Factors Impacting Microcredit in African Countries

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Introduction

In the 1970s, economics professor Muhammad Yunus noticed that the poorest women in Jobra, Bangladesh needed money to buy bamboo to make goods to sell. He found they could get loans but only at interest rates so high that they could not make sufficient profit. Professor Yunus began making small loans with moderate interest rates to these women, earned a return, and improve these women's lives. He later founded Grameen Bank to continue making these types of loans and in 2006 won the Nobel Peace Prize for his efforts. Professor Yunus' insight created the modern idea of microfinance (Marotta 2014). Jonathan Morduch a professor of Public Policy and Economics at NYU Wagner Graduate School of Public Service wrote, "The hope is that much poverty can be alleviated—and that economic and social structures can be transformed fundamentally—by providing financial services to low-income households." (Morduch 1999, p. 1).

Microfinance provides financial services to poor families and microenterprises through banking type organizations called microfinance institutions (MFI). The World Bank Group's stated mission is to "end extreme poverty" and "promote shared prosperity." (World Bank, n.d.). In 1997 the World Bank through its subsidiary, the International Financial Corporation (IFC), began a program of MFI development in Africa.   Among the IFC's first target countries were Angola and Ghana (International Finance Corporation, n.d. p.3). Both countries are sub-Saharan, have similar population size (Angola 30M v Ghana 28M), religious affiliations (Christian 79% v 71%), government structures (both Presidential republics), and economic conditions (2007

GDP $194B v $134B) (The World Factbook: Angola and Ghana, 2018). Despite these similarities, as of 2017, Ghana had $376 million in unpaid microloans outstanding (The MIX: Ghana, n.d.) while Angola had only $10 million (The MIX: Angola, n.d.). In other words, Ghana had nearly 40 times more microcredit loans outstanding than Angola. The resemblances between Angola and Ghana in terms of social, political, and economic systems suggest that those factors are not explanatory variables in influencing whether microcredit is adopted and diffused. Understanding this difference is an important question because worldwide, while some "700 million people have gained access to formal financial services … 2 billion remain excluded" (Beck, 2015). As a specific research question this paper provides some insight into; what factors allow for greater microcredit diffusion within a country?

My main hypothesis is that intrastate conflict dampens microcredit diffusion. I also investigated the impacts from a country's legal system and from the deployment of female loan officers. Using regression analysis, I was not able to find significant impact from the intrastate violence or the strength of a country's legal system. However, I did find that the greater the representation of female loan officers in the lending transaction the greater the success in funding microcredit.

Exiting Literature

There is a large body of research that analyzes microcredit demand side issues. For example, there is work relating to impact of high interest rates (Dehejua 2012) and the degree of borrower financial literacy (Fernandes & Netemeyer 2014). Other research focuses on lending techniques such a group lending (Cassar & Wydick 2010). My research will focus on supply side concerns.

MFIs are likely to be concerned with support institutions (e.g. government, laws, regulation). It is intuitive that "higher quality" lending laws will likely benefit shareholder-owned and regulated institutions. This was indeed found in one study which concluded that because of a stronger rule of law, relationship-based exchanges are less crucial thus allowing for greater microcredit lending (Barry & Tacneng 2014). Another study found that "good practice" in policy and regulation generally improved microfinance performance (McGuire 1999). Therefore, higher quality support institutions in the microcredit market within a country may account for a relatively greater diffusion of microcredit.

A number of research articles evaluate the impact women have on microcredit development. It finds that when women are in leadership roles microcredit expands. For instance, one study found that microfinance institutional performance improves when boards have a higher share of female members (Mori, et al. 2015). Similarly three other studies found that institutions with female CEOs or institutions otherwise managed by women performed better (Hartarska, et al. 2014), (Strøm, et al. 2014), (Boehe & Cruz 2013). Additionally, loans authorized by female loan officers have lower default rates (Hartarska et al. 2014). And finally, female clients of microfinance institutions lowered portfolio risk (D'Espallier, et al. 2011). While this may not be immediately intuitive, these studies demonstrate that women seem to be more financially astute. This financial acumen appears to directly translate into greater microcredit diffusion. Concluding from this literature that women may represent a greater proportion of MFI customers and that deploying female loan officers may represent an advantage, I will

investigate whether having a greater proportion of female loan officers improves a country's microcredit diffusion.

