



Special Report | Research
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Housing Finance Reform

How GSE affordability targets address income and racial imbalances in homeownership

The US government's outsized role in housing finance yields comparable homeownership rates to most developed economies. We examine how the rise in income inequality has exerted downward pressure on home ownership in the US and conclude that the GSEs' affordability targets have acted as a buffer against widening levels of income inequality, benefiting underrepresented and minority households in particular.

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- More than a decade after Fannie Mae and Freddie Mac were placed under conservatorship, the debate about the appropriate role of government in the housing market continues. Given that the homeownership rate in the US is similar to that in other developed countries, sceptics posit that the outsized role of government only incentivizes households to buy larger, more expensive homes.
- However, structural differences between economies complicate cross-country comparisons. One such difference is income inequality, which has widened in the US and is now notably higher than in other developed countries.
- Using a panel dataset of income inequality and homeownership spanning all 50 US states from 1985-2015, we demonstrate that the rise of inequality has exerted significant downwards pressure on US homeownership.
- Our research shows that government intervention can provide an effective counterbalance. The negative impact of income inequality on homeownership was reduced by 40-60% after the 1992 CSE Act, which introduced affordable housing goals for Fannie Mae and Freddie Mac. These targets likely helped the US maintain high home ownership despite the rise in inequality.
- Further, our analysis suggests that the negative effects of income inequality on homeownership fall disproportionately on Black residents. Although we do not have individual level data, the sensitivity of homeownership to inequality is 2.4 times higher in the states with the highest Black populations than in those with the lowest Black populations, and these same states benefited the most from the introduction of affordability targets.
- We conclude that the government can positively influence housing outcomes. Further, the distinct effect of the affordability targets indicates that other forms of support, such as the FHA, do not provide sufficient support for low income and minority borrowers in their current form.
- From a policy perspective, this does not translate into support for the status quo. Many interventions should be reviewed and may be unnecessary, and we cannot ignore the lessons from the financial crisis and resulting bailouts. But as we consider options for reform now, amidst both a pandemic that is likely to further raise inequality, and a heightened awareness for racial and social justice, we believe that low income and minority citizens face risks to homeownership through the reform process that cannot be ignored.

Inequality post COVID, and the impact on housing finance

A debate about the future of housing finance in the US has been ongoing at least since the GSEs were put into conservatorship at the height of the financial crisis. A major flashpoint is the role of the government in housing finance. Lawmakers' positions span from eliminating or dramatically reducing government support for housing, to maintaining the current patchwork of explicit and implicit subsidies and interventions, to explicitly increasing support for low- and middle-income homebuyers, whether through the GSEs or through other means, like the FHA. With COVID-19 raising both hardship for individuals and families and the strain on government finances, these differences are likely to become more stark going forward.

The US government is heavily involved in many aspects of housing finance, including explicitly issuing or guaranteeing mortgages and offering implicit support through tax treatment and subsidies. The overarching goal of these interventions is to support homeownership by increasing access to mortgage credit for more borrowers, and by reducing the rate that borrowers pay, vis-à-vis what would have been available in the private market¹. These support mechanisms are obviously related, and some interventions support both².

Some statistics suggest that the structure of housing finance in the US does little more than encourage better off households to purchase larger and more expensive houses. Homeownership rates in the US are similar to those in other developed countries that have little or no support from the public sector. At the same time, the US ranks well above most other developed countries in terms of the average house size per occupant. If the principal effect of the government's involvement is to increase home prices to reflect the value of cheap financing and subsidies, without raising, or even lowering rates of owner occupancy, then the case to reduce the government's role in housing finance would be quite strong.

We believe this is too simplistic a take. Structural economic differences complicate any comparison of home ownership rates across countries. Income inequality, in particular, is higher in the US than in other developed countries, and we document a strong inverse relationship between inequality and homeownership. The right question may not be why the US has similar homeownership as other countries, despite substantial public support, but instead, if the government's role in housing facilitates a similar homeownership rate in the US despite its higher income inequality.

We test this using a state-level panel of homeownership and inequality over the past 30 years. One important public sector intervention in the housing market was the introduction of affordable housing targets for the GSEs in 1992. The introduction of those targets reduced the negative effect of inequality on homeownership by a factor of three. Given the rise in inequality in the US, we estimate that this subsidy alone raised homeownership by over 100bp since its inception, with the gains concentrated at the middle and lower parts of the income distribution.

We also find evidence that the negative effects of inequality on homeownership, and the offset provided by the GSE affordability targets, fall most heavily on Black Americans. Using state-year demographic data, we determine that the negative effect of income inequality on

¹ For the purposes of this study, we take the economic benefits of homeownership as given, and focus on questions of efficacy – whether or not the government's intervention into the US housing market system actually accomplishes its stated goals. The questions we ask can be considered necessary but not sufficient to justify the government's role in housing. If the subsidy structure does not actually encourage homeownership, then it should be dismantled. If it does, then the debate turns to the desirability of high homeownership. Nonetheless, politically, this goal seems well-entrenched.

