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The Geography of Subprime Credit

by Taz George, Robin Newberger, and Mark O'Dell

Improving the financial lives of the people living in neighborhoods with large concentrations of low-credit-scored households[1] requires an understanding of the socioeconomic and financial challenges of those places. In this study, we identify such neighborhoods and analyze their socioeconomic and financial attributes, focusing on Illinois, Indiana, Iowa, Michigan, and Wisconsin (the five states served by the Federal Reserve Bank of Chicago). We find geographic patterns in the locations of subprime-scored households, in particular that these households are more highly concentrated in urban centers, while suburban areas tend to have very few subprime households. The states of Wisconsin and Iowa have lower shares of subprime households than Illinois, Indiana, and Michigan. We also find significant differences in neighborhood characteristics in places where subprime-scored households live, including a much higher non-white share of the population, weaker labor market outcomes, lower educational attainment, and higher housing vacancy rates.

Differences in credit scores and other attributes across neighborhoods are likely to affect the overall supply and nature of lending and investment in those places. Importantly, individuals with subprime scores face higher borrowing costs and may be unable to obtain bank credit at all, which may lead to use of more costly alternative financial products that have fewer consumer protections. Credit scores also affect access to other products and services, such as cell phone contracts, employment, and housing. By shedding light on the socioeconomic and financial characteristics of neighborhoods with concentrations of subprime-scored households, this study provides a more complete picture of the challenges they face, and informs the design of policy and programmatic interventions. In particular, the analysis helps inform

where community advocates may wish to direct resources, as well as the associated socioeconomic and financial challenges they will likely confront. It also guides the practices or advice used by credit counselors who work with low-scoring households, helping them recognize the neighborhood economic adversities correlated with low scores. Our work also adds important context to discussions about innovations to improve the flow of lending and investment to underserved neighborhoods.

Data and approach

Our research builds on the descriptive work of other Reserve Banks using the Federal Reserve Bank of New York's Consumer Credit Panel (CCP/Equifax data), including studies that analyzed outstanding debt by state;[2] credit access and management in counties and zip codes;[3] credit utilization by neighborhood income;[4] the distribution of subprime scores within a metro area;[5] and the relationship between (neighborhood) location characteristics and risk scores in Indian country.[6] Our analysis of credit and neighborhood characteristics relies on CCP/Equifax data from the fourth quarter of 2018. We further utilized publicly available zip code level data, including American Community Survey (ACS) and Internal Revenue Service (IRS) data. The CCP/Equifax data is based on a 5 percent sample of all American citizens and permanent residents via a random selection of social security numbers, plus all other individuals with a credit file residing in the same household as a member of the sample in a given quarter. Thus, the Equifax data provides a comprehensive depiction of household debt holdings for its sample.

Certain household liabilities and credit payments are not reported to Equifax or other major credit bureaus, such as payday loans, interpersonal or seller-financed loans, and rental payments. These categories are therefore not included in our analysis. We further limit our analysis to only those households with a credit score[7] and exclude households in which no adult has sufficient credit history for Equifax to assign a score. Our final analysis sample includes 1.3 million households with an Equifax risk score in Illinois, Indiana, Iowa, Michigan, and Wisconsin in the fourth quarter of 2018.

We classify households scored as subprime, near-prime, or prime based on the highest risk score in the household. We classify a household as subprime scored if the highest scored individual in the household has a risk score of less than 620. If the highest-scored individual falls between 620 and 760, the household is classified as near-prime, and scores of 760 or higher are classified as prime. Next, we classify zip codes into four quartiles based on the share of subprime-scored households. The first quartile ("least subprime") has the lowest concentration of subprime households, while the fourth quartile ("most subprime") has the highest concentration of subprime-scored households.

Zip codes may not fully capture neighborhood concentrations of subprime-scored households if zip codes aggregate very diverse households who are segmented within zip codes. Nonetheless, we focus on zip codes because this level of geography allows us to study a sufficiently large number of households and to match this information with reliable income data from the IRS.

Next, we describe delinquency rates and Equifax risk scores at the state level, as well as maps to illustrate the spatial variation in subprime household concentration across our district. We use this information to explore how household credit profiles vary by state and by urban, rural, and suburban status. We further explore spatial differences by examining the relationship to population density. Finally, for each zip code quartile, we analyze differences in neighborhood demographic, economic, and housing characteristics. Because age and credit score are highly correlated, we test whether our results are consistent when limiting the analysis to fixed age groups, and find that our results are unaffected.

