The Electoral Outcomes of Contractions in Mortgage Credits:

Evidence from Gubernatorial and House Elections[*]

Amir Tayebi[†]

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Abstract

This paper investigates the effects of the conditions of the mortgage credit market on elections in U.S. From 2004 to 2008, the U.S economy experienced an unexpected shift from the most generous underwriting standards for mortgages to a strict shrinkage of mortgage credit during the financial crisis of 2007-2008. According to the previous research, voters responded to the financial crisis of 2007-2008 by punishing the incumbent party in the presidential election, meaning that the vote share of the incumbent party decreased. To further investigate the effects of the financial crisis on elections, we employ an individual-level dataset of loan application outcomes to examine the effects of the contraction in the mortgage credit market on the House and Gubernatorial elections of 2008. We estimate the effects of credit market conditions on political outcomes in two stages. The first-stage regression isolates a bank-specific measure of mortgage credit supply growth by controlling for the demand for credit. In the second stage, we estimate the effects of changes in the mortgage credit supply extracted from the first-stage regression on the change in votes for the candidate of the democratic party as well as the candidate from the challenger party. We find no significant impact of the shrinkage in mortgage credits on House and Gubernatorial elections' outcomes. This finding suggests that voters only punish the president for the change in mortgage credits as they may believe lower-level officials are not responsible for this shift.

1 Introduction

The economic voter theory suggests that the condition of the economy impacts voting behavior.[1] While there is a vast literature on the relationship between the macro-state of the economy and electoral outcomes (Fair, 1978, 1996, 1998, 2020; and Lewis-Beck and Stegmaier, 2000), the literature at the micro-level indicators is scarce. Recent studies have tried to fill this gap, mostly by focusing on the housing market.

There are valid reasons to argue that credit subsidies can affect voting behavior: during the last century, economic policies regarding home-ownership have partly shaped American politics and have also influenced a number of electoral races all over the world. In this regard, Antoniades and Calomiris (2020) argue that while politicians are directly punished by voters for bad economic conditions, they might be rewarded for supporting credit subsidies through mechanisms other than voting. For instance, politicians are rewarded by the political or financial support of well-organized vested interests, including the banking sector and organizations, which played an essential role in sponsoring mortgage credits, particularly from 1992 to 2007 (Calomiris and Haber, 2014).

From 2004 to 2008, the U.S. experienced an unexpected shift from the most generous underwriting standards for mortgages in the history of the U.S. in 2004-2006 to a strict shrinkage of mortgage credit during the financial crisis of 2007-2008. As for the political outcomes, in the 2008 election cycle, the Republican Presidential candidate lost 9 states in 2008 whose predecessor had won in 2004. In addition, the Democratic party experienced a net seat change of 8 in Senate, 21 in House, and 1 in Gubernatorial elections, respectively.

Hall et al. (2021), using individual-level data on foreclosure rates for Ohio, find that people whose homes were foreclosed were less likely to participate in voting in the 2008 election cycle. In another work, Antoniades and Calomiris (2020) find that the contraction in mortgage credits during the financial crisis of 2008 led the Republican Presidential candidate to lose the 2008 Presidential election. In this paper, we build on Antoniades and Calomiris (2020) to investigate the effects of the contraction in mortgage credit supply on the Gubernatorial and House elections of 2008 and provide a of micro-level evidence on the relationship between the economy and politics. We employ a large dataset on millions of mortgage application outcomes provided by the Home Mortgage Disclosure Act (HMDA) to identify how changes in mortgage credits might have impacted the outcomes of House and Gubernatorial elections of 2008.

Our goal is to examine if the contraction in mortgage credits had electoral consequences. We make use of a two-stage estimation strategy proposed by Antoniades and Calomiris

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[1]Lewis-Beck and Stegmaier (2013) provide an extensive review of the literature on this subject.

([2020](#)) to isolate the effects of the shrinkage in mortgage credits. In the first stage, we estimate an OLS model of the application outcome (reject - not reject) and track the supply of the credit. In other words, for each year, we regress the application outcome, which is a binary variable that takes a value of one if a loan application is rejected and zero otherwise, on a set of applicants' characteristics as well as county and bank fixed effects. The first-stage regression isolates a bank-specific measure of mortgage credit supply growth. In particular, it controls for the demand for credit conditioning on an application having been applied for. We then extract the bank-specific supply of credit using the coefficients of bank-year dummies in the model for each year to calculate county-specific changes in mortgage credit supply from 2004 to 2008. In the second stage, we regress the change in the Democratic candidates vote shares change from 2004 to 2008 on our calculated measure of the change in mortgage credit supply.[2]

We find that the contraction in mortgage credits had a negative effect on the vote shares received by the Democratic candidates in the Gubernatorial election of 2008. As for the House election, we find a positive but insignificant impact. We then consider the fact that voters respond to bad economic conditions by voting against incumbents and modify the dependent variable of the second stage to the change in the vote shares received by the challenger candidates.[3] We find no significant effect of the contraction in the mortgage credits in either elections.

Our results are robust to a different specification of the second stage regression where all variables except the variable of interest are in levels. Finally, we add more control variables with regard to the status of the housing market in 2008, including vacancy rates, loan rates, OFHEO Price Change, and foreclosure rates, but we do not find different results. Our findings are in line with studies showing that the status of the economy has no effect on Congressional elections. Notably, our work closely links to the study of Lynch (2002) to the extent that economic conditions can affect Presidential election outcomes but not Congressional ones.

The rest of the paper is organized as follows. Section 2 reviews the related literature. Section 3 describes the construction of our data. In section 4, we present the identification strategy of the paper. In Section 5, we present our estimation results and discuss them. In section 6, we present the results of the robustness checks. Section 7 concludes.

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[2]We mainly do this for two reasons: first, we try to closely follow the approach proposed by Antoniades and Calomiris ([2020](#)), and second, the challenger of the Presidential election of 2008 as the top-of-the-ballot candidate was a Democrat.

[3]The main reason that Antoniades and Calomiris ([2020](#)) use the change in the Democratic vote shares as the outcome variable is that the Democratic candidate in the 2008 Presidential election was the challenger.