Theory

The level of *intra*state (cf. *inter*state violence or between countries violence) conflict experienced within a country might have a negative impact on microcredit diffusion. I propose the following causal relationship: High levels of intrastate conflict produce an environment where lenders are less unwilling to transact. There are likely multiple factors producing this effect. For example, intrastate conflict makes business operations more hazardous (e.g. community outreach becomes more dangerous) thus reducing the wiliness of MFIs to enter the market. Additionally, conflict may reduce borrowers' ability to repay due to their displacement or loss of property. This increased risk would reduce MFI's desire to lend. In general, higher levels of country violence create market uncertainty. Therefore, I theorize that higher levels of intrastate conflict will be negatively correlated with microcredit loan production.

Research Design

To summarize the three hypotheses I will be investigating are: 1) Greater quality of lending laws allows for greater microcredit diffusion; 2) Greater female participation in supplying microcredit increases diffusion; and 3) Greater *intra*state violence reduces microcredit diffusion.

Methodological Selection

For the reasons explained below, this research paper will be based on a large-n statistical analysis. Three other methodological approaches were considered. The first was to perform a qualitative case study. This type of study compares several countries that vary on each hypothesis' independent variables. This approach requires the identification of several countries that show variability only on the independent variable under study. Identifying such countries is difficult. Additionally, even if a qualitative case study could be constructed, the findings are most often not generalizable and remain specific only to the countries compared. Experimental studies are useful to identify causality. In this instance, however, an experimental study would simply be impracticable. Experimental studies often require mailings, interviews, performance of simulations, etc.; as well as human trials ethics board review. Even if the time and cost limitations could be overcome, it is not clear how generalizable might be the ultimate findings for the hypotheses listed above. For these reasons, an experimental study is not appropriate. Lastly, a game theoretic approach is not appropriate. Previously reviewed literature identified many different factors that might help explain microfinance lending levels. Incorporating these into a model would cause the model to be overly complicated. Therefore, the best analytical approach given the time and resources available is the large-n statistical methodology. It allows for statistical inferences to be drawn between the dependent and independent variables, and it allows for the creation of similarities between countries through the use of control variables. Finally, because the results can be statistically confirmed they can be generalized.

Sample

My sample will be those African countries that are reporting microfinancing through the Mix Market (The Mix, n.d.) online database. The Mix is an individual company self-reporting database used by microfinancing companies to track lending practices throughout the world. I will aggregate company data at the country level. All data will be annual and to the extent country data is available, will covered the years from 2000 to 2017. The countries with available data are shown in the table below:

Angola	Cote d'Ivoire	Malawi	South Sudan
Benin	Ethiopia	Mali	Sudan
Burkina Faso	Gabon	Mozambique	Swaziland
Burundi	Gambia, The	Namibia	Tanzania
Cameroon	Ghana	Niger	Togo
Central African Republic	Guinea	Nigeria	Uganda
Chad	Guinea-Bissau	Rwanda	Zambia
Comoros	Kenya	Senegal	Zimbabwe
Congo, Democratic	Liberia	Sierra Leone	
Congo, Republic	Madagascar	South Africa	

The dataset likely has a certain sample selection bias, as noted by another study, Mix Market data includes mostly very large MFIs (Mersland, Randøy, & Strøm, 2011). Acknowledging this bias I do not anticipate that it will materially impact the findings as the variables under review should impact large and small MFI equally.

