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Determinants of profitability in microfinance institutions in Sub-Saharan Africa

A financial perspective on a uprising investment opportunity

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Bachelor Thesis - 15 ECTS
June 9, 2016

Abstract

The aim of this study was to investigate and present the most prominent determinants of profitability of microfinance institutions (MFI) in Sub-Saharan Africa. Creating an empirical framework including variables concluded to be of protruding effect to profitability and adapting it to the microfinance field, we are able to isolate the determinants which play the central role in this emerging market. The model is applied to a dataset of MFIs in Sub-Saharan Africa during the period 2005-2014, which result in estimations showing that MFI specific variables, such as credit risk, cost management and size are important factors in explaining why some succeed while others fail. We find some, yet sparse, convincing evidence of macroeconomic determinants significantly affecting MFI profitability, although we acknowledge our model may be limited in its ability to capture the complexity of the economic environment in Sub-Saharan Africa.

Acknowledgments

Abbreviations

CSR	-	Corporate Social Responsibility
FE	-	Fixed Effects
GDP	-	Gross Domestic Product
HHI	-	Herfindahl-Hirschman Index
MIX	-	Microfinance Information Exchange
MFI	-	Microfinance Institution
NBFI	-	Non-Bank Financial Institution
NGO	-	Non-Government Organization
NPO	-	Non-Profit Organizations
OLS	-	Ordinary Least Square
RE	-	Random Effects
ROA	-	Return on Assets
ROE	-	Return on Equity
SRI	-	Socially Responsible Investments
SSA	-	Sub-Saharan Africa

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1   Introduction

In 1990 Nobel laureate Robert E. Lucas wrote the article *"Why Doesn't capital Flow from Rich to Poor Countries?"* basing that exact question on calculations showing that the marginal product of capital was 58 times higher in India compared to the United States at that time. Basic economic theory tells us two things relevant to this matter. First, the law of diminishing returns, introduced by early economists such as Smith and Ricardo, implies that the marginal product of capital will be decreasing as the capital stock is increasing. Second, economic rationality implies investments and capital flows will always seek out the allocation of capital which yields the highest possible return. When compiling these theories with the findings of Lucas (1990) there is a clear discrepancy. We would expect capital to flow at unprecedented rates from the western world into developing economies in search of higher returns, whilst likely contributing to stronger economic development in the receiving country. However, in the development up until recently this has not been the case. The majority of loans in the poorer parts of the world are administered by local loan sharks at very high rates of interest and very short maturity periods. Furthermore, this leads us to observe many developing countries struggling with low degrees of capital intensity and credit crunches making it virtually impossible for them to create opportunities for entrepreneurs and businessmen.

The most thriving type of projects aimed at tackling this issue yet, are the microfinance institutions (MFIs). Introduced successfully by the Grameen Bank in Bangladesh, today hosting credit to over 7 million clients (Grameen, 2008) and enabling a larger part of the world's population to access credit. Thereby making possible investments in the development of small scale businesses. However, thus far a successful concept, the problems with MFIs have been considerable. Banerjee & Duflo (2012) point out problems of subsidy dependence and high default rates as issues of the industry. There are also a few fundamental problems with investments, and foremost loans to the poor. First, originating from the fact that the large mass of the poor in need of credit require comparatively small loans, the cost associated with administering micro loans has in many cases exceeded both the prospective earnings of the bank as well as the total amount of the loan. Second, institutional strength and political stability have not been sufficient to guarantee the safety of investments made in many of the affected regions. Weak ownership rights and an insufficient rule of law often cause high default rates and thereby large credit losses. Third, and to some extent a supposition, a large portion of investments and loan programs introduced to the poor up to this point have been part of aid programs, governmental projects or non-profit organizations (NPO) (Banerjee & Duflo, 2012), which cause developmental aspects to play a more central role, thereby overriding economic sustainability.

In more recent years private firms and investment banks have started to take more of an interest in this type of investing. Deutsche Bank, Citibank and others have developed an investment product for their clients making it possible for investors from the developed world to take part and benefit from the development of a credit sector in the poorer part of the world (Reille & Sananikone, 2007; Deutsche Bank, 2014; Citigroup, 2005; Credit-Suisse, 2016). First introduced as a part of their socially responsible investment (SRI) program it now develops into a new area of return seeking asset management. Aspects such as strong profitability, high interest rates and short maturity are put forward as factors which vouch for high return on invested capital (Dieckmann, 2007). The potential social development in addition to the raised profits introduces an opportunity of a double bottom line in this industry for a lot of companies. The social aspect is a strong marketing incentive which is now grabbing the attention of more and more actors in the market. Working in symbiosis the SRI programs provide a value for the recipients, whilst it also helps the benefactor in branding themselves as a responsible corporation. Furthermore, although microfinance is not immune to the effects of the world economy targeted by traditional banking, it is sometimes considered to be disconnected in the sense that the businesses in need of microcredit are usually engaged in areas where demand is relatively unaffected by the overall economic development. In this sense, microfinance provides a great diversification opportunity for investors looking for investment opportunities outside the developed world.

While parts of the western world still struggle with the aftermath of the 2008 financial crisis and investors worry about the stagnating growth of the Chinese economy, we find that of the World Bank's top 12 prospected growing economies, half of them are found in Sub-Saharan Africa (SSA) (World Bank Group, 2016). SSA has yet to see an expansion of microfinance equal to what has been observed in some countries in Latin America (Mexico) and Asia (India). Yet, it is currently growing rapidly, with expected growth of the microfinance industry at 15-20% in 2015 (Etzensperger, 2015). MFI growth in combination with commercial bank profits in SSA being higher than anywhere else in the world (Flamini *et al.*, 2009), vouch for economic prospects of these types of investments to be highly advantageous.

The aggregate conclusion we observe is; in the developing world there is still a rather large unexplored market for credit with potential returns reaching manifold of what is observed in the developed world. The attendant question to this matter is what actually marks a successful MFI program and how do we determine what they are? Like any investment decision, the investor wants to acquire as broad and accurate information about the potential investment as possible. However, research and analysis conducted on MFIs with a focus on microfinance as an investment perspective is scarce. Few studies explore

the return or profitability aspects and even fewer investigate the subject from the perspective of the investor. With previous research having primarily focused on outreach and poverty-reducing aspects of microfinance, the marketability of the concept as an investment opportunity remains rather unexplored. The lack of research on this aspect in turn reduces the possibility for investors to assimilate relevant information for their decisions. Likely resulting in skepticism towards the investment opportunity from parties which do not have the financial or administrative possibility to investigate the subject themselves.

Our objective is to shine light on the investment perspectives of MFIs and thereby create material for investors and future studies. Our hope is that this will lead to further investigation of the opportunity that microfinance can be both financially beneficial for the investor, as well as create development opportunities in the receiving countries. To achieve this objective the aim of this paper consists of two parts. First, we aspire to identify the primary determinants of profitability as measured by return on assets as well as return on equity in microfinance institutions in Sub-Saharan Africa. Second, having determined the mark of a successful MFI in SSA, we want to pinpoint which type of organization is best suited, and perhaps most needed, in the microfinance industry in SSA.

The remaining part of this paper is structured as follows: Section 2 will present a brief review of the literature covering determinants of other financial institutions, and to some extent also that of institutions operating in the chosen region of study. Section 3 introduces the theoretical framework and methodology which will be applied in the study. Section 4 presents the data and variables included in the model. Section 5 presents the main results of the study and discusses some potential implications. Section 6 provides concluding remarks and provides some recommendations and food for thought concerning the future development of the investment industry engaged in MFI projects.

2   Literature review

This section provides a brief non-exhaustive review of previous literature of relevance to our study. We have encountered literature conducting comprehensive bank profitability studies as well as in depth analysis of factors specific to microfinance. However, we have been unsuccessful in locating research with the aim of analyzing MFIs as an investment vehicle. Literature of relevance has therefore been a combination of performance analysis of commercial banks, which have provided us with an understanding of how to measure profitability in combination with specific MFI orientated studies, allowing us to better adapt our study to the field of microfinance. When conducting similar studies, the literature typically considers two aspects of determinants; specific characteristics of each financial institution and macroeconomic characteristics under which the financial institutions operate. The literature review will consequently be structured accordingly.

