DETERMINANT FACTORS IN CREDIT RISK MANAGEMENT OF MICROFINANCE INSTITUTIONS IN ETHIOPIA

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Abstract
The purpose of this paper is to empirically identify the factors that affect credit risk of microfinance institutions in Ethiopia where interventions through the delivery of microfinance services are considered as one of the policy instruments of the government to eradicate poverty. This study has identified the determinants of credit risk of microfinance institutions using Morgan Stanley’s rating methodology of microfinance institutions and GLS random effect regression. Given Morgan Stanley’s rating methodology, Ethiopian microfinance institutions had an excellent performance in terms of credit risk management, profitability, operating efficiency, productivity, liquidity, and leverage. However, the size of their gross loan portfolio was very poor during the period under study. In addition, the regression result has revealed that size of portfolio, return on asset, and operating efficiency have negative and significant impact on credit risk. However, productivity, liquidity, leverage, and age have no effect on credit risk. Thus, size of portfolio, return on asset, and operating efficiency are the important variables that account for variation in credit risk among microfinance institutions in Ethiopia.

Key words: Credit risk, Microfinance institutions, Ethiopia.

1. Introduction
Ethiopia is the second most populous country in Sub-Saharan Africa with a population of 94.1 million and a population growth rate of 2.6% in 2013. Ethiopia is also one of the world’s poorest countries. However, the economy has experienced strong and broad based growth over the past decade, averaging 10.8% per year in 2003/04 – 2012/13 compared to the regional average of 5.3%. After the downfall of the Derg regime, the country is following a “free market” economy policy. This allowed private firms to participate in the business activities in different sector of the economy (NBE, 2012). Following this, a number of private banks and microfinance institutions (MFIs) are established in different part of the country. The Ethiopian government has designed a focused strategy enhancing small and medium scale enterprises as a means to solve poverty and unemployment. The major challenges of these small and medium scale enterprises are lack of access to capital. In this regard, micro finances play undeniable role to mitigate the financial challenges of the small and medium sized enterprises (Asemelash, 2013). Their special characteristics in terms of accessibility and minimal bureaucracy are the reasons for their importance (Obo, 2009).

1 WWW.worldbank.org/en/country/ethiopia/overview
In this regard, the establishment of sustainable MFIs that reach a large number of rural and urban poor who are not served by the conventional financial institutions, such as the commercial banks, has been a prime component of the development strategy of Ethiopia (Amha, 2000).

With a larger number of poor people in Ethiopia, there is a fertile ground for microfinance and providing these segments of people with access to credit and other financial services will help people engage in income generating activities and employments (Helmore, 2009). Currently Ethiopian micro finances provide a wide range of services, including credit and saving to small enterprises and households. Despite their importance especially in encouraging micro enterprises by providing credit without collateral, Ethiopian microfinance institutions are not free from problems. The major problem of micro finances of Ethiopia is collection performance and default (Mohammed, 2014).

Risk taking is an inherent element and integral part of financial services in general and of microfinance in particular and, indeed, profits are in part the reward for successful risk taking in business. On the other hand, excessive and poorly managed risk can lead to losses and thus endanger the safety and soundness of microfinance institutions and safety of microfinance institution’s depositors. Consequently, microfinance institutions may fail to meet its social and financial objectives. This implies that proactive risk management is essential to the long term sustainability of MFIs (NBE, 2010). According to NBE, credit risk is one of the most common risks MFIs face.

Evidences (Nyamsogoro, 2010; Tehulu, 2012, and Tehulu, 2013) also show that credit risk has a significant effect on sustainability of MFIs. However, studies aimed at identifying determinants of credit risk of Ethiopian microfinance institutions are missing. Thus, this paper aimed at identifying the determinants of credit risk of microfinance institutions in Ethiopia where interventions through the delivery of microfinance services are considered as one of the policy instruments of the government to eradicate poverty. To achieve the article’s objective, the newly comprehensively developed Morgan Stanley approach was used to assess credit risks in the microfinance industry. The Morgan Stanley approach was used because it is specifically tailored to institutions (i) that are strictly dedicated to providing microfinance products, and (ii) whose business model mainly revolves around providing micro-loans as financing for micro-entrepreneurs’ businesses (Arvelo et al., 2008).

