Income Inequality, Easy Credit Policies and Homeownership*

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Abstract

Did the rise in income inequality that occurred in the U.S. since the 1980s induce politicians to implement easy credit policies aimed at boosting homeownership among middle and low-income households? In this paper, I investigate empirically this issue by studying the relationship between income inequality and both the change in credit availability and in homeownership across the U.S. states from the mid-1990s to the mid-2000s. I find that in states where inequality was higher in 1996, homeownership increased more during the subsequent ten years. Next, exploiting across-state variations in mortgage-related legislation, I find that in states with higher inequality politicians were more likely to impose laxer scrutiny requirements on lenders, as compared to less unequal states. These results suggest that in more unequal states politicians faced stronger pressure from their constituencies and were thus more likely to implement easy credit policies. Related to this, I also find that, between 1995 and 2005, credit was extended more aggressively and lending standards were eased more in states with higher initial inequality. Overall, results in this paper suggest that increasing income inequality triggered a political reaction aimed at expanding cheap housing credit, and that the easy credit policies were not confined to the federal level, but were implemented extensively at the state level as well.

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1 Introduction

Since the 1980s, income inequality has increased remarkably in the U.S., especially between households at the two extremes of the income distribution and the rest of the population. Real after-tax income of households at the top 1% of the income distribution grew approximately by 275%, while for the rest of the population it increased by less than 40%. Even more, individuals at the bottom 20% of the income distribution saw their wages decline. The ultimate result was a substantial divergence in income between households in the two tails and those in the middle of the income distribution. Another feature of the U.S. economy since the 1980s has been a dramatic surge in household indebtedness, which grew by almost 300% in less than 20 years. Such an increase became particularly strong between 1995 and 2005, especially for middle and low-income households.

Are these two phenomena related? This paper presents extensive evidence suggesting that they are. Specifically, I argue that in states with higher income inequality, politicians faced a stronger pressure from their constituencies to extend cheap credit to middle and low-income households, and more comprehensive actions were thus undertaken here, compared to less unequal states. As a consequence, credit supply increased and lending standards declined to a larger extent, enabling middle and low-income households in more unequal states to borrow more. Given that most of the credit policies enacted concerned housing credit, the final result was to increase homeownership by allowing households to afford to buy new houses.

Using U.S. state-level data, I test empirically the mechanism described above. As a preliminary step, I investigate whether states that in 1996 had higher income inequality experienced a larger increase in homeownership between 1996 and 2007. I find a strong and positive relationship between initial inequality and subsequent change in homeownership across U.S. states. Next, I directly test whether higher income inequality induced politicians to implement policies aimed at expanding credit availability for middle and low-income households by exploiting state-level variation in laws that require lenders to scrutinize borrowers in advance. Importantly, I find that in more unequal states scrutiny requirements were less likely to be imposed on lenders by the state legislature, suggesting that politicians responded to inequality intervening to implement soft credit regulation. My findings are consistent with those obtained by Mian, Sufi, and Trebbi (2011), who show that subprime mortgage borrowers influenced the credit policies enacted by the U.S. federal government between the mid-1990s and the mid-2000s. My work complements their

paper by focusing on state-level legislation, and exploring an additional channel through which politicians may have influenced mortgage markets.

State politicians can influence housing-related credit policies and ultimately credit supply not only through explicit pieces of regulation, but also by indirect actions such as pressure upon banks to extend cheaper credit to low-income households. Thus, I study the relationship between initial inequality and change in credit availability between 1995 and 2005 across U.S. states, finding a strong and positive relationship between the two variables. In states where the Gini Index was higher at the beginning of the period, lending standards declined more, and both the number and the amount of loans increased more, compared to states with lower initial inequality. Importantly, I can disentangle the effect that inequality has on credit demand from the one it has on credit supply by looking at the change in denial rates, a variable that unambiguously captures lenders' behavior. This, in turn, allows me to interpret the boom in credit availability as an outward shift in credit supply.

Finally, I investigate whether the easy credit policies reached their goal, that is, if in states where credit availability increased more, homeownership grew to a larger extent. To avoid endogeneity problems due to reverse causation I estimate the causal effect of credit by instrumenting the latter with the initial level of inequality. As expected, I find a positive and strong effect of increased credit availability on the change in homeownership.

Overall, my work suggests that the implementation of the easy credit policies differed across states, depending on the degree of inequality politicians had to respond to. In states with higher inequality, politicians faced a stronger pressure, and were thus more likely to push for the expansion of cheap housing credit, especially for middle and low-income borrowers, as compared to states with lower income inequality. These results are consistent with Rajan (2010) and Kumhof and Ranciere (2010), who tried to link inequality to the dramatic surge in credit availability in the U.S., which is considered by many scholars one of the causes of the 2007-2009 financial crisis.

Kumhhof and Ranciere (KR) study the link between inequality and credit, by developing a model in which rising inequality between the top 5% and the rest of the income distribution induces most households to borrow to prevent their living standards from falling. Even though in the short run this mechanism allows living standards to remain constant (or even to increase), the increase in leverage generates instability and makes the economy more and more fragile, and exposed to economic shocks. My empirical evidence can be reconciled with the KR model: the behavior of lenders can be influenced by the

easy credit policies, both directly and indirectly. Directly, if credit policies make it more profitable to lend to low-income households. Indirectly, if incentives in the private sector are distorted by political decisions.

This is exactly what Rajan argues in the first chapter of "Fault Lines" (2010): public policies implemented to cope with the increased pressure deriving from higher inequality distorted the incentives of the private sector as lenders (correctly) perceived that the government would have intervened in case risky (low-income) borrowers had defaulted on their loans.

The rest of the paper is organized as follows: Section 2 documents the recent rise in U.S. income inequality and discusses the "political reaction" hypothesis by presenting evidence of the political actions aimed at expanding credit to marginal borrowers. Section 3 describes the data. In Section 4 I first present a reduced form regression to study the relationship between inequality and the change in homeownership. Then, I study whether state-level inequality has any predictive power on scrutiny requirements imposed on lenders by state mortgage statutes, and next I investigate empirically the relationship between initial inequality and change in credit availability. In Section 5 I adopt an instrumental variable approach to assess whether the easy credit policies were successful in increasing homeownership using initial state-level inequality as an instrument for credit expansion. Section 6 concludes.

2 Income Inequality and the Easy Credit Policies

2.1 Increasing Income Inequality

Income inequality has increased in the U.S. over the last 30 years (see Fig.1). The difference in earnings between the top 1% of the income distribution and the rest of the population persistently widened, while low income households saw the gap between their wages and that of the average worker widen. A study conducted by the Congressional Budget Office (CBO) in 2011 found that, between 1979 and 2007, real average (after-tax) income in the U.S. increased by 62%. Yet, the increase was very uneven: for the top 1% of the income distribution, real after-tax income grew, on average, by 275%. During the same period, average income grew by 65% for households in the 81st through 99th percentiles, and by less than 40% for those between the 21st and the 80th percentiles. Finally, households in the bottom 20th percentile experienced a very feeble growth (18%) compared to the

rest of the population, not to mention the top 1%. The extent of uneven growth in after tax income varied across the U.S. states, with some states growing much more unequal than others. Almost everywhere the gap between the top and the bottom fifths of families widened substantially. In no state did inequality decline: at best it did not increase. Table 1 presents the top-to-bottom ratios for the U.S. in the late 1980s and mid 2000s, as calculated by the Center on Budget and Policy Priorities[1] (CBPP) in 2008. Similarly, Figure 2 shows the unbalanced growth of the average income for households belonging to different income percentiles, between 1979 and 2007.

Another pattern, somehow connected to the rise in income inequality, that has characterized the U.S. economy in these years has been a sharp reduction in relative upward mobility. Bradbury (2011) shows that family income mobility was higher in the 1970s and 1980s than in the 1990s for all quintiles of the income distribution. Also, consistently with Winship (2011), she finds that relative upward mobility is significantly lower for households belonging to the bottom income quintile, and that it has declined over the last thirty years. Similarly, Hungerford (2008, 2011) documents statistically significant reductions in relative mobility between the 1980s and the 1990s.

Clearly, a reduction in relative upward mobility exacerbates even further the social displacement generated by the increase in income inequality. Indeed, McCall and Kenworthy (2009) find that the opposition to inequality in the U.S. has grown substantially since the late 1980s, probably reflecting the increase in income inequality itself. Furthermore, they find that pessimism about future economic mobility is strongly and positively correlated with income inequality.

2.2 The Consequences of Increasing Income Inequality

According to Rajan (2010), the increase in inequality, coupled with a reduction in relative upward mobility, has fueled a widespread discontent among the American middle-class, and generated a strong pressure upon politicians, who started looking for a viable solution. In particular, Rajan argues that increasing income inequality induced middle and low-income households to ask for more credit in order to prevent their living standard from falling compared to those of top-income earners, in spite of declining or stagnant wages. The latter idea is widely debated, and many alternative explanations have been proposed to explain the dramatic surge in households debt, as well as the fact that consumption

[1] "Pulling Apart. A State-by-State Analysis of Income Trends", April 2008.

inequality has increased less than income inequality over the last thirty years. However, recent papers have found results in support of the idea that increasing consumption by high income households, who became richer as compared to the rest of the population, eventually induced middle and low-income households to consume more in order to prevent their relative living standards from falling.

In particular, Bertrand and Morse (2012) (B-M) argue that the rise in earnings at the top of the income distribution exerted a positive influence on the consumption of low and middle-income households, a process that they label "trickle-down" consumption. Specifically, the authors find that in states where the top quintile experienced a stronger increase in income, consumption of households at the mid of the income distribution rose more compared to other states, even though the income of the latter group did not rise. In their empirical investigation, the authors rule out the hypothesis that the increase in consumption by "non-rich" households is due either to actual or expected growth in their future income, and argue that the income growth experienced by the "rich" contributed to fuel the surge in consumption by "non-rich" households. In other words, individuals down in the income distribution adjusted their consumption habits upwards, as a reaction to the augmented consumption of top-income earners in their state. The latter process is precisely what B-M define "trickle-down" consumption. Finally, to further corroborate their hypothesis, B-M show that in states where households at the top of the income distribution became richer, middle and low-income households were more likely to report financial duress in the subsequent period.