Dependent Variable Operationalization

As noted above my data will come from the Mix Market (The Mix, n.d.) online database. In measuring microfinance lending, the most direct dependent variables (DV) would be either the annual dollar value of new lending or number of new loans. Both these variables are available from the Mix. However, their availability is of very limited

duration. Generally, the data is available only for the three years ending 2017. Two delta variables are also available; namely, the change in gross loan portfolio and, secondly, the change in the number of active borrowers. Because these are delta variables they marginally restate the research question to focus on "what causes a change" in microfinancing rather than the original "why do some countries have more" microfinancing. Both these later delta variables are robustly available beginning with 2000 and thus were considered as potential alternative DVs. A final potential DV was available, namely, number of new borrowers. The number of new borrowers is less exacting as it does not include repeat borrowers but it is temporally longer; available beginning with 2009. Because this DV has more observations available and that it remains consistent with the original research question, I chose it as the best proxy DV for this paper.

Independent Variables Operationalization

The independent variables (IVs) to operationalize are: female participation in supplying microloan financing, quality of country lending laws, and intrastate violence.

Anticipating that those in direct communication with the customer, female participation will be operationalized through a percent of female loan officers. This is available from the Mix Market (The Mix, n.d.) online database and is generally available beginning 2010. Also available are the following female related variables: percent female managers and percent female board of director members. The additional variables are available over a similar timeframe. These additional variables will be used in evaluating robustness of my results.

To operationalize the quality of country lending laws hypothesis, I used the strength of

legal rights by country index available from the World Bank. (World Bank - Strength of

legal rights index, n.d.). The index is annual, available for the entire period under

review, and for all countries (except Swaziland). While it is possible that a given country

could have weak lending laws but otherwise have high other legal rights, it is likely that

there is a high correlation between the target quality and this variable such as to make it

a reasonable proxy for the IV.

Lastly, to operationalize intrastate violence two variables were available. Both are from

the Uppsala (Uppsala Conflict Data Program, n.d.). The two variables are: 1) one-sided

violence, and 2) non-state conflict. One-sided violence is defined as, "the use of armed

force by the government of a state or by a formally organised [sic] group against

civilians which results in at least 25 deaths in a year" (Uppsala Definitions, n.d.). Non-

state conflict is defined as, "the use of armed force between two organised [sic] armed

groups, neither of which is the government of a state, which results in at least 25 battle-

related deaths in a year" (Uppsala Definitions, n.d.). The number of deaths caused by

state and non-state actions should provide an adequate proxy for the level of intrastate

violence. As such both these variables will be added together to create one total. The

data is generally available for all countries and all periods under review.

Control Variables

There are many factors, other than the three IVs identified above, which likely impact

the DV. As microcredit is directed toward the underserved poor, it is very likely that

microcredit diffusion will be impacted by a given country's level of poverty and related

unemployment rate. In order to control for these, the following control variables (CVs),

available from the World Bank (World Bank Open Data, n.d.) were utilized:

Control Variables - Poverty Related	Available From	Period
Percent Headcount Ratio		
Percent Poverty Gap	World Bank	2000-2017
Unemployment Rate		

While the unemployment rate requires no explanation, the other two deserve some

description. According to the World Bank, poverty headcount ratio is the percentage of

the population living below the national poverty line. National estimates are based on

population-weighted subgroup estimated from household surveys. Again from the

World Bank, the poverty gap at national poverty lines is the mean shortfall from the

poverty lines (counting the nonpoor as having zero shortfall) as a percentage of the

poverty lines. This measure reflects the depth of poverty as well as its incidence (World

Bank Open Data, n.d.).

