Analyzing the Relationship Between Crime and Small Business Lending: Considering Lending from a Credit Risk Perspective

By

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Abstract

Small businesses serve important functions in the communities in which they serve. These businesses tend to rely on external sources of financing, such as loans, to operate and expand. Thus, it is important to consider variables that may impact the loans they receive. In studies and discussions about how certain variables influence business lending, income and race are two that have been largely focused on. One less discussed variable has been crime. This analysis aims to understand the relationship between crime and lending. The motivation for analyzing crime comes from thinking of lending from a credit risk perspective. Crime imposes costs to local businesses and thus threatens their viability. In turn, this may make lenders hesitant to lend, meaning that crime can negatively influence lending.

The analysis studies Chicago community areas and finds evidence that crime does have a negative relationship with lending. In turn, it is recommended that policymakers promote and enhance lending incentive programs, such as the New Markets Tax Credit (NMTC) Program, in an effort to encourage lending by rewarding lenders for the risks they take on.

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Introduction

Much has been written about the positive contributions that small businesses make to the communities in which they serve. Small businesses not only provide access to local goods and services, but they also provide local employment opportunities, community funding, and help bolster a sense of community identity ("How Small Businesses Impact Their Communities" 2018; Woodstock Institute 2019, 1). A vital function of small business success is their funding. In order for small businesses to expand their operations and continue generating economic and social activity, small businesses require access to financial capital (Bates 2006, 231; Woodstock Institute 2019, 1). Without such access, the growth potential of small businesses is obstructed — leaving a void in communities where small business activity is weak.

Existing literature has explored the question of what impacts business lending. Two widely studied variables are race and income. A 2019 research study from the Woodstock Institute found that in Chicago, areas with lower proportions of minority residents received a disproportionately greater share of small business loans. The analysis also found that, between 2015 and 2017, businesses in Low-to-Moderate Income (LMI) areas received a small proportion of both the total number of loans and the total dollar amount of loans given over the period (Woodstock Institute 2019).

The Woodstock Institutes observations are not unique. Bates and Robb also note in their paper the disparity in lending between minority and white firms (Bates and Robb 2015). Moreover, the existence of the Community Reinvestment Act (CRA) is premised on the observation of income based disparities in lending ("History of the CRA" n.d.; Macey and Miller

1993, 340-341). While race and income have been two widely explored variables when it comes to interpreting differences in lending, one variable that has not been as widely explored is crime.

Crime, like income, is an interesting variable to consider when thinking about lending from a credit risk perspective. Unlike income, however, crime's impact on lending has been less widely examined. Some papers may identify and discuss crime as being a potential explanatory variable in explaining differences in economic activity, but fail to quantify its impact (Matti and Ross 2016).

This paper aims to understand the impact of crime on small business loan amounts and doing so is motivated in part by the consideration of credit risk. When thinking about credit risk of a business — essentially how comfortable a bank would be extending a loan to a business — crime is interesting to think about in the sense of how local crime may impact the attractiveness of visiting a local business to consumers. Small businesses rely on consumers to generate revenue. Thus, consumer traffic is important. However, if crime is a deterrent for consumer traffic, banks may be wary about the viability of a business in areas with increased crime and thus might be more hesitant and restrictive in their lending.

In order to analyze crime's relationship with small business lending, this paper will conduct a quantitative analysis. In particular, the paper will regress small business lending on property crime and violent crime amounts to understand the impact of each category. Specifically, the data will focus on lending and crime across the community areas of Chicago — a city where differences in crime activity across neighborhoods has also been discussed (Stockwell 2020, 97). In the context of the scope of the data used in this paper, then, this project examines how crime activity across community areas in Chicago relates to the amount of small business lending local businesses receive.

Existing research has used lending as the explanatory variable when analyzing the relationship between lending and crime — finding that higher amounts of lending are associated with lower levels of crime (Kubrin and Squires 2004). Looking at the relationship in this way often leads to the conclusion that more lending is needed to combat crime. However, such a conclusion lacks nuance in that it does not explain why lending differs in the first place. Instead of asking how lending impacts crime, this project aims to reverse the analysis — looking at crime as a predictor of lending.

As the results of this analysis will be local, their interpretation should be understood locally as well. However, hopefully this project will motivate more research into crime's impact on lending in other regions. Additionally, it is the hope that this analysis will motivate further exploration of other variables that may influence lending so as to identify that which is negatively correlated with lending and emphasize the need to address those issues.

Literature Review and Background

Reviewing the Community Reinvestment Act (CRA)

The two following subsections are meant to provide background on the small business lending data that the analysis uses and to discuss income based lending disparities. The Community Reinvestment Act was established in 1977 to combat lack of community investment and urban decline. Congress found that banks have a duty — based on pre-existing chartering laws that require banks to show that their deposit taking facilities serve the needs of their communities — to meet the credit needs of the communities in which they are chartered, including low- and moderate-income (LMI) communities. Under the CRA, LMI refers to those communities that have a median family income of less than 80 percent of the area median income. The CRA requires federal banking regulators to encourage financial institutions to aid in meeting the credit needs of the communities where said financial institutions are located (“History of the CRA” 2018).

The financial institutions that are required to be CRA compliant are those that are a part of the Federal Reserve System. These are called member banks. While the exact guidelines for what constitutes compliance under the CRA are blurry, and the act has been criticized for such vagueness, in general banks must demonstrate to federal regulators that they are meeting the credit needs of the communities in which they operate (FFIEC 2020; Reid 2019). Of course, banks have to ensure that they are safely meeting such credit needs. This is partially why policymakers have left CRA performance evaluation standards open to more interpretation, as putting hard metrics on standards could lead to banks being forced to institute unsustainable lending practices in order to be in compliance with some threshold. Also, hard metrics might incentivize banks to do “just the right” amount of lending to be in compliance, rather than genuinely trying to help their local communities within their faithful capacity (Reid 2019).