² For example, if the private market would only provide mortgage credit to a borrower at a rate that was unaffordable, then "access" really means "access at a feasible rate".

homeownership is 2.4 times higher for states with the highest percentage of Black Americans than for states with the lowest percentage. These same states benefited disproportionately from the introduction of affordability targets. Although we do not have individual level data, the strength of the state level results is strongly indicative that the linkages between inequality and homeownership are concentrated on Black Americans.

We conclude first that rising income inequality is imposing a constraint on homeownership. Income inequality can affect homeownership through a variety of channels. It could be a proxy for wealth inequality, and the associated difficulties making a down payment; alternatively, income inequality could correlate with other constraints facing prospective lower income borrowers, such as less predictable wages. Our research indicates that one of the main mechanisms through which income inequality affects homeownership is access to mortgage credit. Lower-income households are less able to make substantial down payments and have poorer credit scores, which reduce the likelihood that they will qualify for a mortgage. Absent government support, these types of borrowers find it more difficult to obtain an affordable mortgage. Although other support mechanisms exist for these types of borrowers – notably the FHA – we conclude that they are insufficient by themselves to counter the effects of rising inequality, else we would not find such a stark effect of the affordability targets.

From a policy perspective, our results do not imply support for the status quo. That borrowers with lower credit quality may particularly benefit does not mean that the societal gains from homeownership are being delivered in a cost-efficient manner. Much of the current system may still accomplish little more than distorting housing choices and prices for homeowners who would otherwise be able to access mortgage credit. For example, the fact that even the highest quality borrowers still end up with GSE guaranteed loans suggests that the current system provides broad-based benefits (likely in the form of lower rates) vis-à-vis what would be available in the private market.

Instead, we interpret this as evidence that well-structured government intervention can be beneficial and effective. Proposals for reforming housing finance include a wide range of ideas on the appropriate government support for lower income and/or lower credit quality borrowers, from eliminating it entirely to strengthening the role of GSEs. Others recommend stripping these goals from the GSEs and embedding them within other entities, such as FHA.

We conclude that, left unfettered, the economic structure of the US would restrict homeownership relative to other developed countries. However, while we do not assess what the optimal form of intervention might be, the effectiveness of affordability targets (and likely other federal interventions, such as the FHA, which we do not study explicitly) at inveighing against this suggests they are an important tool to facilitate homeownership.

These results are important now, for several reasons.

- The economic effects of Covid-19 are likely to weigh most heavily on borrowers with lower credit quality.
- The level of affordability targets was sharply reduced in the aftermath of the financial crisis, implying a shift in the balance of subsidies away from those borrowers. As a result, any rise in inequality in the wake of Covid-19 will now be met with a much-reduced buffer from the GSEs.
- Also troubling is the likelihood that Black Americans will be particularly affected by the pandemic, given that the homeownership of Black Americans may be most sensitive to changes in both inequality and the extent of government support.

Finally, our results have two interesting implications for the debate about the effects of income inequality: First, the negative relationship between income inequality and homeownership that we document means the rise in inequality experienced in the US over the past several decades exerted significant downwards pressure on homeownership. Second, since they are effective at supporting homeownership, our research finds that the subsidies imbedded in housing finance should be considered alongside taxes and transfers when comparing pre-tax and after-tax inequality.

US Housing Policies

US housing policy is a complex mixture of subsidies (both implicit and explicit), regulations and taxes implemented on a federal and state level. Freddie Mac and Fannie Mae, the two government-sponsored enterprises (GSEs), play a central role in this framework.

The GSEs were established to improve efficiency of capital markets and overcome market frictions, which prevent funds flowing from suppliers of capital to the housing market. The mechanism works through a guarantee provided by the GSEs, which limits the exposure of investors to default losses. By acquiring mortgage loans from originators, the GSEs transfer prepayment and interest rate risk from originators to investors of mortgage-backed securities (MBS), while the GSEs retain the credit risk. The goal was to allow an efficient allocation of risk, increase the mortgage investor base, decrease the cost for long-term loans, and, therefore improve access to mortgage credit, and ultimately raise homeownership levels.

Initially, the GSEs' footprint was relatively low – their market share hovered around 5% of total single-family mortgage debt during the 1970s (Figure 1). The rapid growth of the GSEs began in the 1980s, when banking regulators started to tighten capital requirements for banks and thrifts. Since the capital requirements for the GSEs remained well below those of other financial institutions, the GSEs had a competitive edge over other financial institutions in holding mortgage risk, which further incentivized financial institutions to sell their mortgage originations to the GSEs. Furthermore, the congressional charters conferred to the GSEs gave rise to the perception of an implicit government guarantee. Taken together, these developments led to the pronounced growth of the GSEs; their market share increased to 25% by 1990 and to 44% by the end of 2003. In September 2008, following severe default-related losses, the two GSEs were bailed-out by the federal government and were placed under conservatorship, which continues to this day³.