One of the most frequently observed components of institution-specific characteristics is risk taking. Financial theory tells us that accepting a higher level of risk could potentially result in higher rewards. Risk is typically split up into three subcategories in the literature; credit risk, i.e. risk on loans, diversification, i.e. risk involved with relying on one or few income generating activities and financial risk, i.e. risk in the funding structure of the institution. Previous studies have examined the effects of credit risk on profitability with varying results. Dietrich & Wanzenried (2014) discovered a strongly significant negative effect of credit risk on profitability looking at data from 118 countries, as was also the case of Miller & Noulas (1997) study on profitability in the United States. On the other hand, analyzing profitability in commercial banks in Sub-Saharan Africa, Flamini *et al.* (2009) showed a positive significant effect of credit risk. Flamini *et al.* (2009) also found the ratio of net interest revenues in relation to other operating income to be negative and highly significant. Thus implying institutions would benefit from diversifying their activities. Demirgüç-Kunt & Huizinga (1998) found evidence in their study of banks from 80 countries over an eight year period that banks with higher ratio of non-interest earning assets to total assets were less profitable than their counterparts. Whereas interest earning income is potentially riskier than other operating income due to the possibility of default, it can however pay off in higher revenue. In terms of risk involved in the funding structure, highly leveraged institutions can generate larger profits by increasing their gross loan portfolio which earns interest income. Meanwhile they are at greater risk due to the aggressive debt funded growth approach, which will generate higher interest expenses. While interest income comes with a degree of uncertainty, debt payments do not and could result in large losses when interest income is declining. Studies have shown an endogenous growth approach to be more beneficial for profitability (Berger 1995; Flamini *et al.*, 2009; Athanasoglou *et al.*, 2008).

Several studies have examined the role of market concentration on profitability in banking businesses. The findings of Short (1979) indicate concentration has a role in explaining profitability in banks, although the relatively small coefficient levels in his results conclude a large change in concentration would be required in order to notice a change in profitability. Bourke (1988) as well as Molyneux & Thornton (1992) find evidence supporting a positive effect of market concentration on profitability.

Given the current development of the MFI market, the different types of actors in the market is an interesting parameter to the profitability of different programs. First, while a rising amount of private, corporate controlled actors are making an entrance in the market there are still a substantial amount of NGOs, non-profits and similar types of private or government owned institutions involved in the MFI industry. The literature thoroughly discusses the question of whether profitability of a company in general is to any extent

related with the ownership structure. Short (1979) found little support of the theory that privately-owned companies produce higher economic profits while Molyneux & Thornton (1992) find there to be little evidence supporting any correlation between ownership and profitability at all. Drawing partly from these earlier studies, Delis (2006) investigates the effect ownership has on bank profitability. The results also found ownership to have an insignificant effect on profitability. However, as many MFI programs were developed in an attempt to reduce poverty it may be speculated that the ownership directives of those institutions are more directed towards development and less so towards profit.

One of the major issues of MFIs to date has been to create enough efficiency in a large and otherwise inert organization in order to make micro loans profitable. In this aspect cost management becomes a highly important parameter. The system of MFIs requires administrative costs to be very small on a per loan basis which is why the adaption of a cost efficient system is expected to play a large role in the success of an MFI. Different perspectives on the topic of cost management have previously been discussed by Hartarska (2005) and Flamini *et al.* (2009), also highlighting the importance of operating efficiency. The aggregate conclusion is that cost management does play a role in the profitability of the studied institutions. Roberts (2013) investigates whether the microfinance sector benefits from more MFIs with a stronger profit minded approach, following the recent debates of the increase in profit oriented microfinance institutions. His results point towards the fact that for-profit MFIs provide loans with higher interest rates than their non-profit counterparts. However, as the costs of for-profit MFIs are also higher, in part due to greater salary costs for highly paid executives, their profits are not higher. He highlights the importance of cost management in order to provide lower interest rates to clients, not only in order to be profitable but also to contribute to the MFI community by providing cheaper credit to poor clients.

The general perception of increasing size is that with larger size comes greater opportunities for specialization and thereby efficiency and higher profits, Marshall & Weiss (1967). In contrast, the problem of larger banks related with engagements in MFIs has been that large administrations and complex control systems has made it uneconomical to development any MFI programs reaching beyond the point of CSR Banerjee & Duflo, 2012).

Macroeconomic variables are introduced among those studies in the literature which concern cross-country analysis in order to capture and control for the differing economic and institutional environments. Strength of domestic institutions and rule of law are commonly discussed as important factors of economic growth and development. Demirgüç-Kunt & Huizinga (1999) highlight that the strength of institutions may play a role in determining efficiency on a company level. When debating the topic of institutions in

a developing context, like that of many SSA countries, links are often made between ownership rights, political stability and rule of law and their importance in creating a favorable business climate. Flamini *et al.* (2009) discuss the importance of institutions in SSA specifically with respect to profitability in the banking sector. However, in their study they are unable to find a statistically significant effect of institutional quality. Ahlin, *et al.* (2011) analysis on MFIs shows the importance of including the macroeconomic perspective when conducting a cross country comparison of MFIs. Their findings include GDP growth affecting performance, attributing the increased performance to lower default rates which arise from GDP growth. Demirgüc-Kunt & Huizinga (1999) found evidence of economic development along with higher inflation positively affecting profits and institutional factors were found to be of importance, especially in developing countries.

3 Methodology

3.1 Simple linear regression model

To estimate the determinants of profitability we will begin by introducing a simple linear regression model. Ordinary least squares (OLS) is applied to our unbalanced panel data. The model in its general form is presented as follows:

$$P_{it} = C + \sum_{b=1}^{B} \beta_b X_{it}^b + \sum_{m=1}^{M} \beta_m X_{it}^m + \varepsilon_{it}$$

Where C is a constant term, X_{it}^b are the institution specific explanatory variables and X_{it}^m are the macroeconomic control variables. Furthermore, dividing the institution specific and macroeconomic determinants into their respective components derives the simple linear regression which will provide baseline estimates of profitability determinants:

$$
\begin{aligned}
P_{it} = \beta_0 &+ \beta_1 CRED_{it} + \beta_2 MIX_{it} + \beta_3 LEV_{it} + \beta_4 CONC_{it} + \beta_5 BANK_{it} \\
&+ \beta_6 NBFI_{it} + \beta_7 NGO_{it} + \beta_8 UNION_{it} + \beta_9 COST_{it} + \beta_{10} SIZE_{it} + \beta_{11} INST_{it} \\
&+ \beta_{12} GDP_{it} + \beta_{13} DEV_{it} + \beta_{14} RATE_{it} + \varepsilon_{it}
\end{aligned}
$$

Where P_{it} is profitability of institution i at time t measured by return on assets/return on equity and β_0 is a constant. $CRED_{it}$ is the credit risk of institutions defined by the write-off ratio; MIX_{it} is the diversification risk calculated from the institutions net interest income in relation to other operating income, LEV_{it} is the financial risk measured by the institutions equity to assets ratio; $CONC_{it}$ is the market concentration calculated using the Herfindahl-Hirschman index; $COST_{it}$ represents cost management where the

logarithm of each institution's total operating expenses is used as a proxy; $SIZE_{it}$ is the size of the MFI measured by the logarithm of gross loan portfolio; $INST_{it}$ is the institutional strength of the firms registered native country measured by a self-compiled index based on the World Bank "Ease of Doing Business Index", GDP_{it} is the cyclical output effect controlled through the GDP growth of the primary operating country; DEV_{it} is the economic development represented by the GDP per capita measure of the operational country; $RATE_{it}$ is the real interest rate in the primary operational country. Finally, ε_{it} is the idiosyncratic error term including the unobserved effect.