Finding 1: Wide variation exists across zip codes in the share of subprime-scored households.
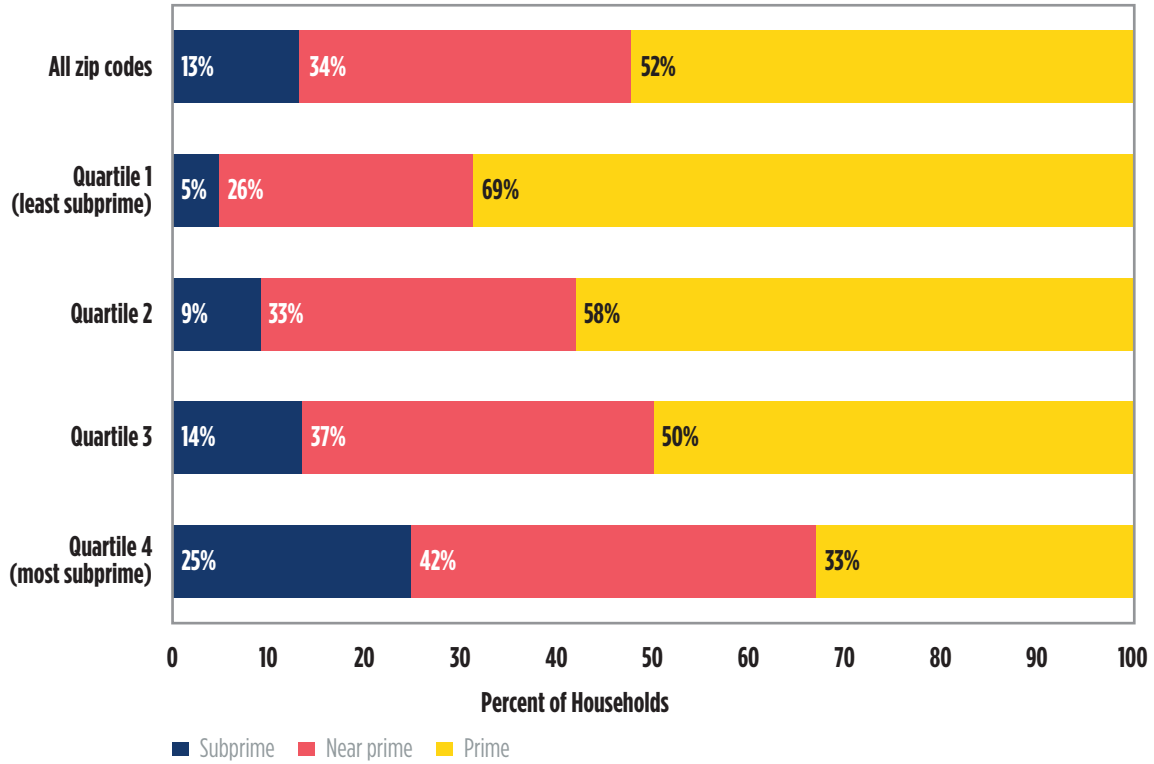
As seen in figure 1, zip codes in our study area are not homogeneous in terms of the credit scores of the households who live in them. In the most subprime quartile of zip codes, roughly one-quarter of households have a subprime score while one-third have a prime score. In the neighborhoods with the lowest concentrations of subprime borrowers, about 5 percent of households have subprime scores, while 69 percent of households have prime scores. We also find that the highest-scored households are quite unlikely to live in neighborhoods with the lowest-scored households. We see a highly negative correlation (about -0.9) between the shares of super-prime (above 820) and subprime-scored households in a given neighborhood. The heterogeneity across places highlights the relationship between credit scores and residential sorting.

Notably, while the share of subprime households varies considerably across zip codes, there is a fairly large share of prime-scored households in all four zip code groups. Even in most subprime zip code groups, roughly one third of households had a prime risk score.

Finding 2: A lower share of households are subprime scored in Wisconsin and Iowa than in Illinois, Michigan, and Indiana.

There are significant state-level differences in the distribution of households with subprime credit scores, and in delinquency rates. As table 1 shows, 16.3 percent of households in Indiana are subprime scored, compared to only 10.8 percent in Wisconsin. The percent of households with any account more than 90 days delinquent also vary by state. In Illinois and Indiana, 16.4 percent of households had a serious delinquency as of the fourth quarter of 2018, compared to only 11.3 percent in Wisconsin. As seen in figure 2, Wisconsin, Iowa, and much of northern Illinois are dominated by the first two quartiles of low-subprime zip codes, while Michigan, Indiana, and southern Illinois are covered largely by darker blue zip codes, indicating higher shares of subprime-scored households.

Figure 1. Zip codes vary widely in credit score distribution.

Category	Subprime	Near prime	Prime
All zip codes	13%	34%	52%
Quartile 1 (least subprime)	5%	26%	69%
Quartile 2	9%	33%	58%
Quartile 3	14%	37%	50%
Quartile 4 (most subprime)	25%	42%	33%

Percent of Households

■ Subprime   ■ Near prime   ■ Prime

Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data from 2018 Q4.
Notes: Quartiles represent groups of neighborhoods based on their percent of households with subprime scores. Subprime scores are risk scores less than 620. Near-prime scores are 620-760, and prime scores are greater than 760.

Table 1. Wisconsin and Iowa have the lowest shares of subprime-scored households in the states of the Seventh District.

	Share of all households in sample	Percent with 90+ day delinquency	Percent subprime	Percent prime
Iowa	8.4	12.7	11.7	57.8
Illinois	31.7	16.4	13.5	53.5
Indiana	17.9	16.4	16.3	48.9
Michigan	26.8	15.4	14.1	52.8
Wisconsin	15.1	11.3	10.8	60.1
All	100	15.1	13.2	52.4

Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data from 2018 Q4.
Notes: Our sample is limited to the states of the Seventh District, which are Iowa, Illinois, Indiana, Michigan, and Wisconsin. Subprime scores are risk scores less than 620. Near-prime scores are 620-760, and prime scores are greater than 760.

