The Effects of Crime on MFI Performance and Access to Finance in Mexico

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Spring 2014

Abstract

This paper examines the potentially negative effects of crime on MFI financial performance in a case study for the MFI, Financiera Independencia. Using state fixed effects in time series regressions, the author estimates various measures of crime as well as economic controls to better understand the drivers of financial performance. The paper aims to elucidate MFI-level decisions regarding where to locate in the face of crime. To help visualize the expansive growth of offices from 2006-2010, the author then introduces a new way to measure the effects of crime using a series of maps for a second MFI case study, Caja Popular. Ultimately, the author finds that crime indeed negatively impacts MFI financial performance, though checks for robustness limit the explanatory power of the regressions.
Acknowledgments

I would like to thank the Haverford College Economics department, specifically Shannon Mudd for introducing me to a topic I now love. It was a pleasure getting to know him over the course of the semester.

Thank you to my good friends, Christopher Christensen ’14 and Jordan Hitchcock ’14 for offering their assistance when it was needed and helping with problems both theoretical and technical. Good luck boys.

Finally I want to thank my parents, Lisa and Spiro Boukas for sending me to Haverford and for their unconditional support in all my endeavors. To Philip and Gregory, thank you for being positive role models.
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Introduction

Microfinance institutions (MFIs) have been heralded as poverty reducing entities that increase access to finance for the world’s poorest individuals. They provide uncollateralized loans at subsidized, or, increasingly, market-based interest rates to poor households that have been excluded from the traditional banking system. MFIs have spread throughout the world, especially since Muhammad Yunus and the Grameen Bank won the Nobel Peace Prize in 2006 for their efforts in relieving poverty. Despite this rapid growth, millions of potential clients go without credit in the world’s poorest regions. This is due to an uncountable combination of supply (MFI) and demand (borrower) characteristics that exclude the poor from financial services. Furthermore, regional characteristics could affect both lenders and borrowers, which this paper will attempt to measure.

Some suggest that in order to better meet this unmet demand, MFI’s must take the steps necessary to achieve self-sustainability. Sustainability indicates the MFI’s ability to cover both operating and financing costs with revenue that is generated from the existing loan portfolio (Hermes et al, 2011). While initially controversial, sustainability is now widely viewed as a signal of cost efficiency, portfolio quality, and professionalism. And, increasingly, MFIs are transforming into for-profit organizations, which formally adds the goal of profitability to their objectives.

Both scholars of microfinance and upgrading MFIs are interested in the factors that determine profit-maximizing conditions. The most obvious costs are their operating costs (paying employees, utilities for offices, etc.) and the values of loans that are not repaid by borrowers. As many MFI’s have expanded their services to areas beyond their
initial office, whether for mission or financial sustainability reasons, they must also consider the opportunity cost of doing business in one region instead of another, potentially more profitable region. MFIs will want to continue doing business in locations that consistently deliver revenue from the interest on loans. This study focuses on one area that may have a strong impact on the MFI’s performance, crime. The author estimates crime’s impact on financial performance from the Mexican MFI, Financiera Independencia, and also determines whether crime measures can help predict the likelihood that an MFI opened a new office among one of the group of most criminally active states in Mexico. Regression analysis will consider crime trends over time and the possible effects of an MFI opening an office in a location that was once not criminally active, but is negatively impacted by crime years later.

Crime at the state level could help explain MFI location decisions because crime is rampant in Mexico and pervades all aspects of life, but also varies from state to state. The influence of crime on MFI location decisions may be particularly important in Mexico because Mexican MFIs, like MFIs in other parts of Latin America, are highly commercialized compared to the rest of the world (Berger et. al, 2006). Crime is highly prevalent in many areas in Mexico. Drug trafficking and gang-related violence plague Mexico, so it is reasonable to assume that crime would negatively impact borrowers from taking loans to build their entrepreneurial endeavors, smooth consumption, or mortgage a home. Other economic and societal factors will surely influence MFI activity in Mexico, and will be controlled for in regression analysis, but crime is worth studying for its propensity to drive these other factors. Focusing on MFI activity as well as microenterprise activity, this study has the advantage of capturing both the effect of crime
on MFI financial performance, the decisions these organizations make regarding where to
grow operations, and the effect of crime on the lives of borrowers. MFIs want to locate in
places that increase access to credit for poor people without jeopardizing their
sustainability and financial performance. In order to do this, the MFI may decide to
expand their operations to regions that those in power believe have more credit worthy
borrowers than others.

This paper moves beyond discussions of outreach in terms of number of
borrowers, loan size, etc. and examines the impact of a potentially significant deterrent to
MFI operations, crime. By testing the hypothesis that crime negatively impacts the
financial success of Mexican MFIs, this study offers a new dimension to the many drivers
that affect the MFI’s pursuance of its social mission. Taking into account other state
characteristics, do MFIs choose to avoid higher crime states and choose to give greater
weight to operational considerations over their altruistic goal of serving clients in
poverty? Assuming interest rates are constant across states (Appendix 1), borrowers in
these crime-ridden states are inherently riskier bets and would produce lower expected
returns.

However, the level of lending in a state may be affected not only by the supply
considerations mentioned above, but also by demand considerations. Clients in higher
crime states may be deterred from taking loans as crime may decrease the expected
returns on any investment made. The assumption is that crime will lower the demand for
credit and increase the cost per borrower for the MFI.