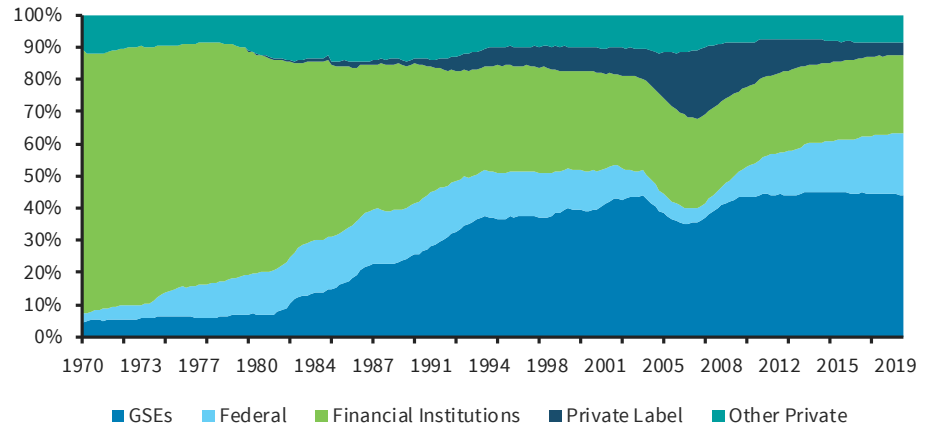
Other federal-related agencies, such as the Federal Housing Administration (FHA), and the Department of Veteran Affairs (VA), have also been a considerable source of mortgage support targeted at low-to-moderate income borrowers and veterans. Running parallel to the FHA and the VA, the Rural Housing Service (RHS) provides assistance to borrowers living in low-income rural areas. The minimum down payments and credit scores required for these loans are typically lower than conventional loans, thus promoting homeownership among financially constrained borrowers.

The Government National Mortgage Association (GNMA), or Ginnie Mae, then serves as the financing arm of the government and guarantees securities insured by FHA, VA and HUD. These are the only mortgage-backed securities (MBS) backed by the explicit “full faith and credit” guarantee of the US government.

³ There have been changes to the structure of conservatorship. The GSEs originally owed Treasury a 10% dividend on the senior preferred stock that Treasury purchased as part of conservatorship. This was replaced by a net worth sweep in Q3 2012, whereby the GSEs were required to pay any earnings above pre-set capital buffers to Treasury. The capital buffers were subsequently revised higher (in 2017 and then again more materially in 2019); currently both GSEs are below these new capital buffers and are thus retaining earnings.

As of today, the market share of the GSEs stands at 44.1% and that of Federal agencies at 19% (Figure 1). In total, the US government has a two-thirds share of all mortgage credit risk in the US.

FIGURE 1
Shares of Single-Family Mortgage Debt Outstanding by Mortgage Holder



Source: Federal Reserve, Mortgage Debt Outstanding (Table 1.54), Data Q1 1970 – Q3 2019

Finally, a sizeable portion of the government’s spending on housing is funnelled through subsidizing homeowners through the tax code. For example, the non-taxation of imputed rent adds a significant home-ownership bias to the tax code⁴. This has been reduced somewhat through various provisions of the recent Tax Cut and Jobs Act, but likely remains an important channel⁵.

Promoting Homeownership

The government’s involvement in the US housing market has often been justified with the goal of making mortgage credit more available, and thereby supporting homeownership. For example, the objective of HUD is to “maintain and expand homeownership”⁶. Similarly, Freddie Mac’s mission is to “make homeownership and rental housing more accessible and affordable”⁷ and Fannie Mae’s mission is to “provide liquidity, access and affordability of mortgage credit across the country”.

Supporting homeownership is desirable, in theory, because homeownership allows households to accumulate wealth, save for retirement and thus build financial security. Moreover, research generally agrees that higher homeownership leads to positive externalities such as higher educational achievement, improved health and lower crime rates. Of course, there are counterexamples. For example, during the financial crisis the decline in housing prices may have constrained the mobility of homeowners with negative equity, restricting their ability to take advantage of economic opportunities in different parts of the country.

⁴ Refers to the concept that homeowners do not pay rent for the home they own, whereas landlords must pay a tax on the income they receive in the form of rents.

⁵ The TCJA did not directly address imputed rents. However, it did reduce the ability for home owners to deduct both mortgage interest (via reducing the cap on mortgage notional eligible for the deduction) and property taxes, via new limitations on SALT deductions. Both mortgage interest and property taxes are still considered business expenses for landlords; thus the TCJA has reduced somewhat the home ownership bias.

⁶ https://www.hud.gov/program_offices/housing

⁷ <http://www.freddiemac.com/about/>

As suggested by the federal-agency mission statements above, government support for housing aims to improve homeownership by increasing access to mortgage credit for borrowers who would otherwise struggle to meet underwriting requirements, and/or to reduce the mortgage rates at which these or other prospective homeowners borrow.

A more cynical view is that government subsidies in practice have a limited impact on homeownership rates, but instead benefit existing homeowners or new homeowners who would have been able to buy a house regardless. Although some subsidies (such as tax relief for mortgage interest payments) may indeed lower the cost of debt, due to institutional design (such as itemization) this benefit accrues disproportionately more to middle and high-income households and incentivizes them to buy larger and more expensive homes.