Figure 2. Geographic patterns of subprime concentration are evident at the state and local levels.
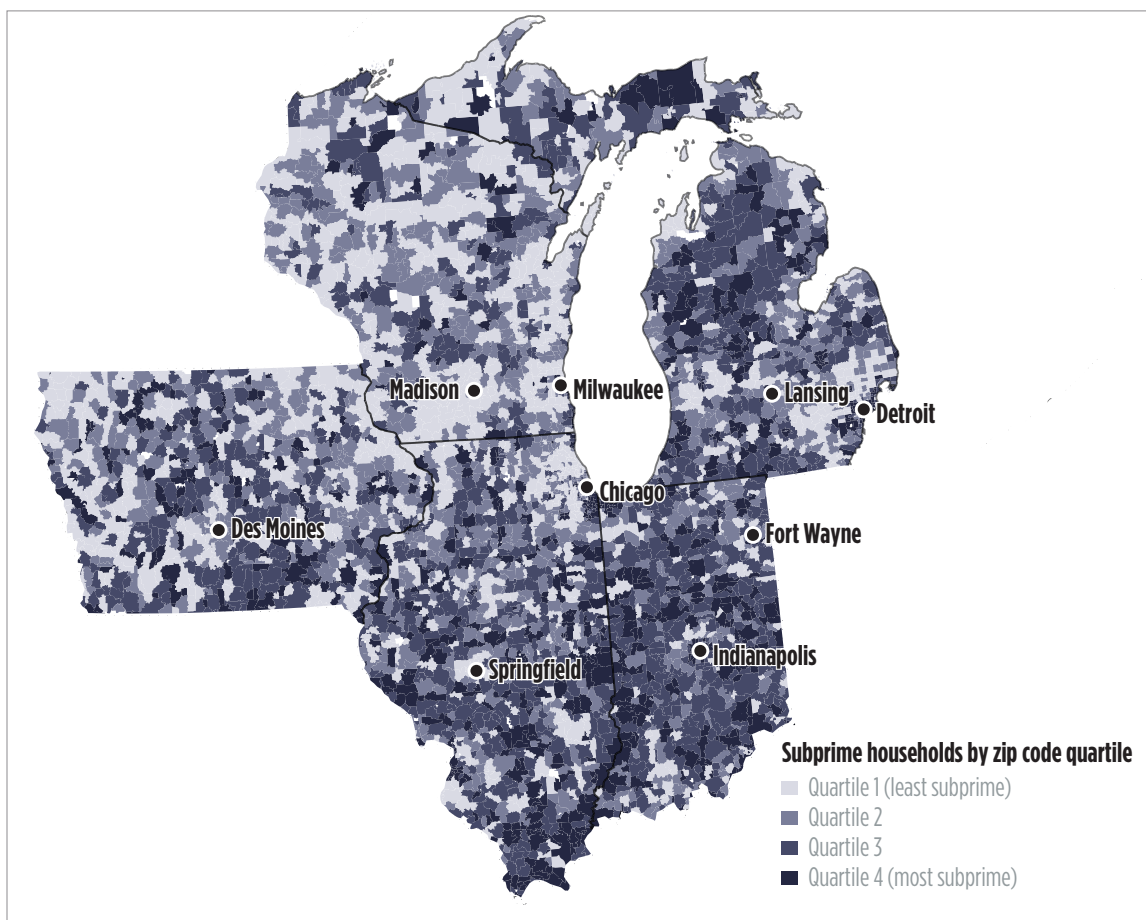
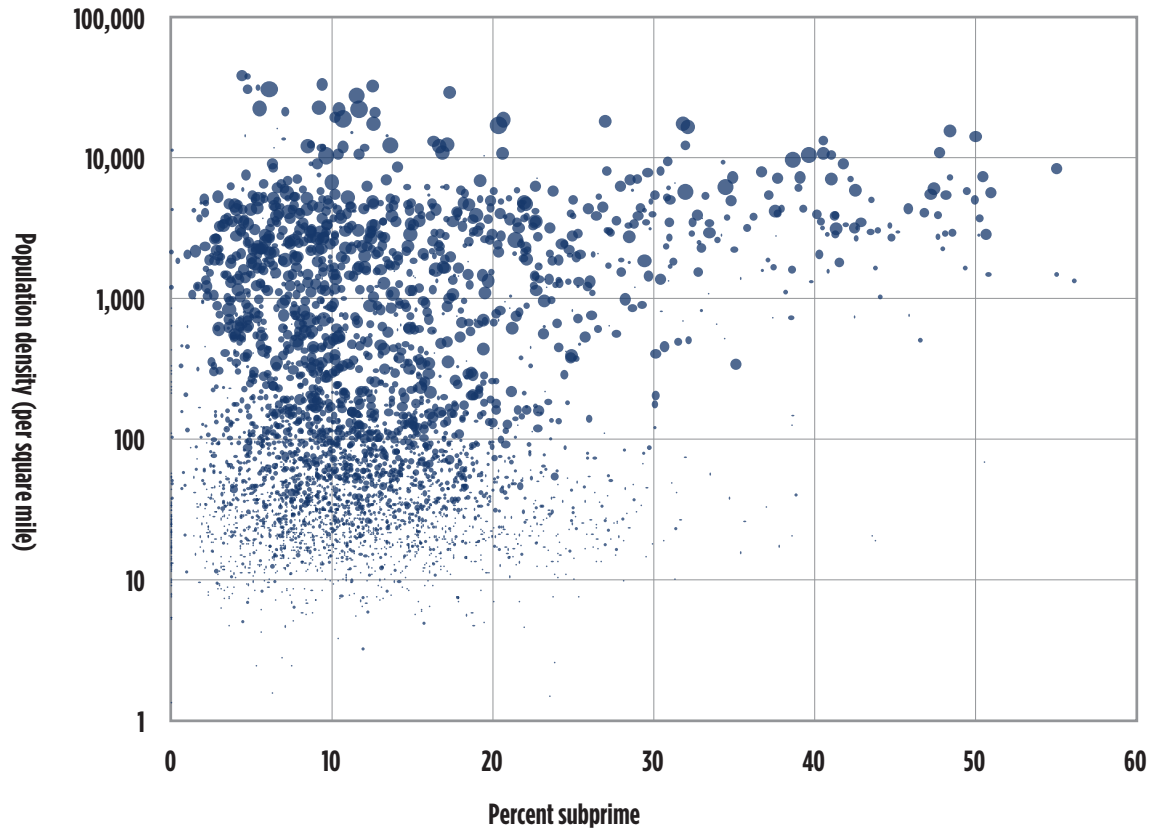Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data from 2018 Q4.
Notes: Quartiles represent groups of neighborhoods based on their percent of households with subprime scores. Subprime scores are risk scores less than 620.