2   Literature Review

This paper relates to the literature in several ways. First, it contributes to the large body of literature on the relationship between economic conditions and voter behavior. This relationship has been extensively investigated in the literature. There is ample evidence in economics and political science providing grounds for the view that voters are sensitive to economic conditions (e.g., Key, 1996; Hibbs, 1987a,b; Alesina et al., 1993; and Persson and Tabellini, 2002). Also, Fair (1978, 1996, 1998, 2009, 2020) has done an influential work of investigating the roles of macroeconomics variables on both Presidential and Congressional elections. The literature on the relationship between economic conditions and outcomes of presidential elections is conclusive: voters support incumbents when economic growth is high, inflation is low, and no adverse shock is present in the economy, and oppose incumbents when those variables are opposite. As for the Congressional elections, the literature is not conclusive. While Erikson (1990), Alesina et al. (1993), and Lynch (2002) show that there is a no relationship between the state of the economy on voter behavior, Kiewiet and Udell (1998) and Grier and McGarrity (2002) find a positive one.

The relationship between economic condition and voter behavior may also be asymmetric. A wide range of studies have found that voters punish incumbents for bad economic conditions but do not reward them for favorable ones (e.g., Bloom and Price, 1975; Lewis-Beck and Stegmaier, 2013; Quinn and Woolley, 2001; and Jensen et al., 2017). This asymmetric relationship relates to the literature on political psychology. When a voter finds a good job or secures a mortgage, they come to the conclusion that this is the result of their accomplishments. However, when they lose a job or their mortgage application gets rejected, it is easy for them to blame others, especially politicians.

Second, our work contributes to the growing body of literature on the political outcomes of the housing market and credit subsidies. Although the economic aspects of the housing market has been vastly studied in the literature, there is little evidence about how the housing market affects politics.

Homeownership policies have been an essential part of American politics for almost a century. Although those policies appear in a wide range of forms, most of them act through the subsidization of mortgage credit risks. The United States is not the only country in the world in which mortgage subsidies have shaped politics. The "help-to-buy" program proposed by Prime Minister Cameron in the U.K. was part of his last electoral campaign. Dilma Roussef won Brazil's 2014 election partly due to her plan to ease home buying called "Minha Casa Minha Vida."

Regarding the question of how credit subsidies are received by recipients who are of inter-

est of politicians, it is highly acknowledged that providing inexpensive credit is politicians' favorite way of subsidizing preferred targets, either due to the fact that other more direct ways of transfers and taxes are blocked by political procedures that do not relate to banking regulations (Rajan et al., 2010 and Calomiris and Haber, 2014), or because those who endure the costs of granting credit subsidies cannot recognize those costs readily (Coate and Morris, 1995).

There is also ample evidence that credit subsidies are employed in favor of special groups, including both individuals and firms where the government owns or controls lenders (for example, Sapienza, 2004; Dinç, 2005; Khwaja and Mian, 2005; Claessens et al., 2008; and Carvalho, 2014).

A large body of the literature have found that politicians' behavior in many democracies is based on the view that they will be rewarded by voters if they deliver cheap credits to voters. Cole (2009) finds that agricultural credits increase in election years in a state-owned bank agricultural lending in India, and credit-granting is more prominent in districts where the contest is close. In the United States, Liu and Ngo (2014) show that banking failure is less likely in the year leading to an election in states in which governors are up for re-election. This effect is more severe where governors have control of both the upper and lower houses.

Finally, this paper is among the first works to make use of micro-level data to study the relationship between the economy and political outcomes. Antoniades and Calomiris (2020) find that the contractions in mortgage credits during the financial crisis of 2008 cost the incumbent party the Presidential election. Mabud (2016) finds that the increase in mortgage credits in post-2000 elections helped incumbents in low-income counties to win elections. Hall et al. (2021) find that an increase in foreclosure rates was associated with lower turnout in Ohio.

3 Data

To explore the electoral outcomes of the contraction in mortgage credits, we collect data from several sources. The first part of our data comes from the Home Mortgage Disclosure Act (HMDA). HMDA requires all financial institutions to collect and report detailed data regarding applications for mortgage loans. HMDA is a very rich dataset that includes loan-level information about the status of mortgage applications, as well as information on the borrowers' personal characteristics, including gender, race, ethnicity, and income. It also reports information on loans' characteristics, including the location of the property and the purpose of the loan. In our baseline analysis, we make use of the HMDA data for years 2004 and 2008.

Pooling together, there are more than 50 million loan applications in these two years. However, we drop around 65 percent of the observations for several reasons. First, we drop withdrawn loans as well as loans purchased from other institutions. Second, we remove non-conventional loans as they do not follow traditional mortgage loan requirements. Third, we drop loans with missing information. Finally, we exclude the smallest banks from our data for computational purposes in our first-stage regression. We define the smallest banks as those receiving less than 1 percent of all loan applications received within a state-year. Table 1 reports the summary statistics of the HMDA data for years 2004 and 2008. Loan applications decreased by around 4 million from 2004 to 2008 while the rate of rejection increased from 25 percent to 37 percent, a clear sign of a reduction in mortgage credits during this time.

We also collect county-level data on personal income and unemployment rate from the Bureau of Labor Statistics, median age, the share of the black population, the share of bachelor's graduates, sex ratio, age dependency ratio, and Gini coefficient from the Census and American Community Survey databases, and the share of Evangelical Protestants from the Religious Congregations and Membership Survey database.

As for election returns, we obtain data on them from two sources. We have county-level election returns on Presidential and Gubernatorial elections from the CQ Voting and Elections Collection and house elections from the Dave Leip's Atlas of US elections. As shown in Table 1, the vote shares received by Democratic candidates increased from 2004 to 2008 in both Gubernatorial and House elections.

Finally, we collect data on foreclosure rate, vacancy rate, high-cost loan rate, home-ownership rate, and home price change rate from the Department of Housing and Urban Development database and use them in our robustness analysis.

4 Identification Strategy

We employ the individual-level data on loan applications to identify how changes in mortgage credits impacted the House and Gubernatorial elections of 2008. Our focus is primarily on a four-year period from 2004 to 2008 as this period experienced an unexpected shift from the most generous underwriting standards for mortgages in the history of the U.S. in 2004-2006 to a strict shrinkage of mortgage credit during the financial crisis of 2007-2008.

We closely follow the estimation strategy proposed by Antoniades and Calomiris (2020) and estimate a two-stage econometric model to link the shrinkage of mortgage credits to electoral outcomes. In the first stage, we make use of the outcomes of millions of mortgage applications in 2004 and 2008 to isolate a bank-specific measure of mortgage credit change.