Though performance standards are subjective, federal regulators who carry out evaluations tend to focus on volume and distribution of lending — all within the context of meeting community needs. Once evaluated, banks are given one of four ratings: Outstanding, Satisfactory, Needs to Improve, and Substantial Noncompliance (FFIEC 2020). As performance standards are left largely to interpretation, discerning what exactly is needed to achieve an “outstanding” or “satisfactory” rating is difficult. Similarly, discerning exactly how to improve if given a “needs to improve” rating is also difficult (Reid 2019). Nonetheless, a good CRA rating matters to banks. A bad rating can limit a bank's ability to open branches, conduct mergers, and expand. Moreover, a bad rating looks bad from a public optics perspective, and thus can negatively color the reputation and business model of a bank. A bad rating also subjects a bank to more frequent CRA examination, a process which is administratively burdensome for a bank (FDIC n.d.).

In terms of the CRA's effectiveness, the CRA is not unlike many other policies: it is thought to be useful in some ways, and lacking in others. It is believed that the CRA is, in principle, needed to incentivize banks to take an active role in trying to help out the communities in which they are authorized to do business (Reid 2019; Woodstock Institute 2019, p. 41). Discerning exactly how well the CRA has worked in this effort is complicated, but evidence suggests that the implementation of the CRA has increased lending to LMI communities. As one report by Berry and Romero, affiliates of the Federal Reserve System, states: "In general, the evidence suggests the CRA has increased lending to LMI communities, although the magnitude is a matter of debate and it is difficult to disentangle the effects of the CRA from the effects of other regulatory and market changes," (Berry and Romero n.d.).

However, even with the existence of the CRA, there still exists disparities in business lending between communities. As the 2019 report from the Woodstock Institute finds: LMI census tracts still receive a smaller share of CRA-reported lending than higher income census tracts.

Contextualizing the Persistence of Lending Disparities Despite the Implementation of the CRA

According to a research report from the Federal Reserve, small businesses in LMI communities tend to be smaller than firms in high income tracts. In comparison to small businesses in higher income areas, businesses in LMI tracts tend to have more limited personal savings. Moreover, internal connections for these businesses, such as friends and family, tend to have limited savings as well. Friends and family can be another potential source of funding for businesses. As businesses in LMI neighborhoods have limited access to funding on both a personal and network level, these businesses tend to have less personal capital to devote toward investment. These businesses also tend to have lower credit scores and insufficient collateral (Mills et al 2021).

In general, small businesses are risky by nature. This is because small businesses, in comparison to large firms, tend to generate less revenue and possess less resources (Attard 2021; Segal 2020). For small businesses in LMI neighborhoods, such characteristics are magnified — making them look that much more concerning to lenders (Mills et al 2021). Again, while the CRA is meant to encourage lending, banks are not forced to lend if the loan is deemed unsafe.

The aforementioned information about businesses in LMI neighborhoods helps to contextualize the finding from the Woodstock Institute's 2019 report that LMI census tracts received less funding than higher income tracts. Businesses in LMI neighborhoods tend to possess financial limitations that make them appear more risky to lenders.

Examining the Issue of Racial Inequity in Lending

As mentioned, much of the existing literature has recognized the issue of racial inequity in lending (Bates 2006; Robb and Fairlie 2007; Woodstock Institute 2019). Black loan applicants are more likely to be denied or, when they are deemed eligible for a loan, are charged higher interest rates (Robb and Fairlie 2007, 66). Not unlike other policies aimed at combatting racial discrimination, while the Equal Credit Opportunity Act (ECOA) makes it illegal to discriminate in credit transactions on the basis of race, inequities in lending persist. However, as has been repeated by those who study racial inequity, and echoed here by Professor Mark Cohen of Vanderbilt University, "Racial disparity is oftentimes very subtle, hard to detect. It can occur without any racial animus…" (Jung 2020). Even those who are the subjects of discrimination can have a hard time discerning whether or not they have been discriminated against. As Fiske and Krieger note in their paper:

> "Targets cannot usually know when they have been discriminated against, partly because of the difficulty inherent in disentangling the reasons — discriminatory or nondiscriminatory — why a particular decision was made," (Fiske and Krieger 2013, 59)

Because discrimination can be so hard to detect, it is hard to combat. This point is made throughout Fiske and Krieger's work. Racism's subtle nature can explain the inefficiencies in those very policies — like the ECOA — meant to address it. Afterall, it is hard to enforce a policy if it is hard to determine what violating such policy looks like.

Additionally, because discrimination is difficult to discern, it can be difficult to make a convincing argument that differences in lending — or any other variable — are purely due to discrimination. Many factors have to be controlled for before making such an assertion and, in practice, it is hard to control for everything. Thus, analyzing crime as an explanatory variable helps in two ways. Not only can a relationship between crime and lending be quantified but, by examining the impact of a variable that is often left out when it comes to explaining differences in lending, a more rigorous and better contextualized case for lending discrimination may be made.