Finding 3: There is a striking contrast between urban and suburban areas in the concentration of subprime-scored households.

A close review of the map in figure 2 reveals a striking contrast between urban and suburban areas. The darkest shade indicates the most subprime quartile of zip codes, while the lighter shades represent zip codes with lower concentrations of subprime-scored households. The urban cores of Milwaukee, Chicago, Detroit, Indianapolis, and Des Moines are all marked by clusters of zip codes in the fourth (most subprime) quartile. Surrounding the inner cores of these cities are bands of the first and second quartile zip codes, indicating suburban areas with relatively few subprime-scored households.

We further study the distribution of subprime households across urban and suburban places by examining the relationship between population density and credit scores of zip codes. Figure 3 shows each zip code in our study area as a circle with its area proportionate to population size (larger circles represent more populous zip codes). The zip codes are plotted by the percent of households that are subprime on the horizontal access, and the population density on the vertical access. Zip codes with relatively high percentages of subprime households, above 20 percent (recall that in quartile 4, 24.8 percent of households are subprime), are mostly densely populated, with the exception of some sparsely populated zip codes at the bottom tail of the distribution. The less subprime zip codes (those in quartiles 1 and 2, for example) range from low to very high in population density.

Figure 3: Highly subprime zip codes tend to be high-density urban areas.

Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data from 2018 Q4 and American Community Survey 2013-2017 five-year averages.
Notes: Each circle represents one zip code, and the circle size reflects zip code population size. Subprime scores are risk scores less than 620.

The distribution of zip codes by percent subprime and population density suggests that the most subprime places tend to be (densely populated) urban areas, while the least subprime places are a mix of urban, suburban, and rural areas.

Finding 4: Places with lower credit scores show more signs of economic adversity and reflect patterns of segregation.

Adding neighborhood data from the 2013-2017 ACS to the CCP data allows us to compare characteristics of zip codes with high concentrations of subprime households to zip codes with relatively few subprime-scored households. The economic, demographic, and housing variables included in our analysis are shown in table 2, with means computed for each quartile of zip codes and for all households overall. Stark differences emerge across the zip code quartiles for many of these variables. Mean household income is much lower in the high subprime neighborhoods than in the least

subprime neighborhoods – $42,000 versus $102,300. The unemployment rate in subprime neighborhoods is also much higher, at 10.8 percent on average, versus 6.6 percent overall, and just 4.2 percent in the least subprime neighborhoods.

Differences in racial and ethnic composition are apparent in the most subprime quartile of neighborhoods. In these places, the share of black households in zip codes with the highest concentration of subprime-scored households is 31 percent, but only 5.7 percent in the next-highest quartile. Similarly, the share of white households drops notably from the third to the fourth quartiles, from nearly 80 percent to 53.5 percent. The disproportionate representation of black households in the most subprime neighborhoods point to important dynamics that may be at play, including the wide gap in median net worth between black and white households at the national level ($17,600 versus $171,000 as of 2016).[8]

The high share of black households in the most subprime zip codes in urban areas also reflects the level of racial segregation in the major metropolitan areas of the Seventh District. The overlap of racial segregation with places of concentrated advantage and disadvantage can manifest in risk scores and other measures of household financial well-being. On average, we also find a number of indicators associated with less economic opportunity in places with lower credit scores, including lower educational attainment; higher rates of households receiving public assistance in the form of SNAP, TANF, or SSI; lower rates of homeownership and residential stability; and higher rates of individuals without health insurance.[9] In the quartile with the highest share of subprime-scored households, only 18.7 percent of adults have a bachelor's degree, compared to 45 percent in the first quartile. Nearly half of households in the fourth

Table 2. Neighborhoods with more subprime households exhibit greater signs of economic adversity.

