15.05	450	1.025	0.318	1.864	0.00	15.05
Lagged Inflation rate	INF	627	0.032	0.000	0.049	-0.058	0.219	795	0.041	0.000	0.118	-0.139	2.3
Per capita income	GNI	310	0.077	0.10	0.092	-0.106	0.273	351	0.138	0.096	0.231	-0.125	0.434

Table 6: Correlations Matrix

	ROA	AG	S	CAP	GR	EFF	PAR	LS	INF	GNI	PROF	WA	SA	EA	CA	REG	PR	COR
ROA	1.000 1058																	
AG	.095** 1055	1.000 1143																
S	.121** 1056	.360** 1141	1.000 1144															
CAP	-.016 1058	-.166** 1142	-.112** 1143	1.000 1145														
GR	.130** 876	.163** 950	.153** 952	-.461** 952	1.000 953													
EFF	-.312** 865	-.065* 897	.008 899	.062 899	-.211** 754	1.000 899												
PAR	-.075** 1057	.060* 1141	.005 1142	-.081** 1143	-.004 951	.032 898	1.000 1145											
LS	.123** 1055	.108** 1139	.003 1140	-.116** 1141	.096** 949	-.098** 897	-.026 1142	1.000 1143										
INF	.044 1033	.075** 1109	-.033 1110	.067* 1111	.005 923	.102** 876	.114** 1111	-.062* 1109	1.000 2066									
GNI	.042 865	.092** 904	.045 904	-.044 906	.078* 756	-.054 858	.078* 905	-.006 904	.240** 897	1.000 906								
PROF	-.061 1058	.022 1143	.045 1144	.045 1145	-.147 953	.080 899	.045 1145	-.168 1143	.081 2066	.013 906	1.000 2310							
WA	.054 1058	.077** 1143	-.041 1144	-.117** 1145	.097** 953	-.178** 899	-.067* 1145	.031 1143	-.003 2066	.096* 906	.123** 2310	1.000 2310						
SA	-.057 1058	-.128** 1143	-.018 1144	.121** 1145	-.145** 953	.276** 899	.166** 1145	.044 1143	.083** 2066	-.064* 906	.030 2310	-.402** 2310	1.000 2310					
EA	-.019 1058	.004 1143	.079** 1144	.062* 1145	-.040 953	-.007 899	-.102** 1145	-.096** 1143	-.025 2066	-.063 906	-.079** 2310	-.519** 2310	-.332** 2310	1.000 2310				
CA	.018 1058	.041 1143	-.038 1144	-.071* 1145	.118** 953	-.059 899	.052 1145	.043 1143	-.060** 2066	.031 906	-.115** 2310	-.279** 2310	-.175** 2310	-.230** 2310	1.000 2310			
REG	.134** 1051	.131** 1135	.116** 1136	-.202** 1137	.144** 945	-.166** 892	-.026 1137	.142** 1135	-.040 2056	.006 899	-.219** 2299	.109** 2299	-.072** 2299	-.104** 2299	.077** 2299	1.000 2299		
PR	.202 58	.514** 66	-.101 66	.113 65	-491** 52	.159 56	-.129 66	0.038 66	.002 113	-.168 54	-.038 132	0.80 132	.453** 132	-290** 132	-301** 132	-.179* 132	1.000 132	
COR	-.148 58	.235 66	-.031 66	-.156 65	-438** 52	.365** 56	.045 66	-0.043 65	-0.92 113	-2.04 54	.098 132	.119 132	.344** 132	-.114 132	-499** 132	-284** 132	.562** 132	1.000 132

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed). Figures beneath are the observations (N)

Table 7 reports results from the basic specification (3.2). The estimated model fits the panel data reasonably well, having fairly stable coefficients, while the Wald-test indicates fine goodness of fit since the overall test statistic shows rejection of the hypothesis that all coefficients are equal to zero (rejects the null hypothesis of joint insignificance of parameters). Although the estimated equation indicates the presence of negative first-order autocorrelation, this does not imply that the estimates are inconsistent. Inconsistency would only hold if the second order autocorrelation was present but this is rejected by the test for AR (2) errors (Arellano and Bond, 1991). The value test for the second order autocorrelation implies that the moment conditions of the model are valid.