2. Related Literature Review

2.1 Micro Finance and Credit Risk

The meaning of microfinance is derived from its main characteristics and functions provided. In this regard, it has been defined as the means by which poor people convert small sums of money into large lump sums (Mayoux, 2001). According to Robinson (2001), micro finance refers to small scale financial services, primarily credit and savings provided to poor people who farm or fish or herd or; who operate small enterprises or micro enterprises where goods are produced, recycled, repaired or sold; who provide services; who work for wage or commissions; who gain income from renting out small amounts of land, vehicles, draft animals, or machinery and tools; who engaged in petty trading ;and to other individuals and groups at local levels of developing countries both rural and urban. Micro finance has also been defined as the supply of loan and saving services to the poor (Schreiner, 2002).

Microfinance is an effective tool to fight poverty by providing financial services to those who do not have access to or are neglected by the commercial banks and other financial institutions. The poor,
having no or very little income, cannot offer any collateral which banks require, have no credit history, banks are too far away to verify and observe their behavior (there is little information) and the loans are generally far too small compared to transaction costs (Dokulilova et al, 2009).

A microfinance institution exists not only to accept deposits but also to grant credit facilities, therefore inevitably exposed to credit risk. Credit risk is by far one of the most significant risks faced by MFIs (NBE, 2010). According to Chen and Pan (2012), credit risk is the degree of value fluctuations in debt instruments and derivatives due to changes in the underlying credit quality of borrowers and counterparties. Coyle (2000) defines credit risk as losses from the refusal or inability of credit customers to pay what is owed in full and on time.

Credit risk, according to Basel Committee of Banking Supervision BCBS (2001) and Gostineau (1992), is the possibility of losing the outstanding loan partially or totally, due to credit events (default risk). Credit events usually include events such as bankruptcy, failure to pay a due obligation, or credit rating change and restructure. Basel Committee on Banking Supervision- BCBS (1999) defined credit risk as the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms. Heffernan (1996) observe credit risk as the risk that an asset or a loan becomes irrecoverable in the case of outright default, or the risk of delay in the servicing of the loan. Credit risk is critical since the default of a small number of important customers can generate large losses, which can lead to insolvency (Bessis, 2002).

2.2 Credit Evaluation Metrics

Many credit rating agencies developed a number of credit rating factors that can be applied to rate financial institutions exposure to credit risk. One well known approach to evaluate the credit risk of financial institutions is the Morgan Stanley’s methodology. The Morgan Stanley approach was used because it is specifically tailored to institutions (i) that are strictly dedicated to providing microfinance products, and (ii) whose business model mainly revolves around providing micro-loans as financing for micro-entrepreneurs’ businesses (Arvelo et al., 2008). In addition, besides drawing upon the methodology of major pioneers in microfinance rating, the Morgan Stanley methodology allows us to assess the risk of MFIs relative to any other issuers via a global (foreign and local currency) scale rating - an approach that is not currently prevalent in the microfinance industry (Arvelo et al., 2008).

The Morgan Stanley has identified seven “rating factors” that are important to consider when assessing the credit risk of these institutions. These credit rating factors are: loan portfolio; profitability, sustainability and operating efficiency; asset-liability management; management and strategy; systems and reporting; internal controls; and growth potential. Management and strategy, systems and reporting, internal and operational controls, and growth potential are qualitative rating factors. Due to the problem of getting information on qualitative factors in Ethiopian micro finance institutions, this study used the quantitative indicators (variables) only.

Morgan Stanley’s credit analysis and rating methodology makes use of the following six grades for the quantitative rating factors as shown in Table 1: (see Arvelo et al., 2008)

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2 Standard and Poor’s, Planet Finance, MicroRate, M-CRIL and CRISIL are some instances mentioned in Arvelo et al. (2008)

3 Morgan Stanley’s methodology draws upon the work of Standard & Poor’s June 2007 report on assessing microfinance risks, Planet Finance rating, MicroRate, M-CRIL, CRISL as well as key industry players like ACCION, CAMEL and the Consulting Group to Assist the Poor (CGAP) (Arvelo et al., 2008).
Table 1: Morgan Stanley’s credit analysis and rating methodology of MFIs-Selected Quantitative Indicators

