

Social Capital and Mortgage Delinquency

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Abstract: This study offers a simple theoretical model and empirical evidence to address the impact of social capital on mortgage delinquency. Previous studies suggest that social capital includes the norms, values, trust, and information common to a social network, which enable cooperative and shared actions. Using a new county-level dataset between 1999 and 2011 for the U.S, we find strong evidence to show that social capital significantly affects the likelihood of mortgage delinquency, controlling for income, employment, population and other factors. In particular, we find that a one-standard-deviation increase in social capital leads to almost a 0.13 standard deviation decrease in mortgage delinquency. The primary explanation is that social norms or trust could limit opportunistic behavior among homeowners and negatively affect the default activities strategically. Our tests also suggest important findings on the social capital effect when comparing pre- and post-crisis environments. During and after the financial crisis period, the impact of social capital on mortgage delinquency increases significantly. Our findings have important implications for players in the mortgage industry and policymakers in that cooperative and shared actions play a crucial role in the mortgage default process. Thus, the assessment of default risk should take social capital into consideration, besides the factors already documented in the literature.

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1. Introduction

There have been significant movements in real estate values in many economies in the past two decades. In the United States, house prices increased by 55% during the period between 2000 and 2006. The following sharp decline in house prices has been widely viewed as a major factor contributing to the 2008 financial crisis. The mortgage delinquency rate (defined as loans past-due 60 days or more, plus foreclosures) was on average 2 percent between 1980 and 2005, while it increased to almost 11 percent in 2010.¹ The financial crisis has drawn the attention of participants in mortgage markets and policymakers to the need for more accurate methods of assessing mortgage default risk in order to improve models of underwriting and pricing of mortgages and mortgage-backed securities and to develop effective public policy to reduce foreclosures.

A growing body of literature has been focusing on mortgage performance, especially the default risk. Some studies have attributed the patterns of default to observable borrower- and market-specific variables, such as loan terms, borrower's characteristics, and macroeconomic variables (Doms, Furlong, and Krainer 2007; Gerardi, Shapiro, and Willen 2008; and Gerardi, Lehnert, Sherlund, and Willen 2009), while others explore the role of possible agency problems between loan originators and investors (Bubb and Kaufman 2009; Elul 2009; Krainer and Laderman 2009; Keys, Mukherjee, Seru, and Vig 2010; and Agarwal, Chang and Yavas, 2012). Another line of literature examine strategic default (White 2010; FICO 2011; Wilkinson-Ryan2011; Guiso, Sapeinza and Zingales 2013; Seiler et al. 2014; Seiler 2014), where the borrower *chooses* to default even though has the financial means to make the mortgage payments. In this paper, we study the role of social capital as a determinant of default risk and how its impact varies over time.

¹ It is Federal Reserve estimates based on data from the Mortgage Bankers Association.

Woolcock (1994 and 1998) defines social capital as the norms, values, and trust in a social network, which enables cooperative and shared actions. Hasan et al. (2017b) suggest that cooperative norms and close social networks in an area encourage a local environment that limits opportunistic behaviors. Guiso et al. (2004) examine the relationship between social capital and financial development by following the notion that “high levels of social capital generate higher levels of trust toward others” in a local community or social network. Social capital has also received growing attention in the recent finance literature, where it has been shown that social capital has an impact on financial and economic decisions (e.g., Jha and Cox, 2015; Javakhadze et al., 2016; Gupta and Raman, 2016; Hasan et al., 2017a, 2017b). The recent behavioral studies look at the role of non-monetary considerations, such as how default decisions are viewed by one’s social network, on borrowers’ default decisions (Seiler et al 2012, Seiler and Walden 2014). Guiso, Sapienza, and Zingales (2013) argue that when your peers adopt a philosophy or action, the idea is more likely to be deemed acceptable by those within the same neighborhood or social circle, namely social contagion. Especially in situations when there is a clue of the best course of action, people look to others before making decisions. Thus, social norms and trusts can play an important role in the default activities in the local neighborhood. We argue that incorporating social capital into mortgage analysis can enhance our understanding of mortgage default dynamics, help policy-makers with maintaining financial stability, and aid lenders with better pricing of risk. This study offers a simple theoretical model and empirical evidence to investigate the role of social capital in determining mortgage delinquency. Consistent with the findings of previous studies that emotional attributes and social network affect borrower’s default decision, we conjecture that areas with a higher level of social capital have lower levels of mortgage delinquency rates. Distressed homeowners weight the “moral costs’ against the strong financial incentives when deciding

whether to walk away from a substantially underwater mortgage. When more borrowers in the neighborhood default strategically, the sense that ‘everyone is doing it’ grows, and the resulting shift in the cultural environment may cause decay in moral aversion to default and make strategic default less stigmatizing. On the contrary, when a homeowner lives in a community with a higher level of social capital, the shared actions and altruism in a social network is more likely to discourage strategic default behavior and lead to a lower delinquency rate in a down market.

Our empirical analysis is based on a comprehensive dataset constructed from a series of proprietary and public data sources. This county-year level data set covers about 2220 counties² in the U.S from 1999 to 2011 and includes a set of key variables of interest including mortgage delinquency rate, measures for social capital, median house price, auto balance, credit card balance, subprime population, and demographic variables such as income, education, and unemployment. Given the large number of counties in our sample, we exploit cross-sectional variation over time in county outcomes to empirically isolate our coefficients of interest.

Our theoretical model offers two testable predictions. One is that higher social capital leads to a lower probability of delinquency. The other is that a deterioration in the house price distribution amplifies the negative marginal impact of social capital on the probability of default. Thus an increase in social capital should have a larger deduction in default probability during the recent housing crises than during the pre-crisis period. Our empirical analysis supports both of these predictions. We show that a one-standard-deviation increase in social capital leads to almost a 0.13 standard deviation decrease in mortgage delinquency. The implication of this result for the

² Our sample covers a majority of the U.S. counties. It does not include all the counties due to data availability, which is discussed in more detail later in the paper. For example, mortgage delinquency information is not available for counties with a population less than 10,000. Moreover, the sample used in our empirical analysis covers the period of 1999-2011 due to data availability. Our mortgage delinquency data is available for the period of 1999-2011. More details on the data is provided later in the paper.

players in the mortgage industry and policymakers is that to access the risk of mortgage default, they need to take into consideration social values and norms besides observable borrower attributes and macroeconomic activities. We also show that the impact of social capital in discouraging mortgage delinquency has been magnified after the financial crisis began. For example, compared to the pre-crisis period, the impact of social capital on mortgage delinquency has almost doubled. In particular, a one-standard-deviation increase in social capital leads to a 0.0569 standard deviation decrease in mortgage delinquency for the pre-crisis subsample, whereas a one-standard-deviation increase in social capital leads to a 0.1852 standard deviation decrease in mortgage delinquency in the post-crisis subsample. This finding provides strong evidence for the impact of social capital on mortgage delinquency considering the financial crisis as an exogenous shock to the housing market. This result stems from the fact that common values and trust among community members limit the strategic behaviors of homeowners. Thus, when the housing market goes down, homeowners in a neighborhood with higher social capital level have lower default risk.