More specifically, we estimate a model of the application decision (reject- not reject) to control for the demand for credit and track the supply of mortgage credits. We estimate the following equation for each year in the first stage:

$$LAR_{ijkt} = \alpha + \beta_{kt} + \gamma_{it} + \delta X_{it} + \zeta X_{it} \times After_t + \eta Y_{jt} + \lambda Y_{jt} \times After_t + \epsilon_{ijkt} \qquad (1)$$

Where LAR stands for Loan Application Rejection, which is a dummy variable. It takes a value of 1 if an application gets rejected and 0 otherwise; i denotes the lender (bank) type; j indexes the particular loan application; k denotes the county in which the applicant applies for a loan; t indexes the year the application is made; β_{kt} denote county-year fixed effects; γ_{it} denotes bank-year fixed effects; vectors X and Y control for various characteristics of applicant and loan type, respectively; After takes a value of 1 if the year is 2008 and 0 otherwise; and ϵ is the residual. We estimate Equation (1) using an OLS estimation method.[4]

As we include personal characteristics of applicants in our estimation, Equation (1) controls for variation in borrower attributes. As a result, all the demand-side shifts that are linked to the varying compositions of borrowers are removed. By including time-interacted county fixed effects, it also controls for differences in the economic environments of counties. Moreover, it might remove some of the supply-side effects that are associated with the location of lenders. For instance, banks may treat borrowers differently according to their locations with regard to variations in location-specific risks.[5]

We then extract the bank-specific supply of credit using the (negative of the) coefficients of bank-year dummies in the model to calculate county-specific changes in mortgage-credit-supply. This is done in two steps: First, for each county and year (2004, 2008), a weighted average of the estimated bank-specific fixed effects is taken over all banks that run in a county that year. The number of loan applications received in each county and year is used as weights to control for bank importance. Second, we take the difference between the two computed county-level measures of mortgage-credit-supply aggregates.

We then link the shift in county-specific mortgage credit supply to county-level shift in voting behavior through a second-stage OLS regression. The second-stage equation takes the form of the following:

$$\Delta\%DemCanVote_{kt} = \alpha + \beta(\Delta MortgageCreditSupply_{kt}) + \gamma Z_{kt} + \delta S_{zt} + q_{kt}, \qquad (2)$$

where k indexes the county in which the voter resides; z indexes the state in which the county is located; t indexes the election year (2008 initially); Z captures various county-level characteristics; S denotes state fixed effects, and q is the error term.

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[4]This estimation includes more than 700 fixed effects, and as a result, we estimate it using an OLS approach to obtain consistent estimates. However, a logistic regression produces incontinent estimates. See Wooldridge (2004, p 484)

[5]For instance, expected house price appreciation can vary based on location.

In the second-stage, we include county and state fixed effects as well as county characteristics to control for other county-level shifts that can affect voting behavior, such as shifts in economic indicators and voter demographics.

5   Results

5.1   Main Findings

Table 3 represents the results of the first-stage regression. The dependent variable is loan application rejection, which takes a value of 1 if a loan application is rejected and zero otherwise. As expected, loan application denial is correlated with a wide range of applicant characteristics, as well as bank and county fixed effects, which are reported in the Appendix. The results from Table 3 suggest that it is important to control for borrowers' characteristics when using a rejection model, and it is not enough to only consider the originator's lending capacity.

Using bank-time fixed effects in the first stage, we calculate a measure of the change in mortgage credit supply from 2004 to 2008, as explained in section 4. Figure 1 shows the change in mortgage credit supply from 2004 to 2008. It is the aggregation of the *negative* of the weighted bank-time fixed effects. Figure 2 displays the density function of the change in mortgage credits. According to our calculation of the change in mortgage credits, only 4 percent of counties experienced an increase in mortgage credits from 2004 to 2008 experienced an increase in mortgage credits.[6]

We now turn to the results of the second-stage estimation. In our second-stage regression, we explore the effects of the contraction in mortgage credits on the change in the Democratic vote shares (i.e., the proportion of votes going to the Democratic candidate in 2008, minus the percentage for the Democratic candidate in 2004 within each county) in the Gubernatorial and House elections of 2008 as it appears in Equation (2).[7]

The Gubernatorial elections of 2008 were held in 11 states, out of which 6 had a Democratic incumbent governor (Delaware, Montana, New Hampshire, North Carolina, Washington, West Virginia) and 5 had a Republican incumbent one (Indiana, Missouri, North Dakota, Utah, Vermont). Except for Missouri, where the Democratic party gained a seat, all other seats were held by the incumbent party. There are 565 counties in all of those states. However, the data are available only for 277 counties. The House elections were held

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[6]That is why we cannot observe credit increase in Figure 1.

[7]Antoniades and Calomiris (2020) investigate this effect on the Presidential election of 2008. We replicate their estimation in the Appendix.

nationally, and the Democratic party gained 21 seats. The availability of data for the House election is limited to 1510 counties.

Table 4 shows the estimation results for the Gubernatorial election. The first column shows the effect of the dependent variable on the set of control variables we make use of in our estimation. We find that economic conditions affect the change in the Democratic candidate vote shares as the estimated coefficient on the change in personal income is positive and statistically significant, and the estimated coefficient on the change in the unemployment rate is positive and significant. Younger people and minorities are associated with gain for the Democratic candidates while the Evangelical share has a negative impact. According to the results, the presence of the educated people has a negative effect on the Democratic vote share, which is not expected. However, our sample includes only 277 counties, and we need to be cautious in interpreting our findings in this regard. The estimated coefficient on the sex ratio is positive but not significant, meaning that men are more likely to support the Democratic party. It is also unexpected but in line with the findings of Antoniades and Calomiris (2020).

Column 2 of Table 4 includes the change in the raw mortgage credit rejection rate. The coefficient on the change in the raw mortgage credit rate is negative (the "wrong" sign) but not statistically significant from zero, meaning that a greater decline in the mortgage credit approval rate is associated with a decrease in the democratic party candidate votes share. Column 3 represents our main finding for the Gubernatorial election: the contraction in mortgage credits from 2004 to 2008 had a negative and statistically significant on the change in the Democratic party candidates vote shares. Our results contradict the findings of Antoniades and Calomiris (2020) as they find that the contraction had a positive impact on the vote share received by the Democratic candidate as the challenger.