<table>
<thead>
<tr>
<th>Rating factors</th>
<th>Definition of indicators</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loan portfolio</strong></td>
<td><strong>PAR30:</strong> Portfolio at Risk = (Outstanding loans with arrears over 30 days + restructured loans)/Gross loan portfolio</td>
<td>&lt;3% &lt;6% &lt;9% &lt;12% &lt;15% above 15%</td>
</tr>
<tr>
<td><strong>SIZE:</strong> Size of portfolio = Gross loan portfolio</td>
<td>&gt;300M &gt;250M &gt;100M &gt;50M &gt;10% less than 10M below -2%</td>
<td></td>
</tr>
<tr>
<td><strong>ROA:</strong> Return on average assets = Net income/Average assets</td>
<td>&lt;3% &lt;2% &lt;1% &lt;0% &lt;-2%</td>
<td></td>
</tr>
<tr>
<td><strong>OEF:</strong> = Total operating expenses/Average gross loan portfolio</td>
<td>&lt;20% &lt;25% &lt;30% &lt;40% &lt;50% above 50%</td>
<td></td>
</tr>
<tr>
<td><strong>PROD:</strong> Productivity = Numbers of borrowers/Total loan officers</td>
<td>&gt;200 &gt;190 &gt;170 &gt;145 &gt;130 below 130</td>
<td></td>
</tr>
<tr>
<td><strong>LIQ:</strong> Liquidity: (Cash + Short-Term Investments) / (Gross Loan Portfolio)</td>
<td>&gt;15% &gt;12% &gt;9% &gt;6% &gt;3% below 3%</td>
<td></td>
</tr>
<tr>
<td><strong>LEV:</strong> Leverage = Total liabilities/(Net worth+subordinated debt)</td>
<td>&lt;5.0x &lt;6.0x &lt;7.0x &lt;8.0x &lt;9.0x above 9.0x</td>
<td></td>
</tr>
</tbody>
</table>

2.3 Empirical Literature

Empirical literatures examining determinants of credit risk of the Microfinance industry are virtually non-existent. The only worth mentioning study in this regard is the one by Ayayi (2012) who made an assessment of credit risk determinants- an application to a selected group of Vietnamese microfinance institutions and an extension to East Asian and Pacific microfinance institutions. He found that low credit risk is a direct consequence of sound implementation of good governance practices and sustainable financial performance through sound quantitative and qualitative risk management tools. His finding also shows that investors and donors who invest in MFIs have to look for Vietnamese MFIs that implement good governance practices. He also found that while liquidity has a positive impact, size of gross loan portfolio and operating inefficiency have negative impact on credit risk of MFIs. Finally, his study shows that raising operational financial sustainability is associated with improved portfolio quality.

Regarding empirical evidences on determinants of credit risk in the banking industry, results reveal that credit growth and bank size have negative and statistically significant impact on credit risk. Whereas, operating inefficiency and ownership have positive and statistically significant impact on credit risk. The
results of their study also indicated that profitability, capital adequacy and bank liquidity have negative but statistically insignificant relationship with credit risk (Tehulu and Olana, 2014).

Felix and Claudine (2008) also investigated the relationship between bank performance and credit risk management. Their findings has shown that return on equity (ROE) and return on assets (ROA) both measuring profitability were inversely related to the ratio of non-performing loan to total loan of financial institutions. Godlewski (2004) also found the return on assets ratio (ROA) as a proxy for performance negatively impacts the level of NPLs ratio. Similarly, using a panel of 129 Spain banks during 1993-2000, Garcia-Marcos and Robles-Fernandez (2007) as well found that higher levels of return on equity are followed by greater risk in the subsequent periods. They argue that profit-maximizing policies will be accompanied by higher levels of risk.

Thiagarajan (2013) also studied the determinants of the credit risk in the commercial banking sector of Belize by using an econometric model. The model by utilizing a panel data from 2006 - 2012 has shown that both macroeconomic and bank specific factors play crucial role in determining the credit risk of the commercial banking sector. Literatures show that a bank specific factor like growth in loan is a cause for credit risk. Credit growth sometimes called loan growth implies credit expansions by banks. Excessive rapid loan growth, as well as sharp declines in bank capital levels are useful pointers to the deterioration in the financial health of banks and can be employed as early warning indicators of future problem loans (Das and Ghosh, 2007). A strong loan growth translates into significantly higher credit losses with a lag of 2-4 years (Hess et al, 2009).