Methodology

Using the data above, I developed the following panel data regression model:

$$\text{New Borrower Loan Count}_{it} =$$
$$\alpha + \beta 1 * \%\text{ Female Loan Officers}_{it}$$
$$+ \beta 2 * \text{Intrastate Violence}_{it}$$
$$+ \beta 3 * \text{Strength of Legal Rights}_{it}$$
$$+ \beta 4 * \text{Control Variable}_{ijt}$$
$$+ \epsilon it$$

With:

i = Country t = Year

j = specific CV model specification

ϵ = Error term

The DV, IV, and CV variables were included for each country, i, and period, t. As all IVs are included simultaneously, the model directly compares the strength of each hypothesis. Statistical significance allowed the strength of each hypothesis to be evaluated against the DV. Because there are limitations on the number of observations, close attention was paid to the number of right hand side variables to assure that there are enough degrees of freedom to make proper inferences. Multicollinearity is likely not a factor as the IVs are significantly different. Regardless this condition was tested.

Findings

The following graph provides a visualization of the operationalized DV:
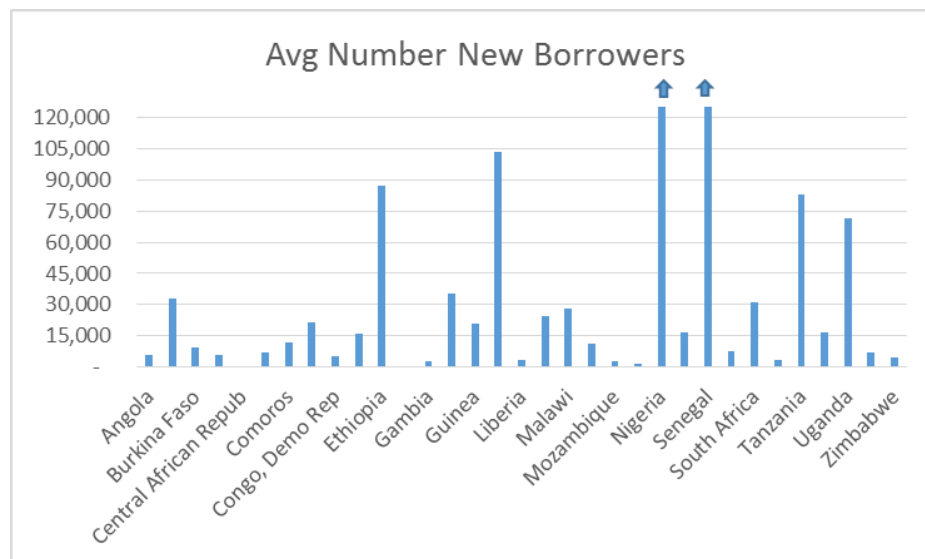
Visually there is substantial variation in the DV. Many countries produce a relatively small level of loans while others fund a substantial number (note, the two off-the-scale upward arrows represent Nigeria and Senegal which produced an average annual new borrower loan count of 1 million and 850 thousand, respectively).

The operationalized IVs are represented below.

Again visually, there is substantial variation in the average percent of female loan officers, but lesser variation in the violence and strength of legal rights IVs.

Concerns over data distribution normality motivated a Kernel density visualization or Parzen–Rosenblatt window method (Parzen, 1962 and Rosenblatt, 1956) analysis. The results of this analysis suggested that, except for the legal rights IV and the two poverty CVs, a logarithmic transformation of the DV and the other IVs and CVs variables would improve the normalization of the level data. Therefore, the appropriate transformations were made.

In order to evaluate multicollinearity, a correlation matrix was prepared. None of the

variables had a correlation of more than 80% indicating little risk of multicollinearity.

Below is the correlation matrix:

	Correlation Matrix					
Variable	Percent Female Loan Officers	Intrastate Violence	Strenght Legal Rights	Unemploy ment Rate	Poverty Headcount Ratio	Poverty Gap Percentage
Percent Female Loan Officers	1.00					
Intrastate Violence	-0.23	1.00				
Strenght Legal Rights	-0.08	0.20	1.00			
Unemployment Rate	0.23	-0.07	0.12	1.00		
Poverty Headcount Ratio	0.17	0.03	-0.03	0.17	1.00	
Poverty Gap Percentage	0.06	-0.04	-0.37	0.33	0.43	1.00

As noted above a panel data regression methodology was used. In developing a panel

data model there is a choice between using fixed effects or random effects techniques.