While the idea proposed by B-M seems reasonable and is supported by some empirical evidence, there exists another, less sophisticated explanation for why increasing income inequality may have generated a surge in credit demand. That is, growing inequality was associated with augmented poverty, especially among low-income households who, in turn, asked for more credit. Arguably, as their real wages stagnated or even declined, U.S. households tried to substitute borrowings for their reduced income, in so doing driving upwards the demand for credit.

In any case, the final result of the surge in income inequality was a substantial increase in credit demand, either because of a "trickle-down" consumption effect, or simply because of increased poverty. As suggested by Rajan (2010), the surge in credit demand, coupled with a widening discontent due to increased inequality, resulted in a stronger pressure upon politicians, who responded to it by implementing easy credit policies[2]. Notably, easy credit

[2]See the discussion conducted by Rajan in "Fault Lines", 2010 (chapter 1).

policies are extremely popular among voters because they allow them to immediately reap the benefits, while the costs are often hidden and all postponed into the future.

The goal of the policies was to boost homeownership, especially among middle and low-income households. Indeed, homeownership has always played an important role in American ideology. Thus, politicians found it appealing to claim that, through the easy credit policies, they were actively helping households to own a house and "realize the American Dream"[3]. Importantly, the political reaction took place not only at the federal level, as documented by Mian, Sufi and Trebbi (2011), but also at the state-level. As my work suggests, the implementation of the easy credit policies was different in different states, and it was clearly influenced by the degree of state-level inequality. In particular, I find evidence[4] suggesting that in more unequal states politicians were more likely to implement easy credit policies, which, in turn, resulted in a larger increase in credit supply, a sharper decline in lending standards, and a subsequent surge in homeownership.

To conclude, rising income inequality induced middle and low-income households to ask for more credit, in turn generating a mounting pressure on politicians, who responded to it by implementing easy credit policies. The political reaction, consisted of both formal Acts, and more informal actions such as lobbying and pressure on lenders. The effect of the easy credit policies was to increase credit supply, especially for housing, by inducing lenders to cut their lending standards. As a result of the increased credit availability, homeownership rates increased remarkably. Fig.3 summarizes the latter mechanism.

In the next Section I describe more in the details how the easy credit policies were implemented, focusing in particular on the actions undertaken by politicians at the state level[5].

2.3 The Relevance of State-Level Channels for the Implementation of the Easy Credit Policies

Previous works have stressed the importance of federal legislation for the implementation of easy credit policies, and, in particular the extent to which housing policies were affected by special interests. For instance, Mian, Sufi and Trebbi (2011) find that, between 2000 and 2004, the fraction of subprime borrowers in a given district and campaign contributions

[3]George W. Bush, "Remarks by the President on Homeownership", speech at the Department of Housing and Urban Development, Washington DC, June 18, 2002.

[4]See Section 4.2.

[5]In a longer version of this paper I conduct a detailed review of the main federal Acts passed at the federal level since the early 1990s.

from mortgage industry are very strong predictors of voting patterns on mortgage related legislation. Furthermore, the authors stress how credit expansion to subprime borrowers coincided with mortgage and housing policies: as the mandate for low-income lending of the GSEs was gradually increased between 1995 and 2004, the fraction of subprime MBS purchased by the federal agencies rose dramatically. Also, they present evidence that congressional majorities of both parties rejected amendments aimed at increasing constraints on the GSEs.

While most of the analyses have focused on federal legislation, the extent to which easy credit policies were implemented at the state level has so far been neglected by the literature. In this paper, I partly fill this gap, by showing that, in fact, reforms and policies were not confined solely to the federal level, but took place extensively at the state level as well. Indeed, state and local politicians played an important role in the implementation of the "Homeownership Strategy". As explained in the description of the "National Homeownership Strategy" by Weiss (2002), the plan heavily relied upon "a massive public private partnership that involved 100 major actions being carried out by thousands of entities". In other words, the involvement of state authorities and local community groups was fundamental in the implementation of the easy credit policies.

Also, even if federal laws may in certain circumstances preempt state regulation concerning the banking sector, very often key aspects of banking activities are regulated and supervised by state laws. Related to this, Agarwal, Lucca, Seru, and Trebbi (2012) find that state regulators are significantly more lenient than federal regulators in exercising commercial banks' supervision. The authors argue that such a more lenient approach is likely to come from the pressure (direct and/or indirect) exerted by banks upon state regulators. Expanding on their interpretation, one can also expect that local community groups too affect regulators' behavior, especially on issues related to housing-credit policies. This hypothesis is supported by the recent findings of Bertrand and Morse (2012), who show that, at the state level, voting patterns on housing-credit related legislation are deeply affected by the current level of inequality. In fact, they find that politicians in districts with higher inequality are more likely to vote in favor of measures aimed at boosting cheap credit for medium and low-income households.

Moreover, state and local governments receive funds from the federal government, through the HOME Investment Partnership Program[6]. State and local politicians are

[6]See "Improving Homeownership Among Poor and Moderate-Income Households", The Urban Institute, June 2005.

then free to spend these grants on the type of housing assistance they prefer. Notably, HOME is an active program and it is reasonable to assume that community groups and special interests can influence decisions about the allocation of grants. In general, political actions need not be explicit laws or formal pieces of regulation, but may also take the form of indirect pressure upon banks to extend cheaper credit to low-income households. Anecdotal evidence brings support to this thesis: for instance, since the early 1990s, community groups at the local level (Homeownership Zones) have exerted increasing pressure upon politicians to boost homeownership and extend cheap credit (Weiss, 2002). Also, with the amendment of the CRA in 1995, local communities became more important in its enforcement, and banks entered into "CRA Agreements" with community groups more and more often (see Bhutta, 2008).

Probably, the most effective way in which states can intervene in the mortgage market is by enacting Anti-Predatory Lending legislation. Since 1999 many states started to introduce Anti-Predatory Lending (APL) laws with the specific aim of protecting consumers (i.e., potential homebuyers) from unfair lending practices, often used by lenders especially in the subprime market. With the boom in subprime mortgage origination, in fact, lenders often charged extremely high interest rates or imposed prepayment fees on marginal borrowers, taking advantage of the relative weak position of this class of borrowers. North Carolina was the first state in which a comprehensive law was implemented, in 1999; since then several states adopted APL legislation, in order to protect potential homebuyers and reduce the probabilities that they were exposed to unfair lending practices. While the aim of APL legislation seems rather straightforward, its final effect on consumer welfare is ambiguous: a large literature has developed to analyze the impact of state provisions on the actual volume of lending, finding, however, mixed evidence. Some studies have documented a reduction in mortgage origination in some states[7], while other papers have found a positive effect of APL legislation on credit availability[8]. Yet, it seems reasonable to presume that, if politicians were to push for cheap credit through the implementation of the easy credit policies, they would vote for more comprehensive measures to protect consumers, for instance by fixing a cap on interest rates and fees charged on borrowers. Indeed, this is also the result of the study by Bertrand and Morse (2012), who find evidence that higher district-level inequality is associated with more politicians voting in favor of easy credit policies. In particular, the authors show that both in Oregon and Ohio, politicians in districts with higher inequality were more likely to vote in favor of

[7]See Ho and Pennington-Cross (2006), Elliehausen, Staten and Steinbuks (2006), Bostic et al. (2008b).
[8]See Li and Ernst (2007), Posner and Meehan (2002).

Anti-Predatory Lending measures.

Importantly, APL laws vary substantially across states, both in terms of the contents, as well as on the enforcement procedures of the provisions[9]. Specifically, states can either fix a cap on interest rates and on fees charged by lenders, or can set limits on prepayments imposed on borrowers. Furthermore, the enforcement of the law differs to a large extent across states. In particular, besides setting limits on the "price" of loans as well as on prepayment fees, states can require that lenders conduct a detailed scrutiny of borrowers before the loan is approved. The latter measure differs importantly from the other two in that failing to impose scrutiny requirements is expected to have an unambiguous positive effect on credit availability. In fact, as opposed to caps that limit the "price" of loans, fewer scrutiny requirements should have an unambiguous, positive effect on mortgage origination, as lenders face lower costs when originating a loan and may also perceive an implicit guarantee by the state on the mortgages originated. It follows that, if politicians in one state were interested in expanding credit for marginal borrowers, one viable strategy could be that of neglecting to impose any scrutiny requirement on lenders.

2.4 Plan of the Paper

In what follows, using U.S. state-level data, I test empirically the mechanism presented in Figure 3 above. Specifically, in the next Section I present the data. Then, as a preliminary step, I analyze the relationship between initial state-level income inequality (1996) and the subsequent ten-year change in homeownerhsip (Section 4.1). Next, exploiting the strong variation of APL legislation across states, I directly test if income inequality has any effect on the probability that state legislation imposes scrutiny requirements on lenders before loan origination (Section 4.2.2). As noted above, politicians can influence housing-related credit policies and credit supply also through indirect actions, such as lobbying activities and pressure on lenders. For this reason, in Section 4.2.3 I investigate the relationship between initial income inequality and change in credit availability and in lending standards from 1995 to 2005 across U.S. states. Finally, in Section 5, I ask if the easy credit policies (which resulted in a surge in credit supply) were effective in boosting homeownership. To avoid endogeneity problems that would probably affect OLS estimates of a regression for the change in homeownership on the change in credit availability, I instrument credit expansion and the change in lending standards with initial state-level inequality.

[9] See Bostich et al. (2008b) and Ding, Quercia, and White (2009) for an accurate review of the literature.

3 Data

When studying the relationship between inequality and change in homeownership, the dependent variable is the change in homeownership in each U.S. states between 1996 and 2007 (*Change in Homeownership*). Data are gathered from "The Danter Company"[10]; homeownership measures the percentage of households that own a house (in each state, in every year). The change is computed as the difference between the 2007 and 1996 level. The choice of 1996 as first year is due to the lack of data for previous years on the website of "The Danter Company".

In the second step of my empirical analysis, the dependent variable is a binary indicator constructed by Ding, Quercia, and White (2009) that takes on the value of 1 if a state imposes scrutiny requirements on lenders, 0 otherwise (*Scrutiny Requirements*). Specifically, in their work, the authors code state Anti-Predatory Lending (APL) Laws, decomposing them in different subcategories. I use the binary indicator just mentioned, as it should be the best measure to capture whether politicians are interested in extending credit to middle and low-income borrowers[11].