Before we discuss the possible explanations as to why we find a different effect of the contraction in the mortgage credits on electoral outcomes than Antoniades and Calomiris (2020), we present our estimation results for the House elections of 2008 in Table 5. The first column shows the effects of the control variables on the vote shares received by the Democratic candidates. As Expected, our findings here are almost similar to the ones in the first column of Table 4. We include the change in the raw mortgage credit rate in column 2 of Table 5. While the estimates coefficient on the change in the raw mortgage credit rate is positive, it is not significant. In the third column of Table 5, we include the calculated measure of the change in the mortgage credit supply. Contrary to our findings for the Gubernatorial election but in line with Antoniades and Calomiris (2020), the estimated coefficient on the change in mortgage credit supply is negative, meaning that the contraction in the mortgage credits had a positive effect on the change in the Democratic party candidates

vote shares. However, this effect is not statistically significant.

5.2 Discussion

Contrary to Antoniades and Calomiris (2020), we find that the contraction in the mortgage credits from 2004 to 2008 had a negative effect on the vote shares received by the Democratic candidates in the Gubernatorial election. As for the House election, while the effect of the contraction is positive, it is not significantly different from zero. In this section, we discuss our findings and the way they link to the literature, especially to the work of Antoniades and Calomiris (2020).

We first review the intuition behind the dependent variable and then repeat our estimations with a new dependent variable. The incumbent president at the time of the Presidential election of 2008 was a Republican meaning that, the Democratic candidate of the Presidential election was the challenger. In line with the literature, Antoniades and Calomiris (2020) argue that bad economic conditions gave the challenger of the Presidential election an advantage. As a result, the contraction in the mortgage credits from 2004 to 2008 helped the challenger to win the election. Our dependent variable is also the change in the vote share received by the Democratic candidates in the Gubernatorial and House elections. However, not in all regions, the challenger is a Democratic. To address this issue, we change our dependent variable to the change in the votes received by challengers and re-estimate Equation (2).[8]

The estimation results for the Gubernatorial and House elections are presented in Tables 6 and 7, respectively. We should note that we need to interpret the estimated coefficients on some of the control variables differently than our previous estimations.[9] As for our main variable of interest, the directions of the coefficients are the same as the previous estimations. However, the estimated coefficient on the change in mortgage credit supply becomes insignificant in the Gubernatorial election but still positive. Moreover, we do not find a significant effect of the change in personal income and the change in unemployment rate on the change of challenger vote shares. As a result, we can conclude that the way we construct our dependent variable is not responsible for finding different results than Antoniades and Calomiris (2020). Nonetheless, we do conclude that our findings for the Gubernatorial election in Table 4 are not robust as they are sensitive to a different but quite plausible construction of the dependent variable.

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[8]We lose around 400 observations for the House election mainly because in many cases seats are uncontested.

[9]For instance, an increase in the share of BA graduates is not necessarily associated with an increase in the change of the challenger vote shares.

Our findings are in line with Erikson (1990), Alesina et al. (1993), and Lynch (2002), as they find that economy has either a negative or insignificant effect on the congressional elections. Among those papers, our work is a nice parallel to the studies of Erikson (1990), Alesina et al. (1993) with regard to finding different impacts of the economy on Presidential and Congressional elections. Our work also provides anecdotal evidence in favor of the so-called coattail effect, which suggests that the top-of-the-ballot candidate attracts voters for down-ballot candidates. The literature on this effect is not conclusive as there are a wide range of papers both in favor and against the effect. Although the vote shares received by the Democrat candidates increased in both the Gubernatorial and House elections, it might be the effect of the Presidential candidate, not the effect of the economic factors as Antoniades and Calomiris (2020) suggest.[10]

5.3 The Role of Location

We now test the sensitivity of our results to the urban and rural areas.[11] Following Antoniades and Calomiris (2020), we remove all the control variables from our estimation to obtain a larger sample. Using the reports from the 2010 census, we consider a county urban if 75 percent or more of the population is classified as urban. The estimation results for the Gubernatorial and House elections are presented in Tables 8 and 9, respectively. It appears that our findings for the Gubernatorial sample are mainly driven by rural areas. Interestingly, the estimated coefficient on the change in the credit supply for urban areas is negative and much smaller than the one for rural areas, but still insignificant. As for the House election, while all the estimated coefficients are insignificant, the magnitude of the coefficient for the urban areas is almost twice as much as the one for the rural areas.

6 Robustness Checks

To check the robustness of our results, we conduct two sets of robustness checks. First, we add more control variables to our baseline estimation to address the omitted variable bias. Tables 10 and 11 show the estimation results for the Gubernatorial and House elections, respectively. The first columns of both tables show the estimation results of Equation (2), including all previous controls. The actual concern of voters might be the increase in foreclosure rates, rather than the contraction in mortgage credits. To address this concern, we add foreclosure

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[10]The vote shares received by the Democratic candidates increased by 8 and 2.5 percentage points in the Gubernatorial and House elections, respectively.

[11]Hereafter, our dependent variable is the change in the Democratic vote share. We present the results with the alternative dependent variable -change in the challengers vote shares- in the Appendix.

rates to our estimations. This appears to be the case in the House elections but not in the Gubernatorial elections. We also control for the variation in the characteristics of the housing market by including loan rates, vacancy rates, and the peak-to-trough change in housing prices. Columns 2 through 5 of Tables 10 and 11 show the estimation results. We only find a significant effect of loan rates on the change in the vote shares received by the Democratic candidates in the House elections. Once we include all control variables together, none are significant in either election (column 6 in tables 10 and 11). With regard to our main variable of interest, the magnitude of the estimated coefficients and the levels of significance are almost the same across all estimations in both elections.

Second, we consider a different specification of Equation (2), where all variables are in levels in 2008. Tables 12 and 13 presents the estimation results of the alternative specification for the Gubernatorial and House elections, respectively. Once again, the magnitude and the levels of significance of the main variable of interest is the same as our baseline estimations.

7   Conclusion

The economic vote theory suggests that the condition of the economy impacts voter behavior. While there is ample evidence regarding the relationship between macro-level variables and political outcomes, little attention has been devoted to micro-level variables. Moreover, the literature on the relationship between the housing market and politics is scarce. In this paper, we studied the political outcomes of the contraction in the mortgage credits during the financial crisis of 2008 in the Gubernatorial and House elections using micro-level data provided by HMDA.

We estimated a two-stage regression model to isolate the effects of the contractions in mortgage credits on political outcomes. In the first stage, we estimated an OLS model of loan application ejection for years 2004 and 2008. In our estimations, we controlled for borrower and location characteristics to get rid of the demand side variations that are linked to the changing compositions of borrowers. Making use of the extracted bank-year fixed effects from the first-stage regression, we calculated the contractions in mortgage credits from 2004 to 2008. In the second stage, we regressed the change in the Democratic vote shares from 2004 to 2008 on the calculated measure of the change in mortgage credits. We also controlled for other factors that can affect voter behavior, including income, unemployment rate, the share black population, the share of people with at least a Bachelors degree , etc.