This paper contributes to the mortgage default literature in several ways. First, this paper focuses on the significance of social capital for mortgage default risk. Our findings complement the existing studies focusing on the impact of emotional drivers and social network on default decisions. Our empirical strategy exploits the geographically varying mortgage delinquency rate over time at the county level and demonstrates that social capital has a negative impact on the mortgage delinquency rate. Furthermore, our county-level data on local characteristics such as income, employment, education, population, and median house price allow us to perform tests that mitigate concerns that omitted credit quality variables are polluting the estimates of the social capital effect. Second, the dataset we employ covers all major geographic areas of the United States. Third, the link we establish between social capital and mortgage delinquency serves as new

evidence in the literature examining the impact of social factors. Our results have implications for lenders and policymakers, which can enhance the understanding of mortgage dynamics and help lenders with better pricing of risk.

The rest of the paper is organized as follows. The next section reviews the literature and motivates our decision to use social capital to study mortgage market dynamics. Section 3 provides a theoretical model of default for establishing the relationship between social capital and mortgage default. Section 4 discusses the county-level dataset in the U.S that we use for the analysis. Section 5 lays out the empirical test and results of our study. Section 6 provides a conclusion.

2. Literature Review

The literature on the housing and mortgage market collapse is now quite substantial. A vast and growing body of literature has prompted a search for the factors that contribute to mortgage default risk. A number of studies focus on observable factors, such as loan terms, borrower's characteristics, and macroeconomic variables (Doms, Furlong, and Krainer, 2007; Gerardi, Shapiro, and Willen, 2008; Gerardi, Lehnert, Sherlund, and Willen, 2009), while the focus in others is on the role of possible agency problems between loan originators and investors (Bubb and Kaufman, 2009; Krainer and Laderman, 2009; Keys, Mukherjee, Seru and Vig, 2010; Agarwal, Chang and Yavas, 2012; Elul, 2015; Ambrose, Sanders and Yavas, 2016). For example, one factor is the relaxation of lending standards by mortgage issuers, such as the underwriting of loans with high loan-to-value ratios, high loan-to-income ratios, little or no documentation of income, and so on. This relaxation of lending standards would tend to increase the riskiness of the subprime borrower pool, and therefore it would not be altogether surprising for delinquencies to increase. FICO score, Combined Loan-to Value ratio (CLTV), Original Loan-to-

Value ratio (OLTV), documentation and a variety of other loan and borrower characteristics may have contributed to increased risk. In addition to a riskier borrower pool, other factors that may have contributed to the observed changes in mortgage default include economic conditions and price changes in the local housing market. Doms, Furlong, and Krainer (2007) find evidence for the effect of all three factors—riskier borrower pool, changing economic conditions, and recent housing price behavior—on the subprime mortgage delinquency rate and show that the recent behavior of house prices is the strongest predictor of changes in subprime delinquencies.

Negative equity (owing more on the mortgage than the property is currently worth) is a necessary, but not a sufficient condition for default. The decision to become delinquent on a mortgage depends on both the ability and the willingness of the borrower to repay the loan. It is also important to examine the factors that can vary across regions and affect both the ability and the willingness to stay current on a mortgage, such as the riskiness of the borrower pool at the regional level and the local economic conditions that might impact borrower income streams. The willingness to pay depends on the options available to the distressed homeowners. Deng, Quigley, and VanOrder (2000) find that accounting for a borrower's prepayment option helps to explain the seemingly slow propensities of borrowers to default during the 1990s. The authors demonstrate that the default hazard is sensitive to interest rate volatility. Borrowers evidently lower their default points because of the value of their prepayment options.

The second line of literature is related to studies on social capital. Hasan et al. (2017b) report that “cooperative norms are non-religious social norms that constrain narrow self-interest (Knack and Keefer, 1997), limit opportunistic behaviors in transactions (Coleman, 1988), and help to overcome the free rider problem (Guiso, Sapienza, and Zingales, 2010).” Recent studies have focused on the role of social capital in corporate outcomes, such as corporate social responsibility

and corporate innovations (Jha and Cox 2015; Gupta et al. 2016). Other studies have examined the positive impact of social capital on accessing finance and reducing the cost of financing (Hasan et al. 2017a; Hasan et al. 2017b; Gupta and Raman 2016; Ferris et al. 2017; Jha and Chen 2015). These studies provide evidence on how local social capital affect corporate level outcomes.

The externalities of foreclosures on local neighborhood enable us to establish a link between social capital and mortgage delinquency. The mortgage defaults, foreclosures and REO dispositions affect the well-being of surrounding homeowners. When the proportion of foreclosures in a market remains low, the externality is likely to be modest. However, increased foreclosures in a market affect the tax base, school quality, proportion of vacant properties, homelessness, and even crime rate (Immergluck and Geoff, 2006). Because of these negative externalities, a neighborhood that has experienced a high percentage of foreclosures is a less desirable place to live and thus increases the likelihood of default even among those borrowers who can still afford to make their mortgage payments. Previous studies have documented that foreclosures depress the market value of neighboring properties (Campbell, Giglio, and Pathak, 2011; Harding, Rosenblatt and Yao, 2009; Anenberg and Kung, 2014; Gerardi, Rosenblatt, Willen and Yao, 2015; Fisher, Lambie-Hanson and Willen, 2015; Li, 2017). The pressure on local property prices further reduces the incentive for distressed homeowners to stay current with the mortgage. Given the significant cost of foreclosures to the neighborhood, the norms to reduce such costs will be stronger in a neighborhood with higher social capital. Higher *SocialCapital*, representing stronger trust and cooperation or norms and networks that encourage collective action, could play an important role in discouraging the strategic default activities.

In a related literature, a number of studies examine the determinants of strategic default. White (2010) argues that underwater homeowners choose to continue paying their mortgages because of

the negative emotional attributes, such as fear, shame, and guilt. Homeowners also consider the financial backlash associated with defaulting, relocation costs, and the relative costs of renting versus owning. Wilkinson-Ryan (2011) uses experimental methodology to show that the likelihood of strategic default increases for banks that have been bailed out, for banks that are perceived as acting greedy (e.g., large subprime presence), for banks that have sold servicing rights to another party and for homes located in neighborhoods where the foreclosure rate is high. Guiso, Sapeinza, and Zingales (2013) examine strategic default with survey data and report that 37.4% of homeowners who view defaulting as morally objectionable will still default if their home is \$200,000 underwater. People who do not view default as morally wrong will default at the much higher rate of 59.2%. Seiler et al. (2014) conduct a survey of mortgagees and find that realized shame and guilt are consistent with ex-ante expectations. Empirically, they find that key strategic default drivers include moral evaluation of the decision to strategically default, political ideology, gender, income, and age. Seiler, Lane, and Harrison (2012) conduct laboratory experiments to examine the herding behavior in of strategic defaults. Seiler (2014) and Seiler and Walden (2014) use inequity aversion theory to demonstrate that the borrower's strategic mortgage default decision is also a function of how they perceive the character of their lender. The above studies are consistent with our findings that local social capital affects borrowers' willingness to stop paying their mortgages, even when they have the ability to make their payments. Specifically, in a neighborhood with a higher value of social capital, the social network and common norms could discourage strategic default and herding behavior.