Next, I use as dependent variable the change in credit availability, or in lending standards between 1995 and 2005 in each U.S. state. Specifically, I rely on the dataset assembled by Mian and Sufi (2009) using information on loan origination available through the "Home Mortgage Disclosure Act" (HMDA). The U.S. Congress requires that all information related to loan applications is reported to the federal government. For each application, data on its status (originated/approved/denied), its purpose (home purchase/refinancing/home improvement), loan amount, and applicant characteristics are available. Mian and Sufi (2009) "aggregate the application-level HMDA data to census tract", because their unit of analysis is a zip code. In my work, instead, I aggregate their data to the state level, being my unit of analysis the 50 U.S. states. The data I have access to cover the period 1995-2005. Consistently with the literature, I use the percentage of loans denied as a proxy for lending standards, and the number/dollar amount of loans originated for home purchase as a proxy for credit available to households.

The percentage of loans denied indicates the fraction of loan applications submitted but denied in each state. To measure the change in lending standards (*Ch.Denial Rates*), for each state, I compute the difference between the percentage of loans denied in 2005

[10] See http://www.danter.com/statistics/homeown.htm.
[11] See Section 2.3.

and in 1995. I also calculate the percentage change in loan amount ($\%Ch.Loan\$HP$), and the percentage change in the number of loans ($\%Ch.NumLoanHP$) originated for home purchase in each state between 2005 and 1995. I use the percentage, rather than the absolute change to minimize problems related to differences in population size or population growth in each state.

The main variable of interest in all my empirical specifications is state-level inequality, measured as the Gini Index. The source of the data for inequality (for each state) is the dataset assembled by Joshua Guetzkow, Bruce Western, and Jake Rosenfeld for the Russel Sage program on the Social Dimension of Inequality[12], in which the authors calculate the Gini Index using family income in each state. The dataset also reports state family income from all sources for the previous year, as well as the deciles of the income distribution in each state between 1963 and 2004. Specifically, when studying the relationship between inequality and change in homeownership or in credit availability, I use the Gini Index that refers to the beginning of the period (1996) to reduce concerns about reverse causation or simultaneous causality. Indeed, it is unlikely that the initial level of inequality was caused by the subsequent ten-year change in homeownership or in credit availability (or in lending standards). Also, it is reasonable to assume that it takes some time for the policies to become effective in increasing credit availability and boosting homeownership. Ten years seem a long enough period for the policies implemented to respond to initial conditions (high inequality) to become effective.

Instead, when studying the relationship between state-level inequality and scrutiny requirements, I use the Gini Index in 2000, for each state, since almost all the APL laws were passed between 2000 and 2003. As a robustness check, I repeat the analysis using also the Gini Index in 1999.

To reduce the scope of omitted variable bias and to make my results more precise, I also include in my analysis the change in (the natural log of) per capita state income (*Income Growth*), for each state between 1996 and 2007 (in the first step), or between 1995 and 2005 (when the dependent variable is change in credit availability or in lending standards). Data for per capita state income are collected from the BEA[13]. For the same reason, I control for average population per square mile in each state (*Pop.Density*), the percentage of blacks (*Black*), of Latinos (*Hispanic*), the percentage of the population over

[12]See http://inequalitydata.org/.

[13]I do so, since the dataset assembled by Guetzkow, Western, and Rosenfeld does not cover the period 2004-2007. Importantly, even when using income data collected from the dataset of the "Russel Sage program on the Social Dimension of Inequality", results do not change.

65 ($Over65$) in 2000, and population growth either between 1990 and 2000 or between 2000 and 2010 ($Pop.Growth$) in each state. Data for these variables come from the Census Bureau.

Using control variables that refer to the year 2000 may generate endogeneity. For instance, it is possible that states where homeownership increased more attracted more Blacks. In general, there may be a relation between inequality and one or more control variables which is not accounted for in the regression, and that could generate endogeneity. Hence, I repeat my analysis using socio-demographic variables that refer to the beginning of the period (1996 or 1995)[14], to rule out the possibility of endogeneity that arises from the inclusion of variables that are measured after the variable of interest (Gini Index). As before, data are collected from the Census Bureau.

Finally, in Section 5 I use a variable that captures state level differences in regulatory constraints to interstate branching ($Branching\ Index$) as an instrument for credit expansion[15]. The index was first created by Johnson and Rice (2008): it ranges from 0 to 4, with higher values indicating more restrictions to interstate branching. States with tighter interstate branching regulation may experience a smaller increase in credit. Importantly for my estimation strategy, this variable is orthogonal to credit demand, and can thus be used as an instrument for credit supply (see Favara and Imbs, 2010).

Summary statistics are reported in Table 2. The sample consists of 50 states.

4 Testing the "Political Reaction" Hypothesis

4.1 Income Inequality and Change in Homeownership

In this paragraph I return to the explanation that runs from the increase in inequality to the increase in homeownership, and test empirically this hypothesis, by studying the relationship between income inequality and homeownership in the U.S. states between 1996 and 2007. In particular, I ask whether between 1996 and 2007 homeownership in the United States increased more in states where income inequality was higher in 1996.

4.1.1 Estimation Strategy

I estimate the following cross-sectional regression:

[14] Data not reported for brevity.

[15] The very same variable is used in Favara and Imbs (2010) for the same purpose.

$$\text{Change in Homeownership} = \alpha + \beta Inequality + \delta X + \varepsilon$$

where the dependent variable is the change in homeownership in each U.S. state between 1996 and 2007, *Inequality* is the Gini in each state in 1996, and X is a vector of control variables that includes the change in per capita state income (1996-2007) and other socio-demographic variables such as population growth (2000-2010), population density, and the percentage of Blacks and of over 65 in the population in each state in 2000.

Using the change in per capita state income between 1996-2007 exposes my estimation strategy to the problem of endogeneity. Indeed, it is possible that the causal relation assumed in the regression presented above (i.e., from income growth to change in homeownership) is in fact reversed: it might be that not only stronger income growth positively affected the change in homeownership, but also that the rise in homeownership had a positive effect on per capita state income, for instance through augmented home equity. Similarly, it seems reasonable to expect that in states where homeownership grew more, the housing sector contributed to a larger extent to boost the local economy, thus generating a positive effect on the change in income. The ideal way to solve this problem would be to find a valid instrument for the change in per capita state income. However, it is hard to come up with a variable correlated with income, but that affects homeownership only through income.

I acknowledge the risk of endogeneity bias that comes from the inclusion of the change in per capita state income in the regression for the change in homeownership on initial state level inequality. Yet, the correlation between the residuals of a regression of the Gini Index on the vector of controls X (excluding income growth) and the residuals of a regression of income growth on X is quite low (0.09). Similarly, the correlation between the Gini Index and change in per capita state income is as low as 0.1. Hence, concerns about the bias that may stem from the endogeneity of income growth are reduced: results should not be significantly affected, even in case income growth was actually endogenous.

4.1.2 Results

Results are shown in Table 3. In column (1), I control only for the change in per capita state income between 1996 and 2007. The coefficient on inequality is positive and statistically significant at the 5% level, suggesting that states with higher inequality in 1996 experienced a greater increase in homeownership between 1996 and 2007. Specifically, a

one standard deviation difference in the Gini Index (0.0169) between two states predicts an increase in homeownership of 0.79 percentage points, or of 30% of the average, in the state with higher inequality, compared to the state with lower inequality in 1996. Given that between 1996 and 2007 homeownership increased on average by 2.696 percentage points, the effect of inequality on the change in homeownership is rather strong.

In column (2), I include also population density, the percentage of the population over 65, the fraction of Blacks in the population for each state in 2000, and population growth in each state between 2000 and 2010. Results barely change: the coefficient on inequality remains positive and statistically significant at the 5% level, while its magnitude increases slightly. As before, results suggest that states with higher inequality in 1996 experienced a larger increase in homeownership between 1996 and 2007. Fig.4 confirms that a positive relationship between inequality and change in homeownership exists, and suggests that results are not driven by outliers[16].

When including in the regression the fraction of Hispanics in each state in 2000 (see column (3)), the coefficient on inequality loses its significance (p-value 10.8%), even though its magnitude remains close to previous estimates. Yet, results obtained when including the fraction of Latinos in each state should be interpreted with extreme caution for at least two reasons. First, the correlation between inequality and the former variable is remarkably high (0.71)[17], suggesting that an unspecified relationship between the two variables may be present, and that the fraction of Hispanics in each state in 2000 is likely to be endogenous. Second, the distribution of the variable Hispanic is particularly uneven across the U.S. states, and so there is the serious risk that results in column (3) are actually driven, or at least influenced, by outliers.

Finally, in column (4) I restrict my analysis to the period 1996-2005: after 2005, the increasing trend in homeownership started to reverse, and the U.S. housing market started to slow down. In fact, as the demand for houses cooled somewhat, prices begun to decline. To make sure that this trend is not influencing the results, I compute the change in homeownership for each state between 1996 and 2005, and run the same regression as in column (2). Also in this case, the coefficient on inequality is strongly positive and significant at the 5% level.

[16]From Fig. 4 one may wonder whether Arizona is an outlier which is driving the results. I repeat the analysis excluding Arizona but results (not reported here) do not change: the coefficient on inequality remains positive and statistically significant at the 5% level.

[17]Consider, for instance, that the correlation between inequality and the fraction of Blacks in each state is 0.05.

Overall, the results obtained are supportive of the "political reaction" hypothesis, according to which easy credit policies were implemented to cope with the increase in income inequality. Indeed, I find that states that in 1996 had higher inequality experienced a greater increase in homeownership between 1996 and 2007. Results are quite robust: when controlling for additional variables, and restricting the period considered, the coefficient on inequality remains strongly positive and highly significant. Also, in a longer version of this paper, I tried different specifications for inequality, and used socio-demographic variables at baseline (1996) as well as an index of interstate branching deregulation (*Branching Index*) to further test the robustness of my results. Importantly, results barely changed, always remaining strongly positive and highly significant.