While we did not find any significant effect of the contraction in mortgage credits on the Democratic vote shares for the House elections, we found a negative and significant effect for the Gubernatorial election. Once we replaced our dependent variable with the change in

challenger vote shares, we did not find a significant effect in either election. The advantage of the change in the challenger vote shares over the change in the Democratic vote shares is that voters respond to bad economic conditions by voting against incumbents, not Republicans. In addition, the number of observations in our Gubernatorial sample was limited due to the fact that the Gubernatorial elections were held in only 11 states in 2008, and most of them are not populous. As a result, we cannot be sure about the effect of the contraction in mortgage credits in the Gubernatorial elections.

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Figures and Tables

Figure 1: Change in Mortgage Credit Supply from 2004 to 2008
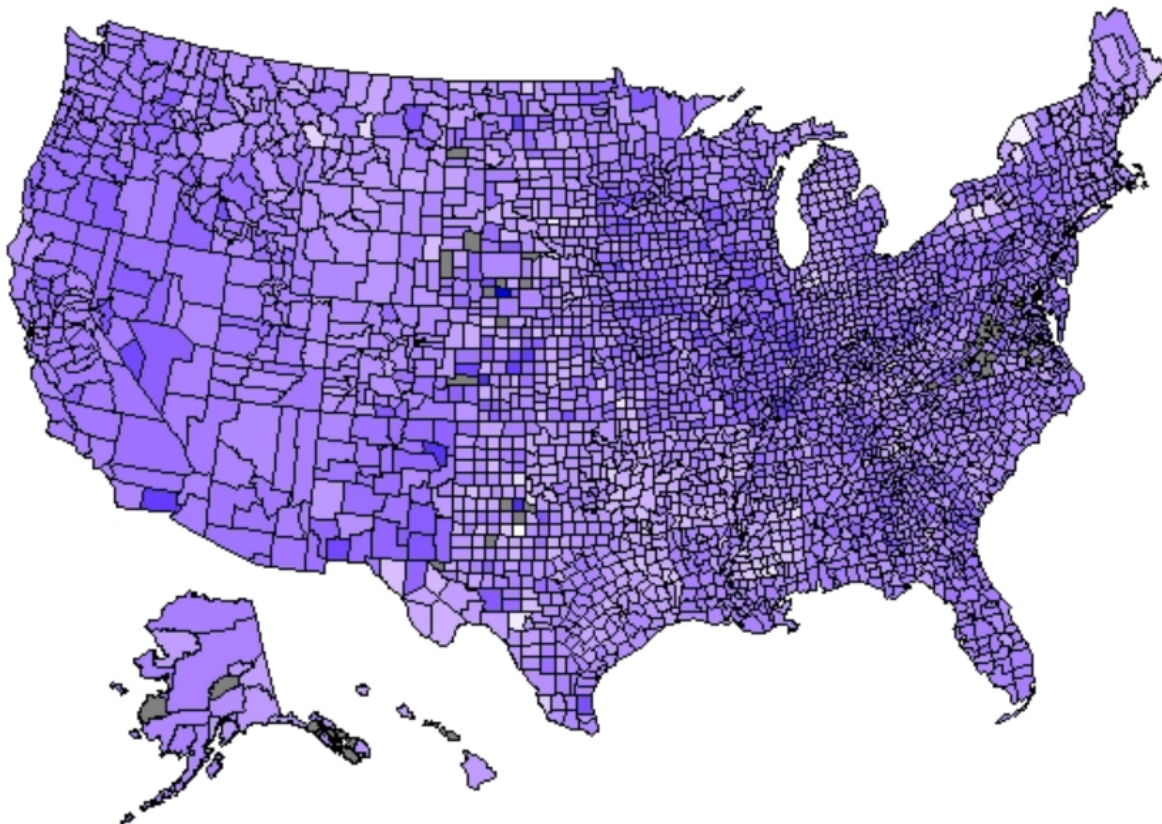
Notes: Each cell represents a county. The change in credit supply is calculated as explained in section 4. The magnitude of the change is shaded from white(no change) to dark blue (most negative change).

Figure 2: Density Function of Mortgage Credit Growth from 2004 to 2008
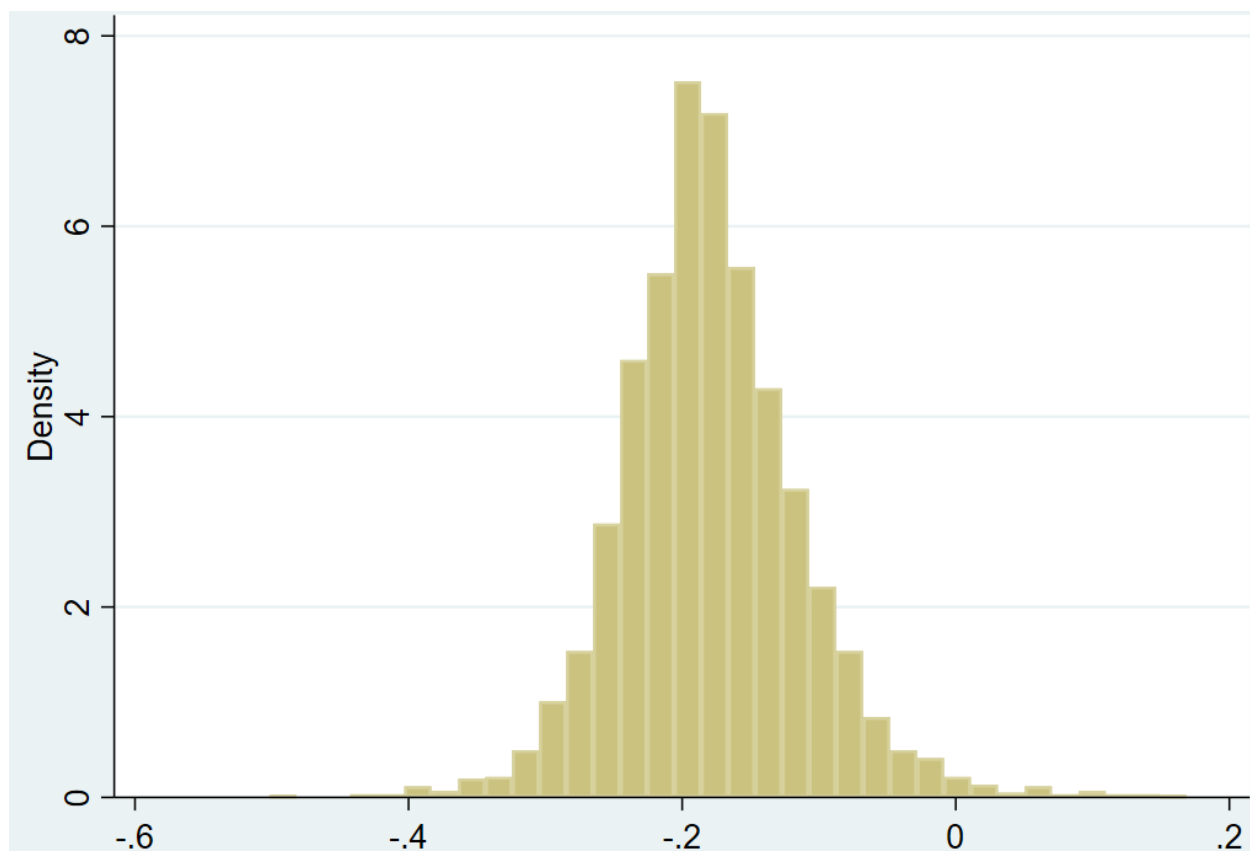
Notes: The change in credit supply is calculated as explained in section 4.