Inspired by the earlier results on the role of social capital in corporate outcomes and the behavioral studies of strategic default, we investigate the role of social capital in mortgage default.

We provide strong evidence that lenders and policymakers need to take social capital into consideration in their mortgage underwriting and pricing decisions and policies.

3. The Model

In this part of the paper, we offer a simple model of default to establish the relationship between social capital and mortgage default. Consider a competitive lending market with risk-neutral lenders and borrowers. Let L be the loan amount, and i be the interest rate. In the first period, the borrower obtains L to purchase an asset of value P_0 , $P_0 \geq L$.³ In the second period, the borrower sells the asset and pays the lender the loan balance, the principal plus interest, $B = (1+i)L$. For simplicity, we will focus on fixed-rate mortgages where i is fixed. Hence B is deterministic, though the analysis can be easily repeated for a variable-rate mortgage. Each borrower has a current income of Y at which he/she qualifies for the mortgage offered. The borrower will enjoy income Y in the second period as well.

The source of default, and the only uncertainty that the borrower (and the lender) faces, is the uncertainty about the value of the asset in the second period. The second-period value of the asset, P , is a random variable with marginal density $f(P)$ and cumulative density $F(P)$ on the interval $[\underline{P}, \bar{P}]$.

If the borrower defaults, s/he suffers the default disutility of $D > 0$. Default disutility captures social and psychic effects of default and damage to the borrower's credit rating, as well as the transaction costs of default.⁴ We assume that default disutility also increases with social capital; homeowners in areas with higher social capital suffer more disutility from defaulting and

³ Assuming $P_0 \geq L$ rules out unsecured debt.

⁴ Seiler et al. (2012) document that disadvantages to defaulting include a substantially reduced FICO score, a greater expense and difficulty obtaining future credit, moving expenses (if the home is a primary residence), potential social backlash from family and friends, possible tax implications, and the chance of the lender pursuing a deficiency judgment.

imposing negative externalities on their neighbors. For simplicity, D will be independent of the amount due at the time of default.

The borrower will choose to default if the value of the asset plus the default utility is less than the mortgage balance: $P + D < B$. In other words, a default will happen if the property value falls enough such that $P < B - D$.

Let $\delta < 1$ be the borrower's discount factor. The borrower's utility function is given by:

$$Y + L - P_0 + \delta \int_{\underline{P}}^{B-D} (Y - D) f(P) dP + \delta \int_{B-D}^{\bar{P}} (Y + P - B) f(P) dP \quad (1)$$

In the first period, the borrower earns Y and borrows L to make the payment P_0 to purchase the asset. In the second period, if the realized property value is less than $B - D$, the borrower defaults, loses the asset to the lender and suffers the default loss D , and thus enjoys the surplus $Y - D$.⁵ If the realized property value in the second period is greater than $B - D$, the borrower sells the asset for P , pays the lender B and enjoys the surplus $Y + P - B$. Ownership of the asset generates a certain level of utility for the borrower that makes it worthwhile to obtain the loan to purchase the asset.

Borrower's probability of default, θ , is captured by the first integral term of equation (1):

$$\theta = \int_{\underline{P}}^{B-D} (Y - D) f(P) dP .$$

It is straightforward to obtain the main prediction of the model:

Proposition 1: Higher social capital, hence higher default disutility, leads to lower probability of default.

⁵ It is assumed that in the case of a default the borrower will consume his income Y , instead of giving it to the lender. This assumption is inconsequential for the analysis.

Proof: Using Leibnitz' rule, we obtain

$\frac{\partial \theta}{\partial D} = -[F(B - D) - F(\underline{P})] - (Y - D)f(B - D) < 0$ since $F > 0$, $f > 0$ and $Y > D$ (otherwise, the borrower would never default and the problem becomes irrelevant).

The lender's problem is to choose an interest rate, i , to maximize expected profits:

$$-L + \beta \int_a^{B-D} Pf(P)dP + \beta \int_{B-D}^z Bf(P)dP$$

where $\beta < 1$ is the lender's discount factor. Note that higher social capital, hence a higher D , will increase the lender's expected profits. This is due to the fact that B in the second integrand is higher than any value of P in the first integrand (otherwise the borrower would not choose to default in the first integral). In a competitive market with zero-profit constraint, higher social capital will lead lenders to offer a lower interest rate, i , thus magnifying the impact of social capital on default probability given in Proposition 1 above.⁶

We next consider the impact of a downturn in house prices, as observed in the recent financial crisis. We capture this by reducing the lower bound of the price distribution from \underline{P} to $\underline{P} - \alpha$, thus changing the support of the distribution to $[\underline{P} - \alpha, \bar{P}]$. The new probability of default is:

$$\theta = \int_{\underline{P}-\alpha}^{B-D} (Y - D)f(P)dP.$$

⁶ In practice, the lenders will not be able to offer different interest rates to areas with different social capital, as this may be perceived an indirect form of redlining in some cases.

The impact of social capital on default probability becomes:

$$\frac{\partial \theta}{\partial D} = -[F(B - D) - F(P - \alpha)] - (Y - D)f(B - D) < 0$$

Using α as a proxy for a shock to housing prices, we obtain the second prediction of our model:

Proposition 2: A deterioration in the house price distribution (higher α) amplifies the negative marginal impact of social capital on the probability of default.

Proof: Taking the cross partial derivative of the probability of default function, we obtain $\frac{\partial^2 \theta}{\partial D \partial \alpha} < 0$. That is, a drop in the lower bound support for the price distribution (higher α) magnifies the negative impact of social capital on default probability.

One implication of Proposition 2, as will be tested in the empirical part of the paper, is that an increase in social capital should have a larger deduction in default probability during the recent financial crises than in the pre-financial crisis period.

4. Data, Sample Selection, and Summary Statistics

Our sample covers the years between 1999 and 2011. The main variable of interest in our tests is *SocialCapital*, which measures social capital for a given county in the U.S. Our social capital variable is from the county level social capital index constructed by Rupasingha et al. (2006) to measure social capital.⁷ Rupasingha et al. (2006) use principal component analysis to form their

⁷ We thank Rupasingha, Goetz, and Freshwater for making their social capital index publicly available on <http://aese.psu.edu/nercrd/community/social-capital-resources>.

social capital by using several factors in measuring county-level social capital.⁸ Their measure has been widely used by recent studies in finance literature and other disciplines (e.g., Jha and Chen, 2015; Jha and Cox, 2015; Gupta and Raman, 2016; Gupta et al., 2016; and Hasan et al., 2017b). Consistent with the recent literature, we use their dataset to measure local level social capital and use interpolations⁹ of the data for the years without available data.¹⁰ Rupasingha et al. (2006) use “associational density of civic, religious, and sports organizations, voter turnout rate, Census response rate, and per-capita non-profit organizations” when constructing the county-level social capital index. After obtaining these variables from these different data sources, Rupasingha et al. (2006) use principal component analysis to create their social capital index measure.