6.2 Persistence of profit and speed of convergence

The final column of Table 7 gives the preferred model. In all the regressions, the speed of adjustment coefficient η (the lagged profitability measure) is positive and significant. The coefficient on the lagged dependent variable is about 0.3 and significantly greater than zero. The departure from perfect competition is however marginal—profits tend to adjust fairly fast to their average level. This implies that there is some moderate persistence in microfinance profitability in Africa. It is plausible that if there is a shock to profitability level in the current year, about 30% of the effect will persist into the following year. Intuitively, microfinance industry in Sub-Sahara Africa is not competitive.

Table 7: Two-step system GMM estimation results (dependent variable: ROA)

Variable	Notation	Variant of model specifications	
		1	2
Lagged ROA	Π_{t-1}	0.2499*** (9.22)	0.3169*** (10.63)
Log size	S	0.0090*** (3.35)	0.0060*** (3.54)
Log age	AG	-0.0001 (-0.14)	-0.0117 (-0.80)
Capital	CAP	0.0507** (2.22)	0.0750*** (2.79)
Gearing	GR	0.0716*** (2.98)	0.1163*** (3.60)
Efficiency	EFF	-0.1863*** (-6.17)	-0.2234*** (-9.70)
Portfolio at risk	PAR	-0.0327* (-1.79)	-0.0096** (-1.94)
Loan size	LS	0.0008 (0.94)	
Inflation expectations	INF		0.0457 (1.32)
Per capita incomes	GNI		-0.0067 (0.70)
Property rights	PR		0.0405 (1.51)
Freedom from corruption	COR		0.0019*** (2.77)
Wald-test		$\chi2(7) = 169.97$ Prob>chi2=0.96	$\chi2(11)= 173.06$ Prob>chi2=0.96
Sargan-test[a]		$\chi2(44) = 28.39$ Prob>chi2=0.97	$\chi2(44) = 21.62$ Prob>chi2=0.99
AR(1)[b]		z = -2.98 p-value = 0.00	z =-2.79 p-value = 0.00
AR(2)[c]		z = 1.58 *P-value* = 0.85	z =-1.77 *P-value* = 0.97

Estimations were performed using GMM estimation. T-Statistics are in parentheses and significance at the 10%, 5%, and 1% level is noted by *, ** and *** respectively.

The Wald test is a test of the null hypothesis that the coefficients in the given equation are all zero (Greene, 2008). A low value indicates null hypothesis rejection.

[a] Test for over-identifying restrictions in GMM dynamic model estimation.

[b] Arellano-Bond test that average autocovariance in residuals of order 1 is 0. (H0: no autocorrelation).

[c] Arellano-Bond test that average autocovariance in residuals of order 2 is 0. (H0: no autocorrelation).

The theoretical proposition tested in the profit persistence literature that entry and exit is sufficiently free to eliminate any supernormal profits whatever their cause, and that all firms' economic profit tends to converge to the same long-run average rate (see Berger et al., 2000; Singh 2003; Cuaresma and Gschwandtner, 2008) is not supported here. The findings signal barriers to competition reflecting either impediments to market competition or informational asymmetry (Berger et al., 2000). It may also indicate the existence of market power in the industry (Goddard and Wilson, 2009). All these factors may encourage and intensify competition or slow/accelerate the convergence process. Because microfinance industry in Sub-Sahara Africa is not competitive, the application of dynamic incentives at the root of microfinance loan contracts as postulated by Guttman (2008) and Chowdhury (2007) may not be undermined. The role of the state should thus be to foster competition in the microfinance industry. Government policies that prioritise MFIs stability over competition may have a tendency to introduce new barriers to competition by insulating incumbent MFIs from rivalry.