3.2   Extented model

The simple linear model is extended by including the square of $SIZE_{it}$ to investigate whether MFIs in SSA exhibit inefficiencies with increasing scale. Furthermore, an interaction term between real interest rates and financial risk is also included to enrich the model. The variables are added to the simple linear model to produce the extended model:

$$
\begin{aligned}
P_{it} = {} & \beta_0 + \beta_1 CRED_{it} + \beta_2 MIX_{it} + \beta_3 LEV_{it} + \beta_4 LEVRATE_{it} + \beta_5 CONC_{it} \\
& + \beta_6 BANK_{it} + \beta_7 NBFI_{it} + \beta_8 NGO_{it} + \beta_9 UNION_{it} + \beta_{10} COST_{it} + \beta_{11} SIZE_{it} \\
& + \beta_{12} SIZE_{it}^2 + \beta_{13} INST_{it} + \beta_{14} GDP_{it} + \beta_{15} DEV_{it} + \beta_{16} RATE_{it} + \varepsilon_{it}
\end{aligned}
$$

Where $LEVRATE_{it}$ is an interaction term between financial risk and real interest rate (i.e. $LEV_{it}*RATE_{it}$) and $SIZE_{it}^2$ is the logarithm of gross loan portfolio squared.

3.3   Pooled OLS

The simple and extended model described above will be run in three different econometric environments. The first of which is a pooled OLS approach. The pooled OLS model leaves the unobserved effect α_i (i.e. all unobserved factors affecting profitability that do not change over time) in the idiosyncratic error term ε_{it} (i.e. all time-varying unobserved factors affecting profitability), thus creating a *composite error term* defined as follows (Wooldridge, 2008;2009):

$$v_{it} = \alpha_i + \varepsilon_{it}$$

Since α_i is a time-constant unobserved effect, it creates serial correlation between the v_{it} terms over time. This serial correlation can be quite significant and the estimates using pooled OLS will therefore be incorrect, as will the test statistics that follow (ibid.). In spite of this fact, pooled OLS results are included to provide baseline estimates and will allow us to analyze the bias created by the serial correlation when comparing it with the following two environments.

3.4 Random effects vs fixed effects model

The key factor to consider when determining between a random effects model and a fixed effects model is whether it is reasonable to assume that the unobserved effect α_i is uncorrelated with all of the explanatory variables (Wooldridge,2008;2009). Elaborating the argument we find it unlikely that this is the case. Potential correlation might be found in differing regulation standards in terms of capital flows in and out of the observed countries, where this could affect the availability to credit thus limiting the MFIs ability to leverage their business. Consequently, higher leverage among MFIs might in part be attributed to less restrictive capital controls. The fixed effects model allows correlation between α_i and the explanatory variables for any t which eliminates the possibility to include any time constant variables (ibid.). Consequently, the legal status dummy indicating institution type will be omitted in the fixed effects model as it does not vary over the observed period. Whereas this opportunity is still possible under a random effects model, we do not find it reasonable to assume there is no correlation between the time-constant unobserved effect and all of the explanatory variables. Therefore, we assume the fixed effects model to be better suited for this study.

To formally test this hypothesis, a Hausman specification test (1978) will be applied. The test compares the results from a random effects model and a fixed effects model and tests the null hypothesis that differences in coefficients are not systematic. A rejection of the null hypothesis would point in favor of a fixed effects model. Failure to reject would either imply differences between the two are insignificant and therefore either one could be used, or that variation in the sample of the fixed effects model is large enough making it impossible to prove practical significance (ibid.).

To summarize, the methodology we intend to apply uses two different regressions (simple model and extended model), run in three different environments (pooled OLS, random effects and fixed effects). Pooled OLS results will be included as a baseline estimator and to analyze the bias following the random effects and fixed effects models. With the previous argument in mind, the discussion of the results will be based on the estimates from the fixed effects model as we assume it to be the most reliable in allowing us to achieve the goal of our study.

3.5 Validity of the model

Being a study of market movements and business structures in the developing world we are also bound to deal with issues of endogeneity due to omitted variables which we have been unable to include following either limitations in the data or restrictions of a feasible model. It is likely that macroeconomic variables concerning capital controls and restric-

tions of inflow of foreign money will have an effect on the development of invested-funded MFIs. We may assume that these types of controls can affect our measure of institutional stability and even the leverage of some MFIs because of a potential lack of capital that may occur. A possible dependence between the observed variables and what may be located in the unobserved term in our estimation in either direction may cause a correlation of unobserved effects resulting in biased estimation results. Isolating variables completely in a macroeconomic environment is difficult because of the obvious correlation between aspects compounded on a macro-level and the characteristics of the studied market and vice versa. Similarly, in this study there may be factors included in the unobserved term that have some effect on the observed variables. For example, market factors which have an effect on competition, regulations or business climate of one market are likely to have some effect on the performance of firms even though they are not clearly linked in the same specific market. Furthermore, because of the lack of a clear link between the aspects or variables, it might not be obvious to include an additional variable with relation to the studied subject. In this study the intention has been to include variables which may cover a larger part of the market aspect intended to be investigated whilst at the same time creating a lucid model. The weaknesses presented above are part of a given complex of problems when conducting a study on a regional level with as comprehensive data as the one analyzed in this study. We have aimed to tackle this issue by including as consolidating variables as possible of the studied area as well as include the endogeneity aspect in our interpretation of the estimation results.

4 Data

Our dataset consists of unbalanced panel data from 22 countries[1] in Sub-Saharan Africa during the ten year period of 2005-2014[2]. The dataset consist of 502 observations from 171 different MFIs categorized into four separate subsets of MFI types: Bank, Non-Governmental Organization, Non-Bank Financial Institution and Credit Union /Cooperative. In total, the dataset includes observations from 106 banks, 127 NGOs, 208 NBFIs and 61 Credit Union/Cooperatives. The following part of this section is a dicussion of the data validity and a description of the variables which will be used to analyze the determinants of profitability in microfinance institutions in SSA. The description includes a detailed overview of how each specific variable will be modeled and how we expect the variable to influence our profitability variables.

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[1]See table IV in appendix for full list of included countries. Countries not included have been removed due to insufficient data.

[2]Period was chosen based on available data.

4.1 Validity of the data

The dataset used in this study is self-compiled using data from two primary sources. First, the Microfinance Information Exchange (MIX) provides data on MFI specific variables and factors connected to that industry in particular. Originating out of Washington, USA, with financing from CGAP, Bill and Melinda Gates foundation and Citi Foundation among others, the non-profit organization focuses on distributing reliant data on MFIs and has provided data to several similar studies. MIX being financed by strong international aid and investment entities and being used by eminent researchers and policymakers we are confident in the reliance on this data collection. Second, the macroeconomic variables used in the analyzed dataset are collected from the World Bank database. As the World Bank represents one of the major sources of international data collection, we are confident in the validity of this data. Furthermore, because the data used in this study is collected by entities which are independent from any specific influence we assume bias of the raw data not to be an issue.

MIX defines a microfinance institution based on the size of loans they provide, thus MFIs included in our dataset do not necessarily focus their business exclusively on microfinance. Although a part of this possibility is captured by diversification risk variable which will be described in the section below, not all of the variation in the firms profits may originate from microfinance related business. The most prominently recurring issue when compiling the dataset was missing observations for certain variables among MFIs. This issue originated partly from the fact that we set no transparency requirements on MFIs included in the study. The approach resulted in both positive and negative aspects; by allowing all potential MFI actors to be included, more observations in our dataset could be recorded as well as increasing diversification of the sample. On the other hand, missing observations of certain variables led to a high dropout rate which resulted in a skewed representation in the distribution. In addition, arising from the issue of exclusion of observations and the inability to control for all factors which may affect the result, we can assume that the dropout of some observations is to an extent correlated with the idiosyncratic errors of those observations. An example would be a change of ownership or legal requirements in terms of reporting practices, leading to data potentially not being available in areas where it was previously included. The result of this concern is that the remaining sample section may produce biased estimators. Despite the demarcated nature of our study we have been able to find widespread data allowing us to implement a broad approach without having to adapt our model to fit the data in any greater extent.

4.2 Dependent variables

Return on assets (ROA) and return on equity (ROE) will both be used as measures of profitability. While the two measurements are similar, they do exhibit some differences. ROE is a good base measurement of how well management is able to translate shareholder equity into profits. However, ROE does not take into account the leverage in the business. Assets financed by debt can potentially translate into higher profits given that management has more to work with. A business funded to a large extent by debt could present high net income, and thus also an impressively high ROE whereas ROA might be significantly lower, highlighting the need to analyze both metrics when measuring profitability.