In describing the details of their social capital index, Rupasingha et al. (2006) point to previous studies that suggest that social capital has a positive impact on economic growth and development (Coleman, 1988, 1990; Putnam, 1993) and that social capital can be defined as trust and cooperation or norms and networks that encourage collective action (LaPorta et al., 1997; Woolcock, 2001). Rupasingha et al. (2006) suggest that “formation of groups and other forms of civic activity or collective action are at the heart of this definition.” By following the prior literature on social capital, Rupasingha et al. (2006) analyze “some of the common proxies of social capital” suggested by the previous studies with “accurate available data to construct their county-level social capital measure such as the density of civic, religious, and sports organizations

⁸ Rupasingha et al. (2006) state that they use “data from the *Bureau of the Census, County Business Patterns, USA Counties* on CD, *National Center for Charitable Statistics*, and the *Regional Economic Information System*” in constructing the social capital index. They also use “the response rate for the Census Bureau’s decennial population and Housing Survey, the percentage of voters who voted in presidential elections, and per capita non-profit organizations obtained from National Center for Charitable Statistics” in constructing the social capital index.

⁹ The related literature has widely employed the interpolation method when using local factors, such as demographic, religious, and other cultural factors, to examine the impact of local factors on financial and economic outcomes in their studies (e.g. Kumar et al., 2011; Hilary and Hui, 2009; Alesina and Ferrara, 2000; Hasan et al., 2017a, 2017b).

¹⁰ Rupasingha et al. (2006) social capital index provides an updated data for the years 1990, 1997, 2005, 2009, and 2014 on the data website (<http://aese.psu.edu/nercrd/community/social-capital-resources>). We use interpolation for the years without available data.

in a county.” These variables can help to measure county level cooperation, trust, and social networks among local people as well as the level of collective action. Moreover, some other variables such as voter turnout rate and census response rate can help to measure the local level of shared norms, trust, and cooperation. Rupasingha et al. (2006) employ all these social capital proxies suggested by the prior literature in their principal component analysis and construct a county-level social capital index. They also suggest that measuring social capital at the subnational level (county level) is a better method than measuring at the national level because “collective action, which is promoted by social capital, is mostly observed at the subnational level.”

The following setup is our baseline model to estimate the impact of social capital on mortgage delinquency rate.

$$MortgageDelinquency = \alpha_0 + \alpha_1 SocialCapital + \sum_{i=1}^n \beta_i X_i + \varepsilon \quad (2)$$

where X represents the control variables that we use in our tests. The dependent variable in our tests is *MortgageDelinquency*, which measures mortgage delinquency for a given county in a sample year. *MortgageDelinquency* is the percent of mortgage debt balance 90+ Days Delinquent. *SocialCapital* is the measure of the local level of social capital at the county level. X is a vector of control variables at the county level, including *Mortgage*, *Auto*, *CreditCard*, *Change in Income*, *LocalSeniors*, *Education*, *Population*, *Change in Unemployment*, and *Change in MedianHouseValue*. *Mortgage* is the mortgage debt balance per capita. *Auto* is the auto debt balance per capita. *CreditCard* is the credit card debt balance per capita. The data source for the *MortgageDelinquency* is the FRBNY (Federal Reserve Bank of New York) Consumer Credit Panel / Equifax.¹¹ For the *MortgageDelinquency*, FRBNY states that the “mortgage debt includes

¹¹ We thank the Federal Reserve Bank of New York (FRBNY) for providing the data.

first mortgages, home equity loans, and home equity lines of credit.” *SubprimeCredit* is the “percentage of the population with a credit score below 660.” This variable is provided by the Federal Reserve Bank of St. Louis’s website.¹²

Unemployment shows the unemployment rate (%) in a county and the variable is from the Bureau of Labor Statistics’ (BLS) website. In our empirical analysis, we use *Change in Unemployment* which shows the change in the unemployment rate from the previous year. A lack of capacity to carry all debts, which can be triggered by a job loss, divorce, prolonged illness or death in the family, could also lead to default outcomes. For instance, it would not be surprising to see an increase in the delinquency rate in local economies where the unemployment rate increased. We obtain the county level median household income data from the US Censuses and the US Census website. In our empirical tests, we use *Change in Income* which measures the change in median household income compared to the previous year. When a borrower has a negative income shock and needs to decide on which debt to repay. Because the mortgage is typically the largest debt payment and the borrower could still reside in the home for a while during the long foreclosure process, borrower may elect to pay all obligations except the mortgage.

MedianHouseValue is the median house value in a county¹³. In our regressions, we use *Change in MedianHouseValue* which measures the change in median house value compared to the previous year. Changes in house prices in the local market may also affect mortgage delinquency rate. For instance, distressed borrowers in strong housing markets have more alternatives to delinquency than do distressed borrowers in markets with flat or falling house prices. Those alternatives include selling the home and paying the loan off and possibly refinancing. Additionally, homeowners in

¹² This variable is provided on the website <https://geofred.stlouisfed.org/map/>. The website states that source of this variable is the Federal Reserve Bank of New York/Equifax Consumer Credit Panel (Federal Reserve Bank of New York and Equifax, Equifax Subprime Credit Population).

¹³ It is in \$000’s. Similarly, *Change in MedianHouseValue* is \$000’s.

strong housing markets have greater incentive to keep the mortgage current: if there is a potential capital gain on the house and they default, they risk giving up some or all of that expected capital gain. As underwater property could lead to default outcome, we use the *change in MedianHouseValue* to capture the negative price shock in the housing market. We use standardized income and house values to account for inflation adjustment.¹⁴We also control for year fixed effects in our tests. We also employ the following variables to capture the other local effects. *LocalSeniors* variable is the fraction of individuals who are 65 years old or above in a county. *Population* shows the population of a county. *Education* is the fraction of individuals 25 years and over holding college degrees. *PoliticalAffiliation* is the fraction of local Republican votes in Presidential elections in a county. This variable measures the local area's political ideology and tests whether self-identified liberals are more or less likely than their more conservative counterparts to default. *Minority* is the fraction of people that belong to minority (non-white) ethnic groups in a county.¹⁵

Table 1 reports the summary statistics of variables of interest in our sample. This table shows the mean, 25th percentile, median, 75th percentile, and standard deviation of the variables used in our tests. Table 1 reports that the average mortgage delinquency rate is 2.38 % for the counties in our sample for our sample period. This point suggests that, on average, 2.38% of mortgage debt balances in a county are 90+ Days Delinquent. The *SocialCapital* measure is on average -0.32. This is the average Social Capital index value for the counties in our sample for our sample period. Its median has a value, -0.39, close to the mean. When we look at the Social Capital index value

¹⁴ We obtain the annual CPI values from the Minneapolis Fed's website (<https://www.minneapolisfed.org/community/financial-and-economic-education/cpi-calculator-information/consumer-price-index-and-inflation-rates-1913>). Both income and median house value variables are standardized and adjusted for inflation. They are in 2000's dollar values. When we repeat our empirical tests with unstandardized values, we have very similar results and these results can be provided upon request.