However, an MFI willingness to enter a crime-ridden state may depend on its
level of maturity. It may only be willing to take on the additional risk of operations in a
high crime area after years of sufficient growth when a certain threshold level of sustainability and system development and robustness has been reached. Only at this point can the MFI afford the costs of serving clients that live in criminally active areas be minimized and absorbed, meaning there is cross-subsidization from other states and that profits are sufficiently high that the MFI can absorb losses. This could indicate that the MFI is adhering to their mission and helping to reduce poverty. This scenario might be too idealistic and not in the interest of shareholders.

Literature Review

Are there negative consequences of efforts to achieve and maintain sustainability? Berger, Marguerite, Otero, and Schore (2006) explain the process of “upgrading,” a transitional path from a nongovernmental organization (NGO) to a commercial bank, to be motivated by the quest for commercial sustainability, combined with scale outreach.” However, many have questioned whether there are trade-offs between sustainability and outreach (Swanson, 2008). Do MFIs sacrifice their original goal of reducing poverty at the expense of becoming sustainable?

As MFIs start to resemble the traditional banks that neglect to serve the poor, evidence of these MFIs serving wealthier clients at the expense of poorer clients would indicate mission drift. Cull et al (2007) test the extent of mission drift by showing that commercialization, measured by profitability, involves MFIs extending loans that are larger on average, and moving away from serving women. The number of active borrowers, average loan size, and gender are typical measures of outreach, but cannot individually tell the whole story. Although the number of active borrowers and total loan
portfolio could increase over time, larger average loans indicate the MFI is catering to a wealthier client base. Armendáriz et al (2005) explored this theme by looking at funding. She analyzed subsidy uncertainty and microfinance mission drift, measured by average loan size, finding that mission drift increases with subsidy uncertainty. This uncertainty is what leads MFIs to strive for sustainability and reduce their dependence on subsidies.

The combination of high interest rates, low default rates, and high profits raises concerns about such an MFI’s preference for sustainability over outreach. Critics of “upgrading” argue that maintaining a double bottom line is wishful thinking, and that MFIs face a tradeoff between sustainability and outreach. Most of this criticism came in the wake of the Compartamos IPO, which added the incentives of shareholders to their business model. In 2007, Muhammad Yunus announced, “[he is] shocked by the news about the Compartamos IPO. When socially responsible investors and the general public learn what is going on at Compartamos, there will very likely be a backlash against microfinance.” With rapid growth since commercialization, Compartamos claims their high rates to borrowers ensures that the MFI covers its operating costs and maintains growth. This criticism seems to confirm the contention that upgraded MFIs would focus on profitability over client needs (Rosenberg, 2007).

Hudon and Sandberg (2011) introduce an interesting theoretical discussion about the fairness of interest rates on microcredit. With their procedural approach to fairness, the authors explain how the fairness of a given market transaction depends on how voluntary the transaction was for both parties, and their consent to the terms of the transaction. In the microfinance case, this concern is one sided, that the MFI is not coercing potential borrowers into a loan they are not prepared for. Proponents of what
previous literature calls the institutionalist view argue that it is up to the transacting parties themselves to determine if a loan is fair. Although we might be observing the collective acquiescence of a borrowing class faced with few credit options, their willingness to take these loans indicates that the availability of credit is more important to them than the cost. However, the question remains: do MFIs target a different class of borrowers, neglecting their social imperative, as they become more commercially funded?

Previous literature on the relationship between crime and microfinance activity is scarce. BenYishay and Pearlman (2011) investigate the effects of crime on microenterprise growth. They find that higher rates of property crime are associated with a significantly lower probability that an enterprise will plan to expand in the next 12 months or experience income growth. Krkoska and Robeck (2009) use cross-sectional data to show that enterprises in Eastern Europe and Central Asia are substantially negatively effected by street crime, and that those enterprises that suffer the largest losses are the least likely to make new investments. These studies examine crime’s effect on microenterprise decisions to take on credit, but do not relate crime to the microfinance institutions themselves. If microentrepreneurs decide not to take MFI loans in areas where the incidence of crime, specifically robbery, is the greatest, it is reasonable to assume that MFIs might prefer not to extend loans in those areas and could be dissuaded from growing where crime is most pervasive. BenYishay and Pearlman, examining the impacts of a number of different types of crime, show that robbery is the most impactful crime on microenterprise growth. They control for other types of specifically violent crimes, including homicides and assaults, but acknowledge that these violent crimes may
be related to the underlying factors that determine overall crime and microenterprise growth. With their acknowledgement in mind, this paper examines the effect of total crime in addition to specific crimes like homicide and theft on MFI performance.

**Theoretical Framework**

Geographic expansion is a strategy that may enable MFIs to achieve both their goals of outreach and profitability, yet the strategic decisions that impact where to locate can be influenced by a number of variables. Specifically, local factors can drive the regional expansion of MFIs. An MFI might decide to locate in a region where there is a low level of MFI activity and little competition among lenders. In another scenario, the MFI might decide to locate in a region where is high MFI activity, and borrowers are knowledgeable about microfinance and educated regarding taking loans. The discussion of competition can also be extended to the formal sector, where an MFI decides whether or not to locate where traditional banks are also present. McIntosh et al. (2005) investigate competition and find that MFIs tend to cluster geographically.