	Quartile 1 (least subprime)	Quartile 2	Quartile 2	Quartile 4 (most subprime)	All
Household income ($000)	102.3	66.6	53.9	42	66.2
Unemployment rate	4.2	5.2	6.2	10.8	6.6
Percent white	83.5	80.6	79.5	53.5	74.3
Percent black	2.7	3.7	5.7	31	10.8
Percent Hispanic	5.8	9.7	9.9	10.8	9
Percent Asian	6	3.9	2.5	1.8	3.5
Percent other	3.8	4	4.3	5.5	4.4
Percent with a BA	45.4	32.6	24	18.7	30.2
Percent public assistance	10.5	19.4	26.9	45.2	25.5
Percent uninsured	4.8	7	8.3	10.8	7.7
Vacancy rate	6.5	8.3	10.8	14.3	10
Homeownership rate	78.4	71.1	69.3	58	69.2
Percent moved in last year	11.3	13.3	14	15.6	13.6
Median age of housing (yrs)	40.8	45.3	49.7	59.6	48.8
Population per square mile	2,636	2,843	2,011	3,302	2,698

Sources: American Community Survey 2013-2017 data, IRS income data, and Federal Reserve Bank of New York Consumer Credit Panel/Equifax Data from 2018 Q4.

quartile are on some form of public assistance (45 percent) versus just 10.5 percent of households in the first quartile. There are also noteworthy differences in housing market characteristics, including higher vacancy rates, lower homeownership rates, and older housing stock in the most subprime zip codes.

Finding 5: The most subprime neighborhoods have lower use of mortgages and credit cards; the use of auto and student debt show different patterns.
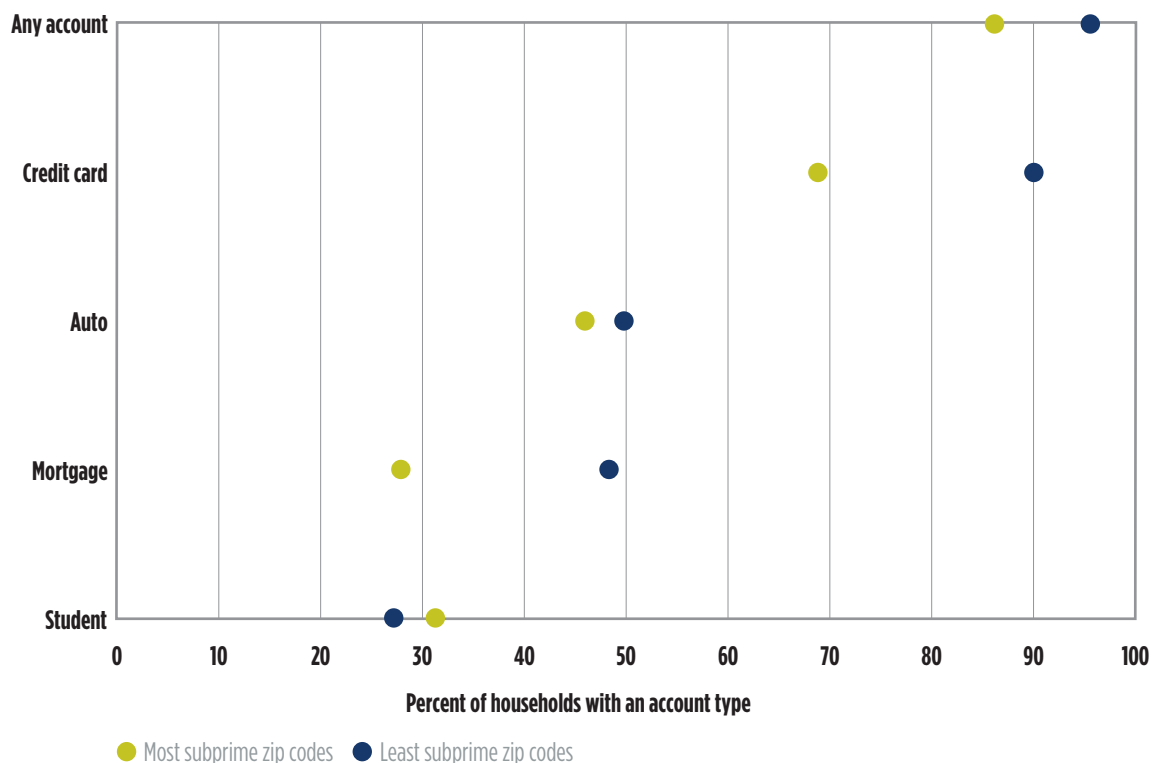
In the most subprime neighborhoods, households are less likely to have credit card accounts[10] or mortgage debt (figure 4). About 73 percent of households in the most subprime neighborhoods have bankcard accounts, compared with 93 percent of households in the least subprime zip codes. Likewise, only 31 percent of households have mortgages in the most subprime quartile, compared to 53 percent of households in the least subprime neighborhoods. Presence of student loan debt and non-bank auto finance debt, on the other hand, is roughly similar across the most and least