¹⁵ Consistent with the literature, we use interpolations of the data for the years without available data for the Census variables as well as the other controls.

for all the US counties, for example in 2009, provided by Rupasingha et al. (2006), the minimum and maximum Social Capital index values are -3.93 and 17.44 respectively, whereas the median value is -0.22. Considering these values, we can say that our sample has similar values to their social capital sample. *SubprimeCredit*, the percentage of the population with a credit score below 660, is on average 33%. The median household income in a given county is on average \$36,340. On average, the median house value of a county in our sample is about \$102,059. Both income and house value variables are standardized to year 2000 dollar values to account for inflation adjustment. *Population* of a county has the mean value of 102,059. *Unemployment* rate (%) in a county has a mean value of 6.3%. On average, the fraction of individuals 25 years and over holding college degrees in a county is 19.39%. On average, the fraction of local senior citizens is 14.4%. On average, the median house value of a county for our sample is \$128,808. On average, the political affiliation variable suggests 55% of the people voted for Republican candidates in the presidential elections. The average minority fraction in a county is about 20%.

[Insert Table 1 Here]

5. Results

5.1. Baseline Results

In this section, we present our baseline results. As suggested by the regression model in equation 1, our dependent variable is *MortgageDelinquency*. Our variable of interest is the county-level social capital index value, which is *SocialCapital*. We also control for other variables including county-level demographic, economic factors, as well as mortgage and credit-related factors. In particular, these control variables are *SubprimeCredit*, *Change in Income*, *LocalSeniors*, *Education*, *Population*, *Change in Unemployment*, *Change in MedianHouseValue*,

*PoliticalAffiliation, and Minority*¹⁶. We also control for year fixed effects in this table as well as all of the following tables. Standard errors are clustered at the county level,

Table 2 shows the estimation results for our baseline model of mortgage delinquency estimation. As predicted in Proposition 1 of our theoretical model, these results reveal significant negative coefficient for *SocialCapital*. These estimates indicate that a one-standard-deviation increase in *SocialCapital* leads to almost a 0.13 standard-deviation decrease in the mortgage delinquency rate, consistent with our hypothesis. This change corresponds to almost 12.1% (16.5%) of the sample average (median) mortgage delinquency rate. This result indicates an important economic effect. When we examine other variables, only *Change in Unemployment* and *Change in MedianHouseValue* provide economic significance higher than the impact of social capital on mortgage delinquency. However, the economic effects of those two variables are slightly higher than the social capital effect. In particular, a one standard deviation increase in *Change in Unemployment* leads to almost a 0.159 deviation increase in mortgage delinquency. Consistent with the literature, unemployment is one key trigger for default outcome; the inability to pay the mortgage on time due to loss of a job could lead to mortgage delinquency. Similarly, a one standard deviation increase in *Change in MedianHouseValue* leads to almost a 0.136 deviation decrease in mortgage delinquency. This is consistent with the literature that negative income shock and negative equity are the two major contributors for mortgage delinquency. In addition to verifying the earlier results on importance of unemployment and median house value, this table demonstrates economic significance of the social capital for mortgage delinquency.

¹⁶ We use inflation adjusted standardized income and median house values. When we repeat our empirical tests with unstandardized values, we have very similar results the ones provided in the paper. These results can be provided upon request.

A county with a higher percentage population with FICO scores lower than 660 exhibits a higher mortgage delinquency rate. FICO score measures the creditworthiness of individuals or businesses. Lenders increasingly use these scores to assess credit risk; they also use them to calculate how likely it is that borrowers eventually will be delinquent (late with payments) or in default. The higher the FICO score, the less likely it is that a borrower will miss payments or go into default on loan within one or two years after the score has been calculated. We show that a one-standard-deviation increase in *SubprimeCredit* is associated with nearly a 0.037 standard-deviation increase in mortgage delinquency rate. This result is consistent with findings in the literature that subprime loan is more likely to experience default outcome than a prime loan, as subprime loans are generally targeted to borrowers who have tarnished credit histories and little savings available for down payments.

Education level also significantly affects mortgage delinquency rate. A one-standard-deviation increase in education is associated with a 0.0837 standard-deviation lower mortgage delinquency rate. Considering the point that people with a higher level of education have higher incomes and better financial literacy than people with a lower level of education, lower mortgage delinquency rate is expected for areas with more education.

[Insert Table 2 Here]

5.2. Pre- vs. Post- Financial Crisis

The recent financial crisis deeply affected the overall economy as well as the mortgage market. According to data from the Mortgage Bankers Association, the share of mortgage loans that were “seriously delinquent” (90 days or more past due or in the process of foreclosure) averaged 1.7 percent from 1979 to 2006, with a low of about 0.7 percent (in 1979) and a high of about 2.4

percent (in 2002). But by the second quarter of 2008, the share of seriously delinquent mortgages had surged to 4.5 percent. These delinquencies foreshadowed a sharp rise in foreclosures: roughly 1.2 million foreclosures were started in the first half of 2008, an increase of 79 percent from the 650,000 in the first half of 2007 (Federal Reserve estimates based on data from the Mortgage Bankers Association). The increase in U.S. mortgage defaults also moved the stability of mortgage markets to the center of policy debates (Campbell, 2012; FED, 2012; Treasury, 2009). It has also renewed academic and policy discussions about macro prudential policies that could prevent defaults and improve housing market and financial stability.

The financial crisis can be considered as an exogenous shock to housing markets, and it provides us with a laboratory environment to examine the impact of social capital on mortgage delinquency before and after the shock. Based on the prediction of Proposition 2 of our theoretical model, we conjecture the negative impact of social capital on mortgage delinquency rates should be more pronounced after the financial crisis. To examine this conjecture, we first divide our sample into two subsamples: pre-financial crisis and post-financial crisis. The pre-financial crisis subsample includes the period before 2007, whereas the post-financial crisis subsample includes the years 2007 and after. We re-run our test as shown in Table 2 for these two subsamples separately in Table 3.