Though crime has not been widely explored when it comes to contextualizing racial differences in lending, the literature has proposed two explanations for the observation: wealth inequality and discouragement from borrowing. As Robb and Fairlie note in their paper:

> "African Americans are found to have levels of wealth that are one-eleventh those of whites. Starting with this disparity, blacks are much less likely to start businesses than are whites, which results in a substantially lower rate of business ownership," (Robb and Fairlie 2007, 67)

Robb and Fairlie also note:

> "Even for those black entrepreneurs who are successful in starting businesses, the authors find that they invest much less capital at start-up on average than white entrepreneurs. Lower levels of start-up capital among black businesses appear to also limit their ability to grow and succeed. Racial disparities in start-up capital contribute to higher failure rates, lower sales and profits, less employment among black-owned businesses, and less survivability of the business," (Robb and Fairlie 2007, 67)

These observations by Robb and Fairlie about racial disparities in wealth help explain racial differences in lending in two ways. One being that, as noted, since African Americans have less wealth, they are more financially restrained when it comes to being able to start a business in the first place. The consequence of lower business ownership among Black Americans as a result can explain differences in lending. If there are less Black businesses, there is less aggregate demand for loans among Black business owners.

Secondly, when thinking about the implications of Black business owners investing less start-up capital and a bank's consideration of credit risk, the racial disparity in lending can also be understood. Bank's want to get their money back when they extend a loan. However, if a business is less viable as a result of having less start-up capital, then a bank is likely to be more resistant to extend funding due to fears of a business struggling and, consequently, being unable to recover the loan.

Additionally, Robb and Fairlie note that Black businesses are less likely to apply for loans because of fear of denial (Robb and Fairlie 2007, 67). A similar claim is also made by Bates and Robb. Bates and Robb found that minority business owners are those most likely to need credit, but not apply for loans. According to Bates and Robb, this is due to minority business owners being discouraged-borrowers. Bates and Robb find that low owner wealth, low business profits, and low credit scores are financial traits that tend to apply to discouraged-borrowers (Bates and Robb 2015, 166). By this, an owner who has low wealth is more likely to need credit but not apply for a loan. The same applies to those owners who operate low profit businesses and who have low credit scores.

The implication of these findings suggest that owners are aware of the credit risk assessments that banks make. As Bates and Robb note:

> "The low-net-worth owner operating an unprofitable firm, in other words, correctly recognizes that banker loan-application approval is unlikely, particularly if the business has a history of credit problems. Filing a loan application is therefore a waste of time," (Bates and Robb 2015, 166)

As mentioned by Robb and Fairlie, minority business owners tend to have less wealth and, consequently, less personal start-up capital to invest in their businesses (Robb and Fairlie 2007). As suggested by Bates and Robb, if these same business owners are aware of how lenders weigh owner financial constraints — then it explains why minority business owners may be hesitant to apply for a loan. Fear of outright rejection or aversion to having to likely pay higher interest rates for being considered riskier are contributing factors as to why individuals, largely minorities, with poor financial standing tend to be discouraged from borrowing.

Bates and Robb also claim that minority business owners expect to be punished or exploited by lenders for the mere fact that they are minorities. They point to trends of minorities being exploited for accepting less favorable price terms and the practice of redlining — not lending to diverse areas because they are diverse — as factors that minorities might consider and that may prevent them from applying for a loan (Bates and Robb 2015, 162). Bates and Robb found that compared to equally creditworthy White firms, Black and Latino owned firms in need of credit were less likely to submit loan applications (Bates and Robb 2015, 166). Thus, discouraged-borrowing can explain racial differences in lending.

Crime and Credit Risk

While the findings by the aforementioned studies are insightful, they fail to analyze or quantify crime's relation to lending and its place in the overall picture. According to Wells Fargo, there are "5 C's" of credit that characterize what lenders assess when making loan decisions. The 5 C's are: credit history, capacity, collateral, capital, and conditions (Wells Fargo n.d.).

Lenders look at credit history to determine whether or not a prospective borrower has a good track record with respect to repaying their debts. Lenders look at capacity to determine how well a prospective borrower can afford loan payments. To assess capacity lenders look at factors such as income and employment history. Lenders look at collateral to assess the value of what a prospective borrower might pledge in the event that there is default on the loan. Lenders look at capital to determine what other assets, beyond income, might contribute to loan repayment. These assets include savings accounts or other investments of prospective borrowers. Finally lenders also look at other conditions, such as economic and environmental conditions, to make their loan decisions.

Credit history, capacity, collateral, and capital assess, in sum, financial traits of prospective borrowers. However, as made evident by the "conditions" category, lenders do not weigh strictly financial traits when making loan decisions. This analysis considers crime as a non-financial variable that lenders might weigh in their lending decisions.

Matti and Ross identify crime as a variable that affects business activity. They note that crime imposes both a direct and indirect cost on surrounding businesses. According to Matti and Ross:

> "Crime affects the cost of doing business in an area, through the direct cost of an increased risk of having merchandise stolen and through the indirect cost of affecting the perceived risk of crime by consumers, which reduces the customer base," (Matti and Ross 2016, 255)

If such costs imposed by crime become too great, a businesses viability may be at significant risk. This would explain a lender's aversion to crime, especially when considering those businesses who might be deemed unlikely to overcome the costs imposed by crime.

Obstacles Present in Analyzing Crime's Relation to Economic Variables

While Matti and Ross also observe that crime is a variable not widely explored when it comes to understanding economic activity — they do not attempt an analysis to quantify crime's relation to business lending. However, Matti and Ross note that measuring crime's impact on economic activity is difficult due to endogeneity issues that would prevent researchers from establishing causal estimates. Matti and Ross note that researchers analyzing crime and its relationship with business or economic activity often face issues with omitted variables and reverse causality (Matti and Ross 2016, 255).

For example, Matti and Ross note that businesses tend to attract crime. Heavy foot traffic present in areas with a large number of businesses gives criminals more opportunity to commit personal theft, motor vehicle theft, and violent crime. Also, more businesses means more burglary opportunities for criminals. However, it is usually profitable for businesses to operate in areas where other businesses are present due to increased local demand in the area, gains from competition, and the ability to gain information due to proximity to competitors (Matti and Ross 2016, 257-258). Thus, this is one way in which not accounting for density of businesses within an area induces omitted variable bias.