4.3 Independent variables

4.3.1 MFI-specific determinants

As a proxy for *credit risk*, we will be using the write-off ratio[3] of the observed MFIs. Given the high risk environments the microfinance institutions operate in, we expect the institutions which are able to withstand the possibility of an increase in loan loss rate to benefit in terms of higher profits following the higher risk they are willing to accept.

We will be using the same proxy as Flamini *et al.* (2009) to represent *diversification risk*, i.e. net interest revenues/other operating income. Continuing on the previous argument for credit risk, we expect the high risk environment we are studying to benefit those with a higher degree of interest earning income.

To capture the risk involved in the funding structure, the ratio of shareholder equity in relation to total assets will be used. Our prediction regarding the effect of *financial risk* is a positive effect on profitability as we believe the larger ratio of assets management has to work with will be beneficial as they can gain more income through increased lending. As ROE does not include the potential higher leverage in an institution, the leverage measure will not be included when using ROA as the dependent variable.

A Herfindahl-Hirschman Index (HHI) will be constructed to describe *market concentration* in the microfinance industry in each country. The HHI index is used to depict an aspect of the market climate in studies of company performance on a macro level. The calculation of the index is described thoroughly by S.A Rhoades (1993); a brief introduction will be presented below.

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[3]http://www.mixmarket.org/about/faqs/glossary - Write-off ratio is calculated as the amount of loans removed from the loan portfolio once they have been recognized as noncollectable in relation to the gross loan portfolio of the same period.

We calculate the index by squaring the market share[4] of each MFI and then summing the squares for each market. Algebraically, the index is calculated as follows:

$$HHI = \sum_{i=1}^{n} \left(MS_{it}\right)^2$$

Where n is the number of firms in the market in each respective country and MS_{it} is the market share of firm i measured in whole percentages at time t. Consequently, the index will range between 0 and 10,000; 10,000 indicating a perfectly concentrated monopolistic market, which would present a single firm with 100% of the market. A small number however, indicates a greater number of smaller and more equal firms and illustrates a highly competitive market. The market share of each firm was calculated based on the total amount of gross loan portfolio in the nation before observations were excluded due to missing data on certain variables.

In order to include the effect differing directives among *institution type* may have on the profitability of an institution we will include dummy variables describing the different types of organizations in our data set. Institutions are divided into bank (BANK), non-bank financial institution (NBFI), cooperative/credit union (UNION) and non-governmental organization (NGO). We expect to observe a higher level of profit orientation among the banking institutions and hence expect a positive coefficient for BANK[5].

The variable operating expense is designated as proxy for *operating efficiency*. Operating expenses includes all costs related to operations including personnel costs, financial costs and administrative expenses[6]. We expect this variable to report a negative causation on profitability, i.e. higher costs are disadvantageous.

The logarithm of each MFIs gross loan portfolio is used to proxy MFI *size* which will give us a good idea of their operational capacity. We expect to find evidence of economies of scale, thus suggesting a positive causation on profitability. The logarithm of squared gross loan portfolio will also be introduced to capture the possibility of diseconomies of scale.

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[4]Market share is calculated by using the share of each MFIs gross loan portfolio in relation to the total gross loan portfolio in the respective country.

[5]When running the regression using a fixed effects model, variables which do not change over time are already controlled for. Therefore, the variables for institution type are not shown in the output.

[6]Mix market, "Glossary", 2012, http://www.mixmarket.org/about/faqs/glossary (acquired 2016-05-16).

4.3.2 Macroeconomic determinants

Institutional quality is modeled by using a compounded index including variables from the World Bank "Distance to Frontier"[7] databank. The World Bank assesses the quality of a range of regulatory institutions on a yearly basis to investigate the structural and bureaucratic fundamental conditions of doing business in the region. As comprehensive information was not available for all years included in our study we chose a select set of variables based on relevance to our study and availability: "Starting a business", "Getting Credit" and "Contract Enforcement"[8].

Cyclical output effects are controlled for by using GDP growth in each separate country as a proxy. A positive coefficient is expected as a result of cyclical output on profitability. When GDP is growing we would expect to see an increased surge in credit demand, boosting the revenues of MFIs. Likewise, low levels of GDP growth or perhaps decline put a constraint on the credit market limiting the profit potential.

In attempting to control for differences in the *economic development* between countries we use the logarithm of GDP per capita. This measure lets us, to some extent, control for the effect of differing developmental levels on the outcome of MFI programs as well as a general measurement of the improvement or decline in living standards. Like the write-off ratio variable, the expected outcome of this variable is somewhat ambiguous. We know from previous studies (e.g. Lucas, 1990) that relatively poorer individuals have a higher potential marginal return. However, the development level must be high enough to enable the individuals taking part in the programs to reach that potential. The most potential lies with the part of the poor which have already covered their basic needs and require funding to help expand their businesses.

Interest rate is included to reflect differing funding costs between nations which inherently create widespread profitability opportunities. Another aspect we wish to capture is the volatility of lending interest rates and the MFIs ability to adapt to changing conditions in their respective countries. In economic regions where inflation and lending interest rates are chronically difficult to anticipate, it will be hard to set an adjusted interest rate accordingly. Therefore, we expect a negative causality of increasing interest rates on MFI profitability. To further investigate this possibility, an interaction term between financial risk and interest rate will be included in the study. Using real interest rates as a proxy will allow us to also include the effects of inflation.

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[7]World Bank "Distance to Frontier" http://www.doingbusiness.org/data/distance-to-frontier (acquired 2016- 05-24)

[8]The index was calculated by giving the variables an equal weight in a compounded index reaching the full span of the investigated period.

Table I: Summary statistics

Variable	Definition/Measure	Notation	Obs.	Mean	Std.Dev.	Min	Max	Expected effect
Dependent variable								
Profitability	Net income/average assets	ROA	502	-0.0159	0.1434	-0.9918	0.9731	
	Net income/average equity	ROE	502	-0.0011	0.5816	-5.035	4.1377	
MFI specific determinants								
Credit risk	Write-off ratio	CRED	502	0.0262	0.0506	-0.0194	0.7001	Positive
Diversification risk	Net interest income/Other operating income	MIX	502	0.3632	0.1041	0.1087	1.0191	Positive
Financial risk	Equity/Assets ratio	LEV	502	0.3632	0.2383	-0.5112	1	Positive
	Interaction term between financial risk and real interest rate	LEVRATE	502	0.0346	0.0699	-0.2933	0.3929	Negative
Market concentration	Herfindahl-Hirschman Index (HHI)	CONC	502	3002.3390	2543.4320	1	10000	?
Legal Status	Dummy variable: 1 = if relevant institution type 0 = otherwise	BANK	502	0.2112	0.4085	0	1	Positive
		NBFI	502	0.4143	0.4931	0	1	?
		NGO	502	0.253	0.4352	0	1	?
		UNION	502	0.1215	0.327	0	1	?
Cost management	Logarithm of total operating expense	COST	502	14.2043	1.7155	8.8881	19.6991	Negative
Size	Logarithm of gross loan portfolio	SIZE	502	15.346	1.8984	9.2262	21.9523	Positive
	(Logarithm of gross loan portfolio)^2	SIZE2	502	239.0975	59.9951	85.122	481.9019	Negative
Macroeconomic determinants								
Institutional stability	Compounded index based on World Bank indicators	INST	502	50.2064	12.1731	21.6133	78.94	Positive
Cyclical output	GDP annual growth (%)	GDP	502	0.0644	0.0325	-0.0401	0.2259	Positive
Economic development	Logarithm of GDP/Capita	DEV	502	6.081	0.7161	4.976	8.7144	Positive
Interest rate	Real interest rate (%)	RATE	502	0.0945	0.1445	-0.4231	0.5232	Negative

Summary statistics presents variable definitions and notations of measure as well as number of observations, the mean, the standard deviation, minimum and maximum observed value registered for each variable within the sample. Source of data: World Bank Database http://data.worldbank.org/ (Acquired 2016-05-25) and MIX Market, 2016, https://reports.mixmarket.org/crossmarket - (Acquired 2016-05-15)

5   Results & Discussion

We examine MFI profitability using an unbalanced panel dataset of microfinance institutions active in the SSA region during the period 2005-2014. The econometric approach towards the models presented in section III will form the basis of our analysis conducted in this section. The emphasis of the analysis is put on the institution specific determinants and, in which way and at what magnitude they affect the dependent variables studied. The first stage of the analysis is to distinguish between a fixed effects (FE) model and a random effects (RE) model. As previously discussed, as we find it unlikely that the time-constant unobserved factor is uncorrelated with all explanatory variables, we assume the FE model to be favorable in describing profitability determinants. However, the Hausman specification test[9] is used as a way of formally detecting whether this reasoning seems to hold. The test rejects the null hypothesis that differences in coefficients between RE and FE models are not systematic when regressing on ROA, favoring the FE model. When running the regression on ROE on the other hand, the Hausman test fails to reject. Second, we investigate the fit of the model in relation to the data. As the F-statistics and Wald-statistics are highly significant throughout our regressions, we can conclude that the model fits the data quite well and will provide reasonable estimates. Third, our results remain relatively steady across our regressions, both in terms of statistical significance and magnitude, providing evidence of the robustness in our model.