subprime zip codes. In the most subprime zip codes, around 52 percent of households in the sample have some form of auto debt while in the least subprime zip codes, around 55 percent have auto debt. Student loan debt is actually more prevalent in the sample in the most subprime zip codes than in the least subprime zip codes, with 38 percent of households in the most subprime areas having some student loan debt, while only 33 percent of households in the least subprime areas have student loan debt. The higher prevalence of student loan debt – but not other types – in the most subprime neighborhoods points to the challenges

Figure 4: The most subprime places have lower credit use for most tradelines, with auto loans and especially student loans differing from the overall trend.

Percent of households with an account type

● Most subprime zip codes ● Least subprime zip codes

Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data from 2018 Q4.
Notes: Quartiles represent groups of neighborhoods based on their percent of households with subprime scores. Subprime scores are risk scores less than 620.

disadvantaged households face in paying for higher education and the role of the federal student loan program – which does not feature underwriting – in enabling access.[11]

Households in the most subprime zip codes borrow smaller amounts than households in less subprime zip codes. In the most subprime zip codes, the average borrowing household holds about $73,000 in debt, compared with about $159,000 in debt for the average borrowing household in the least subprime quartile. Among borrowing households across the sample as a whole, the total amount of debt per households is about

$103,000. Mortgages are the largest type of debt held, with around 47 percent of debt in the most subprime quartile held in first mortgage accounts, and about 69 percent of debt in the least subprime quartile held in first mortgages. In contrast, the next largest source of debt, student loans, range from 9 percent of debt in the least subprime quartile to 21 percent of debt in the most subprime quartile. Mortgage size drives much of the difference in total debt holdings across zip codes; the average outstanding primary mortgage balance in the most subprime neighborhoods is about $106,000, compared to $216,000 in the least

subprime neighborhoods. In contrast, non-mortgaged households have relatively similar average debt loads across zip codes: $25,000 in the most subprime zip codes and $30,000 in the least subprime zip codes (figure 5). These figures are generally in alignment with debt levels reported through the Survey of Consumer Finances, a triennial survey that provides the most comprehensive picture of balance sheet components for families across the United States.[12]

Figure 5: Households with a mortgage account for most of the difference in total debt between zip code quartiles.
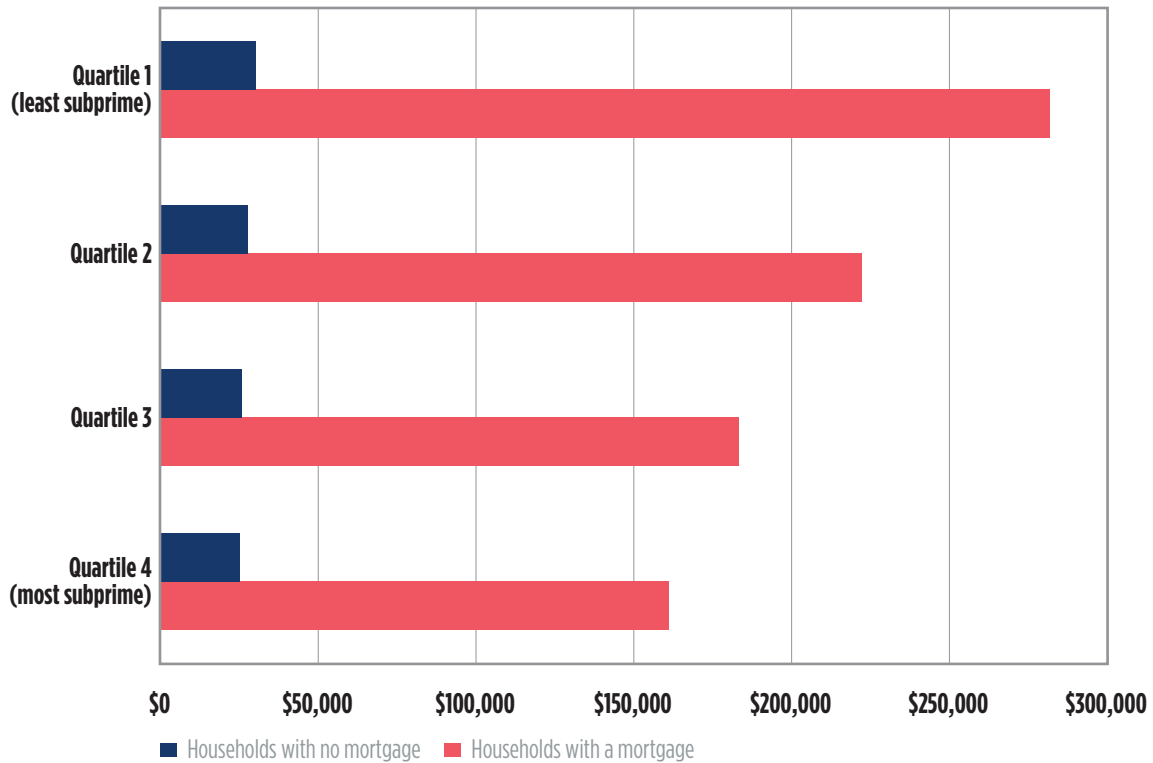
Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data from 2018 Q4.
Notes: Quartiles represent groups of neighborhoods based on their percent of households with subprime scores. Subprime scores are risk scores less than 620.