Finally, a study by Berger and De Young (1997) reveal that poor management in the banking institutions results in bad quality loans, and therefore, escalates the level of non-performing loans. They argue that bad management of the banking firms will result in banks inefficiency and affects the process of granting loans. The banks’ management might not thoroughly evaluate their customers’ credit application due to their poor evaluation skills. Therefore, banks’ inefficiencies might lead to higher non-performing loans. Inefficient managers will not cope successfully with the process of granting and monitoring loans that will lower the banks’ credit quality and bring about a growth in problem loans (Salas and Saurina, 2002).

3. Data and Methodology

3.1 Sampling and Data Collection

This study focuses on the determinants of credit risk of Ethiopian microfinance institutions. In 2011 the numbers of registered microfinance institution in Ethiopia were 31 (MF Transparency, 2011). This study was undertaken using only secondary data. Data was collected from mix market database (www.mixmarket.org), Association of Ethiopian Microfinance Institutions (AEMFI), and prior research paper. The study covers the period 2003-2013. All microfinance institutions that have the required data for at least one year during the study period were included in this study. Thus, fifteen microfinance institutions with 81 observations and unbalanced panel data were considered as samples of this study.

3.2 Variables and Their Measurement

The dependent variable in this study was credit risk. Based on a well known Morgan Stanley model of credit risk rating as well as some prior studies seven variables were considered as possible determinants of credit risk. Morgan Stanley’s model uses both quantitative and qualitative indicators. Due to lack of data regarding qualitative factors, this study has relied on quantitative indicators only. Since prior studies on the banking industry have employed the variable age as independent variable, this variable is also included in our regression model. Thus, in this study, six variables (shown in Table 2) in the
quantitative category of Morgan Stanley’s rating methodology and the variable age were considered as possible determinants of credit risk.

Table 2: Description of Variables and Expected Relationship

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measure</th>
<th>Notation</th>
<th>Expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit risk</td>
<td>PAR30 ratio</td>
<td>CR</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Independent</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of loan portfolio</td>
<td>Natural logarithm of Gross loan portfolio</td>
<td>SIZE</td>
<td>+/-</td>
</tr>
<tr>
<td>Return on Asset</td>
<td>Net Income per Average Assets</td>
<td>ROA</td>
<td>-</td>
</tr>
<tr>
<td>Operating efficiency</td>
<td>Operating expense per loan portfolio</td>
<td>OEF</td>
<td>-</td>
</tr>
<tr>
<td>Productivity</td>
<td>Borrowers per loan officer</td>
<td>PROD</td>
<td>+/-</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Non-earning liquid assets per Gross Loan</td>
<td>LIQ</td>
<td>+/-</td>
</tr>
<tr>
<td>Leverage</td>
<td>Debt per equity</td>
<td>LEV</td>
<td>+/-</td>
</tr>
<tr>
<td>Age</td>
<td>Natural logarithm of Age of MFIs</td>
<td>AGE</td>
<td>+/-</td>
</tr>
</tbody>
</table>

3.3 Method of Data Analysis and Model Specification

The specific variables which were not included in the model affect the dependent variable and, therefore, estimating the coefficients without controlling for these variables lead to omitted variables bias (Wooldridge, 2006). How the control is done will depend on the nature of the omitted variables. That is whether they are constant or changing over time and whether they are constant or changing over cases. These are also known as the time specific and individual specific effects of unobservable or omitted variables, and the econometrics literature suggests two common methods for dealing with omitted variables. These are the fixed effect and random effect (Hsiao, 2007). To fix between random effect (RE) and fixed effect (FE) models the study employed the Hausman test. The result shows random effect is more appropriate than the fixed effect model (chi2(6) =1.07, P-value = 0.9826). Then to select between random effect and pooled OLS regression, the Breusch and pagan lagrangian multiplier test for random effects is employed and the result shows chibar2(01) = 58.22, Prob>chi2=0.0000 which is significant supporting GLS random effect rather than pooled OLS regression.