The following part of this section presents and discusses the results of our analysis. Table II reports the results of the estimation by the model presented above using ROA to describe the profitability of MFIs. Table III reports our results when ROA is substituted for ROE.

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[9]See Table V in appendix for results.

Table II: Return on assets regression results

Variable	Pooled OLS		Random effects		Fixed effects	
	(1)	(2)	(1)	(2)	(1)	(2)
CRED	-0.547***	-0.549***	-0.534***	-0.548***	-0.524***	-0.526***
	(0.200)	(0.194)	(0.184)	(0.172)	(0.178)	(0.160)
MIX	-0.129**	-0.156**	-0.150	-0.160*	-0.182	-0.172
	(0.062)	(0.065)	(0.092)	(0.091)	(0.120)	(0.113)
LEV	0.092**	0.147***	0.089	0.168***	0.070	0.181**
	(0.036)	(0.046)	(0.063)	(0.062)	(0.103)	(0.090)
LEVRATE		-0.350*		-0.646**		-0.906**
		(0.192)		(0.330)		(0.416)
CONC	-0.000***	-0.000**	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BANK	-0.008	-0.006	-0.005	-0.010		
	(0.025)	(0.025)	(0.042)	(0.044)		
NBFI	-0.041*	-0.048**	-0.059	-0.079*		
	(0.024)	(0.024)	(0.041)	(0.043)		
NGO	-0.018	-0.019	-0.009	-0.020		
	(0.028)	(0.029)	(0.047)	(0.049)		
COST	-0.084***	-0.086***	-0.117***	-0.116***	-0.166***	-0.157***
	(0.012)	(0.012)	(0.019)	(0.018)	(0.029)	(0.027)
SIZE	0.092***	0.190***	0.120***	0.280***	0.151***	0.370***
	(0.012)	(0.040)	(0.019)	(0.064)	(0.032)	(0.109)
SIZE2		-0.003***		-0.005***		-0.007**
		(0.001)		(0.002)		(0.003)
INST	0.000	0.001	0.001	0.001	-0.000	-0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
GDP	0.016	0.011	-0.135	-0.146	-0.290	-0.310
	(0.185)	(0.184)	(0.226)	(0.220)	(0.285)	(0.274)
DEV	0.037***	0.036***	0.020	0.017	0.232*	0.268**
	(0.010)	(0.010)	(0.016)	(0.016)	(0.135)	(0.111)
RATE	0.026	0.158**	0.057	0.291**	0.088	0.412***
	(0.035)	(0.070)	(0.036)	(0.121)	(0.060)	(0.144)
Constant	-0.324***	-1.080***	-0.205	-1.450***	-1.205*	-3.225***
	(0.092)	(0.306)	(0.127)	(0.493)	(0.657)	(1.012)
Observations	502	502	502	502	502	502
R^2	0.330	0.348	0.317	0.327	0.181	0.163
F-statistic	8.72	9.08			6.27	7.10
	(0.000)	(0.000)			(0.000)	(0.000)
Wald-statistic			82.33	109.11		
			(0.000)	(0.000)		

***Significant at the 1% level; **Significant at the 5% level; *Significant at the 10% level. Robust standard errors denoted in parentheses. Probability values denoted in parentheses for the F-& Wald-statistics. Regressions (1) & (2) represent the simple and extended model respectively, see methodology for further explanation.

Table III: Return on equity regression results

Variable	Pooled OLS		Random effects		Fixed effects	
	(1)	(2)	(1)	(2)	(1)	(2)
CRED	-0.560	-0.560	-0.349	-0.356	0.066	0.025
	(1.110)	(1.111)	(1.080)	(1.087)	(1.010)	(1.055)
MIX	-0.800***	-0.800***	-0.856**	-0.864**	-1.200*	-1.220*
	(0.293)	(0.304)	(0.435)	(0.439)	(0.632)	(0.633)
CONC	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BANK	0.033	0.033	0.006	0.005		
	(0.000)	(0.101)	(0.153)	(0.154)		
NBFI	-0.107	-0.107	-0.160	-0.172		
	(0.097)	(0.095)	(0.144)	(0.143)		
NGO	0.063	0.063	0.007	-0.002		
	(0.127)	(0.124)	(0.189)	(0.187)		
COST	-0.233***	-0.233***	-0.279***	-0.280***	-0.412***	-0.393***
	(0.048)	(0.048)	(0.067)	(0.067)	(0.137)	(0.133)
SIZE	0.243***	0.242*	0.277***	0.374***	0.394***	0.810***
	(0.047)	(0.129)	(0.062)	(0.139)	(0.103)	(0.224)
SIZE2		0.000		-0.003		-0.013**
		(0.004)		(0.004)		(0.006)
INST	-0.003	-0.003	-0.002	-0.002	-0.012	-0.012*
	(0.003)	(0.003)	(0.040)	(0.004)	(0.007)	(0.007)
GDP	2.170**	2.175**	1.600	1.603	0.631	0.722
	(1.080)	(1.080)	(0.981)	(0.982)	(1.088)	(1.073)
DEV	0.130***	0.130***	0.083	0.082	0.586	0.538
	(0.047)	(0.047)	(0.066)	(0.066)	(0.404)	(0.392)
RATE	0.130***	0.325*	0.410**	0.407**	0.675***	0.680***
	(0.168)	(0.167)	(0.162)	(0.162)	(0.560)	(0.258)
Constant	-0.441	-0.434	0.035	-0.675	-2.173	-5.319**
	(0.325)	(0.842)	(0.484)	(0.898)	(1.884)	(2.472)
Observations	502	502	502	502	502	502
R^2	0.148	0.148	0.140	0.139	0.090	0.090
F-statistic	7.47	7.26			4.73	5.10
	(0.000)	(0.000)			(0.000)	(0.000)
Wald-statistic			60.78	63.66		
			(0.000)	(0.000)		

***Significant at the 1% level; **Significant at the 5% level; *Significant at the 10% level. Robust standard errors denoted in parentheses. Probability values denoted in parentheses for the F-& Wald-statistics. Regressions (1) & (2) represent the simple and extended model respectively, see methodology for further explanation.

Contrary to the findings of Flamini *et al.* (2009) who observed credit risk as a positive driver of commercial banking profits in SSA, our analysis suggests the opposite for MFIs in SSA. Credit risk is statistically significant and negatively correlated with profitability when measured as ROA. When using ROE as the dependent variable, we observe no such evidence. The result is not what we expected, yet not surprising. We argued previously that MFIs able to handle a greater level risk could potentially be rewarded with greater profits. It seems risk management is more important than risk taking in search of profits in microfinance in SSA. Whereas commercial banking relies on collateral as security for loans, the poor generally have very little or nothing at all to use as collateral. This fact highlights an important factor separating microfinance from regular commercial banking. The lack of collateral requires MFIs to approach credit risk in a unique way. MFIs typically use group lending as method of controlling the risk involved, where a group of borrowers will engage in a loan together, thus making each one of them responsible for their partners ability to repay the loan (Banerjee & Duflo, 2012). The groups will typically be assembled by the group members themselves, thus simplifying the screening process. The members of the group have agreed to engage in a joint loan with the other members because they trust their ability to repay the loan. Whereas collateral can decrease in value or be over leveraged, thus endangering the security behind the loan, the approach towards microfinance in response to a lack of collateral may actually imply that the microfinance industry is less risky and less susceptible to collapses. Our findings of the effect of credit risk may be inconsistent with commercial banking evidence in SSA, but are in line with the results from Dietrich & Wanzenried (2014), who also find credit risk management to be an important explanatory factor of profitability.