Another channel through which housing subsidies could negatively affect market outcomes is by altering prices. Standard macroeconomic theory predicts that given a limited housing supply, subsidies to residential real estate are capitalized into higher prices. If prices increase for everyone, but the subsidy is received by a much smaller number of households or by households whose ability to purchase a home is not meaningfully improved by the subsidy, then in the extreme case subsidizing the housing market could ultimately make homeownership less affordable.

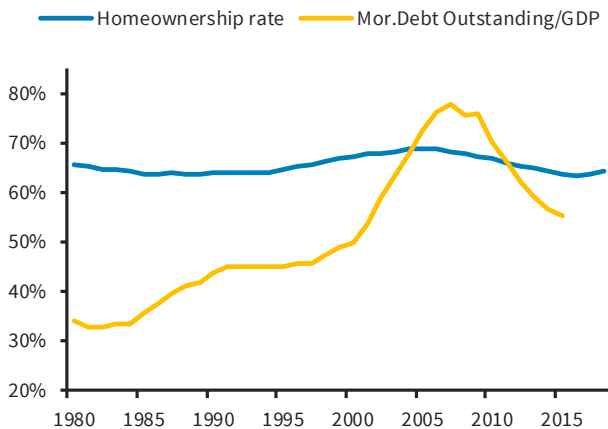
An initial read of the data does suggest that the housing subsidy infrastructure in the US creates real distortions without a material improvement in home ownership.

- First, the growth of the GSEs and other Federal-related agencies correlated with an increase in single-family mortgage debt outstanding, as a percentage of GDP (Figure 2). However, the expanded role of the government in the US housing market led to little, if any, increase in homeownership rates over time. At the beginning of our sample, in 1980, US homeownership stood at 66%; it increased to 69% during the housing bubble and decreased back to 64% at the end of 2018.

Higher mortgage debt without an increase in homeownership (except for the obvious bubble years preceding the crisis) means that borrowers took advantage of any reduction in rates to either put less money down or buy a more expensive house. The latter could be due to the same house costing more or purchasing a bigger house.

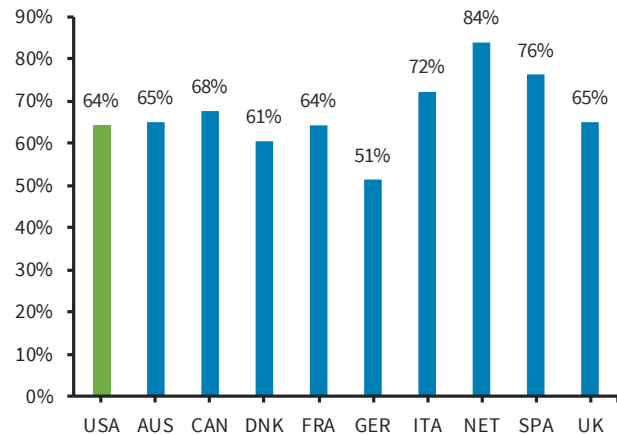
- Second, on an international scale, US homeownership rates are comparable to those of other developed countries (Figure 3) with the exception of Germany, Italy and Spain. The lower homeownership rate in Germany can be attributed to a combination of a tax system that discourages homeownership and a strong social rental system, which protects the rights of renters. On the other hand, the higher ownership rates in Southern Europe mostly reflect cultural values and weak support for rental housing.

FIGURE 2
US Housing Trends



Source: Federal Reserve, Mortgage Debt Outstanding (Table 1.54), Data 1980 – 2018. Mortgage Debt Outstanding normalized by GDP.

FIGURE 3
International Homeownership Levels



Source: ABS (Australia), CHMC (Canada), Census Bureau (USA), EMF (Europe), Statistics Bureau Japan. Data: 2018 (or most recent available)

These similarities in homeownership rates across countries are striking, because no other country in the sample has such an outsized role of the government in the housing market as the US⁸. Figure 4 compares select countries in this aspect. Most other countries do not have a government guarantee. Canada and Japan have guarantee programs; Canada and the Netherlands have government-backed mortgage insurance programs. Perhaps the closest overseas system to the US's in design is found in Korea. However, even there the market share of government-backed institutions is much lower than in the US.