[Insert Table 3 Here]

We observe that the impact of *SocialCapital* on mortgage delinquency rate varies with time significantly. Column 1 suggests that, before the financial crisis, a one-standard-deviation increase in *SocialCapital* suggests a 0.0569 standard-deviation decrease in the mortgage delinquency rate. This decrease is associated with almost 4.75% (3.65%) of the average (median) mortgage

delinquency rate for the pre-financial crisis period subsample. The magnitude of this effect rises significantly after the financial crisis. Column 2 suggests that, after the financial crisis, a one-standard-deviation increase in *SocialCapital* suggests a 0.1852 standard-deviation decrease in the mortgage delinquency rate. This decrease corresponds to about 14% (16.8%) of the average (median) mortgage delinquency rate for the post-financial crisis subsample. These results are consistent with the notion that mortgage delinquency rates are higher in the post-crisis period than the rates in the pre-crisis period.¹⁷ These results support our conjecture and suggest the impact of social capital on mortgage delinquency is stronger after the financial crisis. In other words, this effect in the post-crisis period is almost two times the effect before the financial crisis. Overall, Table 3 confirms our earlier findings and provides additional evidence highlighting the role of social capital in mortgage delinquency.

When housing market price crashed in 2007, many properties went underwater. Distressed homeowners could benefit from walking away from their properties and engaging in strategic default, even if they still had the ability to make monthly mortgage payments on time. However, a cluster of foreclosures has been proven to be harmful to a neighborhood, imposing significant social cost through negative amenity, declining property value, increase in crime rate, etc. Under this circumstance, higher *SocialCapital*, representing stronger trust and cooperation or norms and networks that encourage collective action, could play an important role in discouraging the strategic default activities, which may cause negative externality in the neighborhood.

We have presented the test for the pre-crisis and post-crisis subsamples in Table 3. Now, as a robustness check, we also conduct the following test shown in the following regression model:

¹⁷ The average mortgage delinquency rate in the post-crisis subsample is more than two times the average rate in the pre-crisis subsample.

MortgageDelinquency

$$= \gamma_0 + \gamma_1 \text{SocialCapital} + \gamma_2 \text{SocialCapital} \times \text{PostCrisis} + \gamma_3 \text{PostCrisis} + \sum_{i=1}^n \theta_i X_i + \epsilon \quad (3)$$

where *PostCrisis* is a dummy variable that takes the value of one if the year is 2007 or after and zero otherwise. Its interaction with *SocialCapital*, which is *SocialCapital* × *PostCrisis*, is also included in the test. The results are reported in Table 4. We find a statistically significant coefficient for the interaction term. This result highlights the pronounced role of social capital in mortgage delinquency after the financial crisis and supports our conjecture. Table 4 also provides additional support for our earlier findings and underlines the role of social capital.

[Insert Table 4 Here]

5.3. Low vs. High levels of Social Capital

Now we investigate the impact of social capital on mortgage delinquency on different levels of social capital. We divide our sample into two subsamples based on the median level of social capital in our sample and call the subsample of observations with a social capital value less than or equal to (greater than) the median value of social capital the low (high) social capital subsample. We repeat our main tests for these two subsamples of social capital to examine how the social capital effect varies with different levels of social capital in Table 5.

[Insert Table 5 Here]

As Table 5 shows, the social capital coefficient is negative and statistically significant for both subsamples consistent with our previous results. Both columns suggest a negative relationship

between social capital and mortgage delinquency. When we look at the coefficient magnitudes, there is some difference between the low and high social capital subsamples. The social capital coefficient is stronger for the low social capital subsample compared to the high social capital subsamples. In particular, a one-standard-deviation increase in *SocialCapital* leads to a 0.1054 standard-deviation decrease in mortgage delinquency rate in the low social capital subsample, whereas the same increase in *SocialCapital* leads to a 0.0548 standard-deviation decrease in mortgage delinquency rate in the high social capital subsample. This table suggests that social capital has a more pronounced effect on areas with a lower level of social capital compared to areas with a higher level. This result is consistent with our expectations. In areas with lower social capital level, we would expect a higher percentage of delinquency arising from strategic default, since strategic defaulters in these areas are likely to face less criticism and social pressure. Thus, when social capital level increases marginally in those areas, it is reasonable to expect the improvement in delinquency rates to be more significant.

5.4. Identification Tests and Instrumental Variable (IV) Approach

In this section, we address potential endogeneity concerns. In studies of social capital in the corporate finance literature, researchers suggest that a firm's location choice can be endogenous, and they usually try to overcome this problem by investigating the role of local factors on corporate outcomes. In our study, we conduct not a firm-level analysis but a local market analysis—local mortgage delinquency. While it is possible that a firm's choice of a location with a particular level of social capital is endogenous, the same argument cannot be easily suggested for the entire set or a big group of the population of residents in a county. One does not expect big population movements from one county to another county in search of factors related to social capital in a short period of time, such as our sample period. Yet, it can

still be argued that there might be an omitted variable that affects both current levels of social capital and mortgage delinquency. To address this concern, we first use an alternative social capital measure used in the related literature and re-examine our main results as a first step. Next, we use a two-stage least square (2SLS) analysis with an instrumental variable (IV) approach.

One might argue that our social capital measure can be subject to endogeneity problem. To investigate this conjecture, we use an alternative measure which might not be subject to the endogeneity problem and re-examine our main results. Earlier studies (e.g., Hasan et al. 2017b; Guiso et al., 2004; and Buonnanno et al., 2009) use organ donation per capita as an alternative proxy for social capital. Consistent with the literature we use the state-level organ donation per capita, *OrganDonation*, as an alternative measure for social capital¹⁸ and re-run our baseline test in Table 6. There is a negative and statistically significant coefficient for *OrganDonation*. Our alternative measure of social capital provides a result similar to our earlier results in Table 6.

[Insert Table 6 Here]

Next, we provide a more direct test to address the potential endogeneity concern. We use a two-stage least square (2SLS) analysis with an instrumental variable (IV) approach to see whether our results remain robust after controlling for endogeneity in Table 7. In particular, we use a set of different instrumental variables for social capital by following the prior literature and present them in different panels of Table 7. Consistent with the previous studies (e.g., Hilary and Hui, 2009), we use the social capital lagged by three years as an IV in Column 1 of

¹⁸ We follow Hasan et al. (2017b) and we use the state-level organ donation data from the Organ Procurement and Transplantation Network (OPTN) provided on their website (<https://optn.transplant.hrsa.gov/data/>). Consistent with their study, we define the alternative social capital variable as the organ donation per capita at state level multiplied by 1,000.

Panel A. The social capital lagged by three years can be considered correlated with the current level of social capital. However, one expects that the social capital lagged by three years is not correlated with any omitted variables in the current year settings. Therefore, the past social capital can be a good candidate of IV because it is not affected by any omitted variable that affects social capital and mortgage delinquency in current years while it helps to explain current social capital. In Column 2, we use the social capital lagged by five years as an IV as an even stronger IV. We report the results of the second stage of our 2SLS analysis with IV approach in Table 7. In both columns of Panel A, the instrumented social capital coefficient is negative and statistically significant. The result is strong and consistent with our previous empirical findings. This point presents additional evidence on the impact of local social capital on mortgage delinquency.