Still, the regression above does not *directly* support the idea that, via easy credit policies, an expansion of housing credit to middle and low-income households occurred in the period considered. As I argued, the easy credit policies resulted in a greater supply of loans to low-income families, that in turn caused an increase in homeownership. Therefore, a deeper analysis is needed, to study the relationship between inequality and mortgage loans origination, and between the latter and the change in homeownership. In the next Section, I more extensively test the "political reaction" hypothesis by analyzing the effect that inequality has on scrutiny requirements imposed on lenders by state regulation, and by studying the relationship between initial inequality and change in credit availability across states.

4.2 "The Core": Income Inequality and the Easy Credit Policies

In this section, I first investigate whether state-level inequality is a good predictor of the implementation of easy credit policies. My results show that in states with higher income inequality state laws (APL) impose laxer scrutiny requirements on lenders. This result is extremely important, in that it shows a direct link between inequality and credit market policies and regulations, supporting the "political reaction" hypothesis. Next, I test empirically the relationship between inequality and credit availability in the U.S. states between 1995 and 2005. Specifically, I ask whether in states with higher initial inequality, credit was expanded more aggressively and lending standards were eased more, as compared to states with lower initial inequality. Importantly, I find corroborating evidence of a positive relationship between initial inequality and credit expansion over the subsequent ten years.

4.2.1 Inequality and the APL Laws

In this Section, I investigate the effect of differences in state-level inequality (in 2000) on the probability that a state imposes higher scrutiny requirements on lenders (*Scrutiny Requirements*). As I mentioned in Section 3, most of the APL laws were passed between 2000 and 2003 and thus using the Gini Index of 2000 seems appropriate to better capture the pressure faced by politicians. As a robustness check, I also repeat my analysis by using the Gini Index in 1999. Furthermore, I include in the regression the same socio-demographic variables used in previous Sections, i.e., average population per square mile in each state (*Pop.Density*), the percentage of Blacks (*Black*), of Latinos (*Hispanic*), and of over 65 (*Over*65) in the population in each state in 2000. I also control for (the natural logarithm of) average per capita state income in 2000.

Results (reported in Table 4) should be interpreted as probabilities that a state imposes scrutiny requirements on lenders. Accordingly, the positive sign of the coefficient associated to any one regressor indicates that a marginal increase in such a regressor rises the probabilities that a state requires lenders to scrutinize borrowers before originating a loan. To summarize, I estimate the following regression:

$$\Pr(Scrutiny\ \mathrm{Re}quirements = 1) = \alpha + \beta Inequality + \delta X + u$$

Where the dependent variable equals 1 if scrutiny requirements are imposed on lenders, and X represents the set of control variables, i.e., per capita state income, population density, the percentage of the population over 65, the percentage of Blacks, and Hispanics in each state in 2000.

I first run the above regression using a linear probability model (LPM). The main advantage of the LPM is that it does not require the strong assumptions concerning the whole distribution of the error term, which are instead needed when using a Probit or a Logit Model. In the LPM, in fact, one has to make "only" the standard OLS assumption of orthogonality between regressors and residuals. Furthermore, the LPM allows for an easy interpretation of results. Yet, these advantages come at a cost: since the dependent variable represents a probability, its value should be bounded between 0 and 1. However, nothing in a linear regression prevents the dependent variable from taking on values greater than 1, or smaller than 0. In other words, the specification implied by the LPM is intrinsically incorrect. For this reason, I also repeat my analysis using a Probit Model, instead of the LPM.

Results obtained when using the LPM are reported in Table 4, column (1). As mentioned above, the main regressor of interest is the Gini Index (in each state) in 2000. The coefficient on inequality is negative and statistically significant at the 5% level, suggesting that states with higher inequality in 2000 are less likely to have enacted laws that impose scrutiny requirements on lenders. Specifically, if the Gini Index in one state is one standard deviation (0.0168) higher than in another, the probability that scrutiny requirements are imposed is 16 percentage points lower in the state with higher inequality, as compared to the other. In other words, a one standard deviation difference in the Gini between two states is expected to reduce the probabilities that the more unequal state has scrutiny requirements in place by 50%, as compared to the other state[18]. These findings strongly support the hypothesis that higher inequality affected state politicians, and suggest that the impact of inequality on political decisions and regulation is remarkable. As discussed above, laxer requirements should induce lenders to originate a larger volume of loans, especially for potentially risky borrowers. Hence, it seems reasonable to assume that, if politicians wanted to increase credit availability for middle and low-income borrowers, they would have refrained from imposing tight scrutiny requirements on lenders.

To check whether results are robust to the use of different models, and to more precisely gauge the marginal effect of a change in state-level inequality on the probability that scrutiny requirements are imposed, I repeat the same analysis conducted in column (1), using a Probit Model instead of the LPM. In column (2), I report the marginal effects computed at the mean of the regressors. As before, results are negative and statistically significant at the 5% level: higher inequality is associated with a lower probability that state laws impose scrutiny requirements on lenders. Specifically, if the Gini Index increases by 0.01 over the average, the probability of having scrutiny requirements in place declines by 10 percentage points. Notably, the magnitude of the marginal effects computed using the Probit Model is very close to the results obtained when using the LPM.

Finally, in column (3) I use the Gini Index for the year 1999, rather than for 2000, in order to check the robustness of my results. While the coefficient on inequality is slightly smaller than before, it nonetheless remains strongly negative and highly significant. In particular, if the Gini increases by 0.01 over the average, the probability that a given state requires lenders to scrutinize borrowers in advance declines by 9 percentage points. Again, these findings strongly suggest the existence of a link between inequality and policies aimed at increasing the credit available to marginal borrowers: laxer requirements are

[18]This result is easily obtained by noting that the average probability that a state has scrutiny requirements in place is 0.32.

found precisely in states where inequality was higher, i.e., where the pressure faced by politicians was probably stronger.

4.2.2 Income Inequality and Change in Credit Availability

Easy credit policies may have been implemented not only through formal pieces of legislation, but also through indirect and more hidden actions such as pressure on lenders or lobbying activities aimed at expanding credit availability to marginal borrowers. In this section I investigate the relationship between initial income inequality and change in credit availability across U.S. states between 1995 and 2005. According to the political reaction hypothesis, in more unequal states politicians faced stronger pressure and were thus more likely to implement easy credit policies. Henceforth, one should expect a larger increase in credit availability, and a sharper decline in lending standards to occur in states with higher initial inequality. Indeed, this is precisely what results in this Section suggest.

I run different cross sectional regressions, using as dependent variable the change in credit availability, or in lending standards between 1995 and 2005 in each U.S. state, as defined in Section 3. As before, I control for the change in per capita state income over the period considered, and for other state-specific characteristics. Results are reported in Table 5.

In column (1), the dependent variable is the percentage change in the amount of loans originated for home purchase in each state between 1995 and 2005 ($\%ChLoan\$HP$). The coefficient on inequality is positive and statistically significant, suggesting that in states with higher initial inequality, the amount of loans originated increased remarkably more, compared to states with lower inequality. Specifically, if the Gini Index in one state is one standard deviation (0.0169) higher than in another state, the increase in loan amount is higher by 17% of the average in the former state between 1995 and 2005. A possible explanation for these results is that the increase in inequality induced lenders to divert credit from low to high income borrowers. Given that wealthier borrowers usually get larger loans, an increase in inequality may have induced banks to increase the total amount of loans originated. Alternatively, these results may be supportive of the "political reaction" hypothesis: in states with higher inequality, politicians arguably faced a stronger pressure, and, thus, more comprehensive measures were adopted there. This could explain the positive relationship between inequality and credit availability documented in column (1).

In column (2), the dependent variable is the percentage change in the number of loans originated for home purchase in each state between 1995 and 2005 ($\%Ch.Num.LoanHP$). Again, the coefficient on inequality is positive and statistically significant: states with higher initial inequality experienced a larger increase in the number of loans originated[19] between 1995 and 2005. Results suggest that if the Gini Index increases by one standard deviation (0.0169), the number of loans originated increases by 22 percentage points, or by 15% of the average. Also in this case, the findings are supportive of the hypothesis that inequality induced a political reaction aimed at extending cheap credit to middle and low-income households. Notice that the change in the dependent variable is measured in relative terms, and so differences in population growth rates across states do not influence the results.

While these findings can be interpreted in light of the political reaction hypothesis, they do not necessarily imply that credit for middle and low-income households actually increased in states where the initial level of inequality was higher. In fact, loan amount may have increased more in more unequal states because lenders originated larger loans for richer people, and more inequality may simply indicate that top income earners are richer compared to the rest of the population. If the surge in credit availability was driven solely by increased borrowings from high-income households, then the "political reaction" hypothesis would be untenable.

Furthermore, if the interest rate charged by lenders cannot be observed, it is not possible to disentangle the effect that inequality has on the demand from the one it has on the supply of credit by merely looking at the two measures of credit expansion considered above. Indeed, higher income inequality may induce households to ask for more credit, for any given level of the interest rate charged by lenders. Related to this, some authors[20] have recently argued that growing inequality triggered a significant increase in the demand for credit by middle and low-income households. Then, by solely looking at the change in the number or in the amount of loans originated without controlling for the level of the interest rate one may mistakenly attribute to credit supply an increase in credit availability which is in fact due to credit demand. Failing to observe changes in credit supply would substantially reduce the relevance of my analysis, as the political reaction hypothesis rests on the idea that credit supply shifted outwards as a result of the easy credit policies.

An effective way to overcome the issues discussed above is to focus on lending stan-

[19] For home purchase.

[20] See Al-Hussami and Remesal (2012), Bertrand and Morse (2012), Kumhof and Ranciere (2010), Rajan (2010), and Frank, Levine and Dijk (2009).

dards, analyzing if inequality had any effect on them. Consistently with the literature, I measure lending standards as the fraction of loan applications submitted but denied (in each state). A decline in denial rates means that the fraction of households that are credit rationed drops. Thus, a relaxation of lending standards should indicate that not only rich households enjoy more and/or larger loans, but also that more "risky" borrowers are granted credit. Moreover, looser lending standards cannot be adduced (only) to an increase in credit demand, but also to an outward shift in credit supply. Henceforth, by looking at lending standards it is possible to disentangle the effect that inequality has on the different sides of credit markets. In particular, one can detect the relationship between inequality and credit supply. For this reason, studying the effect of inequality on the change in lending standards is crucial for my empirical strategy.