Table 1: Descriptive Statistics

Variable	2004	2008
States	51	51
Counties	3,180	3,186
Census Tracts	19,011	18,971
Financial Institutions (Banks)	317	369
Loan Applications	8,557,111	4,811,881
Applicant Income (average, in thousand USD)	87.04	100.84
Loan Amount (average, in thousand USD)	165.19	192.63
Loan to Income Ratio	2.25	2.37
Type of Loan: Home Purchase (% of total)	35	28
Type of Loan: Home Improvement (% of total)	8	12
Type of Loan: Home Refinance (% of total)	56	60
Female Applicants (% of total)	32	33
Hispanic Applicants (% of total)	12	10
Minority Applicants (% of total)	18	17
Applications with Co-Applicant (% of total)	46	48
Loan Rejection Rate (% of total)	25	37
Change in Democratic Vote shares(House)) (Percentage Points)		8.06
Change in challenger Vote shares(House) (Percentage Points)		0.44
Change in Democratic Vote shares(Gubernatorial) (Percentage Points)		2.52
Change in challenger Vote shares(Gubernatorial) (Percentage Points)		-1.70

Notes: Full description of variables are presented in Table 2

Table 2: Data Description

Variable	Description
Female Applicant	Dummy Variable – 1 if loan applicant's gender is female, 0 otherwise.
Ethnicity: Hispanic	Dummy Variable – 1 if loan applicant's ethnicity is hispanic, 0 otherwise.
Race: Minority	Dummy Variable – 1 if loan applicant's race is minority (non-white), 0 otherwise.
Loan to Income	Requested loan amount over applicants' income (total income for application with co-applicant).
Log(Income)	log(Applicants' Income).
Log(Loan Amount)	Log(Loan Amount).
Loan Purpose: Home Purchase	Dummy Variable – 1 if loan purpose is home purchase, 0 otherwise.
Loan Purpose: Home Improvement	Dummy Variable – 1 if loan purpose is home improvement, 0 otherwise
Loan Purpose: Home Refinance	Dummy Variable – 1 if loan purpose is home refinance, 0 otherwise
Co Applicant	Dummy Variable – 1 if application has a co-applicant, 0 otherwise.
Δ (Personal Income)	Change in per capita personal income between two election years.
Δ (Unemployment Rate)	Change in unemployment rate between two election years.
Median Age	Median age of household members.
Median Income	Median income of household members.
Black	Black or African American – Share of total population.
Evangelical	Evangelical Protestant – Rates of adherence per 1,000 population.
BA Graduate	Total population 25 and over – Percent bachelor's degree or higher.
Sex Ratio	Males per 100 females.
Age Dependency Ratio	(Population below 18 + Population above 64)/population(18 to 64)
Gini Coefficient	Gini coefficient at the county level.
Δ (Raw mortgage rejection rate)	Loan Applications rejected - Percentage of total applications filed at each county.
Δ (Vote share)	Change in the vote shares received by either Democrat or challenger candidate from 2004 to 2008

Table 3: First-Stage Regression Results

	Loan Application Rejection	S.E.
Female Applicant	-0.00317	(0.00310)
Female Applicant $\times After$	0.00896**	(0.00444)
Hispanic Ethnicity	0.0486***	(0.0105)
Hispanic Ethnicity $\times After$	0.0547***	(0.0156)
Minority Race	0.0653***	(0.00560)
Minority Race $\times After$	0.0170	(0.0122)
Log(Income)	0.0243	(0.0162)
Log(Income) $\times After$	0.0223	(0.0259)
Log(Loan)	-0.0631***	(0.0173)
Log(Loan) $\times After$	-0.00626	(0.0274)
Loan to Income	0.0387***	(0.00636)
Loan to Income $\times After$	0.0128	(0.0119)
Co Applicant	-0.0291***	(0.00506)
Co Applicant $\times After$	-0.00282	(0.00863)
Purpose: Home Purchase	-0.0497***	(0.00753)
Purpose: Home Purchase $\times After$	-0.0542**	(0.0214)
Purpose: Home Improvement	0.0468	(0.0344)
Purpose: Home Improvement $\times After$	-0.0119	(0.0413)
Observations	13,090,171	
R2	28.5	
County-year Fixed Effects	Yes	
Banks-year Fixed Effects	Yes	

Notes: The dependent variable is loan application rejection. The estimation includes county fixed effects, bank fixed effects, and a constant term, although we do not report the results here. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the bank level.