[Insert Table7 Here]

Next, we use a different instrumental variable used in the literature in Panel B and re-examine our results. Jha and Cox (2015) use the average social capital of the neighboring counties within a 100-mile radius as an IV. Jha and Cox (2015) suggest that this IV is a strong IV because the social capital of neighboring counties is similar to the one in the given county. Similar to Jha and Cox (2015), one can expect that it is unlikely that the scope of the mortgage delinquency in a given county influences the average social capital of the neighboring counties within a 100-mile radius. Panel B indicates that the instrumented social capital coefficient is again negative and statistically significant when we use the average social capital of the neighbor counties as an IV. The test in Panel B provides additional support to the social capital effect documented in our previous results.

Last, we use another alternative instrumental variable used in the literature. Hasan et al. (2017b) use the distance to the Canadian border as an instrumental variable by following the previous studies (e.g., Putnam 2001). The prior literature suggests that distance to the Canadian border is an important and strong predictor of the social capital for the locations in the US (e.g., Putnam 2001; and Hasan et al., 2017). In line with the previous literature, we use the distance of a given county to the Canadian border as an alternative IV and re-examine our results in Panel C. In particular, we follow Hasan et al. (2017b) and construct the IV, $\log(\textit{BorderDistance})$, by taking log of the distance to the Canadian border. Panel C shows that the instrumented social capital coefficient is negative and statistically significant in line with our earlier results when we use $\log(\textit{BorderDistance})$ as an IV. The social capital coefficient is strong and highlights the significance of the social capital effect. Overall, the tests in this table demonstrate that our results remain robust after controlling for endogeneity. The tests in this section also provide additional evidence on the role of local social capital on mortgage delinquency.

6. Conclusion

In this paper, we study how neighborhood social capital, a measure of social norms, trust, and network, affects the mortgage delinquency outcomes. We first offer a simple theoretical model that yields two testable predictions: higher social capital should lead to a lower probability of delinquency, and higher social capital should have a larger deduction in default probability during housing crises. Then, using new county-level data in the U.S. between 1999 and 2011, we empirically establish that a one-standard-deviation increase in *SocialCapital* leads to almost 0.13

standard-deviation decreases in mortgage delinquency rate. This change corresponds to almost 12.1% (16.5%) of the sample average (median) mortgage delinquency rate.

Previous literature documents that default depends not only on the extent to which a borrower has negative home equity but also on the extent to which borrowers are constrained by their ability to make mortgage payments. These two factors are sometimes described by mortgage practitioners as “dual triggers” of default. However, our findings suggest that for borrowers experiencing negative home equity but not constrained in their ability to make mortgage payments, social capital plays an important role in their mortgage delinquency choices. One plausible explanation is that borrowers in the high social capital neighborhood are more likely to take into consideration the negative externality of foreclosures on the neighborhood, such as less desirable amenity, increase in crime rate, and declining property value. Given these considerations, they are more likely to avoid strategic default when social network and trust are stronger in the neighborhood.

We also show that this result is stronger after the financial crisis, as predicted by our theoretical model. When a foreclosure wave arises after a financial crisis, the negative externality of foreclosures on the neighborhood becomes more prominent. We show that when negative equity becomes widespread, the role of social capital in preventing mortgage delinquency becomes more important. The effect of social capital on mortgage delinquency got stronger after the financial crisis compared to the pre-financial crisis period. Its economic significance in the post-financial crisis period is almost two times the economic significance of the social capital effect in the pre-financial crisis period.

Our results shed light on both government policy and lending practice. The findings imply that government or lender programs should take into consideration social capital as an important component in examining mortgage delinquency. Reinforcing a strong neighborhood social

connection and trust ex-ante is an area where the government could play a leading role, besides providing financial assistance to underwater borrowers to enable them to refinance at a lower rate or to obtain loan modifications. Programs with the aim to build a neighborhood with higher social capital have the potential to significantly reduce mortgage delinquencies. Our results also have important implications for lenders in pricing default risk. A logical and important implication for lenders is to improve the model of pricing borrower's risk by incorporating the social capital measure as a contributing risk factor. Given our estimates, it is crucial for both government and lenders to realize the significant role of social capital in preventing mortgage delinquency in the financial crisis, during which negative foreclosure externality could further depress housing markets and trigger more foreclosure activities.

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Table 1. Summary Statistics

MortgageDelinquency is the percent of mortgage debt balance 90+ Days Delinquent. *Mortgage* is the mortgage debt balance per capita. *SubprimeCredit* is the “percentage of population with a credit score below 660.” This variable is provided on the Federal Reserve Bank of St. Louis’s website. *SocialCapital* is the county level social capital index constructed by Rupasingha et al. 2006). *Unemployment* shows the unemployment rate (%) in a county and the variable is from the Bureau of Labor Statistics’ website. *LocalSeniors* variable is the fraction of individuals who are 65 years old or above in a county. *Population* is population of a county. *Education* is the fraction of individuals 25 years and over holding college degrees. *Income* is the median household income in a given county. *MedianHouseValue* is the median house value in a given county. It is in \$000’s. It is scaled by 1,000 to present it in a better way. Both *Income* and *MedianHouseValue* are standardized variables to year 2000dollar value to account for inflation adjustment. *PoliticalAffiliation* is the fraction of local Republican votes in Presidential elections in a county. *Minority* is the fraction of people that belong to minority (non-white) ethnic groups in a county.

Variable	Mean	25th percentile	Median	75th percentile	Std. dev.	N
MortgageDelinquency (%)	2.38	0.94	1.74	3.11	2.29	28,683
SocialCapital (index)	-0.32	-0.99	-0.39	0.26	1.02	28,683
SubprimeCredit (%)	33.00	27.17	32.24	38.57	7.75	28,683
Income (\$)	36,340.29	30,057.82	34,599.10	40,406.61	9,313.18	28,683
LocalSeniors	0.14	0.12	0.14	0.16	0.04	28,683
Education (%)	19.39	12.88	16.90	23.55	9.07	28,683
Population	102,058.70	17,700	31,900	79,100.00	271,657.40	28,683
Unemployment(%)	6.32	4.40	5.70	7.70	2.81	28,683
MedianHouseValue (\$000)	112,737.3	71,700	92,580.650	126,783	70,480.41	28,683
PoliticalAffiliation (%)	55.48	47.85	56.10	64.10	12.32	28,683
Minority	0.20	0.06	0.13	0.30	0.18	28,683

Table 2. Baseline Test

This table shows our baseline results. Year fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively. Standard errors are clustered at county-level.

Dependent Variable	MortgageDelinquency
SocialCapital	-0.2819*** (-5.37)
SubprimeCredit	0.0109** (2.14)
Change in Income	-0.0001*** (-11.49)
Education	-0.0212*** (-5.45)
Population	0.0000*** (2.86)
Change in Unemployment	0.2326*** (11.94)
Change in MedianHouseValue	-0.0500*** (-14.87)
Political Affiliation	-0.0153*** (-7.53)
Minority	1.2823*** (6.95)
LocalSeniors	4.3994*** (4.42)
Constant	1.1665*** (4.09)
Year fixed effects	Yes
Observations	28,683
R-squared	0.396

Table 3. Pre- vs. Post-Financial Crisis

The main sample covers the years between 1999 and 2011. The pre-financial crisis subsample includes the years before 2007, whereas the post-financial crisis subsample includes 2007 and after. Year fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively. Standard errors are clustered at county-level.