Thus, to investigate how MFI’s credit risk is affected by selected specific variables a GLS random effect model was used. The general form of the random effect model is given by:

\[ Y_{it} = \alpha_0 + \beta X_{it} + \varepsilon_{it} \]  

Eq.1

Where: \( Y_{it} \) is the year t credit risk of MFI i
\( \alpha_0 \) is the constant
\( \beta \) represent the coefficients of the independent variables
\( X_{it} \) is the set of the independent variables related to each MFI at time t.
\( \varepsilon_{it} \) is the error term including the unobserved individual heterogeneity

Extending Eq.1 to reflect all the independent variables, the base line model is as follows:
\[ CR_{it} = \beta_0 + \beta_1 \text{SIZE}_{it} + \beta_2 \text{ROA}_{it} + \beta_3 \text{OEF}_{it} + \beta_4 \text{PROD}_{it} + \beta_5 \text{LEV}_{it} + \beta_6 \text{AGE}_{it} + \varepsilon_{it} \]

In this study, in addition to analyzing data using GLS random effect regression, descriptive statistics was also employed to compare Ethiopian MFI’s performance with Morgan Stanley’s credit analysis and rating methodology of microfinance institutions.

4. Results and Discussions

4.1 Descriptive Statistics

For comparative analysis of credit risk of Ethiopia MFIs with Morgan Stanley methodology, we have obtained the following descriptive statistics results.

**Table 3. Descriptive Statistics**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Obs.</th>
<th>Mean</th>
<th>Grade Based on Morgan Stanley’s Rating</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAR30</td>
<td>81</td>
<td>0.029</td>
<td>1</td>
<td>0.10</td>
<td>0</td>
<td>0.373</td>
</tr>
<tr>
<td>SIZE</td>
<td>81</td>
<td>18,430,325</td>
<td>5</td>
<td>40,306,591</td>
<td>54229</td>
<td>170,000,000</td>
</tr>
<tr>
<td>ROA</td>
<td>81</td>
<td>0.057</td>
<td>1</td>
<td>0.081</td>
<td>-0.352</td>
<td>0.099</td>
</tr>
<tr>
<td>OEF</td>
<td>81</td>
<td>0.059</td>
<td>1</td>
<td>0.252</td>
<td>0.025</td>
<td>1.862</td>
</tr>
<tr>
<td>PROD</td>
<td>81</td>
<td>438</td>
<td>1</td>
<td>1004</td>
<td>206</td>
<td>1840</td>
</tr>
<tr>
<td>LIQ</td>
<td>81</td>
<td>0.211</td>
<td>1</td>
<td>0.332</td>
<td>0.051</td>
<td>1.84</td>
</tr>
<tr>
<td>LEV</td>
<td>81</td>
<td>2.58</td>
<td>1</td>
<td>2.01</td>
<td>0.01</td>
<td>8.56</td>
</tr>
</tbody>
</table>

**Source:** MIX market database, Morgan Stanley’s rating, AEMFI and Own Computations

**Portfolio Quality**

The national average PAR30 was 0.029 which is within best grade according to Morgan Stanley’ rating. This implies that Ethiopian MFIs’ performance in terms of credit risk management was excellent during the period under study. The standard deviation of this value was 0.10. This indicates the variability in credit risk among the MFIs was wide. Some of these MFIs have relatively large PAR30 which was substantially greater than the national average while others have lower credit risk. This can be confirmed using the maximum and minimum values of PAR30. As shown in table 3 above, the maximum PAR30 was 0.373 while the minimum value was zero. Factors that account for variation in credit risk among the MFIs are discussed under the heading regression results in subsequent sections.

**Loan Portfolio**

The average value for size of loan portfolio was $18.4 million. However, there was substantial difference in size of loan portfolio among the individual MFIs as reflected in standard deviation for size of loan portfolio ($40.3 million). The size of loan portfolio for the sample MFIs has a rating of grade 5 (poor grade). This difference in size of loan portfolio also is meant a difference in economies of scale with possible impact on the performance of MFIs in general and credit risk in particular.

**Return on Asset**

Return on asset is an important measure of an MFI’s profitability. The average value of return on asset for the sample MFIs was 0.057. This implies that on average Ethiopian MFIs earn 5.7 percent of their asset annually which is best grade given Morgan Stanley’s rating. Return on asset among MFIs ranges from the minimum value of -0.352 to maximum value of 0.099. The minimum return on asset was
negative indicating that the MFI had faced a loss which was greater than 35 percent of its asset which indicates their extreme weak performance.