Comparable evidence amongst the MFIs is scant. Cull, et al (2009b) for example examines competition between conventional banks and MFIs and how this impacts on MFIs profitability and outreach of MFIs. They find that the effect of competition on MFI profitability appears weak. Hisako (2009) investigates whether microfinance competition worsens outreach and financial self-sufficiency. He finds that competition does not worsen financial self-sufficiency (FSS) and therefore does not raise subsidy dependence. Porteous (2006) examines whether microfinance competition lowers interest rates. Mcintosh, De Janvry and Sadoulet (2005) examine whether competition affects the incumbent village bank's ability to attract new clients while Park, Brandt, and Giles (2003), investigates whether competition affects the effort and lending decisions of the

incumbent. These studies do not answer the research question as to whether microfinance profits are persistent ostensibly because; (i) their focus is not on MFI profitability and (ii) their empirical framework does not control for endogeneity on performance using a dynamic panel econometrics; they employ static analytical framework which is nevertheless useful only in identifying causal relationships between key variables when markets are in equilibrium (Geroski, 1990).

In the conventional banking industry, a similar weak evidence of profit persistence was found for the conventional European banks by Goddard, et al (2010; 2004), amongst retail banks in Africa by Flamini et al (2009) and for the Greek banks by Athanasoglou, et al. (2008). It is however far from a foredawn conclusion that what holds true for retail commercial banks as a whole will also hold true for MFI's.

6.3 Control variables

Table 8 shows that efficient MFIs are more profitable. Consistent with much of the previous banking literature (see e.g. Goddard et al 2010, Athanasoglou, et al 2008), efficiency appears to be a more important determinant of MFI profitability. Similarly size and credit risk are significant in explaining microfinance profitability. We also find evidence that gives credence to the hypothesis that firms which use more of debt financing are more profitable. The findings imply that MFIs that are more leveraged are also more profitable. MFI age is not significantly associated with MFI profitability.

Table 8: Random-effects GLS regression results (dependent variable: ROA)

Variable	Notation	Model specification
Intercept	α_{it}	
Log Size	S	0.0100*** (2.49)
Log Age	AG	-0.0056 (-0.49)
Capital	CAP	0.0453** (2.22)
Gearing	GR	0.0168* (1.76)
Efficiency	EFF	-0.1001*** (-12.42)
Portfolio at risk	PAR	-0.0107*** (-2.88)
Inflation expectations	INF	0.1329** (2.35)
Loan size	LS	0.0035 (0.92)
Per capita incomes	GNI	-0.0005 (-0.01)
Property rights	PR	0.0002 (0.37)
Freedom from corruption	COR	0.0002 (0.29)
For profit	PROF	0.0038 (0.23)
Regulated	REG	0.0056 (0.30)
West Africa	WA	0.0521 (0.78)
South Africa	SA	0.0732 (1.07)
East Africa	EA	0.0505 (0.75)
Central Africa	CA	0.0390 (0.66)
R^2		0.40
No of obs.		471
Wald test		chi2(16= 247.97 Prob>chi2= 0.0000
Breusch and Pagan Lagrangian multiplier test		chi2(1)= 71.63 Prob>chi2=0.0000 H0:Var(u_i)=0
Hausman specification test		chi2(11) = 73.06 Prob>chi2 = 0.0000 Ho: difference in coefficients not systematic

Estimations were performed using GLS estimation. T-Statistics are in parentheses and significance at the 10%, 5%, and 1% level is noted by *, ** and *** respectively.

Freedom from corruption is also significant suggesting a higher implicit cost of doing business. Security of property rights is positive but insignificant. Property rights finding is counter-intuitive and should be investigated further. Macroeconomic context is similarly insignificant. However, as financial systems develop and the on-going financial sector reform process in Africa ends, both the current and future rates of economic growth are likely to have an enhanced impact on MFI profitability.

To gain a deeper insight into the processes affecting MFI profitability while controlling for time invariant factors, we ran a random effects (RE) model with complete set of controls, including dummies for location, regulation and charter status. We are aware that FE model is inappropriate since it would remove the time-invariant variables of interest. It is therefore not surprising that the Hausman (1978) specification test rejects the null hypothesis that the coefficients between RE and FE are not systematic and the Breusch and Pagan Lagrangian Multiplier (LM) test similarly confirms the presence of individual effects which provides evidence in favour of the FE model. We take cognizance of the fact that while the presence of unobserved panel effects correlated with the explanatory variables in the regression may bias the result; we try to overcome this bias by including a full set of location dummies.