Beyond local financial competition, an MFI is likely to open new offices where they already have offices, and expand from the focal point of their headquarters. This is likely to occur when the MFI is young and is beginning to grow geographically, but as the MFI upgrades and becomes more mature, the possibility to expand beyond their initial cluster is within reach. Upgraded MFIs have more flexibility with their decision-making regarding where to locate, so it is possible that they can discriminate between locations where a certain borrowing class might live. Stated differently, mature MFIs might take into account borrower characteristics when deciding where to locate. This
could be a major way MFI’s consciously drift from their mission and cater to wealthier clients. The motivation for these regressions is to discover the reasons an MFI decided to open a new office in the location they chose instead of other possible locations. Crime enters the equation as a possible deterrent for locating in certain locations. The author predicts that MFI’s will be less likely to open new offices in the states that have low GDP, low wages, and high levels of crime. The measures of crime are the variables of interest because crime and violence pervade all aspects of life and will negatively impact MFI decisions as well as the likelihood that borrowers seek MFI activity.

A primary source of data are Independencia’s annual reports to shareholders. As of 2012, Independencia is Mexico’s fourth largest MFI by Total Loan Portfolio with 432 million in USD and second largest in terms of Total borrowers with 1.2 million. Independencia is a good example an MFI that has exhibited what Berger et al. would call upgrading. The company has taken a clear path from the first SOFOL (Sociedad Financiera de Objeto Limitado) lender in Mexico, to become one of the only publicly traded Mexican MFIs. SOFOL institutions were designed to provide limited financial services to clients, were unregulated, and were unable to raise public funds. This is Mexico’s specific brand of NGO that starts an MFIs journey in the process of upgrading.

“Some MFIs have begun to offer more sophisticated services to larger clients involving more substantial risks --small business lending, mortgages, factoring, leasing, insurance, etc. This is a controversial development. Some observers denounce MFI “mission creep” and worry that MFIs will abandon their low-income clients as they progress upstream” (Swanson, 2008). Capitalized by their IPO in 2007, the company has maintained its mission to grow by extending microcredit loans on an unsecured basis to
individuals who operate in either the formal and informal economy and who are among
the low-income segments in urban areas of Mexico. With regards to Swanson’s
comments, Independencia has done this without losing its initial mission of promoting
social and economic well-being in the fight against poverty, so they say. This paper aims
to quantify the extent to which Independencia has maintained its double bottom line by
examining its commitment to its clients who are located in high crime areas.

Several MFI specific characteristics influence Financiera Independencia’s (FI)
ability to serve the poor. From 2006 to 2012, hereinafter the test period, Financiera
Independencia’s number of active borrowers (NAB) increased from 499,195 to
1,212,725. During the same period, FI increased their gross loan portfolio (GLP) from
199,678,426 USD to 432,009,028 USD, although there was a decline in the last two years
of the test period from the company’s peak in 2010 at 42,645,972 USD. Both indicators
clearly show that FI grew during the test period, but how and to what extent there is
mission drift is still unclear; there is not clear trend in average loan portfolio.

Other indicators that measure risk, revenue, and financial performance are
important to consider when evaluating FI’s potentially changing client base as they grew
during the test period. FI’s operational self-sufficiency, which is calculated as Financial
Revenue / (Financial Expense + Net Impairment Loss + Operating Expense), declined
from 136.46% to 97.00%. This decline is not consistent with previous literature that
predicts sustainability to be the main goal of MFIs as they grow to take on more
borrowers and extend more loans. However, FI is still highly self-sustaining at 97% at the
end of the test period. The test period captures a snapshot of FI’s history after their IPO in
2007 after years of becoming sustainable.
Throughout the period, FI had its OSS over 100% until 2012 when it dipped under 100% for the first time. This might not be a bad thing for borrowers. Having OSS over 100% is an attempt to cover expenses and retain a surplus of funding for the future. Decreasing OSS to just under 100% could be a result of FI mastering their business model, having reserves in previously accrued assets, and having security in extending loans to potentially riskier borrowers. FI’s profit margin during the test period decreased from 26.72% to -3.09% and its write-off ratio, the Value of loans written-off / Average Gross Loan Portfolio, increased from 12.73% in 2007 to 28.08% in 2012. Profits are decreasing while more borrowers find themselves unable to repay their loans. These superficial trends can’t tell the whole story, but they are surely not attractive to FI’s directors, managers, and shareholders. Still, the evidence of declining operational self-sufficiency in conjunction with these other indicators could point to either economic hard times for FI, or an increased willingness to provide access to credit for Mexico’s poorest households.

**Data**

The state level data on Financiera Independencia’s Total Loan Portfolio and Interest Income came from their annual reports to shareholders. The annual reports were provided from 2006 to 2012, and so it is over the course of this test period that panel data was used. The data are relatively complete, although the company did not operate in Nuevo Leon in 2006 and 2007, so they did not record the Total Loan Portfolio and Interest Income. Independencia is a valuable case study because they operate in every state of Mexico, which is a feature they do not share with most MFIs in Mexico, giving
the opportunity for the author to use state fixed effects in conjunction with state-level crime data.

Institutional level data for Financiera Independencia were collected from the MIX Market (www.mixmarket.org) a NGO that aims to promote information exchange and transparency in the microfinance industry. To date, the MIX contains the best publicly available cross-country data on individual MFI’s balance sheets and financial indicators. MFIs also report outreach and administrative measures to the MIX, which are accessible through their database. Importantly, the MIX uses a diamond ranking system to rate each individual MFI’s reports based on data completeness where 1 is the least complete and 5 is the most complete. It is important to note that MFIs self report to the MIX.

State level data on crime comes from the Instituto Nacional de Estadística, Geografía e Informática (INEGI), which is an organization that was created to generate information on demographic, social, economic and environmental phenomena within Mexico. Statistics and geographical information produced and made available to the state and society contribute to the development of the country, as it promotes a better understanding of reality to inform policy decisions.