	(1)	(2)
Subsample:	Pre-Crisis	Post-Crisis
Dependent Variable:	MortgageDelinquency	MortgageDelinquency
SocialCapital	-0.0694*** (-4.38)	-0.5387*** (-3.44)
SubprimeCredit	0.0353*** (11.51)	0.0095 (0.88)
Change in Income	-0.0000*** (-7.34)	-0.0001*** (-8.28)
Education	-0.0336*** (-17.43)	-0.0199** (-2.17)
Population	0.0000 (0.57)	0.0000*** (2.75)
Change in Unemployment	0.0234* (1.85)	0.3499*** (11.77)
Change in MedianHouseValue	-0.0251*** (-14.05)	-0.1973*** (-7.29)
Political Affiliation	-0.0118*** (-7.91)	-0.0183*** (-4.09)
Minority	0.0896 (0.71)	2.3516*** (6.04)
LocalSeniors	0.2552 (0.60)	11.8891*** (4.56)
Constant	1.1941*** (7.42)	0.1078 (0.17)
Year fixed effects	Yes	Yes
Observations	17,650	11,033
R-squared	0.229	0.295

Table 4. Pre- vs. Post-Financial Crisis: Additional Test

The sample covers the years between 1999 and 2011. *PostCrisis* is an indicator variable that takes the value of one if the year is 2007 or after, and zero otherwise. This table includes the *PostCrisis* dummy variable and its interaction with *SocialCapital*, which is *SocialCapitalxPostCrisis*. Year fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively. Standard errors are clustered at county-level.

Dependent Variable	MortgageDelinquency
SocialCapital	-0.1579*** (-4.02)
PostCrisis	2.4617*** (33.95)
SocialCapitalxPostCrisis	-0.3561*** (-3.97)
SubprimeCredit	0.0127** (2.48)
Change in Income	-0.0001*** (-11.38)
Education	-0.0204*** (-5.05)
Population	0.0000*** (2.82)
Change in Unemployment	0.2144*** (11.95)
Change in MedianHouseValue	-0.0512*** (-15.52)
Political Affiliation	-0.0169*** (-7.42)
Minority	1.2838*** (6.86)
LocalSeniors	4.7353*** (4.48)
Constant	1.1654*** (4.08)
Year Fixed Effects	Yes
Observations	28,683
R-squared	0.402

Table 5. Low vs. High Social Capital

This table re-examines our main tests for low and high-level social capital subsamples. The low-level social capital includes the observations where social capital is less than the median value of social capital for our sample, whereas the high-level social capital includes the observations where social capital is greater than the median value of social capital for our sample. Year fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively. Standard errors are clustered at county-level.

	(1)	(2)
Subsample:	Low Social Capital	High Social Capital
Dependent Variable:	MortgageDelinquency	MortgageDelinquency
SocialCapital	-0.5244*** (-7.12)	-0.1277*** (-2.65)
SubprimeCredit	-0.0014 (-0.21)	0.0380*** (6.59)
Change in Income	-0.0001*** (-8.03)	-0.0001*** (-8.43)
Education	-0.0152** (-2.36)	-0.0152*** (-4.05)
Population	0.0000** (2.26)	0.0000*** (4.12)
Change in Unemployment	0.2329*** (8.93)	0.1960*** (8.92)
Change in MedianHouseValue	-0.0721*** (-20.18)	-0.0301*** (-8.79)
Political Affiliation	-0.0274*** (-9.19)	-0.0052** (-2.35)
Minority	1.2994*** (5.72)	0.2281 (0.96)
LocalSeniors	6.1849*** (4.33)	4.0156*** (3.45)
Constant	1.6227*** (3.67)	-0.1105 (-0.33)
Year fixed effects	Yes	Yes
Observations	14,342	14,341
R-squared	0.388	0.417

Table 6. Test with an Alternative Social Capital Measure

This table shows our baseline results with an alternative social capital measure. Following the prior literature, we use organ donation per capita (OrganDonation) as an alternative social capital measure. More details of this variable are provided in the paper. Year fixed effects are not reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively. Standard errors are clustered at county-level.

Dependent Variable	MortgageDelinquency
OrganDonation	-14.2951*** (-6.44)
SubprimeCredit	0.0180*** (3.84)
Change in Income	-0.0001*** (-11.51)
Education	-0.0305*** (-7.93)
Population	0.0000*** (3.06)
Change in Unemployment	0.2296*** (11.63)
Change in MedianHouseValue	-0.0481*** (-15.31)
Political Affiliation	-0.0135*** (-6.73)
Minority	1.4267*** (7.40)
LocalSeniors	2.1425** (2.21)
Constant	1.9035*** (5.76)
Year fixed effects	Yes
Observations	28,683
R-squared	0.389

Table 7. 2SLS Analysis with IV Approach

This table reports the results of the second stage of the two-stage least squares (2SLS) with an instrumental variable (IV) by using a set of alternative instruments used in the related literature. The dependent variable is Mortgage Delinquency. This table uses $SocialCapital_{t-3}$, which is the county-level SocialCapital measure lagged by three years, as an IV in Column 1 of Panel A. This table uses $SocialCapital_{t-5}$, which is the county-level SocialCapital measure lagged by five years, as an IV in Column 2 of Panel A. We use another IV in Panel by following the related literature. We use the average social capital of the neighboring counties. Following the related literature, we use the distance of a given county to the Canadian border as an alternative IV in Panel C. In particular, we use the log of the distance to the Canadian border, $\log(BorderDistance)$. Only SocialCapital is reported for brevity. Robust standard errors are used. T-statistics are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels respectively. Standard errors are clustered at county-level.

	(1)	(2)
Panel A.		
IV	$SocialCapital_{t-3}$	$SocialCapital_{t-5}$
Dependent Variable:	MortgageDelinquency	MortgageDelinquency
SocialCapital	-0.3357*** (-5.71)	-0.3988*** (-5.47)
Controls	Yes	Yes
Year fixed effects	Yes	Yes
Observations	26,475	22,059
R-squared	0.390	0.386
Panel B.		
IV	Avg. Social Capital of Neighbors	
Dependent Variable:	MortgageDelinquency	
SocialCapital	-0.5064*** (-12.26)	
Controls	Yes	
Year fixed effects	Yes	
Observations	28,683	
R-squared	0.390	
Panel C.		
IV	Log (BorderDistance)	
Dependent Variable:	MortgageDelinquency	
SocialCapital	-0.6656*** (-6.41)	
Controls	Yes	
Year fixed effects	Yes	
Observations	28,683	
R-squared	0.379	