The significant and negative sign of the diversification risk measured by the ratio of net interest income to other operating income indicates that profitable firms in SSA typically have a larger share of income unassociated with the riskier interest based income. Whereas we had expected the opposite effect from diversification of income activities, our argument was based on the expectation that higher risk taking would pay off in SSA. The findings are in line with previous findings of Demirgüc-Kunt & Huizinga (1998) as well as our results from credit risk, further highlighting the need for risk management.

Leverage is only included when running the regression on ROA as it will produce a biased result when regressing on ROE. The model presents statistically significant and positive results of financial risk, which is in line with the expectations of leverage effect on institutions involved in lending activities. With a higher advance ration the institution is able to earn a higher return relative to equity. However, the increased debt incurrence also presents a greater risk which is highlighted by the interaction term of real interest rates and financial risk showing a negative and significant coefficient. The magnitude of

the coefficient is quite substantial, suggesting that highly leveraged firms suffer in highly volatile markets in terms of inflation and interest rates.

Market concentration was included in the study as a measure of the competitive situation institutions encounter in their respective nations and measured via the individual institutions share of national gross loan portfolio compiled into an HHI-index. The model does not however produce any statistically significant estimator for market concentration on neither ROA nor ROE. It is possible that in our construction of the HHI index we are unable to construct an index which in a reliable way captures the situation, possibly implying the actual competitive situation differs considerably to what is portrayed in the index.

Size of the studied institutions as measured by the gross loan portfolio is positive and statistically significant when profitability is measured as both ROA and ROE. The results confirm our previous expectations and provide proof that MFIs are no different than other organizations in terms of efficiency gains following economies of scale. Being able to expand with further local offices help MFIs extend their outreach and thereby also increase their gross loan portfolio which earns interest payments. Including the squared variable of gross loan portfolio provides evidence that some diseconomies of scale do exist among MFIs in SSA. However, as the coefficient is very small, a significant change in the size of the institution is required to have an observable effect on profitability.

Along with size, cost management is also highly significant when regressing on both dependent variables. The negative correlation between costs and profitability confirms what we previously expected and comes as no surprise. Our findings further support the results of Flamini et al. (2009) as well as Hartarska (2005). Cost management is of critical importance in any business. However, in microfinance it is especially important. Not only is cost management a necessity to be profitable, but also to achieve what microfinance originally set out to do, reduce poverty. By depressing total operating costs and costs per loan, MFIs can offer more competitively priced loan services. Lower interest rates will make the institution more attractive whilst simultaneously lowering the risk of default since the total amount to be repaid is lower than what was previously the case. A lower cost per loan will also allow the MFI to provide cheap credit to more people. The situation is potentially mutually beneficial where MFIs can benefit from higher profits as credit is available to more people who in turn could use the credit as an escape out of the struggle of poverty. Recapping to Roberts (2013) study which found that profit orientated MFIs tended to seek higher profits by hiring highly skilled top level executives who naturally required high salary. Interest rates would as a consequence be higher and all above mentioned advantages of cost management would be lost. Cost management is no easy endeavor; only highly skilled managers will be able to depress costs to a minimum level while still

maintaining a certain degree of operational size. Yet, acquiring that level of skill comes at a price. Thus, there has to be a balance between depressing costs and the level of spending to achieve that goal.

The results from the macroeconomic determinants are quite surprising. Real interest rate has a highly significant effect on profitability while economic development presents relatively weak yet significant results when regressing on ROA. We do not observe any evidence of cyclical output and institutional quality significantly affecting our profitability measures. Changes in inflation or lending interest rates will affect funding costs, especially for those institutions which rely heavily on external funding in terms of debt. Being able to foresee these changes will be crucial for the sustainability of their business. The ability to forecast inflation expectations and interest rate changes is always a tricky endeavor. Of our dataset of 502 observations, a majority come from six nations; Ethiopia, Kenya, Madagascar, Nigeria, Tanzania and Uganda. Analyzing data from these nations shows the volatility of inflation as well as real interest rates[10]. As real interest rates significantly influence profits, it leads us to assume managers in MFIs are able to correctly foresee and adjust their own lending rates accordingly. This is quite impressive when considering the development during the observed period. Inflation along with real interest rates (affected by inflation) fluctuates violently during our observed period, Nigeria even observing 103% inflation in 2010. We expected increased real interest rates to negatively affect profits following the increased costs of funding faced by highly leveraged institutions. As the average equity/assets rate in our dataset is 0.36 (i.e. only 36% of their total assets are funded by shareholders equity) we would expect their profits to drastically drop following a sharp increase in interest rates. One possibility why this is not the case is that highly leveraged MFIs might receive their funding from private or foreign lenders which set their rates independent of the real interest rate in the respective country.

GDP growth and GDP/capita reflects which state the economy was in during the observed period and where they started out from, i.e. recession or economic boom and how poor they were. A booming economy will allow job opportunities to arise for the poor working in e.g. construction as well as those which are self-employed and run small business. The demand for credit is likely to develop in accordance with the current economic development, as the startup of new businesses as well as the undertaking of larger projects tends to require an initial increase in capital. Yet cyclical output does not significantly affect MFI profits in our study and only sparse evidence is presented supporting economic development being a viable estimator of profitability. The lack of evidence of developmen-

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[10]See figures I & II in appendix for inflation and real interest rate development in above mentioned countries during 2005-2014.

tal determinants significantly affecting MFI profitability might be interpreted as proof that the financial expansion of a country is somewhat disconnected from the development of the domestic population. We can interpret this in relation to the development of ROE/ROA and GDP per capita presented in Figure III and IV[11] as the success of MFIs being somewhat independent of the macroeconomic movements of the global economy. Investing in MFIs could therefore prove to be a great diversification opportunity as the industry is perhaps somewhat dislocated from the "normal" economy.

Broadening the perspective of our results, three determinants emerge as the most contributing to success in microfinance in SSA in terms of significance and magnitude; risk management, cost management and institution size. These findings lead us to the second part of what we set out to accomplish with this paper; which organization structure would most likely flourish in the microfinance industry in SSA, or to put it differently, which organization structure would be the most beneficial to the microfinance industry in SSA. The two differing perspectives are not mutually exclusive in our view; profitability does not necessarily have to come at the expense of limited poverty elimination. Perhaps the key to the reincarnation of microfinance as an investment vehicle and what has kept it from fully blossoming is the lack of efficient organizations within the industry. Analyzing the three main determinants further, we would typically find them in large global organizations. Perhaps having the commercial/investment bankers of the global finance industry play a bigger role in microfinance could provide the industry with the expertise and size that seems to be needed. Obviously the size component is quite explanatory in this aspect. As previously described we observe both economies of scale as well as diseconomies of scale, therefore we cannot conclude bigger is always better since the marginal gain is diminishing. At a given size, the marginal gain of expanding would be less than the loss that follows. However, as the marginal loss is significantly smaller than gain, it points in favor of larger organizations operating in microfinance in SSA. Using their expertise already within the organization, a large global organization could apply their ordinary business approach to depress costs per loan, with the potential benefits that follow as described earlier in the results, as well as adapt their risk management approach to the special needs of microfinance.

6 Conclusions

With growing interest for MFIs as an investment vehicle for the west to reach the high marginal returns of the poor the controversy of profit opposing development is feeding an ongoing global debate. In this study we have taken a starting point in the view that an optimal distribution of capital in the world will help fuel both economic gains for the

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[11]See appendix

investors as well as developmental progress for the receiving nations. Continuing on that view we have investigated what marks the most successful examples of such investment opportunities.