A Hausman test was utilized to help make this decision. The Hausman test establishes

the null hypothesis that the random effects model is preferred and the alternative

hypothesis being a fixed effects model (Greene, 2008). The Hausman test produced

conflicting results. Concerns surrounding model over specification led me to conclude

that the random effects model was the better model.

The smallest number of observations in the dataset was 154. Therefore, in order to

avoid constraints relating to degrees of freedom, the CVs were included as individually

separate models.

The final results for each model is presented in the table below:

	Coef.	Std. Err.
Poverty HC Ratio	-0.08***	(0.02)
Ln Percent Female Loan Officers	0.77*	(0.39)
Ln Violence	-0.05	(0.16)
Legal Rights Index	0.24	(0.26)
Poverty Percent Gap	-0.11*	(0.07)
Ln Percent Female Loan Officers	0.66*	(0.38)
Ln Violence	-0.13	(0.16)
Legal Rights Index	0.10	(0.27)
Ln Unemployment Rate	-0.45	(0.45)
Ln Percent Female Loan Officers	0.64*	(0.40)
Ln Violence	-0.08	(0.16)
Legal Rights Index	0.24	(0.24)

***P<.01; **P<.05; P<.10

Regarding the IVs, the most obvious observation is that for all models the Percent

Female Loan Officers coefficient is positive and significant. Therefore, a greater

percentage of female loan officers results in more new borrowers. This was expected,

as pervious literature has suggested, female involvement in microfinancing lending

improves microfinance institution performance (Boehe & Cruz 2013), (Hartarska, et al.

2014), (Mori, et al. 2015), (Strøm, et al. 2014).   All models have the violence coefficient

as negative. A negative coefficient was expected because increased intrastate violence

would likely lead to greater lending risk and, therefore, fewer loans. However, none of

the specifications shows any significances. For all the models the Legal Rights Index

coefficient is positive. This again should be expected because the stronger the legal

protections afforded business activity the more likely lending will occur. However, under

no specification is the variable significant. Therefore, the only statistically valid

conclusion is that the higher the percentage of female loan officers the more likely it is that there will be larger numbers of microfinance loans.

The analysis of the CVs is challenging. All three CVs have a negative direction. There are two showing significance, namely, Poverty HC Ratio and Poverty Percent Gap. The coefficient's direction is somewhat counterintuitive. I anticipated, that the greater the level of poverty the more opportunity for lending would be present. Perhaps the opportunity is balanced more negatively against the ability to repay.

In order to test the robustness of the above analysis several additional regressions were performed. The first regression replaced the CVs, with macroeconomic variables. These, again were from the World Bank (World Bank Open Data, n.d.) and are listed below:

Control Variables - Economic Related	Avaiable From	Period
GDP per Capita Purchasing Power Parity (PPP)	World Bank	2000-2017
CPI		
Lending Interest Rate		

 Again, a correlation matrix noted no variable correlated over 80%. See below:

	Correlation Matrix					
Variable	Percent Female Loan Officers	Intrastate Violence	Strenght Legal Rights	GDP per Capita PPP	Lending Rate	CPI
Percent Female Loan Officers	1.00					
Intrastate Violence	-0.23	1.00				
Strenght Legal Rights	-0.08	0.20	1.00			
GDP per Capita PPP	0.18	0.08	-0.05	1.00		
Lending Rate	-0.03	-0.05	-0.57	-0.12	1.00	
CPI	0.14	0.15	-0.22	0.18	0.27	1.00

Log transformation was indicated for these CVs similar to the Unemployment Rate CV.