Because of the obstacles inherent in studying crime and economic activity, Matti's and Ross' objective is to highlight the relevance of studying crime's impact and to advocate for improved data collection and data analysis so researchers can better assess the impact of crime (Matti and Ross 2016). Some of the regression analysis suggestions that Matti and Ross point to in order to combat the aforementioned endogeneity issues are differencing and lagged models (Matti and Ross 2016, 257).

Despite the challenges associated with analyzing crime, this analysis will take the advice of Matti and Ross and utilize a "first-difference" regression model in an attempt to better quantify and understand the relationship between crime and small business lending. As mentioned, given that small businesses provide benefits to the communities in which they are located and that their operation is a function of the lending they receive, it is important to consider that which may impact lending for these businesses. Crime is a variable that has been identified as impacting business activity. Given the risk crime imposes to businesses and the examination of non-financial traits in credit risk assessments, the analysis hypothesizes that crime would tend to decrease lending. The results of the regression analysis will be examined to either support or challenge the hypothesis and, then, to base policy recommendations.

Data and Methodology

In order to analyze the question of crime's impact on lending — specifically within Chicago — this project uses crime data from the Chicago Police Department's (CPD) Annual Reports and CRA-reported lending data. The analysis examines the years 2017 through 2019 — a three year period. For the inclusion of control variables, the analysis also uses demographic data on race and median income from the Chicago Metropolitan Agency for Planning's (CMAP) Community Snapshot Reports. This demographic data is based off of the American Community Survey's (ACS) 5-year estimates from 2015-2019. For population estimates, the analysis also uses the ACS 5-year estimates from 2015-2019.

In order to summarize all of the data, a spreadsheet was made. Since CRA lending data is reported by census tract and crime data is reported by community area, each census tract was matched to its corresponding community area. With respect to the specific category of small business lending analyzed, the analysis examined the total dollar amount for loan originations of less than or equal to $100,000 in each tract. This loan amount was then aggregated to reflect lending for the respective community area. In doing this, reported crime in an area became matched with reported small business lending in an area.

Population data used was also reported at the tract level and therefore had to also be aggregated to describe population for a community area. The demographic data for race and median income were already reported at the community area level so there was no need to adjust this data to characterize a community area. However, in order to calculate the percentage minority in a community area, the analysis subtracted percentage white from 100%. Percentage minority was then input into the spreadsheet as a variable. Crime data from the CPD includes the indexes of property crime and violent crime for a given community area. Property crime includes burglary, theft, motor vehicle theft, and arson. Violent crime includes murder, criminal sexual assault, robbery, and aggrevated assault and aggrevated battery (FBI n.d.). These different categories of crime were added to the spreadsheet, with the aggregate number of property crimes being one variable and the aggregate number of violent crimes being another.

Once the spreadsheet was created it was run through R, a statistical computing program, in order to generate regression results. The analysis examines two regression models. One regression model is a simple multivariate regression that includes the explanatory variables of interest, property crime and violent crime, as well as the inclusion of controls.

The second regression model is a "first-difference" model. This model examines the change in lending based on changes in crime. To establish changes between years, crime in one year was subtracted from crime in another. The same was done for lending. In so doing, new variables were generated: change in property crime between a period, change in violent crime between a period, and change in lending between a period. A regression was then run with change in lending as the outcome variable. The explanatory variables are change in property crime and change in violent crime.

Assuming that nothing else changes between periods — only crime and lending levels — then, in theory, the first-difference model should help account for omitted variable bias. For this analysis, one relevant omitted variable is the number of businesses within a community area. As mentioned, areas with more businesses tend to attract more crime. Areas with more businesses also tend to have more lending. By omitting this variable, regression coefficients that describe the impact of crime would be overestimated. In other words, they would be higher than expected had the omitted variable been included and controlled for.

Good, comprehensive data on the number of businesses in each Chicago community area was difficult to find. This is why a variable denoting the number of businesses in a given community area is omitted. Since the analysis is only looking at short time spans, with a difference between 2017 and 2019 being the longest period, the analysis considers the assumption that no substantial changes occurred within other variables between periods to be relatively safe — meaning the first-difference model will be taken to control for the omitted variable problem fairly well.

In sum, there will be a total of four regressions analyzed. Two will be multivariate specifications and two will be first-difference specifications. Though the design of the first-difference models may help control for the omitted variable problem, and thus its estimates might be generally regarded as better than those from a simple multivariate regression, there is one multivariate specification that also offers strong results. The interpretations given by this specification, as well as the others, will be expanded upon in the findings section.

Reasons for a Quantitative Analysis

The motivation for doing a quantitative analysis — running a regression — rather than a qualitative analysis — conducting interviews — comes from the fact that, as mentioned, this analysis would like to establish and quantify a relationship between crime and lending. Moreover, the analysis would like to be able to say whether or not the relationship is statistically significant. By finding significance in a relationship between crime and lending, the analysis can rule out that the relationship is the result of luck or chance. This information cannot be generated from qualitative analysis, it requires statistical analysis.

Furthermore, relying on interviews to understand a relationship between lending and crime may be insufficient because interviewees may lack knowledge about the lending practices of banks as related to crime, or their accounts may be unreliable. Additionally, even if one could rely on the validity of all interviewee accounts, their accounts would be personal. Thus, in order to interpret the findings more generally, beyond the individual, a multitude of interviews would have to be conducted. Given that this study is conducted largely by a single person, conducting a multitude of interviews was outside of the capacity of this analysis.