The aim of this paper consisted of two parts. First, we set out to allocate the determinants of profitability among microfinance institutions in Sub-Saharan Africa. Second, with the findings from our first question, we proceeded to contemplate in which organization type we could locate these parameters and therefore could prosper in the microfinance industry in Sub-Saharan Africa. Using our self-compiled dataset of unbalanced panel data from 22 countries in Sub-Saharan Africa during the period 2005-2014, we find MFI specific characteristics to be the main determinants of MFI profitability. Among them three stand out; risk management, cost management and size of the institution. We find some convincing evidence of macroeconomic determinants significantly affecting MFI profitability, although we acknowledge our model may be limited in its ability to capture such a complex economic environment as Sub-Saharan Africa. Given our findings from the model, we conclude that an entry of large global financial institutions in the microfinance industry in SSA would most likely be of a mutually beneficial nature. Were they would be provided with a large potentially diversified market and the prospect of large profits. Whilst also contributing to the microfinance industry, using their expertise within the main parameters in our study to increase their outreach by providing cheap credit, and thereby assisting in the process of eliminating global poverty.

Conducting our study of MFIs on an international level covering Sub-Saharan Africa presented both opportunities and challenges. First, being conducted on a regional level, the study produces interesting results applicable on a broader level than if we had only observed a single country. However, the cross-country aspect also infers there is a risk that national differences in measurement and transparency of data are given a greater role. More specifically we noticed a larger fall-out of observations from some nations when processing the dataset; other nations however, remained to a greater degree resulting in stronger representation in the final data. As previously mentioned, six countries constitute a clear majority of our observations of 22 countries in total, potentially resulting in findings of the study being more applicable on some countries than others in the studied region. Second, as we have not limited our study based on a certain level of reporting accuracy/transparency, the reliability of the data in our study may be questioned, a flaw which we are fully aware of and accepted in order to maintain a reasonable number of observations.

This study contributes to the literature by serving as a first introduction to future investment analysis of MFIs and provides some evidence as to what aspects play a role on a regional level. Further research may expand the field by investigating these aspects on a national level; thereby offering more specific results for investors and policymakers interested in a specific country.

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8 Appendix

Table IV: Observations per country

Country	Observations	Years observed
Angola	6	2005-2007; 2009; 2010; 2014
Burundi	8	2007-2012; 2014
Cameroon	13	2005-2007
Central African Republic	1	2007
Chad	1	2007
Democratic Republic of the Congo	28	2006-2014
Ethiopia	53	2005-2008
The Gambia	5	2007-2010
Kenya	71	2005-2014
Liberia	4	2011-2013
Madagascar	49	2005-2014
Malawi	25	2006-2014
Mozambique	32	2005-2014
Namibia	1	2008
Nigeria	42	2005-2014
Rwanda	22	2005-2010
Sierra Leone	10	2007-2012; 2014
South Africa	13	2005-2010; 2012; 2013
Swaziland	4	2006-2008; 2011
Tanzania	40	2005-2014
Uganda	57	2005-2014
Zambia	17	2006-2010; 2012-2014

Observations per country presents the number of observations recorded for each country and also which years that are represented in the dataset. Source - MIX Market, 2016, https://reports.mixmarket.org/crossmarket - (Acquired 2016-05-15)

Table V: Hausman specification test

Return on assets				
		Coefficients		
	b	*B*	*(b-B)*	
	Fixed	Random	Difference	S.E.
CRED	-0.526	-0.548	0.022	0.042
MIX	-0.172	-0.160	-0.012	0.037
LEV	0.181	0.168	0.013	0.033
LEVRATE	-0.906	-0.646	-0.260	0.119
CONC	0.000	0.000	0.000	0.000
COST	-1.568	-0.116	-1.452	0.014
SIZE	0.370	0.280	0.090	0.029
SIZE2	-0.007	-0.005	-0.002	0.001
INST	-0.001	0.001	-0.002	0.001
GDP	-0.310	-0.146	-0.164	0.099
DEV	0.268	0.017	0.251	0.093
RATE	0.412	0.291	0.121	0.053

Test: H_0: Differences in coefficients are not systematic
$\chi^2 (11) =$ 32.59
$P > \chi^2 =$ 0.0006

Return on equity				
		Coefficients		
	b	*B*	*(b-B)*	
	Fixed	Random	Difference	S.E.
CRED	0.025	-0.356	0.381	0.270
MIX	-1.224	-0.864	-0.360	0.256
CONC	0.000	0.000	0.000	0.000
COST	-0.393	-0.280	-0.113	0.083
SIZE	0.810	0.374	0.436	0.192
SIZE2	-0.013	-0.003	-0.010	0.006
INST	-0.012	-0.002	-0.010	0.008
GDP	0.722	1.603	-0.881	0.650
DEV	0.538	0.082	0.456	0.505
RATE	0.680	0.407	0.273	0.235

Test: H_0: Differences in coefficients are not systematic
$\chi^2 (9) =$ 12.03
$P > \chi^2 =$ 0.2119