In column (3) I analyze the impact that the initial level of inequality had on the change in denial rates between 1995 and 2005 (*Ch.Denial Rates*). The coefficient on inequality is negative and statistically significant at the 5% level, suggesting that lending standards declined more in states where inequality was higher at the beginning of the period considered. Specifically, if the Gini Index moves from minimum to average, denial rates decrease by 20%. In other words, a 5% increase in inequality is associated with a 20% reduction in denial rates. Figure 5 shows graphically the results reported in column (3). These results reassure us that credit expansion was not driven only by larger (or more) loans to rich borrowers, but that also other income groups experienced a relaxation of credit constraints.

My findings closely mirror those obtained by Mian and Sufi (2009), who document a dramatic expansion in credit supply in U.S. districts with a larger fraction of subprime borrowers compared to other districts, between 1995 and 2005. Specifically, they show that denial rates declined substantially more in areas where the initial quality of borrowers was "worse" (i.e., in districts where there was a larger fraction of subprime borrowers compared to other districts).

4.3 Discussion

As documented by Table 4, in states with higher income inequality the probabilities that lenders have to fulfill scrutiny requirements before originating a loan are lower. These findings suggest that there exists a direct link between income inequality and easy credit policies: if the goal of politicians was that of expanding credit to middle and low-income

households in order to ease the pressure deriving from higher inequality, they could have levered on scrutiny requirements, allowing lenders not to perform a detailed scrutiny over potential borrowers. Then, the ultimate result of growing income inequality will be an outward shift in credit supply, due to the increased pressure exerted by politicians. This is precisely what results obtained in previous paragraphs suggest.

On the one hand, states with higher initial inequality experienced a larger increase in homeownership between 1996 and 2007. On the other, I have provided evidence of a strong, negative relationship between initial inequality and the subsequent change in lending standards. As discussed above, the stronger decline in lending standards associated with higher inequality is extremely important, since it allows to disentangle the effect of inequality on credit demand from the one inequality has on the supply of credit. Importantly, the empirical evidence of previous Sections does not exclude the possibility that credit demand rose more in more unequal states. In fact, it seems reasonable to assume that credit demand is increasing in the level of inequality. However, without an expansion in credit supply the augmented demand for credit could hardly be satisfied[21].

My work adds on the existing literature by suggesting that state-level channels can be, and in fact are, used by politicians to affect lenders and, ultimately, credit market outcomes. Related to this, the papers by Mian, Sufi and Trebbi (2010 and 2011) show that subprime borrowers strongly influenced federal policies towards the implementation of the easy credit policies. By focusing on state-level legislation, my work adds on their studies, shedding light on an additional channel through which politicians (may) have influenced mortgage markets. In addition, I expand on Rajan's idea of easy credit policies for two reasons. First, he does not conduct any empirical analysis to support his hypothesis and, second, he claims that the easy credit policies took place only at the federal level. Conversely, my analysis not only brings support to the "political reaction" hypothesis. It also suggests that the latter was not confined to the federal level, but took place at the state-level as well. While Bertrand and Morse (2012) find preliminary results suggesting that politicians undertook actions also at the state level as a response to growing inequality, their measure of easy credit policies is not very accurate[22]. My work adds on their study by

[21]Related to this, in a longer version of this paper I formally show that, if credit demand rises in response to higher inequality, the equilibrium volume of lending will decline, unless lenders cut their lending standards.

[22]They use an indicator for whether politicians voted in favor or against APL provisions. However, as I discussed in Section 2.3 (and as the authors too point out), the ultimate effect of passing APL laws on the volume of lending is ambiguous. Thus, such a measure cannot be interpreted as a clear indicator for the implementation of easy credit policies.

using a variable which unambiguously indicates whether politicians are willing to extend credit to middle and low-income households.

5 Studying the Effect of the Easy Credit Policies on Homeownership Using Instrumental Variable

5.1 Income Inequality as an Instrument for Credit Expansion

In this Section I ask whether politicians were ultimately able to boost homeownership among middle and low-income households through the implementation of the easy credit policies, in so doing easing the pressure coming from the rise in income inequality. Results in Section 4.1 suggest that, indeed, politicians reached their goal: states that in 1996 had higher inequality experienced a greater increase in homeownership between 1996 and 2007. Yet, a regression of the change in homeownership on the initial level of inequality estimates only a reduced form, and, in principle, is not enough to evaluate the effect of credit expansion on homeownership. To more precisely assess whether the easy credit policies were effective in boosting homeownership one should thus study the relationship between change in credit availability (or in lending standards) and change in homeownership.

However, the OLS estimates of the effect of credit expansion on homeownership are likely to be biased for several reasons. First of all, there could be omitted variable bias, due to the fact that some factors relevant in explaining the change in homeownership correlated with the change in credit are not included in the model. Second, and probably more relevant here, results may be affected by endogeneity bias because of reverse causation and/or simultaneous causality. An increase in homeownership could exert positive pressure on house prices, leading to an increase in the demand for loans in states where homeownership increased more. This, in turn, may have influenced the number and/or the amount of loans originated in equilibrium[23]. Overall, the effect of the change in credit availability on the change in homeownership may be blurred.

Using an Instrumental Variable approach can solve the problems discussed above, provided that a good instrument for credit expansion is found. Indeed, inequality can

[23] Also, the OLS estimates may be incorrect if house prices influenced the change in homeownership, and, at the same time, the demand for loans, as documented by Mian and Sufi (2009), and Favara and Imbs (2010). In this case, results could be biased because of the simultaneous effect of house prices on both the dependent and the independent variable.

be a valid instrument for the change in the number and in the volume of loans, as well as in denial rates. On the one hand, it is positively correlated with the change in credit available to households. Results in Section 4.2, in fact, suggest that higher inequality is associated with a larger increase in both the number and the amount of loans originated, and with a stronger decline in lending standards across the U.S. states (see Table 5). That is, higher inequality is positively and strongly correlated with credit expansion. On the other hand, it is unlikely that the level of inequality in 1996 had any direct effect on the change in homeownership in the subsequent 10 years. In other words, the exclusion restriction put forward here is that the only way in which income inequality affected the change in homeownership is through the implementation of the easy credit policies which, in turn, generated a surge in credit availability. The latter idea is supported by the findings of Section 4.2.1 (see Table 4): states with higher inequality are less likely to have imposed scrutiny requirements on lenders. In turn, a larger expansion in credit supply contributed to generate a stronger increase in homeownership. The time dimension used rules out problems of reverse causation. Also, controlling for many state-specific demographic variables and for income growth is likely to reduce the extent to which inequality may be correlated with the error term in the second-stage regression. Thus, it seems reasonable to use the initial level of inequality as an instrument for the change in credit availability.

5.2 Estimations and Results

I run three different regressions where the dependent variable is always the change in homeownership (1996-2007) and the main regressor of interest is one of the three measures of credit expansion considered above (i.e., percentage change in the amount and in the number of loans originated for home purchase, and change in denial rates between 1995 and 2005). In order to better appreciate the difference between the OLS and the 2SLS estimates, I report both the OLS and the 2SLS coefficients, obtained by instrumenting the change in credit availability (or in lending standards) with the initial level of inequality (as usual measured with the Gini Index). In all regressions, I also control for the change in per capita state income between 1996 and 2007 and for the fraction of Blacks and of over 65 in each state in 2000[24]. Finally, I include the branching index in order to control

[24] I repeated the analysis using baseline variables and results (not reported) did not change. Also, for the reader's convenience I do not report the coefficients on *Over*65 and *Branching Index* when presenting the first set of results.

for the potential effect of the degree in deregulation of interstate branching across states. Results are reported in Table 6.

In the first two columns, the independent variable is the percentage change in loan amount originated for home purchase. When instrumenting the regressor of interest with the Gini Index in 1996, the coefficient becomes more than 2.5 times larger (see column (2)), while the precision of results remains strong. In column (4), the variable instrumented is the percentage change in the number of loans originated for home purchase. As before, the coefficient of the IV regression is significantly larger than the one obtained with OLS. Also, the instrumented results are more precise: the p-value passes from 6.5% to 0.2%. Finally, column (6) reports the results obtained when instrumenting the change in denial rates: also in this case, the instrumented results are more precise and the magnitude of the coefficient increases substantially. Specifically, the estimated effect of the change in lending standards on homeownership is three times greater once the independent variable is instrumented with inequality. Furthermore, the coefficient becomes significant at the 5% level.

Table 7 reports the first-stage regressions for each of the three regressors of interest, as well as the F-statistic and the p-value associated with the test of weak instrument. While the value of the F-statistic is always smaller than 10, the p-value suggests that we can reject the null hypothesis of weak instrument. Furthermore, the coefficient on inequality is always large and statistically significant at the 5% level, again suggesting that the correlation between inequality and change in credit availability is strong.

5.3 Interpretation of Results

In all cases, results suggest that there is a large and positive effect of credit expansion on the change in homeownership. Specifically, in states where the number and the amount of loans originated for home purchase increased more between 1995 and 2005, homeownership grew more during the same period. Similarly, where lending standards declined more, homeownership increased to a larger extent. Notably, by using the 2SLS approach it is possible to attach a causal interpretation to the relationship between credit expansion and change in homeownership.

Interestingly, after instrumenting the change in credit availability with inequality, the estimated effect on the change in homeownership becomes remarkably larger. These findings may suggest that the OLS estimates of the effect of credit expansion on the change

in homeownership are downward biased. However, there exists another, more appealing explanation for the 2SLS estimates being larger than the OLS ones. That is, the heterogeneous effect of inequality on the response given to it by state politicians.

By extending the discussion conducted by Angrist, Imbens and Rubin (1996) on the identification of treatment effects using instrumental variables, one can interpret the initial level of inequality as a treatment assigned to each state that differs in its "intensity" (with higher inequality corresponding to higher values of the treatment). Accordingly, the treatment effect is the political reaction undertaken by state politicians to boost homeownership via the implementation of the easy credit policies. It seems reasonable to assume that (politicians in) each state will respond differently to different degrees of initial inequality (the treatment). If this was the case, then the 2SLS coefficient would not be an estimate of the average effect of the treatment (initial state-level inequality) on the treated (the 50 U.S. states), but the effect of the treatment for compliers. In our context the group of compliers is composed of states where politicians changed their behavior (i.e., implemented the easy credit policies) in response to income inequality. In other words, the 2SLS estimates can be interpreted as the Local Average Treatment Effect ($LATE$) for the states in which politicians implemented easy credit policies as a reaction to the initial level of inequality. Observing very large values for the 2SLS coefficients thus suggests that the states where politicians implemented the easy credit policies (i.e., comply with the treatment) are the ones where the latent demand for credit and for homeownership was stronger. As a consequence, the states where politicians responded to inequality by enacting (more comprehensive) policies, are the ones where homeownership grew the most.