Data from the INEGI is very complete, although some indicators are collected over longer periods of time than others. The variables Crime, Murders, Theft, Sexual Offenses, and %Change in GDP were collected from 2006 to 2010. It is worth noting that data collected for crimes in Mexico should be taken with a grain of salt and only capture a fraction of the total number of crimes reported. Although the number of crimes might
be understated, the author has no reason to believe that crimes were recorded with greater
accuracy in some states than others, so the deficiencies of the data set are universal to
each state. Data on Wages was collected from 2006 to 2012, while data on Suspected
Narcotics Criminals was collected from just 2006 to 2008. Also, data for Wages was not
collected for Distrito Federal for any year, so it is left out of the regression analysis.

The information used to map the expansive growth of the MFI, Caja Popular,
comes from their website. The author compiled the locations of every office opened from
2006-2010, and the years they opened to map the growth over time. It should be noted
that Caja Popular was founded in 1996 and has 465 offices as of 2013. In order combined
this information with the crime statistics available, and map the expansive growth in the
country’s most criminally active states, the author’s analysis is limited to working with
the 89 offices opened from 2006-2010.

Table 1 presents a correlation at the 10% confidence level of the dependent and
independent variables used. Total Loan Portfolio and Interest Income are highly
correlated, so the author does not expect wildly different results between the two sets of
regressions presented in Tables 2 and 3. Interestingly, the various measures of crime are
all positively correlated with the dependent variables, Total Loan Portfolio and Interest
Income. CRIMES, MURDERS, and SEXOFFENSES are the only crime variables
negatively correlated with ChangeGDP, yet they are all positively correlated with the
other economic control, WAGE.
**Methodology**

Using panel data and state-level fixed effects, the author uses the following empirical model to investigate the extent to which crime level can explain the variation of success of the microfinance institution, Financiera Independencia (FI) across states:

\[ Y_{it} = \alpha + \beta_1 X_{it} + \beta_2 Z_{it} + \beta_3 C_{it} + \text{STATEFE} + \epsilon_i \]

The dependent variable (Y) is one of two measures of MFI financial performance; X is a set of state level crime variables; Z measures state level wages and salaries; and C is a set of state-level controls that include more specific measures of crime and the economy.

While primary variables of interest are CRIME and WAGE, with the additional controls added in recognition of variation the company’s client base across states. The dependent variables, state level *** and stage level ***, can be thought of as measures of FI’s expansive growth, while the main independent variables, WAGE and CRIME, elucidate the level of quality or creditworthiness of FI’s borrowers.
Separate sets of regression specifications employ Financiera Independencia’s Total Loan Portfolio and Interest Income by state as dependent variables. Each variable measured in thousands of pesos. Although Total Loan Portfolio is a proxy for the number of borrowers in a state, it is difficult to say it can proxy for outreach because outreach is indicated by an increase in borrowers and decrease in average loan size. While the former is correlated with increases in loan portfolio, the latter is not. An increase in loan portfolio may be the result of an increase in the number of borrowers (more outreach) but it might also be due to an increase in the average loan size (less outreach). These factors are subtly different and prevent researchers from making general statements about the absolute magnitude of outreach given the variation of commercialization, profitability, and sustainability associated with upgrading.

The regression would be much more telling of FI’s outreach with access to state-level data of the average loan per borrower and the number of active borrowers. Although the product of these desired variables, which have been commonly used together in previous literature to measure outreach, is equal to the Total Loan Portfolio, the dependent variables in these regressions are telling of financial performance rather than outreach.

Interest income is a unique dependent variable not found in previous studies, and is a function of a number of variables. The most obvious are the number of borrowers, the size of each loan, interest rates, and repayment rates. Interest Income is a crucial variable because it is presumably the most important figure for the MFI in terms of revenue. Assuming that profitability is a priority for an upgraded MFI such as FI, costs and revenues dictate where MFIs are going to focus business operations. This could be telling
of lender behavior and management decisions in the MFI’s process of evaluating
potential growth opportunities in the crime-ridden states of Mexico. Although interest
income does not measure costs, state level data allows for a better understanding of
where the MFI is deriving its profits. Estimations of the costs incurred by FI will rely on
descriptive data provided by the MIX.

The main dependent variable (X) measures crime by state. The baseline
regression includes measures of the number of crimes occurring and recorded in previous
investigations of the ordinary court (CRIME) as well as wages (WAGE), which is
measured in thousands of pesos, in the corresponding states. Both CRIME and WAGE
appear in each regression, but the model is then extended to include more specific crime
variables. These are: the number of murders occurring (MURDER), the number of thefts
(THEFT), the number of suspected narcotics crimes (NARCO), and the number of sexual
offenses (SEXOFFENSE). State level growth in GDP (ChangeGDP) is included to better
understand the economic climate that borrowers face as an extension of the variable that
measures wages.

The author expects the various measures of crime to negatively impact FI’s Total
Loan Portfolio and Interest Income, while there should be a positive correlation between
the economic indicators and the selected dependent variables. In addition to the variable
CRIME, which should have a negative sign in the regression results, the expected
negative impact for the more specific measures of crime have individual motivations.
Inspired by the work of BenYishay and Pearlman (2011), THEFT is expected to deter
borrowers from taking microloans due to the fear that their loans or other assets related to
their microenterprise will be stolen. MURDER and NARCO are included to estimate the
effects of the drug war on microfinance activity. Although not all murders are drug-related, it is reasonable to assume that murders will be more prevalent in areas that also have high levels of cartel activity. Finally, SEXOFFENSE are included in the regression analysis because typically women are the victims of such crimes. Women also make up the majority of FI’s borrowers (though not explicitly reported to the MIX), so this type of crime may be a particularly important deterrent of women from taking loans.