Hausman specification test present the results of regressions with fixed versus random effects.
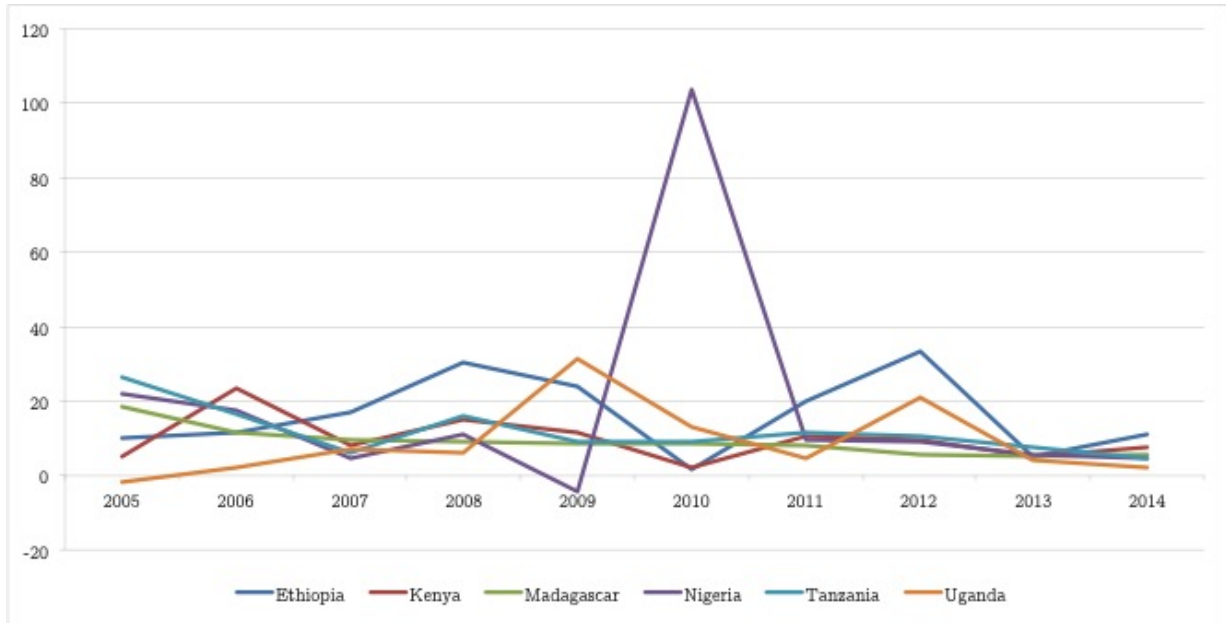
Figure I: The figure depicts inflation development (%) from the six most observed countries in our dataset during the analyzed period of 2005-2014. Source - World Bank Database http://data.worldbank.org/ (Acquired 2016-05-25)
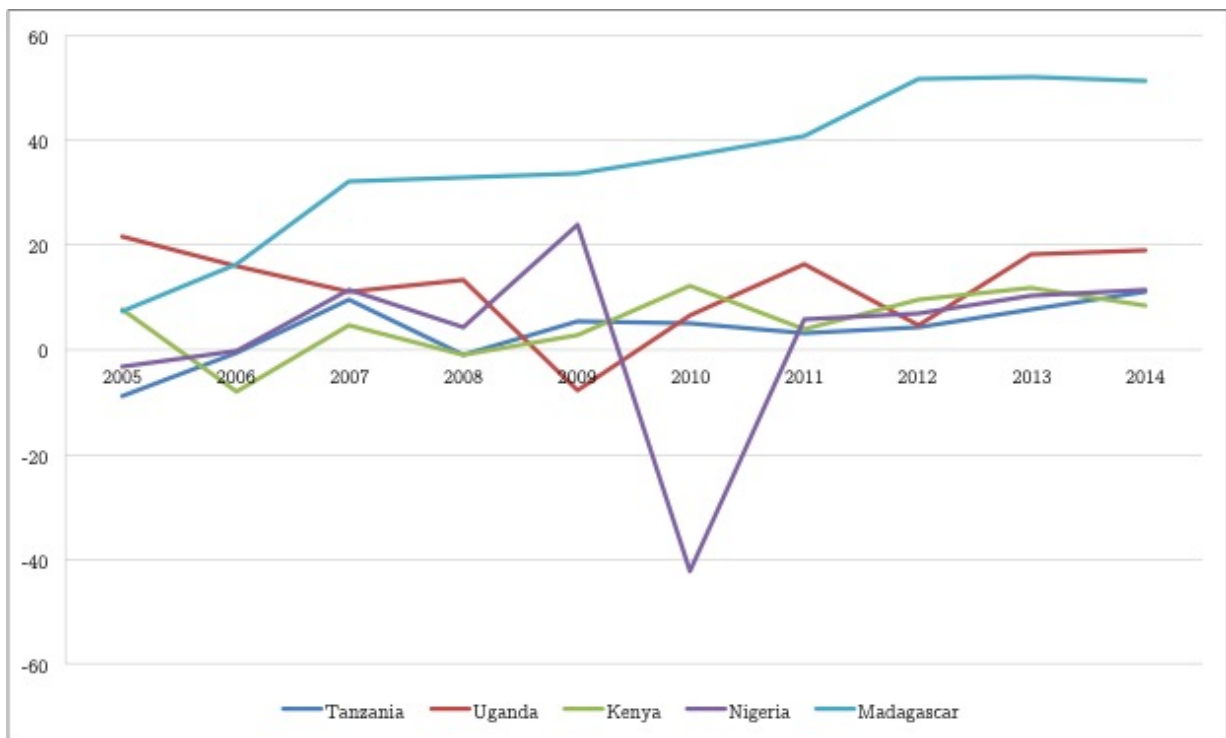
Figure II: The figure depicts real interest rate development (%) from five of the most observed countries in our dataset during the analyzed period of 2005-2014. Source - World Bank Database http://data.worldbank.org/ (Acquired 2016-05-25)
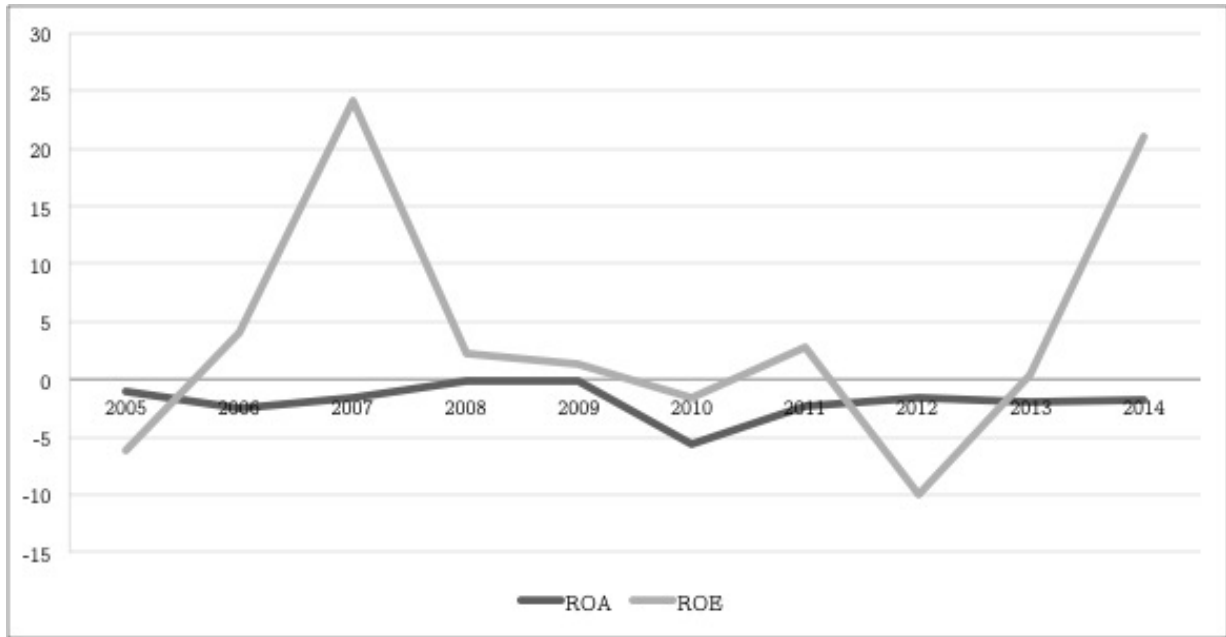
Figure III: The figure depicts average ROA and ROE development of MFIs in SSA between 2005-2014. Source - https://reports.mixmarket.org/crossmarket (Acquired 2016-05-25)
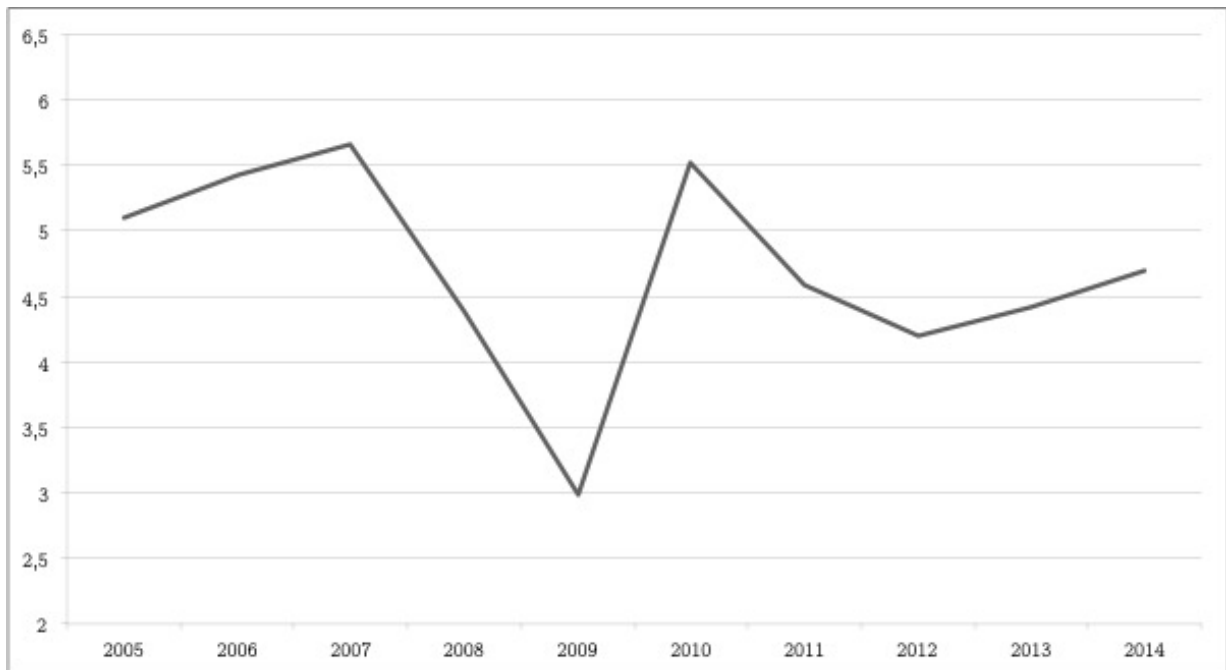
Figure IV: The figure depicts average GDP development (%) in Sub-Saharan Africa during the analyzed period of 2005-2014. Due to lack of observations, Angola and Somalia are not included, observations from South Sudan are missing from 2005-2008 and from Eritrea 2012-2014. Source - World Bank Database http://data.worldbank.org/ (Acquired 2016-05-25)