On the basis of evidence adduced, we do not find empirical support for the hypothesis that institutions formally constituted as NGO's are less profitable. To be attractive investment opportunities, most MFIs reporting to MIXmarket strive to run their operations very efficiently and pay close attention, among other variables, to profitability of their operations. This finding is consistent with Tchakoute-Tchuigoua (2011) who does not find significant difference in profitability between for profit and NGOs. Similarly, Cull, et al (2007) finds the for-profit dummy insignificant in all their regressions. It also confirms Hartarska and Nadolnyak (2007) who shows that the variable NGO is not significant in their profitability regression. This however does not support the theoretical proposition by Besley and Ghatak (2005) who predict that non-profit status alone can positively affect performance as donors would be more willing to support MFIs that are NGOs because the non-profit status guarantees permanency of the MFI social mission.

We find no evidence to confirm the hypothesis of a positive link between regulation and MFI profitability, contrary to the arguments offered by proponents of regulating MFIs (see for example McGuire and Conroy, 2000; Steel and Andah, 2003). This counter intuitive finding confirms Mersland and Strøm (2009), who establish that regulation does not have a significant impact on financial performance and Hartarska and Nadolnyak (2007) who after controlling for the endogeneity of regulation, find that regulation has no impact on financial performance. Previous findings consistent with these results include Barth et al, (2004) who find cross-country evidence that regulation has no impact on the performance of conventional banks but inconsistent with Cull, et al (2011) and Hartarska (2005) who find supervision to be negatively associated with profitability. Clearly this issue deserves further empirical scrutiny.

We also find that location or regional factor is also not significant in explaining MFI profitability, suggesting that this is mainly driven by local conditions. This is contrary to Cull, et al (2007) who found MFIs from Eastern Europe and Central Asia and those from Africa outperformed those from other regions in terms of return on assets. As the microfinance industry aims at greater geographic diversification, the results indicate that profitability is not sensitive to location or regional distributional factors which reinforce the correlations in Table 6.

6.4 Location analysis

Studies of the location of services by commercial banks find that they generally favour economically well-endowed areas/regions to boost their profit margins. Is this the case with MFIs as well? To probe further on the location impacts on MFIs profitability, we split the sample of MFIs into four sub-samples, based on the regional distribution and estimate a fixed effect model for each sub-sample. This allowed us to compare the results with the summary statistics in Tables 4 and 5. The results in Table 9 show that economies of scale do not matter with respect to MFI profitability in South Africa region. It appears MFIs in this region are more constrained by capital. Although loan size is not significant in explaining profitability in other regions, it is crucial in West Africa. Operational inefficiency is more of a problem in East Africa than other regions perhaps because of the higher outreach as shown in Table 5.

Table 9: Estimation Results Using Fixed Effects-within (location effects)

Variant model specifications with robust standard errors					
Variable	Notation	WA	SA	CA	EA
Intercept		-0.1221 (-2.13)	0.2550 (0.75)	-0.5312 (-1.90)	-0.4128 (-2.10)
Log Size	S	0.0099 (2.52)	0.0145 (0.60)	0.0386 (1.97)	0.0353 (2.41)
Log Age	AG	-0.0004 (-0.25)	-0.0065 (-0.89)	-0.0036 (-0.42)	-0.0123 (-0.39)
Capital	CAP	0.0026 (0.10)	0.0509 (2.45)	0.4182 (2.70)	0.1893 (5.36)
Gearing	GR	0.0058 (2.40)	0.0188 (1.12)	0.0032 (0.21)	0.0148 (2.64)
Efficiency	EFF	-0.1828 (-7.43)	-0.1410 (-5.43)	-0.4722 (-4.81)	-0.3245 (-11.32)
Portfolio at risk	PAR	-0.0157 (-0.34)	-0.0158 (-0.21)	-0.1215 (-1.91)	-0.1520 (1.97)
Loan size	LS	0.0095 (2.50)	-0.0035 (-0.69)	0.0026 (0.23)	-0.0046 (-0.38)
Inflation expectations	INF	-0.0011 (-0.01)	0.2949 (1.47)	0.0544 (0.33)	0.0330 (0.27)
Per capita incomes	GNI	-0.0500 (-1.00)	-0.0206 (-0.28)	0.1340 (1.42)	0.1252 (1.56)
R^2		0.28	0.44	0.79	0.61
No of obs.		269	105	40	229

This Table presents regression with robust standard errors results. Estimations were performed using fixed effects estimation. T-Statistics are in parentheses and significance at the 10%, 5%, and 1% level is denoted by *, ** and *** respectively.