The measures of Mexico’s economic climate by state, WAGE and ChangeGDP, are expected to have the opposite effect on Total Loan Portfolio and Interest Income that crime has. The author expects that the states with higher total wages will also have higher levels of Total Loan Portfolio and Income Interest because the borrowers in these states are more financially stable and creditworthy. ChangeGDP is expected to have a similar effect and gives a measure for the general economic climate of the state and borrowers’ ability to repay loans. Still, it is possible that states with stronger economies, proxied by high wages and change in GDP, could have more opportunities for the inhabitants of these states in the more formal sectors of the economy. In this case, microcredit would be less attractive for borrowers because they can work for a company as an employee rather than become an entrepreneur using microfinance. This would result in a negative relationship between WAGE and ChangeGDP, and Total Loan Portfolio and Interest Income.

Results

The author begins to estimate the empirical model using a time series regression with state fixed effects. Controls for WAGE and %Change in GDP are included in each
of the five regressions to capture the wealth of the borrowers in each of the states of Mexico. Each successive regression presented in the tables adds a new measure of crime with standard errors in parentheses below. Each of the regressions tests for significance at the 10%, 5%, and 1%. The $r^2$ of each regression presented is above or equal to .570, so the regressions capture more variation than expected.

Table 2 presents the results from the first set of regressions with Portfolio Interest Income as the dependent variable. The results for WAGES confirm the author’s predictions with positive signs and significance at the 1% confidence level for each regression. This shows that FI had more financial success in the states that had higher wages. The other economic indicator, ChangeGDP, was also significant at the 1% level in regressions 1-3 and at the 5% level in regressions 4 and 5, but has a negative impact on Portfolio Interest Income. These results could be driven by the previously mentioned concerns about alternative opportunities in the formal sector, but it is certainly curious that WAGE and change in GDP have different signs, although Table 1 presents a negative correlation between the two variables. The negative relationship between %Change in GDP and Interest Income could be evidence that in the years when state economies contracted, borrowers were less likely to take loans with a pessimistic outlook on the future economic opportunities.

Surprisingly, CRIME was positively correlated with Interest Income, which is inconsistent with the author’s predictions. What are most surprising are the significant results in models 2, 3, and 5. MURDER and NARCO also have positive signs, but are not significant. The results for THEFT are consistent with the author’s predictions and confirm the work done by BenYishay and Pearlman (2011). The coefficients for THEFT
have negative signs and are significant at 1% in models 2 and 3, and at 5% for regression 4. Finally, SEXOFFENSES are negatively correlated with Interest Income and are significant at the 5% level.

Table 2: Determinants of Variations in State Level Portfolio

<table>
<thead>
<tr>
<th>Dependent Variable: Interest Income</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(0.792)</td>
<td>(1.019)</td>
<td>(1.016)</td>
<td>(1.685)</td>
<td>(1.635)</td>
</tr>
<tr>
<td>ChangeGDP</td>
<td>-1,257.128***</td>
<td>-1,137.945***</td>
<td>-1,101.286***</td>
<td>-2,136.677**</td>
<td>-2,047.550**</td>
</tr>
<tr>
<td></td>
<td>(427.820)</td>
<td>(400.550)</td>
<td>(399.281)</td>
<td>(1,024.184)</td>
<td>(985.090)</td>
</tr>
<tr>
<td>Crimes</td>
<td>0.015</td>
<td>0.786**</td>
<td>0.691**</td>
<td>0.744</td>
<td>0.779*</td>
</tr>
<tr>
<td></td>
<td>(0.272)</td>
<td>(0.316)</td>
<td>(0.320)</td>
<td>(0.486)</td>
<td>(0.467)</td>
</tr>
<tr>
<td>Theft</td>
<td>-2.999***</td>
<td>-3.117***</td>
<td>-2.507**</td>
<td>-0.123</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.699)</td>
<td>(0.700)</td>
<td>(1.158)</td>
<td>(1.510)</td>
<td></td>
</tr>
<tr>
<td>Murders</td>
<td>6.858</td>
<td>10.061</td>
<td>0.979</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4.616)</td>
<td>(7.330)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narco</td>
<td>8.430</td>
<td></td>
<td>10.251</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>(17.258)</td>
<td></td>
<td>(16.605)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SexualOffenses</td>
<td>-18.644**</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(7.980)</td>
<td></td>
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</tr>
<tr>
<td>_cons</td>
<td>-47,351.960***</td>
<td>-72,377.894***</td>
<td>-70,676.521***</td>
<td>-61,121.577**</td>
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<td>(15,599.603)</td>
<td>(24,717.768)</td>
<td>(24,280.953)</td>
</tr>
<tr>
<td>N</td>
<td>153.000</td>
<td>153.000</td>
<td>153.000</td>
<td>91.000</td>
<td>91.000</td>
</tr>
<tr>
<td>F</td>
<td>57.818</td>
<td>54.311</td>
<td>44.334</td>
<td>15.820</td>
<td>15.459</td>
</tr>
<tr>
<td>r2</td>
<td>0.593</td>
<td>0.648</td>
<td>0.655</td>
<td>0.637</td>
<td>0.671</td>
</tr>
</tbody>
</table>

Note: *** p<0.01, ** p<0.05, * p<0.1

The results in Table 3 are for the regressions that use Total Loan Portfolio as the dependent variable. They confirm the results from Table 1 in terms of magnitude and signs of the coefficients. This is likely because Total Loan Portfolio and Interest Income are correlated. As mentioned previously, Interest Income is a function of several things, including the number of active borrowers, average loan size, interest rate, and repayment
rates, so it is not surprising that the results from the Total Loan Portfolio regressions are not vastly different from the Interest Income. Interest rates and repayment rates do not typically change drastically over time and space (Appendix 1), so the major variation comes from the number of active borrowers and average loan size, which when multiplied give the total loan portfolio.