Weaknesses of Method

While a qualitative analysis was deemed unfit for this study, a qualitative analysis can provide information that a quantitative analysis lacks. While a quantitative analysis might be good for uncovering meaningful trends and relationships, interpretations of such analysis are limited to describing what the relationship is. In the case of this analysis, the results will show what the relationship between crime and lending is. These results may even be significant, or statistically meaningful. However, the analysis by itself cannot generate explanations about *why* a relationship is the way it is. Qualitative findings, like statements from lending institutions or interviews from business owners, are needed to uncover a "why."

This analysis does use information from lending institutions and other research as foundation for the hypothesis that since crime likely increases credit risk, crime may in turn negatively impact lending. However, crime as related to increased credit risk is only one potential explanation for any lending difference that may be found. By conducting interviews, one might discover other explanations related to crime that can explain lending differences. In general, the ability to uncover new explanations is lost when only looking at quantitative findings. Analyzing different explanations can add nuance to the implications of findings and can help structure a more complete narrative to help explain findings. Along these same lines, while the generalizability of personal anecdotes might be difficult, personal accounts are still meaningful in that the shared experiences and perspectives of a few can help discover a new quantitative data trend to look into.

Honing in on weaknesses in the structure of the analysis itself, it is mentioned that the strength of the interpretation of the results from the first-difference regression model relies on the assumption that no changes in variables other than lending and crime occur between periods. By this, the analysis assumes that population, income, percentage minority, and number of businesses (as well as any other variables) do not change. As discussed, because the analysis is only looking at short time spans, the analysis is okay with relying on this assumption. Furthermore, even if changes do occur, the analysis is assuming that these changes are not substantial because of the short intervals.

However, it should be noted that if substantial changes do occur in variables other than the explanatory variable of interest (crime) and the outcome variable (lending), then the strength of the interpretations from the first-difference results would be compromised. The strength of the interpretations of the results would be particularly compromised if there was a substantial change in the relevant omitted variable, number of businesses. In sum, while the analysis does not take potential change in additional variables to be a major issue, the analysis is also not ignoring that there *may be* an issue. This is one reason why these results should not be interpreted causally.

The analysis also has a reverse causality problem. Studies have established that lending impacts crime (Kubrin and Squires 2004). Evaluating crime’s impact on lending, then, becomes distorted. Since reverse causality can distort the analysis, this is also reason for the results of the analysis to not be interpreted causally.

Omitted variable bias and reverse causality are both issues that compromise the internal validity of the analysis. It is noted that not controlling for the number of businesses in a given area induces omitted variable bias, but there may be other relevant omitted variables as well — such as education — that also contribute to omitted variable bias. Furthemore, the analysis only looks at the years 2017, 2018, and 2019. Variables likely remain more stable when considering a short time horizon. However, with a longer time horizon there is likely more variation in variables. Thus, it is plausible that crime may be seen to impact lending differently when looking at a longer time span.

Another issue worth noting is potential problems in crime reporting. The analysis takes the data as given. However, it is known that crime data is underreported as people do not always report criminal activity (Matti and Ross 2016, 261; NYU Dispatch 2018). Thus, individuals might have a different understanding about crime activity in communities that may not be captured by crime data. This would limit the interpretations of the analysis as it cannot be deduced from the regression analyses in this project how perceptions of crime levels or “true” criminal activity impacts lending.

Additionally, researchers have raised concerns about bias in crime data (Bronner 2020). Officers may charge one individual for committing a crime and not another. Doubts about the validity of data would distort the validity of the results and impact the interpretations that can be drawn from them. As closer examination of the issue of lack of accuracy in crime data goes beyond the scope of this project, the issue is only raised as something to be kept in mind when interpreting the results from the analysis.

Another issue that the analysis struggles with is related to granularity of data. Crime data from the CPD Annual Reports is reported at the community level. As mentioned, lending is reported at the tract level. In order to properly analyze the relationship between crime and lending, lending had to be aggregated to the community level. However, some community areas are large and have many different tracts. Lending patterns may vary greatly among different regions, or tracts, within an area. This may be related to the amount of crime that is experienced in that specific region of the community.

However, because the crime data used in this project is reported for community areas as a whole, rather than specific tracts or regions within an area, the regression analyses of this project fail to capture the impact of crime on lending at the tract level. Analyzing crime and lending on a tract level may be more informative of the relationship between crime and lending. Given the challenges associated with trying to find crime data at the tract level in Chicago across multiple years, the analysis opted to use data from CPD's Annual Reports which, again, report crime at the community level. This issue is also raised to acknowledge a weakness in the analysis and as something to be kept in mind when interpreting the results.

Finally, as mentioned, the data is collected for the community areas of Chicago. Thus, the interpretations of the results are confined to Chicago community areas. The findings should not be taken to apply to non-Chicago community areas necessarily, since different findings may be found when looking at different areas.

Findings and Implications

The following section contains the findings from two multivariate regression specifications and two first-difference specifications. Displayed in table 1 are the regression results from a multivariate regression specification with the inclusion of violent crime, property crime, median income, population, and percentage minority as variables. As small business lending is regressed on each of these variables, the estimate for each variable indicates the average increase or decrease in small business lending associated with an increase in each variable. The estimates with starred p-values are statistically significant, meaning the effect they reflect is not determined to be the result of chance.

Table 1: Multivariate Regression #1 Results
(Lending is regressed on violent crime, property crime, median income, population, and percentage minority)

Variable	*Estimate*	*Pr(>|t|)*
Intercept	3.965e+03	4.26e-05***
Violent Crime	-1.172e+01	< 2e-16***
Property Crime	7.737e+00	< 2e-16***
Median Income	-1.123e-02	0.15
Population	1.201e-01	< 2e-16***
Percentage Minority	-7.618e+01	< 2e-16***

Table 1

As shown by the results in table 1, violent crime corresponds to a decrease in small business lending. As lending is reported in thousands of dollars, this result means that an additional violent crime corresponds to a decrease in small business lending by $11,720 on average. For property crime, the estimate is 7.737 — meaning on average an additional property crime corresponds to a $7,737 increase in small business lending.