Interpreting results of Table 6 in light of an heterogeneous political reaction to inequality brings further support to the idea advanced throughout this paper. Indeed, the discussion conducted above suggests that, in states where the demand for credit and for homeownership was larger, politicians also faced a stronger pressure and were thus more likely to implement more comprehensive measures to cope with their constituencies' demands. At the same time, stronger pressure on politicians was arguably associated with higher latent demand, which, as soon as credit constraints were relaxed, led to a substantial growth in homeownership.

Even without interpreting results by assuming heterogeneous political responses to inequality, the findings of this Section, together with the empirical evidence of Section 4, are clearly supportive of the political reaction hypothesis, in that they suggest that homeownership increased more in states where credit expansion was more pronounced.

5.4 Robustness Check: Overidentification Test

If a second instrument for credit expansion can be found, then, the validity of the IV approach adopted above could be checked also by using a test of overidentifying restrictions. This test assumes that one of the (two) instruments is truly exogenous and tests for the exogeneity of the other(s): therefore, it can be used as a direct test of the exclusion restriction on inequality. Still, one should be cautious in interpreting the results, since the test may not reject the exogeneity assumption if the instruments are "invalid" but highly correlated with each other.

The main challenge is to find a valid instrument for credit expansion that is not "too highly" correlated with the inequality level in 1996. Such an instrument can be found in the branching index. As mentioned in Section 3, this is an index that captures interstate differences in "regulatory constraints to interstate branching" (see Favara and Imbs, 2010). The Interstate Banking and Branching Efficiency Act (IBBEA) of 1994 granted states different regulatory powers. In particular, states can[25]: i) impose a minimum age on the branching banks; ii) restrict de novo interstate branching; iii) restrict the acquisition of individual branches; iv) impose a deposit cap. The index was first created by Rice and Strahan (2008), and it ranges from 0 to 4, assigning lower values to states more open to interstate branching.

Favara and Imbs (2010) show that the index can be used as an instrument for the supply of mortgage loans, since it is orthogonal to demand conditions[26]. Of relevance for my analysis is Favara and Imbs (2010) finding that in states imposing fewer restrictions on branching, lending standards and both the number and the volume of mortgage loans originated increased more between 1994 and 2005. Hence, the branching index can be used as an (additional) instrument for credit expansion. Indeed, the coefficient on both inequality and on the branching index in the first stage has the expected sign and is statistically significant at the 5% level (see Table 9). Also, the F statistic for weak instrument is now larger than before, approaching a value of 9. In addition, the 2SLS estimate of the (instrumented) change in denial rates is very precise (p-value 2.2%) and of magnitude similar to that obtained when using only inequality as an instrument (see Table 8). These results, together with the findings of Favara and Imbs (2010), suggest that the branching index can be used as an instrument for the change in lending standards, which, among the

[25]For a more comprehensive discussion on branching regulation, see Rice and Strahan (2008).

[26]In their work, the authors instrument credit supply with the branching index to evaluate the impact of a change in credit availability on house prices (see Favara and Imbs, 2010).

three measures of credit expansion used here, is the variable that more clearly captures the change in credit supply.

Thus, an overidentification test can be performed, using both inequality and the branching index (in each state) as instruments for the change in lending standards. The p-value is 0.38661: the test fails to reject the null hypothesis of overidentifiying restrictions (see Table 8). However, these results should be interpreted with extreme caution. Failure to reject the null hypothesis should not be taken as strong evidence in favor of the assumption that inequality is a valid instrument for the change in lending standards. Nonetheless, the findings provide some evidence to substantiate the validity of the IV approach conducted in this Section, and to corroborate the political reaction hypothesis discussed in Section 2.

6 Conclusions

In my work I test empirically whether increasing income inequality in the U.S. generated mounting pressure on politicians who, in turn, responded to it by implementing easy credit policies aimed at boosting homeownership, especially among middle and low-income borrowers. Specifically, I show that the "political reaction" varied across states, depending on the degree of inequality politicians were exposed to. In states with higher income inequality, politicians faced more pressure and were thus more likely to undertake more comprehensive actions to extend cheap housing credit for marginal borrowers.

Indeed, I find that, between 1996 and 2007, homeownership rates increased substantially more in the U.S. states where the initial level of inequality was higher. Then, I directly test for the effect that inequality had on the implementation of the easy credit policies by exploiting across-states variations in mortgage related legislation (APL). I find a strong and negative relationship between inequality and the probability that a state imposes scrutiny requirements on lenders. That is, in states where inequality was higher, fewer scrutiny requirements were placed on lenders. These findings suggest that politicians eagerly reacted to their constituencies' demands by implementing credit-related legislation aimed at boosting credit availability for low-income borrowers. My results are consistent with those obtained by Mian, Sufi, and Trebbi (2011), who show that subprime borrowers strongly influenced federal policies towards the implementation of easy credit policies.

By focusing on state-level legislation, my work expands the scope of the paper by Mian, Sufi, and Trebbi (2011), by exploring an additional channel through which politicians

may have influenced mortgage markets. Furthermore, my empirical strategy allows me to expand on Rajan's idea of easy credit policies for two reasons. First, he does not conduct any empirical analysis to support his hypothesis and, second, he claims that the easy credit policies took place only at the federal level. Conversely, my analysis not only brings support to the "political reaction" hypothesis. It also suggests that the latter was not confined to the federal level, but took place at the state-level as well. Related to this, my findings complement the work by Bertrand and Morse (2012) by improving on the measure used to capture the implementation of easy credit policies at the state-level[27].

Political actions need not be explicit laws or formal pieces of regulation, but can also take the form of indirect pressure upon banks and lobbying activities aimed at making cheap credit available to low-income households. For this reason, I study the relationship between income inequality and change in credit availability across the U.S. states, finding that in states with higher initial inequality, lending standards declined more, and credit availability increased to a larger extent between 1995 and 2005, as compared to states with lower initial inequality. Importantly, I can disentangle the effect that inequality has on credit demand from the one it has on credit supply by looking at the change in denial rates, a variable that unambiguously captures lenders' behavior. This, in turn, allows me to interpret the boom in credit availability as an outward shift in credit supply. Observing easier credit standards where initial inequality is higher, i.e. where borrowers are in principle riskier, is rather puzzling. In fact, other things being equal, one would expect credit rationing to increase, and not to decline, in markets where the fraction of riskier borrowers is larger. These findings however can be explained by the fact that rising income inequality generated pressure from middle and low-income households on politicians who, in turn, responded with policies aimed at extending cheap housing-credit to marginal borrower.

The "political reaction" hypothesis, first advanced by Calomiris (2009) and Rajan (2010), helps rationalize why lenders were (more) willing to relax lending standards in states where borrowers were riskier. Specifically, Rajan (2010) argues that the surge in inequality induced middle and low-income households to increase their demand for credit, so as to prevent their living standards from falling, relative to those of high-income households. Crucially, the effect of the easy credit policies was to induce an outward shift in credit supply, that allowed households to borrow more, in spite of stagnating, or even declining, wages. In other words, the easy credit policies contributed, at least in part,

[27] Scrutiny requirements imposed on lenders by state mortgage statutes.

to the expansion in credit supply that ultimately generated the dramatic rise in credit availability experienced by the U.S. in the decade leading up to the 2007-2009 financial crisis.

It is worth noting that many factors other than the easy credit policies probably contributed to generate the unprecedented expansion in credit that took place in the U.S. between 1995 and 2005. Yet, none of them is in contrast with the "political reaction" hypothesis. In fact, political actions aimed at extending credit to marginal borrowers may have even encouraged securitization, by generating moral hazard on the part of lenders, and favored expansion of credit availability even further. The findings of this paper provide the motivation to further investigate the potential role played by the easy credit policies in distorting private sector's incentives and in generating moral hazard.

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Table 1. Change in Income Ratios

	Top to Bottom	Top to Middle	Top 5% to Bottom	Top 5% to Middle
Late 1980s	6,0	2,2	8,5	3,1
Late 1990s	6,5	2,4	10,3	
Mid 2000s	7,3	2,6	12,2	4,4

Source: "Pulling Apart. A State-by-State Analysis of Income Trends", Bernstein J., McNichol E., Nicholas A., April 2008. Note: Income ratios are calculated by dividing the average family income of the Top Quintile or Top 5% by the average family income of the Bottom or Middle Quintile.

Table 2. Summary Statistics of State Level Data

Variable	Mean	Standard Deviation	Minimum	Maximum
Change in Homeownership	2.696	2.7136	-2.2	9.5
Ch. Denial Rates	0.1063	0.0665	-0.0135	0.2749
%Ch. Num.Loan HP	1.3852	0.7816	0.4103	4.0951
%Ch Loan$ HP	2.933	1.4687	1.0594	6.6029
Scrutiny Requirements	0.32	0.4712	0	1
Gini (1996)	0.3861	0.0169	0.3602	0.4362
Gini (2000)	0.3993	0.0168	0.3639	0.4363
Income Growth	0.4913	0.0637	0.3219	0.7428
Pop. Growth	0.0986	0.0726	-0.0055	0.3514
Black	0.0990	0.0958	0.003	0.363
Over65	0.1254	0.0191	0.057	0.176
Pop. Density	182.698	252.0089	1.1	1144.2
Branching Index	2.214	1.3354	0	4

Note: *Change in homeownership* is the percentage change in each U.S. state between 2007 and 1996. *Ch. Denial Rates* is the change in the fraction of applications submitted but denied in each state between 2005 and 1995. *%Ch. Num.Loan HP* is the percentage change in the number of loans originated for home purchase in each state between 2005 and 1995. *%Ch. Loan$ HP* is the percentage change in loan amount originated for home purchase in each state between 2005 and 1995. *Income Growth* is the change in the natural log of per capita state income in each state between 1996 and 2007. *Gini* is the Gini Index (for each state). *Pop. Growth* is the percentage change in the population between 2000 and 2010 in each state. *Black, Over65* and *Pop. Density* indicate respectively the fraction of Blacks and of over65, and population density per square mile in each state in 2000. *Branching Index* is an index that captures state level differences in regulatory constraints to interstate branching (lower values indicate more openness towards interstate branching).