Discussion

As we demonstrate, credit scores and residential sorting are related. In particular, we find substantial overlap between the geography of subprime-scored households and racial segregation, with much higher shares of black households in neighborhoods where subprime scores are most common. Consumers' credit profiles are closely tied to housing tenure and consumption of amenities. Renters tend to have lower credit scores than homeowners, even after accounting for differences in their respective age profiles.[13] Homeowners with higher credit scores may buy higher-priced homes in more expensive housing markets with higher-quality public schools and proximity to urban/metropolitan areas.[14] Because credit scores have implications for the financial products and services available to households, they influence whether applicants will be approved for loans, qualify for lower loan amounts, and pay higher interest rates (Ross and Yinger, 2002; Munnell et al., 1996).[15]

Our study highlights an important challenge confronting policymakers and the private market: namely, the creditworthiness of households is intertwined with economic adversity at the neighborhood level. Neighborhoods with a greater share of subprime-scored households exhibit more signs of economic adversity and lower levels of credit use compared to neighborhoods where the distribution of credit scores skews higher. Indeed, recent work quantifying aggregate lending flows by neighborhood across Chicago has documented significant disparities in the amount of credit extended to different parts of the region.[16] Private market lending volume was substantially higher in neighborhoods with higher income and greater share of white residents. Further, when the financial challenges of households are spatially concentrated, research suggests individual- or household-level shocks can be more intense. For example, the negative spillovers from a single foreclosure on the value of nearby houses are larger when the density of foreclosures is higher;[17] individual financial distress – as measured by debt collection activity – may be higher in neighborhoods with greater overall distress. Because the flow of credit and investment has major implications for the economic vitality of communities, enforcing existing policies and applying creative solutions to strengthen fair and sustainable lending to disadvantaged neighborhoods are important goals for policy.

More generally, the analysis presented here may help inform areas where community advocates may wish to direct resources for neighborhood investments, as well as the associated socioeconomic and financial challenges they will likely confront. It may also guide the practices used or advice offered by credit counselors who work with low-scoring households, helping them recognize the neighborhood economic adversities correlated with low scores. Our work may further add to discussions about the necessary innovations to improve the flow of lending and investment to underserved neighborhoods. The importance of geography in accessing credit has been a longstanding concern for policymakers, going at least as far back as early efforts to combat redlining.[18] Additional policy concerns may arise if there is a self-reinforcing mechanism of hardship for households whose lower credit scores may have already played some role in neighborhood selection.

Appendix I.

In order to test whether the relationships between the neighborhood variables and percent subprime remain significant after controlling for other factors, we run an ordinary least squares regression of the neighborhood characteristics on the percent of households that have subprime scores at the zip code level.[19] Table 3 includes regression coefficients from three stepwise regression models. In model 1, we include only household income and unemployment. Model 2 includes the full set of neighborhood characteristics, and model 3 adds state fixed effects. We also include standardized coefficients from model 3, which translates the effect size of each variable in terms of the standard deviation change of the dependent variable that is associated with a one standard deviation change of the independent variable. Coefficients that are not statistically significant at a p <.01 level are displayed in light grey.

The model results show that many of the relationships present in the descriptive data are statistically significant after controlling for other characteristics. Log of household income has a negative relationship with percent subprime in all three models. The standardized coefficient in model 3 of -.302 indicates that a one standard deviation increase in log of income is associated with a .302 standard deviation decrease in percent subprime. For zip codes near the center of the income range, an increase in median household income of $10,000 within a zip code corresponds to about a 1.5 percentage point decline in the percent subprime-scored households in that zip code. Unemployment is positively associated with percent subprime, although the coefficient becomes smaller after introducing other neighborhood characteristics in the second and third models. Percent black has a large, positive relationship with percent subprime. The coefficient of .174 in model 3 means that a 1 percentage point increase in percent black is associated with a .174 percentage point increase in percent subprime. On this point, it is important to note that this analysis does not control for differences in wealth between racial groups, which may be driving some of the results as well. While our study does include zip code level median income as an independent variable, the racial disparities in wealth far exceed those in income, and income is

not net of expenses, which may not be distributed proportionately with income.[20] Percent Hispanic and percent Asian have negative, but weaker relationships with percent subprime.

Housing market characteristics also have significant relationships with percent subprime. Vacancy rate and age of housing are associated with higher subprime concentrations, while homeownership rate is strongly associated with lower subprime shares. Finally, the state fixed effects are significant. Relative to Wisconsin, the other four states in the study region are associated with higher shares of subprime-scored households, especially Indiana. Introducing state fixed effects in model 3 causes the effects of percent without health insurance and percent who moved in the last year to become statistically insignificant.