Table 4: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Democratic Vote Shares in the Gubernatorial Election, 2008

	(1)	(2)	(3)
$\Delta(Mortgagecreditsupply)$			0.259***
			(0.0903)
$\Delta(Mortgagecreditsupply)$			0.259***
			(0.0903)
$\Delta(PersonalIncome)$	0.147**	0.134	0.110
	(0.0738)	(0.0882)	(0.0758)
$\Delta(UnemploymentRate)$	0.0124***	0.0116*	0.00892
	(0.00469)	(0.00678)	(0.00640)
Median Age	-0.00161	-0.00170*	-0.00191*
	(0.00104)	(0.000873)	(0.00106)
Black	0.0908	0.0857	0.0804
	(0.0587)	(0.0544)	(0.0567)
Evangelical	0.00000411	-0.000000914	-0.00000585
	(0.0000477)	(0.0000458)	(0.0000434)
BA Share	-0.000365	-0.000336	-0.000365
	(0.000523)	(0.000373)	(0.000517)
Sex Ratio	0.000229	0.000179	0.000100
	(0.000901)	(0.000817)	(0.000683)
Age Dependency Ratio	0.00117**	0.00121**	0.00117**
	(0.000540)	(0.000558)	(0.000585)
Votes(t-1)	-0.0462	-0.0469	-0.0434
	(0.0553)	(0.0569)	(0.0617)
$\Delta(RawMortgageRejectionRate)$		-0.0874	
		(0.0561)	
Observations	277	277	277
R2	82.1	82.3	83.0
State Fixed Effects	Yes	Yes	Yes

Notes: The dependent variable is the change in Democratic vote shares in the Gubernatorial election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.

Table 5: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Democratic Vote Shares in the House Election, 2008

	(1)	(2)	(3)
$\Delta(Mortgagecreditsupply)$			-0.123
			(0.134)
$\Delta(PersonalIncome)$	-0.235***	-0.229***	-0.233***
	(0.0848)	(0.0846)	(0.0866)
$\Delta(UnemploymentRate)$	-0.00816	-0.00843*	-0.00841
	(0.00495)	(0.00503)	(0.00653)
Median Age	-0.00251	-0.00245	-0.00244
	(0.00177)	(0.00188)	(0.00184)
Black	0.185***	0.185**	0.186***
	(0.0600)	(0.0734)	(0.0691)
Evangelical	-0.000180***	-0.000175***	-0.000175**
	(0.0000650)	(0.0000646)	(0.0000745)
BA Share	-0.0000607	-0.0000336	-0.0000322
	(0.000580)	(0.000541)	(0.000479)
Sex Ratio	0.0000579	0.0000807	0.0000948
	(0.000654)	(0.000617)	(0.000577)
Age Dependency Ratio	0.000564	0.000565	0.000577
	(0.000965)	(0.00111)	(0.00105)
Votes(t-1)	-0.409***	-0.410***	-0.410***
	(0.0426)	(0.0438)	(0.0432)
$\Delta(RawMortgageRejectionRate)$		0.0499	
		(0.0704)	
Observations	1510	1510	1510
R2	50.4	50.5	50.5
State Fixed Effects	Yes	Yes	Yes

Notes: The dependent variable is the change in Democratic vote shares in the House election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.

Table 6: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Challenger Vote Shares in the Gubernatorial Election, 2008

	(1)	(2)	(3)
$\Delta(Mortgagecreditsupply)$			0.140
			(0.110)
$\Delta(PersonalIncome)$	-0.0417	-0.0581	-0.0607
	(0.0868)	(0.0821)	(0.0931)
$\Delta(UnemploymentRate)$	-0.00254	-0.00346	-0.00432
	(0.00810)	(0.00673)	(0.00660)
Median Age	-0.00150	-0.00163*	-0.00165
	(0.00115)	(0.000957)	(0.00101)
Black	-0.153***	-0.158***	-0.157***
	(0.0504)	(0.0446)	(0.0345)
Evangelical	0.0000399	0.0000355	0.0000356
	(0.0000379)	(0.0000344)	(0.0000421)
BA Share	-0.000993*	-0.000950*	-0.000990**
	(0.000514)	(0.000497)	(0.000482)
Sex Ratio	0.000385	0.000315	0.000309
	(0.000872)	(0.000942)	(0.000935)
Age Dependency Ratio	0.000528	0.000593	0.000526
	(0.000647)	(0.000575)	(0.000604)
Votes(t-1)	0.940***	0.953***	0.947***
	(0.0553)	(0.0430)	(0.0405)
$\Delta(RawMortgageRejectionRate)$		-0.116*	
		(0.0693)	
Observations	277	277	277
R2	90.7	90.8	90.8
State Fixed Effects	Yes	Yes	Yes

Notes: The dependent variable is the Change in challenger vote shares in the Gubernatorial election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.

Table 7: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Challenger Vote Shares in the House Election, 2008

	(1)	(2)	(3)
$\Delta(Mortgagecreditsupply)$			-0.125
			(0.0784)
$\Delta(PersonalIncome)$	-0.0905	-0.0917	-0.0861
	(0.0908)	(0.0958)	(0.0821)
$\Delta(UnemploymentRate)$	0.00269	0.00273	0.00245
	(0.00491)	(0.00552)	(0.00585)
Median Age	0.000660	0.000649	0.000714
	(0.00118)	(0.00142)	(0.00122)
Black	0.0329	0.0327	0.0336
	(0.0822)	(0.0659)	(0.0696)
Evangelical	-0.0000154	-0.0000162	-0.00000994
	(0.0000480)	(0.0000520)	(0.0000444)
BA Share	0.000377	0.000371	0.000429
	(0.000430)	(0.000573)	(0.000506)
Sex Ratio	0.00176**	0.00176**	0.00180**
	(0.000743)	(0.000760)	(0.000852)
Age Dependency Ratio	0.000252	0.000251	0.000272
	(0.000850)	(0.000787)	(0.000745)
Votes(t-1)	-0.752***	-0.751***	-0.754***
	(0.0347)	(0.0486)	(0.0367)
$\Delta(RawMortgageRejectionRate)$		-0.00988	
		(0.0615)	
Observations	1182	1182	1182
R2	48.5	48.5	48.6
State Fixed Effects	Yes	Yes	Yes

Notes: The dependent variable is the change in challenger vote shares in the House election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.

Table 8: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Democratic Vote Shares in the Gubernatorial Election, 2008: Break-down by Location

	(1) All	(2) Urban	(3) Rural
$\Delta(Mortgagecreditsupply)$	0.0604	-0.00245	0.276**
	(0.0596)	(0.0695)	(0.112)
Votes(t-1)	-0.0648	-0.0937*	-0.00190
	(0.0484)	(0.0514)	(0.0724)
Observations	565	360	205
R2	0.799	0.809	0.804
State Fixed Effects	Yes	Yes	Yes

Notes: The dependent variable is the change in Democratic vote shares in the Gubernatorial election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.