Table 3. Income Inequality and Change in Homeownership

Dep. Variable	Change in Homeownership			
	(1)	(2)	(3)	(4)
Inequality	46.76**	47.24**	44.37	50.96**
	(18.974)	(18.291)	(27.030)	(20.288)
Income growth	4.36	5.13	5.14	50.96**
	(5.784)	(6.330)	(6.379)	(20.288)
Pop. Density		3.89**	3.53**	1.67
		(1.489)	(1.745)	(1.338)
Over65		-11.45	-11.03	0.49
		(15.452)	(15.674)	(15.719)
Black		-3.82	-3.64	-0.58
		(4.306)	(4.677)	(4.602)
Pop. growth		3.48	3.24	-1.90
		(5.083)	(5.334)	(5.269)
Hispanics			0.83	
			(4.894)	
Observations	50	50	50	50
Adj. R-squared	0.06	0.13	0.09	0.05

Note: In columns 1 to 3 *Change in Homeownership* is measured as the change in homeownership in each U.S. state between 1996 and 2007. Column (4) restricts the analysis to the period 1996-2005. *Inequality* is measured as the Gini Index in 1996; *Income growth* is the change in per capita state income between 1996 and 2007 in each state. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Inequality and State Laws' Restrictions on Lenders

Dep. Variable	Pr(*Scrutiny Requirement* = 1)		
	(1)	(2)	(3)
Inequality	-9.48**	-10.62**	-8.85**
	(4.238)	(4.86)	(4.401)
Income in 2000	0.08	0.13	0.08
	(0.696)	(0.656)	(0.650)
Pop. Density	0.28	0.25	0.26
	(0.485)	(0.409)	(0.420)
Over65	-1.06	-0.66	-0.82
	(3.241)	(3.431)	(3.501)
Black	1.10	1.24*	1.14
	(0.722)	(0.743)	(0.725)
Hisp	1.76**	1.95**	1.78**
	(0.765)	(0.825)	(0.833)
Observations	50	50	50
Adj. R-squared	0.05	.	.

Note: *Scrutiny Requirement = 1* indicates that state legislation requires lenders to scrutinize borrowers before originating a loan. Inequality is measured as the Gini Index in 2000 in columns (1) and (2), and as the Gini Index in 1999 in column (3). *Income in 2000* is the natural logarithm of average per capita state income in 2000. Column (1) reports the results of a Linear Probability Model. Columns (2) and (3) report the marginal effects of a Probit Model computed at the mean of each regressor. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 5. The Effect of Inequality on Credit Availability

Dep. Variable	Percentage change in loan *amount* for HP	Percentage change in *number* of loans originated for HP	Change in the percentage of loans denied
Inequality	29.55**	13.90**	-1.13**
	(13.528)	(5.818)	(0.482)
Income growth	2.91	0.95	0.03
	(4.110)	(2.092)	(0.183)
Over65	3.46	-4.57	-0.10
	(13.436)	(7.821)	(0.756)
Black	-1.80	-1.68	-0.10
	(2.010)	(1.126)	(0.088)
Branching Ind.	-0.20*	-0.10	0.02***
	(0.119)	(0.063)	(0.006)
Observations	50	50	50
Adj. R-squared	0.05	0.06	0.15

Note: The change in the dependent variable is always referred to the period 2005-1995. *Inequality* is measured as Gini Index in 1996. *Branching Index* is an index (ranging from 0 to 4) that captures the degree of state regulation to interstate branching, with lower values indicating more openness. Repeating the analysis by including population density or by using the fraction of Blacks and of over 65 in each state in 1996 does not alter the results. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. The Effect of the Easy Credit Policies on Homeownership

Dep. Variable	Change in Homeownership					
	(1)	2SLS	(3)	2SLS	(5)	2SLS
Credit Expansion	0.70***	*1.80****	1.07*	*3.80****	-15.28**	*-46.64***
	(0.259)	*(0.648)*	(0.563)	*(1.218)*	(6.143)	*(18.657)*
Income growth	4.64	2.47	5.76	5.07	6.60	7.78
	(5.774)	(6.450)	(5.655)	(6.796)	(5.337)	(6.653)
Black	-0.55	1.29	0.03	4.55	-3.43	-6.93
	(4.320)	(5.135)	(4.312)	(6.003)	(4.611)	(5.554)
Measure of Credit Expansion						
%Ch Loan$ HP	X	X				
%Ch. Num.Loan HP			X	X		
Ch. Denial Rates					X	X
Observations	50	50	50	50	50	50
Adj. R-squared	0.10	.	0.08	.	0.11	.

Note: *Change in Homeownership* is the change in homeownership in each U.S. state between 1996 and 2007. *Income Growth* is the change in the natural log of per capita state income in each state between 1996 and 2007. *%Ch. Loan$ HP* is the percentage change in loan amount originated for home purchase in each state between 2005 and 1995. *%Ch. Num.Loan HP* is the percentage change in the number of loans originated for home purchase in each state between 2005 and 1995. *Ch. Denial Rates* is the change in the fraction of applications submitted but denied in each state between 2005 and 1995. The 2SLS columns report results when each measure of credit expansion is instrumented with inequality (measured as the Gini Index in 1996 in each U.S. state). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7. First Stage Regression

Dep. Variable	Percentage change in loan *amount* for HP	Percentage change in *number* of loans originated for HP	Change in the percentage loans denied
Inequality	29.44**	13.98**	-1.14**
	(13.742)	(5.942)	(0.484)
Income growth	1.47	0.01	0.06
	(3.566)	(1.744)	(0.141)
Over65	2.97	-4.87	-0.096
	(13.641)	(7.819)	(0.734)
Black	-1.96	-1.79	-0.1
	(2.021)	(1.102)	(0.084)
Branching Ind.	-0.19	-0.1	0.02***
	(0.124)	(0.066)	(0.006)
F-Statistic	4.59	5.53	5.53
P-Value	0.037	0.023	0.023
Observations	50	50	50

Note: The change in the dependent variable is always referred to the period 2005-1995. *Inequality* is measured as Gini Index in 1996. *Branching Index* (index ranging from 0 to 4) captures the degree of state regulation to interstate branching, with lower values indicating more openness. P-value is the p-value associated with the test of weak instrument. In all cases, we can reject the null hypothesis that inequality is a weak instrument. Repeating the analysis by including population density or by using the fraction of Blacks and of over 65 in each state in 1996 does not alter the results. Robust standard errors in parentheses. ***p<0.01, ** p<0.05, * p<0.1.

Table 8. Robustness Checks: IV Regression with Two Instruments

Dep. Variable	Change in Homeownership		
	(1)	(2)	(3)
%Ch Loan$ HP	1.87***		
	(0.643)		
%Ch. Num. Loan HP		3.92***	
		(1.258)	
Ch. Denial Rates			-33.66**
			(13.498)
Income growth	2.03	4.78	8.05
	(6.608)	(6.897)	(5.538)
Over65	-11.26	13.33	-11.72
	(25.092)	(35.716)	(27.698)
Black	1.38	4.74	-5.45
	(5.177)	(5.954)	(5.592)
Hansen J-Statistic	.	.	0.75
P-Value	.	.	*0.3866*
Observations	50	50	50

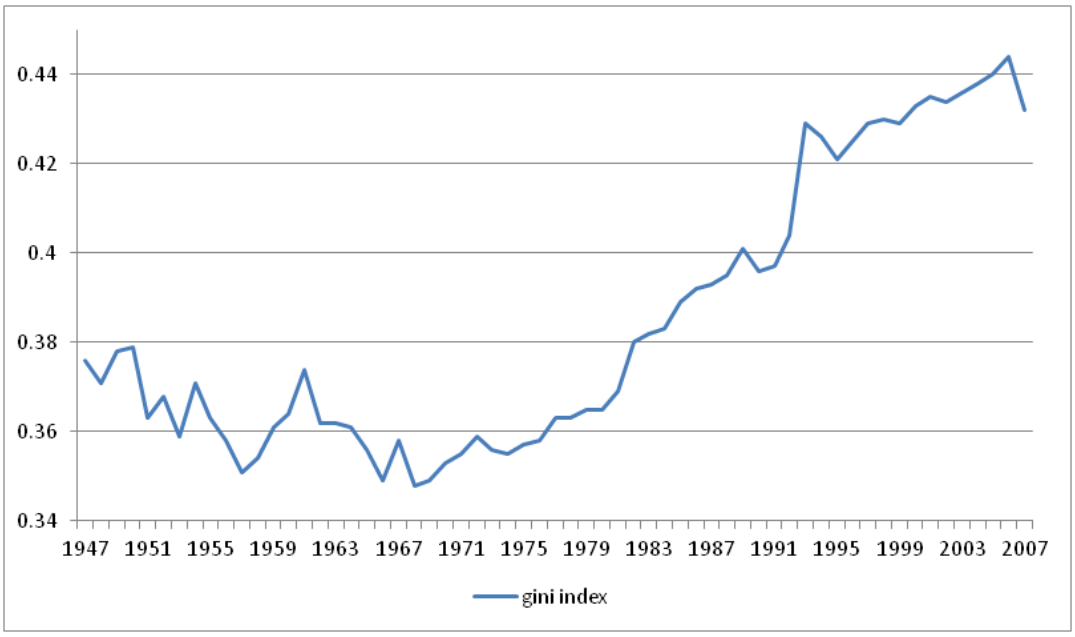
Note: *Change in Homeownership* is the change in homeownership in each U.S. state between 1996 and 2007. *Income Growth* is the change in the natural log of per capita state income in each state between 1996 and 2007. *%Ch. Loan$ HP* is the percentage change in loan amount originated for home purchase in each state between 2005 and 1995. *%Ch. Num.Loan HP* is the percentage change in the number of loans originated for home purchase in each state between 2005 and 1995. *Ch. Denial Rates* is the change in the fraction of applications submitted but denied in each state between 2005 and 1995.Each measure of credit expansion is instrumented with both the Gini Index in 1996, and the Branching Index. P-Value reports the p-value associated with the test of overidentifying restrictions. We cannot reject the null hypothesis of overidentifying restrictions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 9. First Stage Regression: Credit Expansion on Inequality and Branching Index