FIGURE 4
Government Housing Market Support in Other Countries

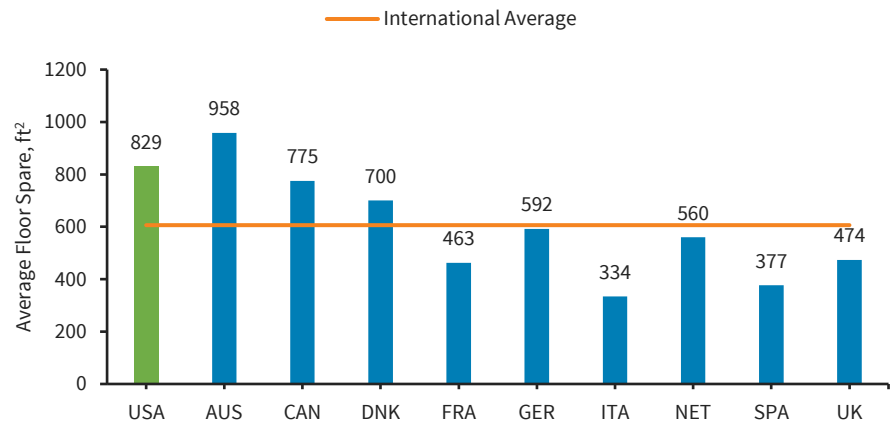
Country	Government Mortgage Insurer	Government Security Guarantees	Government Sponsored Enterprises
USA	FHA	GNMA	Fannie Mae. Freddie Mac
Australia	No	No	No
Canada	CMHC	CMHC	No
Denmark	No	No	No
Germany	No	No	No
Japan	No	JHF	Possible
Korea	No	No	Korean Housing Finance Corp.
Netherlands	NHG	No	No
Spain	No	No	No
UK	No	No	No

Source: Mortgage Bankers' Association (MBA)

⁸ Refer to (Lea, 2010) for a detailed international comparison of mortgage product offerings.

- Third, evidence shows that the average US homeowner today owns a considerably larger home than a few decades ago. According to American Housing Survey (AHS 2017) data, average floor space for single-family homes has increased by nearly 40%: from c.2,200 ft² in the 1980s to c.3,000 ft² in 2010s. Moreover, comparing average floor space per person across developed countries in Figure 5, we clearly see that the US home size stands considerably above the international average.

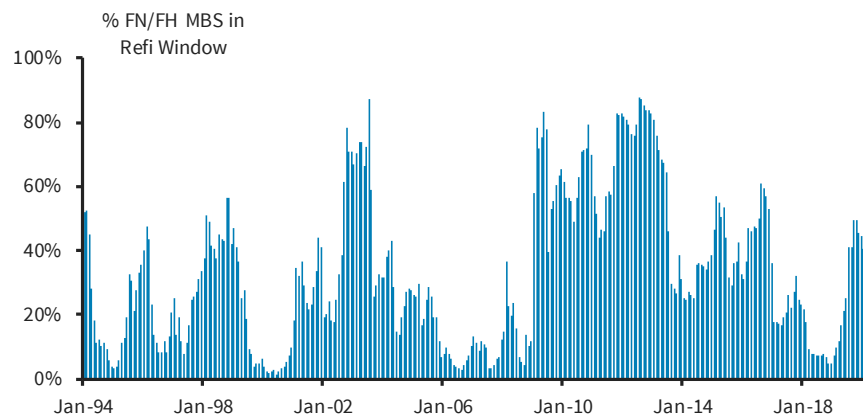
FIGURE 5
Average Floor Space per Person, ft²



Source: CommSec, RBA, UN, US Census

- Finally, another reason often given as support for government involvement in housing finance is that US homeowners benefit from a 30-year mortgage – something that doesn't exist in large scale elsewhere in the world. However, the benefits of the 30-year mortgage to the US homeowner could be greatly overstated, for two reasons.
 - The US bond market has been on a 40-year bull run. Coinciding with the very start of government involvement in US housing finance, mortgage rates have come down very sharply over the last few decades, in tandem with bond yields. For example, Figure 6 shows that the average US borrower has had at least a 50bp economic incentive to refinance every 3-4 years over the last decade.
 - Second, mortgages in the US are not portable, meaning mortgages are paid off whenever a homeowner trades properties. Further, US homeownership mobility is greater than in many other countries. The net result is that the vast majority of US borrowers never stay in a mortgage for a decade, let alone 30 years, and thus do not need the 'certainty' provided by the same mortgage rate for three decades.

FIGURE 6
Mortgage Refinancing



Source: Barclays Research

Note: The figure shows the percentage of the agency MBS universe that is at least 50 bps in-the-money.

The fact that homeownership levels have plateaued, while at the same time the role of GSEs has been steadily increasing, has often been cited as compelling evidence against the effectiveness of housing subsidies in the US.

This outcome, in combination with the extremely costly bailout of the GSEs by the Federal Government in 2008⁹, has prompted calls to reform the US housing market in ways that limit the role of the government and better protects taxpayers. A decade after the GSEs were placed under conservatorship, the debate about the appropriate role of the government in the housing market is still ongoing.