Table 3. Multivariate analysis of neighborhood characteristics and percent subprime

	Model 1	Model 2	Model 3	Model 3, standardized
Intercept	.351	.347	.357	
Log income	-.077	-.060	-.061	-.302
Unemployment rate	1.159	.320	.346	.171
Percent black		.175	.174	.417
Percent Hispanic		-.082	-.057	-.087
Percent Asian		-.178	-.160	-.098
Percent other		.147	.176	.063
Percent uninsured		.192	.031	.016
Vacancy rate		.032	.044	.043
Homeownership rate		-.072	-.089	-.164
Housing age		0	0	.042
Log population density		0	0	-.005
Percent moved in last year		.026	-.013	-.010
Indiana			.036	.165
Iowa			.019	.062
Michigan			.009	.049
Illinois			.010	.055
R^2	.74	.86	.880	.880
N	3091	3091	3091	3091

Sources: American Community Survey 2013-2017 data, IRS income data, and Federal Reserve Bank of New York Consumer Credit Panel/ Equifax data from 2018 Q3.

Notes

1. We define credit scores below 620 as subprime. We refer to households whose highest individual credit score is below 620 as low-credit-scored or subprime-scored households.

2. Tenth District Consumer Credit Report, Federal Reserve Bank of Kansas City.

3. 2017 Long Island Credit Profile: Nassau and Suffolk Counties, Federal Reserve Bank of New York.

4. "Analysis of Consumer Credit Data by Neighborhood Income; Third Federal Reserve District, 2005Q1 – 2013Q2," Federal Reserve Bank of Philadelphia.

5. Chadda, Anmol, 2018, "The Concentration of Financial Disadvantage: Debt Conditions and Credit Report Data in Massachusetts Cities and Boston Neighborhoods," Federal Reserve Bank of Boston.

6. Dimitrova-Grajzl, Valentina, et al., 2015, "Consumer Credit on American Indian Reservations," Elsevier B.V. Science Direct Economic Systems, Vol. 39, Issue 3, September, pp. 518-540.

7. In the Consumer Credit Panel dataset, Equifax provides a credit score variable called "risk score." This risk score value behaves similarly to a traditional credit score measure. It ranges from 300 to 850, with higher values reflecting a more robust credit history.

8. Dettling, Lisa J., et al., 2017, "Recent Trends in Wealth-Holding by Race and Ethnicity: Evidence from the Survey of Consumer Finances," September 27, Board of Governors of the Federal Reserve System.

9. We note that the correlation between zip code level income and credit scores is stronger than at the individual level, suggesting patterns of sorting (see "Are Income and Credit Scores Highly Correlated?").

10. Here, "credit card accounts" capture a category labeled as "bankcard" in the Equifax data. This category consists of lines of revolving credit issued through a bank or credit union, which are typically unsecured and associated with a card that can be used with one of the major credit card networks.

11. Our analysis omits households that have no reported credit history, or too little history to compute a risk score, so many residents of quartile four neighborhoods may not be counted in this calculation. Accounting for these households could affect the share of households with each type of debt across the zip code quartiles.

12. According to the Survey of Consumer Finances, the reported mean debt for debt-carrying families was $123,400 (compared to $154,000 in the Equifax data). However, the unit of analysis in the SCF data is the family rather than the household; and the amount of debt in the SCF represents an average for (debt-carrying) families across the country in 2016, versus an average for (borrowing) households in Illinois, Indiana, Iowa, Michigan, and Wisconsin in 2018. See https://www.federalreserve.gov/publications/2017-september-changes-in-us-family-finances-from-2013-to-2016.htm.

13. Li, Wei, and Laurie Goodman, 2016, "Comparing Credit Profiles of American Renters and Owners," The Urban Institute, March.

14. Aiko Nelson, Ashlyn, 2010, "Credit Scores, Race, and Residential Sorting," Journal of Policy Analysis and Management, Vol. 29, No. 1, pp. 39-68.

15. Ibid.

16. Theodos, Brett, et al., 2019, "Neighborhood Disparities in Investment Flows in Chicago," The Urban Institute, May.

17. Kingsley, G. Timothy, Robin Smith, and David Price, 2009, "The Impacts of Foreclosures on Families and Communities," The Urban Institute, May; and Immergluck, Dan, and Geoff Smith, 2006, "The External Cost of Foreclosure: The Impact of Single-Family Mortgage Foreclosures on Property Values," Housing Policy, pp. 57–79.

18. The Bureau of Consumer Financial Protection's Office of Research, 2018, "Data Point: The Geography of Credit Invisibility," September.

19. Educational attainment and public assistance variables are omitted from the regression analysis due to multi-collinearity. The variables for percent white and for Wisconsin fixed effect are omitted as reference categories.

20. Other research points to the connection between liquid assets and financial vulnerability. For example, if faced with an unexpected expense of $400, 27 percent of households would have to borrow or sell something to cover the cost, and an additional 12 percent would not be able to cover it at all, according to the Federal Reserve's 2018 Survey of Household Economics and Decisionmaking.

Biographies

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