6.5 Robustness checks

To confirm the main results, a robustness check was performed by running the same set of regressions for a smaller data set of 1,260 observations over a reduced period of six years (2002-2007). Using a significantly reduced unbalanced sample does not fundamentally alter the results. Table 10 shows that the significance and the relative magnitude of influence of all variables of interest are preserved. Therefore, while controlling operating expenses remains the most important task for MFIs, credit risk, capital adequacy and scale economies play a significant role in determining MFI profitability.

Table 10: Random-effects GLS regression results (dependent variable: ROA)

Variable	Notation	Model specification
Log Size	S	0.0113*** (2.84)
Log Age	AG	-0.0104 (-0.89)
Capital	CAP	0.0508*** (2.46)
Gearing	GR	0.0198** (2.10)
Efficiency	EFF	-0.0951*** (-11.87)
Portfolio at risk	PAR	-0.0102*** (-2.56)
Loan size	LS	0.0031 (0.92)
Inflation expectations	INF	0.1668*** (2.89)
For profit	PROF	0.0105 (0.66)
Regulated	REG	-0.0005 (-0.02)
West Africa	WA	0.0487 (0.74)
South Africa	SA	0.0717 (1.08)
East Africa	EA	0.0494 (0.75)
Central Africa	CA	0.0449 (0.75)
R^2		0.39
No of obs.		444
Wald test		chi2(14)= 229.25 Prob>chi2= 0.0000
Breusch and Pagan Lagrangian multiplier test		chi2(1)=58.64 Prob>chi2= 0.0000 H0:Var(u_i)=0
Hausman specification test		chi2(9) = 35.97 Prob>chi2 = 0.0000 Ho: difference in coefficients not systematic

Estimations were performed using GLS estimation. T-Statistics are in parentheses and significance at the 10%, 5%, and 1% level is noted by *, ** and *** respectively.

7. Conclusions, policy implications and further research

In this study, we specified a dynamic empirical framework to investigate persistence of microfinance profits in Africa. All the estimated models are robust across various specifications. This makes the findings more reliable and credible. The study identifies a series of new findings and policy implications.

Although competition is effective in eliminating excess profit, the results suggest that this is not happening within microfinance industry in Africa. Therefore successful MFIs with advantages which enable them to earn supernormal profits can be expected to take measures to try and maintain those advantages in the future. This calls for some serious reconsideration of microfinance policy in Africa. Government regulations faced by MFIs are often ambiguous and opaque in most of the Sub-Sahara Africa countries which makes it difficult as well as labour intensive to create financial stable MFIs (see Lafourcade, et al 2006). Policymakers should therefore strive to remove MFI entry barriers as well as other obstacles to competition and similarly lower regulatory costs. Competition may support profitability of MFIs if the benefits of agglomeration effects and a stronger regulatory environment outweigh negative spillovers.

In order to maintain a competitive environment, policy makers will need to concentrate not only on

capital adequacy, but also on competition in product markets. That notwithstanding, few issues remain unresolved. For example, competition for deposits imposes a cost that has to be borne under increased microfinance competition, and its role should be analyzed in a dynamic framework that allows for the development of customer relationships. MFIs ability to raise funds may also be correlated with depositors' or investors' expectations concerning profitability, so that MFIs that are perceived as being profitable should find it easier to raise funds as well as entering new markets.

Given the important role that the microfinance sector plays in the expansion of the private sector, future research on the persistence of MFI profits should focus on country-specific studies that will provide country-level policy conclusions. The model put forward in this study can easily be expanded to include a persistence parameter that account for asymmetric profits and profit persistence dynamics or regime shifts in the autoregressive parameter governing the autocorrelation in profit rates. Put differently, future research should seek to answer research questions such as; to what extent is the estimated speed of adjustment for MFIs reporting negative profits different from that of positive profits and the impact of lending technology and the type of contract on profit persistence. Another possible extension could be the examination of differences in the determinants of profitability between small and large or high-profits and low-profits MFIs. These are important considerations for microfinance development in Africa.

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