Curiously, CRIME becomes significant at the 10% level in regressions 4 and 5, and MURDERS become significant in regression 4. Another difference that occurs when Total Loan Portfolio becomes the dependent variable is the lack of significance for SEXOFFENSES, which was significant when Interest Income was the dependent variable.

Table 3: Determinants of Variations in State Level Portfolio

<table>
<thead>
<tr>
<th>Dependent Variable: Total Loan Portfolio</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1.290)</td>
<td>(1.666)</td>
<td>(1.672)</td>
<td>(2.989)</td>
<td>(2.987)</td>
</tr>
<tr>
<td>ChangeGDP</td>
<td>-1,902.590***</td>
<td>-1,715.066***</td>
<td>-1,678.952**</td>
<td>-3,912.457**</td>
<td>-3,811.861**</td>
</tr>
<tr>
<td></td>
<td>(696.136)</td>
<td>(655.058)</td>
<td>(656.895)</td>
<td>(1,816.393)</td>
<td>(1,799.794)</td>
</tr>
<tr>
<td>Crimes</td>
<td>0.105</td>
<td>1.366***</td>
<td>1.273**</td>
<td>1.464*</td>
<td>1.504*</td>
</tr>
<tr>
<td></td>
<td>(0.443)</td>
<td>(0.516)</td>
<td>(0.527)</td>
<td>(0.862)</td>
<td>(0.854)</td>
</tr>
<tr>
<td>Theft</td>
<td>-4.719***</td>
<td>-4.835***</td>
<td>-4.516**</td>
<td>-1.825</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.143)</td>
<td>(1.151)</td>
<td>(2.054)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murders</td>
<td>6.756</td>
<td>25.140*</td>
<td>14.890</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(7.595)</td>
<td>(13.000)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narco</td>
<td>10.571</td>
<td>12.625</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(30.607)</td>
<td>(30.338)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SexualOffenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-21.043</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(14.579)</td>
</tr>
<tr>
<td>N</td>
<td>153.000</td>
<td>153.000</td>
<td>153.000</td>
<td>91.000</td>
<td>91.000</td>
</tr>
<tr>
<td>F</td>
<td>52.496</td>
<td>48.940</td>
<td>39.241</td>
<td>15.382</td>
<td>13.747</td>
</tr>
<tr>
<td>r2</td>
<td>0.570</td>
<td>0.624</td>
<td>0.626</td>
<td>0.631</td>
<td>0.645</td>
</tr>
</tbody>
</table>

Note: *** p<0.01, ** p<0.05, * p<0.1
Robustness Check

The identification strategy relies on state- and time- level variation in crime rates and economic controls. As per BenYishay and Pearlman (2011), there are concerns that certain states with high population densities could drive the results. To check for robustness of the previous regressions, the author excludes the states Distrito Federal (the Federal District), and the State of Mexico. Distrito Federal contains Mexico City, among other small cities, and can be equated to Washington, DC in the US. Excluding these states is of particular interest for this study because FI identifies in their mission statement with catering to urban populations. Tables 4 and 5 present the same regressions as 2 and 3 respectively, but exclude these two states.

With the omission of Distrito Federal and the State of Mexico, THEFT, the variable of interest in the previous regressions, becomes insignificant in all regressions except regression 5. The economic controls, WAGE and ChangeGDP remain significant, however. Curiously, the coefficients for CRIME are negative in the first few regressions and become positive after model 4 in Table 4 and after model 3 in Table 5. This change in the direction of magnitude is unseen in the preliminary regressions, for which the author does not have an explanation. Still, SEXOFFENSE and THEFT are significant in the final regression when Interest Income is the dependent variable, which confirms the author’s predictions. Overall, the robustness checks confirm the author’s results regarding the relationship between the economic controls used and MFI financial performance. As they pertain to the various measures of crime, the robustness checks cloud any definitive statements that can be made about the relationship between crime and financial
performance. These results could imply that the negative impacts of crime on financial performance are strongest in highly populated, urban areas, although these are typically the types of places FI conducts business.