While the result for property crime suggests a positive relationship, the model is flawed. Particularly, the omission of number of businesses as a control makes the estimates positively biased. As mentioned, if this variable were included, then one would expect the estimate to be lower. This is true for violent crime as well. One would expect violent crime to have a more dramatic negative relationship with lending with the inclusion of number of businesses as a control.

One might also note the estimates for median income and percentage minority. The estimate for median income suggests that a positive change in median family income corresponds to a decrease in lending on average. Though this finding is small, it is inconsistent with that of existing studies finding that higher income corresponds to more lending (Woodstock Institute 2019). However, the estimate for median income is not statistically significant meaning it is harder to conclude that the result is not the result of chance.

Moreover, one explanation for why the regression provides a negative estimate for median income could be related to the fact that the number of businesses is not controlled for. Higher income areas tend to have more business activity than lower income areas (Matti and Ross 2016). As mentioned by Matti and Ross and seen within the data used by the analysis, these high income, high business activity areas also generally had high levels of crime, particularly property crime. Perhaps the negative estimate for the median income variable is capturing lender's response to the crime trends in high income, high business activity areas. Although, this is just a hypothesis.

For percentage minority, the estimate is -7.618x10^{1}. This suggests that a percentage increase in the minority population corresponds to a decrease in small business lending by $76,180 on average. This result is not inconsistent with findings from previous studies finding race to be negatively correlated with lending (Robb and Fairlie 2007). Three explanations for this finding are percentage minority's positive correlation with crime, the absence of tranditional credit characteristics in the analysis, and possible discrimination.

After running two additional regressions to analyze the relationship between percentage minority and crime, the analysis found that percentage minority is positively correlated with both violent and property crime.[1] Meaning that as the percentage minority increases, so does violent and property crime. The estimates for percentage minority are statistically significant. These findings are not necessarily novel as previous studies have established a similar relationship between percentage minority and crime and have discussed the issue of crime in minority neighborhoods (Bates and Robb 2015, 165). If lenders tend to respond to higher crime with less lending, then this would explain why the variable denoting percentage minority has a negative estimate.

Additionally, lack of traditional credit characteristics in the analysis — like credit ratings or measures for how much collateral is posted — may also explain the large negative coefficient for percentage minority. If additional credit characteristics were controlled for, they would help better explain the relationship between percentage minority and lending. Particularly, we might expect to see the estimate for percentage minority have a less dramatic magnitude, even if the relationship is still negative.

Finally, and perhaps obviously, racial discrimination might also explain why the estimate for percentage minority is negative. The analysis includes crime — a variable that tends to be excluded — population, and median income as control variables in an effort to isolate and assess the relationship between percentage minority and lending. However, as mentioned, the analysis does not include traditional credit characteristics. Again the inclusion of these characteristics as control variables would help better explain the relationship between percentage minority and lending. The analysis also does not account for discouraged borrowing among minorities that Bates, Robb, and Fairlie mention. As mentioned, discouraged borrowing helps explain the

[1] See appendix for regression tables

negative relationship seen between race and lending, since minority borrowers are more likely to be discouraged borrowers. Since such information is excluded it is harder to make the case for blatant racial discrimination in lending, at least from this analysis.

However, just because it may be difficult to find concrete evidence about something does not mean it does not exist. This analysis is not denying the existence of discrimination. As mentioned, discrimination is often covert and hard to detect, but that does not mean that it is not present. Given the array of documented historical practices of discrimination and the once normalized derogatory and discriminatory attitudes of individuals it would be erroneous to believe that discrimination disappeared with a few policy changes.

Many minority Americans still report being discriminated against. Their experiences should not be discredited and that is certainly not the aim of the analysis. The analysis only seeks to present crime as a variable that can explain lending and promote it as a variable that should be taken into consideration to more completely understand the relationship between race and lending. The analysis does include crime, but fails to account for other relevant controls, and so the estimate from the analysis for percentage minority likely does not represent very holistically the relationship between race and lending.

In summary, displayed in table 1 are the regression results from a multivariate regression model with the inclusion of the explanatory variables of interest — property crime and violent crime — as well as median income, population, and percentage minority. However, when trying to assess the relationship between crime and lending, the coefficients for crime are likely overestimated due to the issue of omitted variable bias. The following regression specifications attempt to better address this issue.

Table 2 reflects the results from another multivariate regression model. However, this time community area is included as a control. This means that community area characteristics like income, population, and percentage minority are accounted for. Moreover, this means the amount of businesses in a community — or local economic activity — is accounted for as well. The assumption with this model, as with the first-difference model, is that these other variables do not change over time. Essentially how one can interpret this specification is that a regression for lending and crime is run at each community area in Chicago, capturing lending and crime trends for each community across the three year time period.

Table 2: Multivariate Regression #2 Results (Lending is regressed on violent crime, property crime, and community area)		
Variable	*Estimate*	*Pr(>|t|)*
Intercept	1.466e+04	< 2e-16***
Violent Crime	-4.337e+00	6.30e-12***
Property Crime	-6.401e+00	< 2e-16***

Table 2

The resulting estimates for violent and property crime reflect the average relationship between crime and lending across all community areas. In other words, given the estimate for violent crime, an additional violent crime corresponds to a $4,337 decrease in small business lending on average for a given community area. Given the estimate for property crime, an additional property crime corresponds to a $6,401 decrease in small business lending on average for a given community area. Each of these estimates are statistically significant.