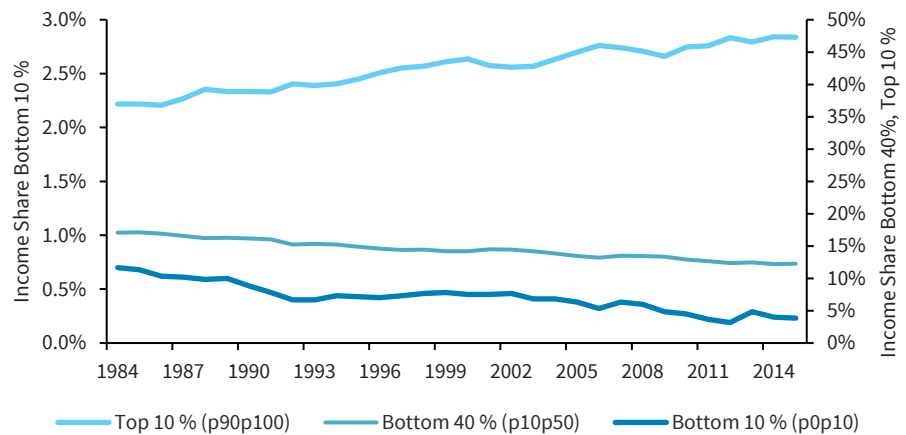
An Alternative Hypothesis – A Buffer against Income Inequality

We believe that income inequality is an underappreciated channel affecting housing market outcomes, which has so far received relatively little attention in the public debate on housing reform.

Income inequality in the US has been steadily increasing over the past decades, with top earners greatly outpacing the rest of the population. In Figure 7 we plot the income shares of the top 10%, bottom 40% and bottom 10% of US earners. The share of income earned by the top 10% has increased from 37% in 1984 to 47% in 2015, whereas the share of the bottom 10% has decreased from 0.7% in 1984 to only 0.23% in 2015. Moreover, the income share of the bottom 40% of earners (i.e. between the 10th and 50th percentiles) also decreased – from 15% in 1984 to 11% in 2015. The figure reveals the crucial point that the pattern of rising income inequality was not solely driven by changes in the tails, but affected the entire income distribution.

⁹ For a more formal evaluation of the fair cost of the GSE's bailout refer to recent work by Deborah Lucas: "Measuring the Cost of Bailouts" (2018).

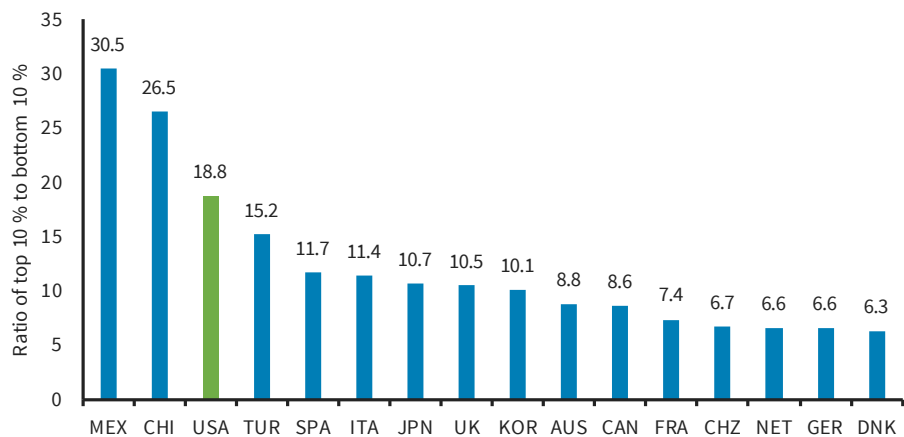
FIGURE 7
Rising Income Inequality



Source: Barclays Research, World Inequality Database (WID)

It is informative to compare income inequality across countries. In Figure 8, we plot the ratio of income of the top 10% earners to the bottom 10% for 16 countries around the world. It is clear that income inequality is considerably more pronounced in the US. In other developed countries such as Denmark, the UK and Japan the top 10% earn between 6 and 10 times more than the bottom 10%. In the US, this ratio is as high as 18.8 times. In fact, income inequality in the US is comparable to that observed in developing countries such as Mexico, China and Turkey, despite the US having higher levels of income per capita.

FIGURE 8
Income Inequality around the World



Source: OECD Income Distribution Database, Data 2013-2015

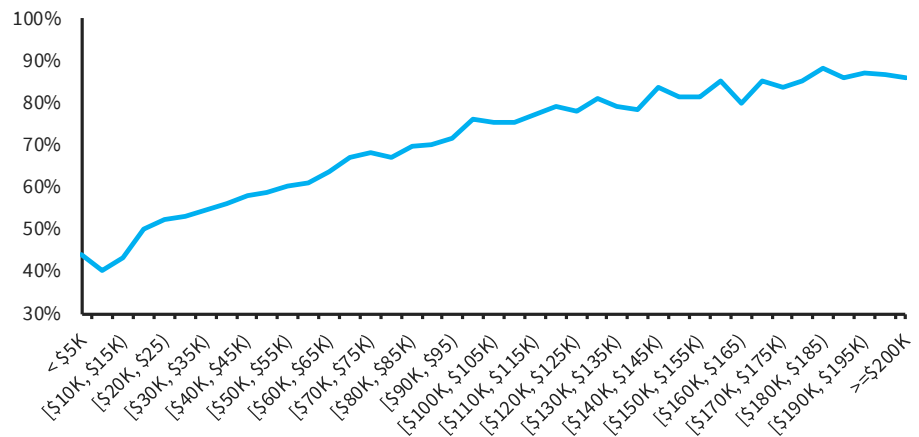
Note: The chart shows the share of all income received by the top 10%, divided by the share of income received by the bottom 10% for each country (S90/S10).