Table 9: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Democratic Vote Shares in the House Election, 2008: Break-down by Location

| | (1) | (2) | (3) |
	All	Urban	Rural
$\Delta(Mortgage credit supply)$	-0.0801	-0.0781	-0.0425
	(0.0655)	(0.0506)	(0.138)
Votes(t-1)	-0.322***	-0.293***	-0.402***
	(0.0413)	(0.0421)	(0.0587)
Observations	2946	1923	1023
R2	44.2	40.4	53.8
State Fixed Effects	Yes	Yes	Yes

Notes: The dependent variable is the change in Democratic vote shares in the House election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.

Table 10: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Democratic Vote Shares in the Gubernatorial Election, 2008: Additional Controls

	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta(Mortgage\,credit\,supply)$	0.259**	0.262**	0.259**	0.257**	0.266**	0.262**
	(0.127)	(0.115)	(0.113)	(0.110)	(0.124)	(0.122)
Foreclosure Rate		0.212				0.574
		(0.621)				(0.801)
Loan Rate			0.00501			-0.0980
			(0.126)			(0.142)
Vacancy Rate				-0.0585		-0.0915
				(0.195)		(0.153)
OFHEO Price Change					-0.299	-0.172
					(0.373)	(0.417)
Observations	277	277	277	277	277	277
R2	83.0	83.0	83.0	83.0	83.0	83.1
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the change in Democratic vote shares in the House election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. Foreclosure rate estimates the number of foreclosures starts over 18 months through June 2008 divided by number of mortgages over the same period. The Vacancy rate is the share of addresses that remain vacant for 90 days or longer divided by total addresses as of June 2008 times 100. The Loan rate is the percent of loans made between 2004 and 2006 shown to be high cost according to HMDA data. The OFHEO price change is a measure of price decline in home values that uses data from the OFHEO Housing Price Index (HPI) to calculate price decline from peak value in the second quarter of any year between 2000 and 2008 and the second quarter home price of 2008. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.

Table 11: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Democratic Vote Shares in the House Election, 2008: Additional Controls

	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta(Mortgage credit supply)$	-0.123	-0.117	-0.119	-0.122	-0.124	-0.120
	(0.125)	(0.120)	(0.111)	(0.119)	(0.124)	(0.142)
Foreclosure Rate		0.742**				0.373
		(0.347)				(0.894)
Loan Rate			0.215**			0.150
			(0.0950)			(0.183)
Vacancy Rate				0.0930		0.0114
				(0.205)		(0.147)
OFHEO Price Change					0.0349	0.119
					(0.140)	(0.227)
Observations	1510	1510	1510	1510	1510	1510
R2	50.5	50.7	50.8	50.5	50.5	50.8
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the change in Democratic vote shares in the House election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. Foreclosure rate estimates the number of foreclosures starts over 18 months through June 2008 divided by number of mortgages over the same period. The Vacancy rate is the share of addresses that remain vacant for 90 days or longer divided by total addresses as of June 2008 times 100. The Loan rate is the percent of loans made between 2004 and 2006 shown to be high cost according to HMDA data. The OFHEO price change is a measure of price decline in home values that uses data from the OFHEO Housing Price Index (HPI) to calculate price decline from peak value in the second quarter of any year between 2000 and 2008 and the second quarter home price of 2008. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.

Table 12: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Democratic Vote Shares in the Gubernatorial Election, 2008: Alternative Specification

	(1) Baseline Specification		(2) In Levels (2008)
$\Delta(Mortgagecreditsupply)$	0.259**	$\Delta(Mortgagecreditsupply)$	0.286***
	(0.114)		(0.103)
$\Delta(PersonalIncome)$	0.110	Personal Income	-0.00000152
	(0.0923)		(0.000000942)
$\Delta(UnemploymentRate)$	0.00892*	Unemployment Rate	-0.00348
	(0.00503)		(0.00470)
Median Age	-0.00191*	Median Age	-0.00100
	(0.000984)		(0.00133)
Black	0.0804	Black	0.0872
	(0.0570)		(0.0553)
Evangelical	-0.00000585	Evangelical	-0.0000175
	(0.0000478)		(0.0000370)
BA Share	-0.000365	BA Share	0.000153
	(0.000499)		(0.000615)
Sex Ratio	0.000100	Sex Ratio	0.000425
	(0.000641)		(0.000816)
Age Dependency Ratio	0.00117*	Age Dependency Ratio	0.00130**
	(0.000605)		(0.000578)
Votes(t-1)	-0.0434	Votes(t-1)	0.960***
	(0.0516)		(0.0645)
Observations	277		277
R2	83.0		93.1
State Fixed Effects	Yes		Yes

Notes: The dependent variable is the change in Democratic vote shares in the House election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.

Table 13: Second-Stage Regression Results: The Effects of the Change in Mortgage Credits on the Change in Democratic Vote Shares in the House Election, 2008: Alternative Specification

	(1) Baseline Specification			(2) In Levels (2008)
$\Delta(Mortgage credit supply)$	-0.123		$\Delta(Mortgage credit supply)$	-0.136
	(0.104)			(0.103)
$\Delta(Personal Income)$	-0.233**		Personal Income	-0.00000211***
	(0.0934)			(0.000000747)
$\Delta(Unemployment Rate)$	-0.00841		Unemployment Rate	0.00577
	(0.00598)			(0.00415)
Median Age	-0.00244		Median Age	-0.00117
	(0.00203)			(0.00167)
Black	0.186***		Black	0.191***
	(0.0715)			(0.0677)
Evangelical	-0.000175**		Evangelical	-0.000160**
	(0.0000788)			(0.0000635)
BA Share	-0.0000322		BA Share	0.00198**
	(0.000455)			(0.000794)
Sex Ratio	0.0000948		Sex Ratio	0.0000809
	(0.000514)			(0.000620)
Age Dependency Ratio	0.000577		Age Dependency Ratio	0.000690
	(0.000997)			(0.00102)
Votes(t-1)	-0.410***		Votes(t-1)	0.586***
	(0.0393)			(0.0449)
Observations	1510			1510
R2	48.5			64.3
State Fixed Effects	Yes			Yes

Notes: The dependent variable is the change in Democratic vote shares in the House election in 2008. In all estimations, we include state fixed effects and a constant term, although we do not report the results here. The asterisks ***,**, and * indicate the 1%, 5%, and 10% significance levels, respectively. The numbers in parentheses are robust standard errors clustered at the MSA level.