These findings are consistent with the hypothesis that lenders are likely to respond negatively to crime, and thus crime is associated with less lending. By controlling for community area, the results suggest that when crime increases in a community lending tends to decrease in that community.

To understand the implications of this, look at Washington Park, a Chicago community area that consistently received less than the average amount of lending between 2017-2019. This is a community that has been identified to struggle with economic development and investment (Caputo and Glanton 2016). In 2019, Washington Park received $677,000 in CRA-reported small business loans for originations of $100,000 or less. Washington Park had a reported 286 violent crimes and 523 property crimes. Given the above findings for the relationships between violent crime and property crime with lending, these crime levels correspond to a net approximate $4.5 million less in small business loans for the area.

To reiterate, these results should not be interpreted as causal. However, the correlation between small business lending and crime established from these findings suggests that crime may dramatically decrease small business lending — particularly, by an estimated $4,337 per violent crime and $6,401 per property crime on average.

Table 3 reflects the results from a first-difference analysis. Specifically, the difference is calculated between 2019 and 2017. For example, violent crime in 2017 is subtracted from violent crime in 2019 to calculate a difference. A corresponding small business lending difference for that time period is calculated as well.

The only variables included are the different categories of crime given the fact that in the data population, median income, and percentage minority remain consistent over the three years analyzed for each community area. Again, this is likely not true in practice, but is what is reflected by the data collected. The analysis assumes that no substantial changes would have occurred within these variables — as well as any other variables — in the three year time frame.

Table 3: First-difference Regression #1 Results (Change in lending between 2017-2019 is regressed on change in violent crime and change in property crime between 2017-2019)		
Variable	*Estimate*	*Pr(>|t|)*
Intercept	1466.8730	< 2e-16***
Violent Crime	6.4444	5.27e-10***
Property Crime	-9.3038	< 2e-16***

Table 3

As shown by the results from table 3, the relationship between property crime and small business lending is found to be negative. The estimate is -9.3038. The interpretation of this estimate, then, is that a positive change or increase in property crime is associated with a $9,303.80 on average negative change or decrease in small business lending. The estimate for violent crime from the first-difference analysis is 6.4444. This estimate would suggest that a positive change in violent crime corresponds to $6,444.40 on average increase in lending. Each of these results are statistically significant.

The negative estimate for property crime is consistent with the result for property crime from the preferred multivariate specification shown in table 2. However, the result for violent crime is inconsistent. An explanation for this is that perhaps the omitted variable bias problem is not controlled for as well as the analysis assumes. There may have been a notable change in economic activity in community areas, causing more violent crime to be associated with areas that have more lending.

Finally, table 4 reflects the results from another first-difference regression specification. Denoted in the table are the results from a regression on the change in small business lending between 2018-2019 and the change in violent and property crime between 2017-2018 and

2018-2019. The estimates communicate the relationship between the change in crime between each period and the change in lending from 2018-2019.

Table 4: First-difference Regression #2 Results
(Change in lending between 2018-2019 is regressed on change in violent crime and change in property crime between 2017-2018 and 2018-2019)

Variable	*Estimate*	*Pr(>|t|)*
Intercept	184.4756	0.00708**
Diff. Violent Crime 2017-18	-0.5127	0.48632
Diff. Property Crime 2017-18	-4.5949	< 2e-16***
Diff. Violent Crime 2018-19	3.0203	0.00136**
Diff. Property Crime 2018-19	-7.4451	< 2e-16***

Table 4

In general it can be seen that positive changes in property crime correspond to negative changes in lending. Particularly, a positive change in property crime between 2017-2018 corresponds to an average $4,594.90 decrease — or negative change — in lending for 2018-2019. Additionally, a positive change in property crime between 2018-2019 corresponds to an average $7,445.10 decrease in lending for 2018-2019.

For violent crime, a positive change in violent crime between 2017-2018 corresponds to a $512.70 on average decrease in lending for 2018-2019. However, this estimate is not statistically significant. Additionally, a positive change in violent crime between 2018-2019 corresponds to a $3,020.30 increase in lending for 2018-2019. Again, this positive estimate for violent crime might be the result of violations in the no change in excluded variables assumption needed to combat omitted variable bias.

An interesting finding suggested by these results, especially when looking at the coefficients for the differences in property crime, is that lenders may respond to immediate crime trends more dramatically. As seen, additional crime — or a positive change in crime — between 2017-2018 corresponds to a smaller decrease in lending for 2018-2019 than that of additional crime between 2018-2019.

Summarizing the Findings

The above findings suggest that crime does have a negative relationship with lending. In the multivariate specification with controls for community area, shown in table 2, this relationship can be best seen. This model helps control for community level variables — like population, income, race, and economic activity. The results from the model with community area controls are the outcome of effectively tracking crime and lending trends across each community area and then reflecting the average relationship found across all community areas in Chicago. In this model, both property crime and violent crime were found to have statistically significant, negative relations to small business lending in Chicago community areas.

In some specifications, violent crime or property crime is found to have a positive relationship with small business lending. This is likely due to missing data that controls for the number of businesses in an area. Even with the first-difference models, these types of variables — and others — might have changed between periods, which would be violating the assumption the analysis relies on for the utility of the first-difference models.

In analyzing the estimates for income and race — the two variables typically considered in discussions about lending disparities — the results from table 1 find that when including crime as a variable median income has a negative relationship with small business lending. However, this result is statistically insignificant. The results from table 1 also reflect that percentage minority has a negative relationship with small business lending. The analysis poses three explanations for this result: percentage minority's positive correlation with crime, the absence of tranditional credit characteristics in the analysis, and discrimination.

In the regression results from table 4, the analysis also finds that lenders might not respond equally to crime trends. Particularly, as suggested by the results, lenders may respond more dramatically to more immediate or current crime trends when making their lending decisions. In other words, the results suggest that lenders may weigh immediate crime more.