In addition, US homeownership increases with income (Figure 9). The homeownership rate for households with low income (< \$25,000) is 46%¹⁰. The rate is 84%, nearly two times higher, for households at the top of the income distribution (> \$132,000).

¹⁰ Homeownership rates for lower-income households are likely to be overstated due to homeowners who have purchased a home when they belonged to a higher income bracket (e.g. retirees).

Although it stands to reason that lower income households would spend less on housing, it is less clear why they are more likely to consume housing via the rental market. One possibility is that income is a proxy for wealth, and that lower income households are less likely to have the necessary savings to make a sizable down payment. Alternatively, lower income may impose other constraints on households. For example, these households may be more likely to have more volatile income streams. This could raise the attractiveness of the rental market, where the consequences of missed or delayed payments are less severe.

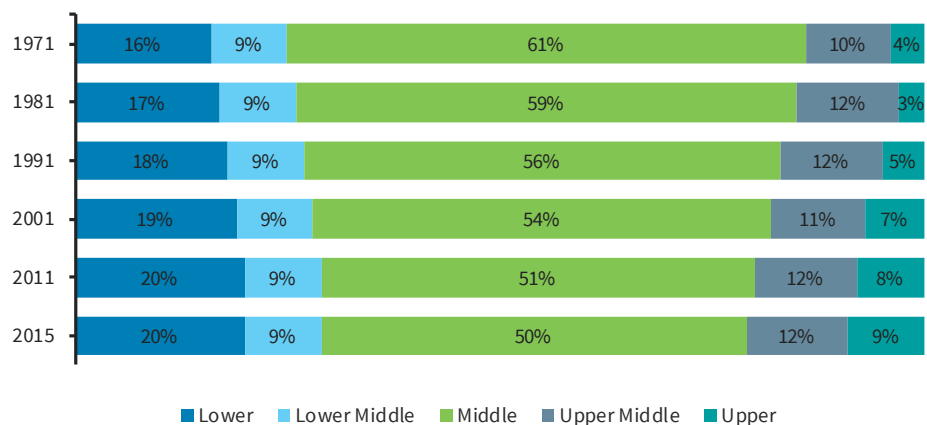
FIGURE 9
Homeownership Rate across the Income Distribution



Source: Census Bureau, Current Population Survey, 2019 Annual Social and Economic Supplement.

Regardless of the specific mechanism, the rise in inequality in the US seems likely to subject a larger fraction of households to constraints on homeownership. In Figure 10, we plot the fraction of households living in each income class.

FIGURE 10
Share of Households by Income Class



Source: Census Bureau, Current Population Survey, 2019 Annual Social and Economic Supplements
 Note: Income classes are roughly based on the following cutoffs: Lower (\$0 - \$29,999), Lower Middle (\$30,000-\$49,999), Middle (\$50,000-\$99,999), Upper Middle (\$100,000-\$349,999) and Upper (\$350,000 +)

The graph clearly reveals the changing shape of the US income distribution. Over time, a sizeable fraction of households has pulled away from the middle class, increasing the size of both the lower and upper income class. These patterns, in combination with the decreasing income shares of the lower and middle income class (Figure 7), indicate that the constraints on homeownership have become more binding over time.

Given elevated (and rising) income inequality, the question from a policy perspective then becomes: how has the US managed to achieve and maintain similar levels of homeownership compared to other developed countries with considerably lower income inequality? A possible (and positive) role of support for the housing market in this environment is to offset the negative impact of income inequality by improving access to mortgage credit for borrowers towards the bottom and middle of the income distribution.

This less cynical take would imply that, absent the government's support of the US housing market, the homeownership rate would be lower, and in particular would have dropped as income inequality rose. The net macroeconomic effect on homeownership is a combination of the uplift from subsidies and the drag from income inequality – in which case the government's role could be considered a success if it did function as an offset.

To examine this hypothesis, we construct a comprehensive panel of US states from 1985 to 2015. The panel includes data on income inequality and homeownership, as well as socio-economic and demographic characteristics.

The advantage of the panel data model is that it allows us to exploit variation across states and over time in order to examine how homeownership varies with income inequality and subsidies. We estimate regression specifications which control for a set of macroeconomic developments (over time), as well as any other time-invariant state characteristics (across states).

To evaluate the role of government support for housing, we focus on one major policy change – the 1992 GSE Act – which introduced affordable housing goals for the GSEs. These targets required the GSEs to increase their purchase of mortgages originated by low- and medium-income borrowers. The goal was to increase access to mortgage financing for these borrowers, who might otherwise have struggled to qualify for loans under the existing system.