Table 4

<table>
<thead>
<tr>
<th>Dependent Variable: Interest Income</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(0.792)</td>
<td>(0.861)</td>
<td>(0.870)</td>
<td>(1.542)</td>
<td>(1.502)</td>
</tr>
<tr>
<td>ChangeGDP</td>
<td>-1,074.491***</td>
<td>-1,091.361***</td>
<td>-1,093.105***</td>
<td>-1,560.449*</td>
<td>-1,491.513*</td>
</tr>
<tr>
<td></td>
<td>(338.226)</td>
<td>(336.784)</td>
<td>(338.681)</td>
<td>(879.942)</td>
<td>(848.521)</td>
</tr>
<tr>
<td>Crimes</td>
<td>-0.245</td>
<td>-0.604*</td>
<td>-0.604*</td>
<td>-0.081</td>
<td>0.044</td>
</tr>
<tr>
<td></td>
<td>(0.214)</td>
<td>(0.326)</td>
<td>(0.327)</td>
<td>(0.456)</td>
<td>(0.443)</td>
</tr>
<tr>
<td>Theft</td>
<td>1.193</td>
<td>1.216</td>
<td>0.733</td>
<td>2.357*</td>
<td>2.357*</td>
</tr>
<tr>
<td></td>
<td>(0.818)</td>
<td>(0.851)</td>
<td>(1.257)</td>
<td>(1.412)</td>
<td>(1.412)</td>
</tr>
<tr>
<td>Murders</td>
<td>-0.410</td>
<td>1.202</td>
<td>-5.559</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narco</td>
<td>5.067</td>
<td>7.546</td>
<td></td>
<td>(14.744)</td>
<td>(14.251)</td>
</tr>
<tr>
<td>SexualOffenses</td>
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<td></td>
<td></td>
<td>-15.819**</td>
<td>(7.077)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(7.077)</td>
</tr>
<tr>
<td>_cons</td>
<td>-77,062.555***</td>
<td>-71,904.591***</td>
<td>-72,028.135***</td>
<td>-84,331.132***</td>
<td>-90,552.858***</td>
</tr>
<tr>
<td></td>
<td>(12,661.821)</td>
<td>(13,087.942)</td>
<td>(13,200.028)</td>
<td>(21,795.472)</td>
<td>(21,186.945)</td>
</tr>
<tr>
<td>N</td>
<td>148.000</td>
<td>148.000</td>
<td>148.000</td>
<td>88.000</td>
<td>88.000</td>
</tr>
<tr>
<td>F</td>
<td>120.244</td>
<td>91.596</td>
<td>72.643</td>
<td>25.490</td>
<td>24.241</td>
</tr>
<tr>
<td>r2</td>
<td>0.758</td>
<td>0.763</td>
<td>0.763</td>
<td>0.746</td>
<td>0.769</td>
</tr>
</tbody>
</table>

Note: *** p<0.01, ** p<0.05, * p<0.1
Table 5

<table>
<thead>
<tr>
<th>Dependent Variable: Total Loan Portfolio</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1.350)</td>
<td>(1.474)</td>
<td>(1.487)</td>
<td>(2.845)</td>
<td>(2.867)</td>
</tr>
<tr>
<td>ChangeGDP</td>
<td>-1,658.508***</td>
<td>-1,679.025***</td>
<td>-1,666.418***</td>
<td>-2,998.269*</td>
<td>-2,930.642*</td>
</tr>
<tr>
<td></td>
<td>(576.516)</td>
<td>(576.677)</td>
<td>(579.034)</td>
<td>(1,623.403)</td>
<td>(1,619.501)</td>
</tr>
<tr>
<td>Crimes</td>
<td>-0.233</td>
<td>-0.669</td>
<td>-0.666</td>
<td>0.133</td>
<td>0.256</td>
</tr>
<tr>
<td></td>
<td>(0.365)</td>
<td>(0.558)</td>
<td>(0.559)</td>
<td>(0.842)</td>
<td>(0.846)</td>
</tr>
<tr>
<td>Theft</td>
<td>1.451</td>
<td>1.677</td>
<td>0.718</td>
<td>2.311</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.401)</td>
<td>(1.455)</td>
<td>(2.318)</td>
<td>(2.695)</td>
<td></td>
</tr>
<tr>
<td>Murders</td>
<td>-4.085</td>
<td>10.865</td>
<td>4.232</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(6.820)</td>
<td>(12.082)</td>
<td>(13.357)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narco</td>
<td>5.001</td>
<td>7.433</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(27.200)</td>
<td>(27.199)</td>
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</tr>
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<td>SexualOffenses</td>
<td></td>
<td></td>
<td></td>
<td>-15.519</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(13.507)</td>
<td></td>
</tr>
<tr>
<td>_cons</td>
<td>-120,199.480***</td>
<td>-113,926.324***</td>
<td>-115,158.117***</td>
<td>-146,258.233***</td>
<td>-152,361.827***</td>
</tr>
<tr>
<td></td>
<td>(21,582.403)</td>
<td>(22,410.533)</td>
<td>(22,567.714)</td>
<td>(40,210.412)</td>
<td>(40,437.742)</td>
</tr>
<tr>
<td>N</td>
<td>148.000</td>
<td>148.000</td>
<td>148.000</td>
<td>88.000</td>
<td>88.000</td>
</tr>
<tr>
<td>F</td>
<td>97.925</td>
<td>73.758</td>
<td>58.746</td>
<td>22.357</td>
<td>19.470</td>
</tr>
<tr>
<td>r2</td>
<td>0.719</td>
<td>0.721</td>
<td>0.722</td>
<td>0.721</td>
<td>0.728</td>
</tr>
</tbody>
</table>

Note: *** p<0.01, ** p<0.05, * p<0.1

Mapping Expansive Growth: Caja Popular

The regressions so far have been limited to the effects of crime on financial performance for the MFI, Financiera Independencia. This section introduces a different approach to understanding the effects of crime on MFI outreach and employs the location and year of opening for the 89 Caja Popular offices opened during the test period. These office locations are mapped against some of the crime statistics used in the previous regressions to determine the likelihood that Caja Popular opened a new office in one of the most criminally active states of Mexico; they are total CRIME, THEFT, SEXUAL...
OFFENSES, and WAGE for a lone economic indicator. These variables were selected because they were the most significant in previous regressions and warrant further investigation. Caja Popular is located in 21 states.