Dep. Variable	Percentage change in the *number* of loans	Percentage change in *loan* amount	Change in the percentage loans denied
Inequality	16.19**	38.83**	-1.14**
	(8.036)	(17.99)	(0.549)
Branching_Ind	-0.18*	-0.38	0.02**
	(0.103)	(0.229)	(0.007)
Income growth	0.74	2.84	0.06
	(2.159)	(4.835)	(0.148)
Over65	-2.77	6.45	-0.10
	(7.052)	(15.794)	(0.482)
Black	-1.77	-2.53	-0.10
	(1.409)	(3.155)	(0.096)
F Statistic	3.46	3.72	8.90
P-Value	0.04	0.032	0.0006
Observations	50	50	50

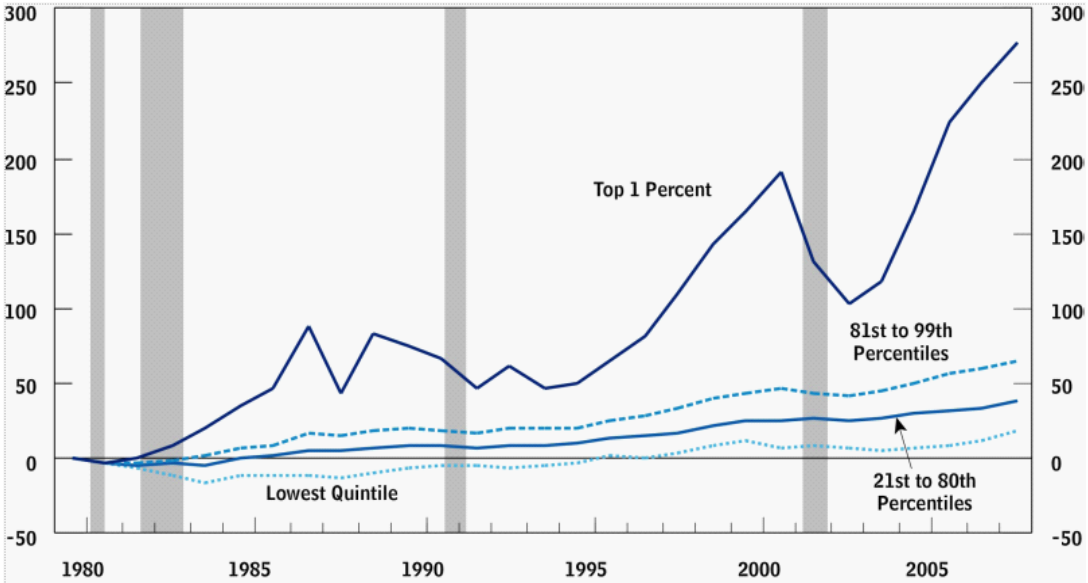
Note: The change in the dependent variable is always referred to the period 2005-1995. *Inequality* is measured as Gini Index in 1996. *Branching Index* (index ranging from 0 to 4) captures the degree of state regulation to interstate branching, with lower values indicating more openness. *P-value* is the p-value associated with the test of weak instruments. Repeating the analysis by including population density or by using the fraction of Blacks and of over 65 in each state in 1996 does not alter the results. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Fig.1 Income Inequality in the U.S. since the Second World War



Source: U.S. Department of Commerce: Census Bureau.

Fig.2 Percentage Change in Real After-Tax Income, by Selected Income Group (1979-2007)



Source: "Trends in the Distribution of Household Income Between 1979 and 2007". CBO, October 2011.

Fig.3 The Political Reaction Hypothesis

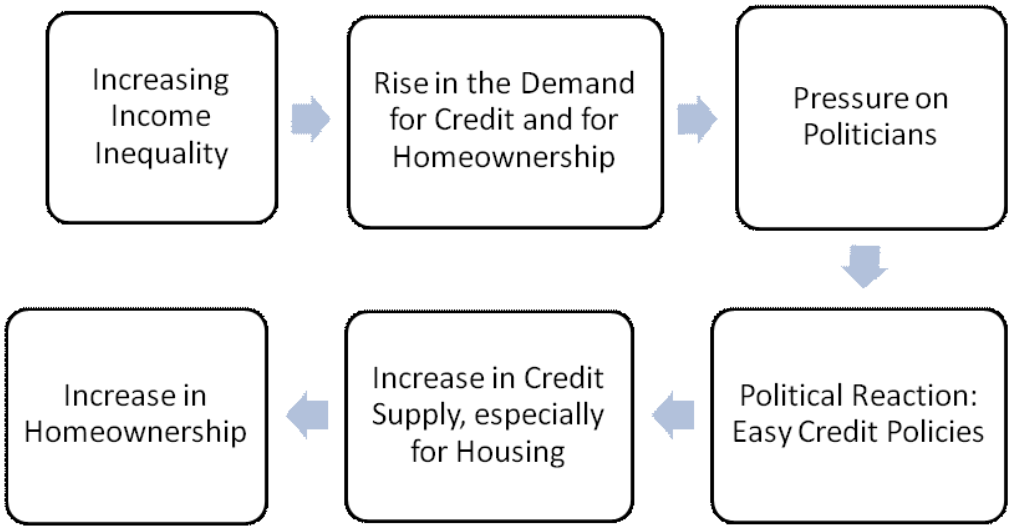
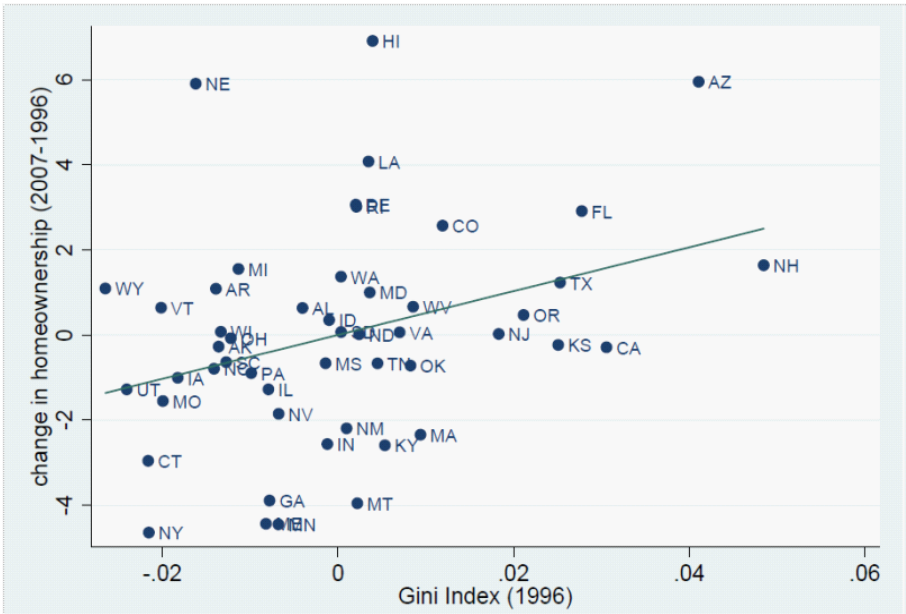
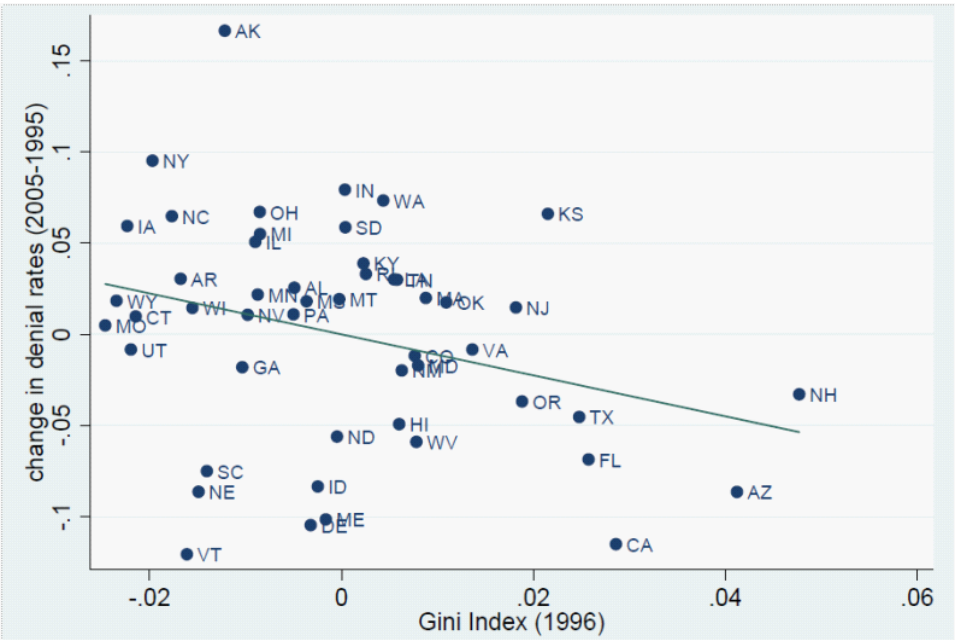


Fig.4 Income Inequality and Change in Homeownership



Note: The graph shows the relationship between the residuals of Change in Homeownership (1996-2007) and of the Gini Index (1996). The residuals are obtained by separately regressing each of the two variables on the following regressors: change in per capita state income (1996-2007) (IncomeGrowth), population density (Density), fraction of Blacks (Black) and of Over65 (Over65) in each state in 2000, population growth in each state (2000-2010) (Pop.Growth), and the index for interstate branching deregulation in each state (BranchingIndex).

Fig.5 Income Inequality and Change in Lending Standards



Note: The graph shows the relationship between the residuals of Change in Denial Rates (1995-2005) and the Gini Index (1996). The residuals are obtained by separately regressing each of the two variables on the following regressors: change in per capita state income (1995-2005) (IncomeGrowth), population density (Density), fraction of Blacks (Black) and of Over65 (Over65) in each state in 2000, population growth in each state (2000-2010) (Pop.Growth), and the index for interstate branching deregulation in each state (BranchingIndex).