Policy Recommendations

The above findings provide evidence that crime can negatively impact small business lending. Specifically, increasing amounts of violent and property crime were found to have negative relationships to small business lending among Chicago community areas. As noted in Matti's and Ross' work, both violent crime and property crime impose costs to businesses and make them susceptible to failure (Matti and Ross 2016). The risk of failure that businesses are subject to due to crime is likely to make lenders resistant to lend.

Given the findings, one evident suggestion would be for policymakers to focus on reducing crime. Policymakers have been working on crime reduction strategies for years. Some policies have been more effective than others, but in general it has been made apparent that it is difficult to combat crime. Thus, policymakers should focus on ways to promote lending despite the presence of crime. Regarding this effort, the analysis proposes that policymakers should utilize tax credits to reward lenders for the risk they face when lending to businesses likely to be burdened by the costs imposed by local variables like crime.

Currently, banks can receive New Markets Tax Credits (NMTCs) for their role in helping to provide investment to low income communities. These tax credits can reduce a bank's tax liabilities, which means it can pay less in taxes (CRS 2019, 23). Due to the structure of the NMTC Program, banks may reduce their tax liability by up to 39% of the investment that they provide (CDFI Fund 2020). Banks may receive these tax credits through providing funds to Community Development Entities (CDEs). A CDE is an entity that has a primary goal of serving low income communities and being accountable to them. CDEs then provide community investment via the funds from the banks. CDEs receive the tax credits directly from the Treasury's Community Development Financial Institutions (CDFI) Fund and then give them to banks in exchange for financing (CDFI Fund 2020; OCC 2016; Tax Policy Center 2021). Banks may also receive CRA credit through investment in CDEs, which as mentioned helps a bank's CRA rating (CRS 2019, 23).

The NMTC Program has been identified as providing a stable source of financing for low income communities (Theodos et al 2021, 5). As mentioned, in order to receive the tax credits from the Treasury's CDFI Fund, organizations must qualify as CDEs. As banks are generally not considered as those entities that have a primary goal of serving low income communities, it is difficult for them to become CDE certified and, thus, they cannot directly receive the tax credits themselves ("New Markets Tax Credit: CDE Certification Question and Answer" 2005). One way a bank can more directly receive the tax credit is through the formation of a subsidiary that is a CDE (OCC 2016). However, this is likely more administratively burdensome for a bank.

Because banks generally cannot themselves become CDE certified, receiving NMTCs requires banks to enter into agreements with external parties — namely whatever CDE they partner with. As NMTCs can be recaptured after seven years if a CDE loses their certification or fails to use the funds to actually provide financing for low income communities, banks must be careful about the CDEs they partner with and receive NMTCs from. They must also be careful about the types of projects that the CDEs they partner with end up financing, since poor CDE financing can reflect poorly on the banks who are the original source of funding (OCC 2016). In sum, banks have to forgo some control in order to receive NMTCs.

As small businesses in low income communities tend to have less financial resources than those in high income communities, the threat crime imposes on these businesses is likely magnified. Thus, the efficiency of lending incentive programs, like the NMTC Program, is relevant. While the NMTC Program has been seen as effective for providing funding to low income communities, it may be even more effective if banks could have more of a direct role in receiving the NMTCs. While low income community development may not be the primary goal of banks, CDE certification should be extended to banks who have demonstrated a serious commitment to serving low income communities, even if a majority of the bank's initiatives as a whole are not necessarily geared toward this effort.

Serious commitment may be determined by analyzing whether or not the bank has created departments who are focused on low income community development, as well as the virtue and quality of the work those departments do. The work should be measured quantitatively and qualitatively. By this, it is important to look at how much a bank has lent out, but it is also important to measure the relationships banks establish with those who they lend to and the types of businesses that the banks are funding. Evidence of solid relationships and assessment of the types of businesses that receive loans is important. Monitoring this before granting a tax credit ensures that banks are actually doing useful work with their financing, rather than doing the bare minimum to reap some reward.

In general, whether through the NMTC Program or a similar program, policymakers should reward banks for meaningful small business lending efforts and practices. If banks are taking on risk due to local traits within a community, then tax credit programs can be used to incentivize banks to lend despite the risk.

Conclusion

Small businesses serve important roles in the communities in which they serve. Small businesses provide local employment opportunities, they contribute to tax revenue, and they provide local access to goods and services. Thus, it is important for policymakers to aid in supporting their growth. A key function of a small business' success is lending. As mentioned, many small businesses lack the resources that major, more established companies possess. Thus, they rely on external sources of funding to expand their operations. However, if their lending is reduced due to a lender’s concerns about crime then, yes, it is important to design policies and initiatives that can help decrease crime. It is also important for policymakers to promote initiatives that can encourage lenders to lend, or make them more willing to lend, despite the presence of crime.

Appendix

Table 5: Multivariate Regression with Violent Crime as Outcome Variable and Percentage Minority as Explanatory Variable of Interest		
Variable	*Estimate*	*Pr(>|t|)*
Intercept	-7.073e+02	< 2e-16***
Population	1.083e-02	< 2e-16***
Median Income	-6.132e-05	0.909
Percentage Minority	1.062e+01	< 2e-16***

Table 5

Table 6: Multivariate Regression with Property Crime as Outcome Variable and Percentage Minority as Explanatory Variable of Interest		
Variable	*Estimate*	*Pr(>|t|)*
Intercept	-2.865e+03	< 2e-16***
Population	3.389e-02	< 2e-16***
Median Income	2.451e-02	< 2e-16***
Percentage Minority	2.182e+01	< 2e-16***

Table 6

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