**Operating efficiency**

This indicator measures MFI’s operating expenses per dollar lent. The operating efficiency mean value was 0.059 indicating that Ethiopian MFIs have been highly efficient (best grade according to Morgan Stanley’s rating) during the study period. This implies that the higher MFIs’ efficiency might mean more profitability and therefore more resources are available to be devoted for ex-ante credit selection and ex-post collection which will help to improve portfolio quality.

**Productivity**

Productivity is measured by the number of borrowers per loan officer. Ethiopian MFIs’ productivity has been 438 borrowers per loan officer, the highest grade according to the Morgan Stanley scale. But this high productivity might count against credit risk. If one employee has to work with many borrowers, this might limit his effectiveness.

**Liquidity**

Ethiopian MFIs have the best grade in liquidity given the Morgan Stanley’s rating methodology. However, this rise in liquidity might be detrimental for the MFIs risk management policy. This is due to the fact that a rise of liquidity may put more pressure on the MFI to accomplish their social goal through depth and breadth of outreach. To achieve this goal, the institution has to become more lenient in its credit policy. This allocation of credit to non-eligible clients will increase the portfolio at risk.

**Leverage**

Leverage indicates the ratio of debt to equity and a reflection of the conservatism or aggressiveness of the capital structure. Mean value of leverage was 2.58 approximately. This indicates that on average debt of MFIs was 2.58 times their equity. However, the leverage varies from institution to institution. The minimum leverage was 0.01 while the maximum was 8.56.

### 4.2 Regression Diagnosis Tests

The presence of multicollinearity problems has been tested using Variance inflation factor (VIF) (See Table 4 for the results). The larger the value of variance inflation factor, the more collinearity between the variables and as a rule of thumb a variance inflation factor greater than 10 is unacceptable (Gujarati, 2004). Therefore, multicollinearity problem is not a concern in this study since the VIF value for each independent variable is less than 3.5.

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>1 / VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEF</td>
<td>3.49</td>
<td>0.286880</td>
</tr>
<tr>
<td>ROA</td>
<td>3.07</td>
<td>0.325575</td>
</tr>
<tr>
<td>SIZE</td>
<td>2.94</td>
<td>0.340335</td>
</tr>
<tr>
<td>AGE</td>
<td>2.34</td>
<td>0.427079</td>
</tr>
<tr>
<td>LEV</td>
<td>1.53</td>
<td>0.654182</td>
</tr>
<tr>
<td>PROD</td>
<td>1.30</td>
<td>0.772009</td>
</tr>
</tbody>
</table>

Mean VIF 2.44

Autocorrelation and heteroskedasticity problems are controlled using clustered robust standard errors in the random effects model.

### 4.3 Regression Results

In this section, the relationship between microfinance institution specific factors and credit risk is examined using GLS random effect model (See Table 5 for the results). The regression results show that
selected MFI specific variables which have been proved to affect the credit risk in Morgan Stanley’s credit analysis and rating methodology of microfinance institutions also have explanatory power in our tests. The result regarding fitness of the model showed, Wald chi2 (6) = 29.62, prop> chi2 = 0.0000 confirming that the explanatory power of the model is reasonably high.

In this study, size of gross loan portfolio has a significant impact on credit risk of microfinance institutions. The regression coefficient for this variable was found to be -0.028 approximately at 99 percent confidence interval. The result implies that as size of loan portfolio increases, credit risk of MFIs will decrease other things constant. This finding is similar with the findings of previous researches (Tehulu and Olana, 2014 & Ayai, 2012) who found that credit growth or size of gross loan portfolio has negative and statistically significant impact on credit risk. This result indicates that increasing loan portfolio does not necessarily mean increasing the true risk of delinquency of the MFI as long as the ex ante client selection is conducted properly and the ex post credit collection policy is adequately implemented (Ayai, 2012).