The results of these regressions also indicated that female loan officers had a positive

and statistically significant impact the number of loans generated. See results in the

table below:

Ln GDP/Cap	-0.67	(0.94)
Ln Percent Female Loan Officers	0.76*	(0.38)
Ln Violence	-0.07	(0.17)
Legal Rights Index	0.18	(0.28)
Ln CPI	-2.57	(1.49)
Ln Percent Female Loan Officers	0.82*	(0.40)
Ln Violence	-0.01	(0.17)
Legal Rights Index	0.30	(0.30)
In Lending Rate	1.74	(1.18)
Ln Percent Female Loan Officers	0.81*	(0.40)
Ln Violence	-0.12	(0.19)
Legal Rights Index	0.53	(0.35)

***P<.01; **P<.05; P<.10

The coefficient for the GDP per Capita PPP is negative. This is an anticipated direction

because, as the GDP per person increases, there would be less demand for

microfinancing which targets the poor. The negative value of the CPI coefficient might

relate to the reluctance lenders have to lending during the uncertainty created in raising

price environments. However, that relationship is probably more complicated and may

not hold. There is little justification for why higher lending rates would increase

microfinance or why increasing population would cause a fall in microfinancing. More

research is needed in these areas.

To further examine the robustness of the Female Participation IV, an alternative operationalized IVs was evaluated, namely, Percent of Female Managers. The models was developed under the same methodology detailed above. Again the IV was log transformed. Below is the results from the female manager IV:

	Coef.	Std. Err.
Poverty HC Ratio	-0.06*	(0.02)
Ln Percent Female Loan Officers	0.13	(0.64)
Ln Violence	0.07	(0.15)
Legal Rights Index	0.08	(0.24)
Poverty Percent Gap	-0.15*	(0.06)
Ln Percent Female Loan Officers	0.05	(0.57)
Ln Violence	0.04	(0.14)
Legal Rights Index	-0.11	(0.23)
Ln Unemployment Rate	-0.50	(0.40)
Ln Percent Female Loan Officers	0.15	(0.56)
Ln Violence	0.14	(0.14)
Legal Rights Index	0.04	(0.21)

***$P<.01$; **$P<.05$; $P<.10$

While this Female Participation alternative operationalization IV, does not confirm the significance of female participation it may not be entirely unexpected because managers generally are further away from the actual loan transaction when compared to the loan officer's direct customer contact. Regardless this test did not help confirm the overall findings. Additionally, the same regression was prepared using Percent of Female Board Members as an alternative IV. The same result was obtained.

Finally, I created interaction variable models as described by Brambor, Clark & Golder (2006) for each of the three primary CV models relating to poverty levels. The interaction variable analyzed the impact from a country being authoritarian versus non-authoritarian. The interaction variable was based on The Economist Intelligence Unit's Democracy Index (n.d.). A dummy variable dividing the countries into 18 authoritarian and 19 non-authoritarian (i.e. Hybrid regimes, flawed democracies, and full democracies) regimes was developed. None of the models indicated statistical significance in the Percent Female Loan Officer IV. Again, failing to indicate robustness in that result. Interestingly, however, the Violence IV had some small statistical significance both for the IV and the interaction variable. This later result could be an area for additional study.

Conclusion

This paper sought to illuminate some of the factors influencing the production of microcredit in African countries. Specifically, I examined the impact from participation in the lending process by female loan officers, the effect of country lending laws, and the influence of intrastate conflict.   My results provided some insights into these factors. Confirming other research's results, this paper demonstrated that it does appear that more female loan officers tend to increase loan production. While not proving robust under some alternative models, the results appear sufficient enough to conclude that this variable has a general positive impact. Contrary to other studies, I was not able to demonstrate under any specification a relationship between lending laws and the granting of microcredit. This may relate to microlenders being less concerned with taking legal action against borrowers; preferring to merely write-off unpaid loans rather

than perusing legal action.   I found little support for my proposition that intrastate

violence results in a change in microfinance loan production. One interesting area

relating to the violence variable did appear in the evaluation of the impact from

governmental regime type. A couple of the interaction model specifications did

demonstrate a small amount of correlation. Therefore, it is possible that intrastate

violence might yet turn out to be a relevant factor in microcredit.

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