The maps are categorized by year and display the number of offices opened in each state. For each map in a given year, the number of offices is the same for each state, but the four maps that appear depict how Caja Popular decided to open new offices in the face of these variables. The colors represent states that were ranked in the top 3 (Red), top 10 (Orange), bottom 10 (Light Blue), and bottom 3 (Dark Blue) states for those various measures in a given year. If Caja Popular decided to open new offices in states that were consistently Red or Orange, it is an indication that crime did not deter their decision to open in a certain state. Conversely, if Caja Popular avoids these states and opens new offices in states that are consistently Blue, this could be evidence that they attempted to avoid crime-ridden states, and potentially mission drift if we assume that there are poorer borrowers in areas with high levels of crime. Only states where Caja Popular opened a new office were colored in. It should be recognized that the intuition for ranking the various states of Mexico by wage is opposite compared to the measures of crime. Warm colored states indicate high wages and cool colored states have low wages, so the incidence of high numbers of offices opened in Red states indicates that the MFI targeted wealthy borrowers, and vice versa for Blue states.

It is difficult to ascertain casual relationships between these variables and the likelihood that Caja Popular opened a new office in a particular state, but there are interesting finding in the maps. Caja Popular is headquartered in Guanajuato, and so the majority of their offices (28) opened in this state. Not surprisingly, Caja Popular also
located many of its new offices in Guanajuato’s neighboring states. Although the maps are effective in depicting the geographic clustering of offices and expansion from the focal HQ, there are several telling findings. For example, 11 of the new offices from 2006-2010 were opened in one of the country’s top 3 states for highest wage. The only other time Caja Popular opened an office in a Red state was in 2010 when they opened a single office in the State of Mexico, in which case the state was in the top 3 for Sexual Offenses and Theft. However, Guanajuato consistently appeared as an Orange state for the different crime variables, and so this is evidence that Caja Popular was not deterred from opening more offices over the years in this crime-ridden state. These conflicting location decisions introduce an interesting theoretical argument. Caja Popular opened many offices in a relatively crime-ridden state, although this state is also where the MFI is headquartered. Do the benefits of opening new offices near already existing offices mitigate the potentially deterring factors such as high crime and low wage? What are the benefits of opening new offices near old ones? These are questions for further research.

Although this is as far as the author can detect obvious patterns in the maps, this method for mapping the geographic expansion of MFI office locations provides an interesting precedence for future researchers who have access to MFI office locations for more than one MFI (and even for the entire history of a single MFI).

Conclusion

Crime has scantly been included in previous research that has analyzed MFI activity, but the results from the regression analysis show that crime negatively impacts MFI financial performance. Specifically, theft proved to be an important determinant of financial performance, which introduces the effects of property rights on MFI activity.
Borrowers who live in areas where theft is prevalent are likely deterred from taking loans for fear that their capital will be stolen. Similarly, sexual offenses, which are mainly limited to women, who also mainly participate in MFI activity, proved to negatively impact financial performance. Should these negative impacts on financial performance persist, MFIs might choose to locate and focus operations in less crime-ridden locations where the return on their loan portfolio will be higher. Although these regressions to not explicitly capture the decisions made regarding where to locate, no doubt will managers of MFIs take the financial performance by state into account when choosing where to locate in the future. The paltry results provided by the robustness check are not promising for making absolute assertions about the effects of crime on MFI performance, but the author contends that the initial results are important given the poor availability of state-level data with which to employ econometric techniques.

The economic controls used in the regressions are telling of borrower characteristics that have been used in previous literature, the wealth of borrowers. Although usually measured by average loan portfolio, WAGE and ChangeGDP are indicative of the economic climates borrowers face. Still, the positive effects of WAGE on Total Loan Portfolio and Interest Income and the negative effects of ChangeGDP are puzzling.

The author offers a novel approach to measuring the effects of financial performance and invites future research to pick up where he left off. The use of state-level data is important for the visibility of MFI activity and for specific analysis that goes beyond cross-country examinations. Because the nature of microfinance is inherently
local, it is important for further pursuits in relating literature to keep a focus on within-
country analysis.
References


Appendix

Christopher (03:32:50) : hola
Christopher (03:33:07) : quales son los precios por region estatal?
Mariela Rojas (03:34:38) : Buen día Señor le atiende Mariela Rojas, es un placer atenderle.
Mariela Rojas (03:34:50) : Disculpe a que se refiere con su pregunta?
Christopher (03:35:26) : quiero saber si los precios son diferentes en los diferentes surcusales
Christopher (03:35:46) : por ejemplo en Baja California contra Guerrero
Mariela Rojas (03:36:21) : Se refiere a los intereses?
Christopher (03:36:24) : si
Mariela Rojas (03:37:17) : Se manejan igual en toda la republica a excepcion de las ciudades frinera que es un poco mas alto
Christopher (03:39:04) : son mas altas en ciudadas que quedan en las dos fronteras?
Christopher (03:39:55) : muchas gracias
Mariela Rojas (03:40:13) : Asi es
Christopher (03:40:26) : soy estudiante en los EEUU y quiero saber mas sobre la microfinancia
Christopher (03:41:26) : hay lugar en el WEB donde puedo encontrar informacion sobre financiera independencia al nivel estatal
Christopher (03:42:05) : ?
Christopher (03:42:36) : gracias por todo
Christopher (03:42:40) : adios
Maps of Mexico
(This page is a reference for the location of each state; the maps generated to plot office location against crime variables are on the coming pages)