The findings also reveal that return on asset has a significant influence on credit risk of microfinance institutions. The coefficient of this variable was -0.409 at 95 percent confidence interval. This implies that as profitability increases, credit risk of MFIs will decrease, other things remain constant. This finding is consistent with the findings of previous researches (Ayai, 2012; Felix and Claudine, 2008; and Godlewski, 2004) who found an inverse relationship of profitability with credit risk. Ayai and Sene (2010) contend that an adverse consequence of the inverse relationship between sustainability and credit risk is that a decrease in financial sustainability which leads to the deterioration of portfolio quality will entail a rationing of credit that will hinder the MFI’s ability to increase its client outreach. The ultimate result may then be a failure to substantially reduce poverty suggesting that MFIs should financially sustainable.
Table 5. GLS Random Effect Regression Results

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>-0.0287861</td>
<td>0.0110197</td>
<td>-2.61</td>
<td>0.009*</td>
<td>-0.0503843 to -0.0071879</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>-0.4090136</td>
<td>0.1982205</td>
<td>-2.06</td>
<td>0.039**</td>
<td>-0.7975187 to -0.0205084</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OEF</td>
<td>-0.1030926</td>
<td>0.0374396</td>
<td>-2.75</td>
<td>0.006*</td>
<td>-0.1764729 to -0.0297124</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROD</td>
<td>0.000042</td>
<td>0.0000338</td>
<td>1.24</td>
<td>0.214</td>
<td>-0.0000243 to 0.0001083</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEV</td>
<td>0.0108302</td>
<td>0.011626</td>
<td>0.93</td>
<td>0.352</td>
<td>-0.0119563 to 0.0336166</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>0.0362769</td>
<td>0.0263431</td>
<td>1.38</td>
<td>0.168</td>
<td>-0.0153545 to 0.0879084</td>
<td></td>
<td></td>
</tr>
<tr>
<td>_cons</td>
<td>0.4111086</td>
<td>0.1472414</td>
<td>2.79</td>
<td>0.005</td>
<td>0.1225207 to 0.6996966</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R-sq – within: 0.1963
- between: 0.2608
- overall: 0.2510

Number of obs.: 81
Number of groups: 15
Obs. per group: min.: 1
- avg.: 5.4
- max.: 8
Wald chi2 (6): 29.62
Prob > chi2: 0.0000

Note: * and ** denote significance at 99% and 95% confidence interval respectively.
Source: MIX market database, AEMFI, Moti (2003) and own computation

Regarding the variable operating efficiency, the result shows a coefficient of -0.103 at 99 percent confidence interval indicating that an increase in operating expense to gross loan portfolio causes a decline in credit risk of MFIs. This shows that microfinance institutions’ credit risk management strategy is accompanied by sacrifice of more resources to ex ante client selection and ex post credit collection. This result is similar with the finding of Ayayi (2012).

The coefficient for productivity is positive though statistically insignificant; possibly indicating that increasing the number of borrowers per credit officer is detrimental for the portfolio quality. Indeed increasing the number of borrower per credit officer implies that the credit officer has to spend less time in pre- and post-contractual relations with each microcredit client which will ultimately have a negative impact on the portfolio quality. Simply put, the adverse selection and moral hazard problems in the heart of microfinance become magnified because of the impossibility of the credit agent devoting the necessary and sufficient time required to correctly screen out and monitor his clients (Ayayi, 2012). Other variables including liquidity, leverage and age were not important variables in explaining credit risk of MFIs. Since liquidity variable is not found to be important variable and has reduced the fitness of the model, it was dropped from the regression model.
5. Conclusions
Using unbalanced panel data of MFIs in Ethiopia for the period 2003 to 2013, this study identified the determinants of credit risk. To achieve this purpose, the study has employed the Morgan Stanley’s rating methodology and GLS random effect. The study has revealed that Ethiopian microfinance institutions had an excellent performance (best grade) in terms of credit risk management, profitability, operating efficiency, productivity, liquidity, and leverage given our benchmark Morgan Stanley’s rating methodology. However, the size of their gross loan portfolio was very poor during the period under study. In addition, the regression result has revealed that size of portfolio, return on asset, and operating efficiency have negative and significant impact on credit risk. However, productivity, liquidity, leverage, and age have no effect on credit risk. Thus, size of portfolio, return on asset, and operating efficiency are the important variables that account for variation in credit risk among microfinance institutions in Ethiopia.

References
Bessis, J. (2002). Risk management in banking, John Wiley & Sons Ltd
Coyle, B. (2000). Framework for Credit Risk Management, Chartered Institute of Bankers, United Kingdom


Helmore, K. (2009), Microfinance in Africa - State of the sector report: Brining the financial services to Africa’s poor, World Population Highlights.