The empirical evidence supports the view that government support can offset heightened inequality. Our main results are:

- Income inequality and homeownership are significantly negatively correlated over time and across states, holding all else fixed.
- The impact of income inequality decreases between 40-60% after the introduction of the Affordable Housing Policy. Before the policy change, a unit increase in income inequality decreased homeownership rates by between 0.36pp and 0.39pp. After the policy change, a unit increase in income inequality decreased homeownership by only 0.13pp-0.20pp. Absent the introduction of the affordability targets, our model predicts between 0.60pp-1.09pp lower homeownership rate due to the negative impact of income inequality.
- We find strong evidence for disproportionate effects by race:
 - The negative effect of income inequality on homeownership is 2.4 times higher for states with higher percentage of black populations than for states with lower black populations.
 - States with higher black populations benefited considerably more from the policy.

A panel of US States

Investigating the relationship between income inequality and homeownership rates is empirically challenging for several reasons:

- First, income inequality is likely to endogenously reflect a variety of economic factors, such as income, employment, GDP growth, etc.
- Second, even if we extensively control for such observable factors, there is still the theoretical possibility that we fail to include unobservable factors that are correlated to our included variables.
- Third, a further endogeneity problem might occur if the relationship between homeownership and income inequality is determined within a broader equilibrium by other variables.

One way to sidestep such problems is to use panel data, which uses both cross-section and time-series variation to help control for confounding influences.

In our analysis we construct a new panel dataset of US States¹¹. Our sample includes homeownership rates and income inequality for each state over a time period from 1984 to 2015 at an annual frequency. We combine data from several sources.

Our measure of income inequality is based on the Gini Coefficient, which is the most commonly used index of inequality. The Gini Coefficient reflects the statistical dispersion of income and is measured on a scale between 0 and 1. Higher values of the coefficient signify higher income inequality, with a Gini of 0 giving complete equality and a Gini of 1 complete inequality. Our Gini Coefficient¹² is based on individual tax filing data. While these filings are not directly available, the Internal Revenue Service (IRS) publishes yearly *state-level* tabulations of the data on its website¹³.

The underlying measure of income is pre-tax gross income, including capital and entrepreneurial income. Notably, it excludes transfer income and interest on state and local bonds. One critique of using pre-tax income data is that both taxes and transfers are major policy tools to mitigate increases in pre-tax inequality, and therefore our inequality statistics likely overstate the post-tax differences¹⁴.

Data on homeownership rates and authorized new building permits are available from Census Bureau Department of Housing and Urban Development. The homeownership rate is defined as the number of owner-occupied homes divided by the total number of occupied housing units. Data on resident populations and median income is available from Census Bureau Current Population and American Community Surveys.

¹¹ We cover 51 states = 50 States + District of Columbia (DC). Results are qualitatively unchanged if we exclude DC and/or Alaska from the sample.

¹² The Gini coefficient is based on Frank-Sommeiller-Price Series. Data is available from Mark Frank's website https://www.shsu.edu/eco_mwf/inequality.html. The exact procedure for the construction of the data is described in (Frank, 2009).

¹³ To access these data refer to Internal Revenue Service, Statistics of Income Division "Individual Income and Tax Data, by State and Size of Adjusted Gross Income" (Table 2) online at <https://www.irs.gov/statistics/soi-tax-stats-historic-table-2>.

¹⁴ Other critiques of our measure are less relevant to this work. For example, so-called "assortative mating", whereby people are more likely now than in the past to marry someone with a similar income, is also considered to be a contributor to income inequality. While that may have different policy implications than other drivers of inequality, it is as likely as any other source to lead to the housing market outcomes we document.

Methodology

Our regression specification runs as follows:

$$Y_{s,t} = \alpha_s + \delta_t + \beta \text{Gini}_{s,t} + \varepsilon_{s,t}$$

where $Y_{s,t}$ is the homeownership rate for state s in year t , α_s and δ_t are state and time fixed effects, $\text{Gini}_{s,t}$ is a vector of time-varying state-level Gini coefficient (income inequality) and $\varepsilon_{s,t}$ is a state-level error term.

The idea behind this model is to control for omitted or confounding variables by using fixed effect dummy variables (α_s and δ_t) as control variables¹⁵. State fixed effects control for time-invariant (potentially unobservable) differences across states such as social, financial, historical or geographical features. Time fixed effects control for aggregate factors, which might confound the effect of income inequality. These factors include, for example, changes in interest rates, business cycles and credit conditions, as well as demographic variables at the national level. Holding fixed state and time effects, a major difference between states over time is the intensity of income inequality¹⁶. Therefore, the regression coefficient β has a clear interpretation and gives the impact on the homeownership rate, in percentage points, of a 0.01 increase in the Gini coefficient – which, for simplicity, we refer to as a 1 percentage point increase in income inequality.

Our main specification includes, $N-1 = 50$ state dummies and $T = 32$ time dummies in addition to the variable of interest, the Gini coefficient, which gives a total of 83 regressors. The consistent estimation of such a heavy econometric specification relies on two main assumptions. First, on a purely statistical level, we need a large number of observations. Fortunately, this is trivially satisfied as we can leverage the power of our panel data, which provides us with 1,632 observations. For comparison, this type of analysis would not be possible if we only observed variables at an aggregate country level over time or if we had a single cross-section of states at a point in time. Second, we need a sufficient amount of total variation in our sample.

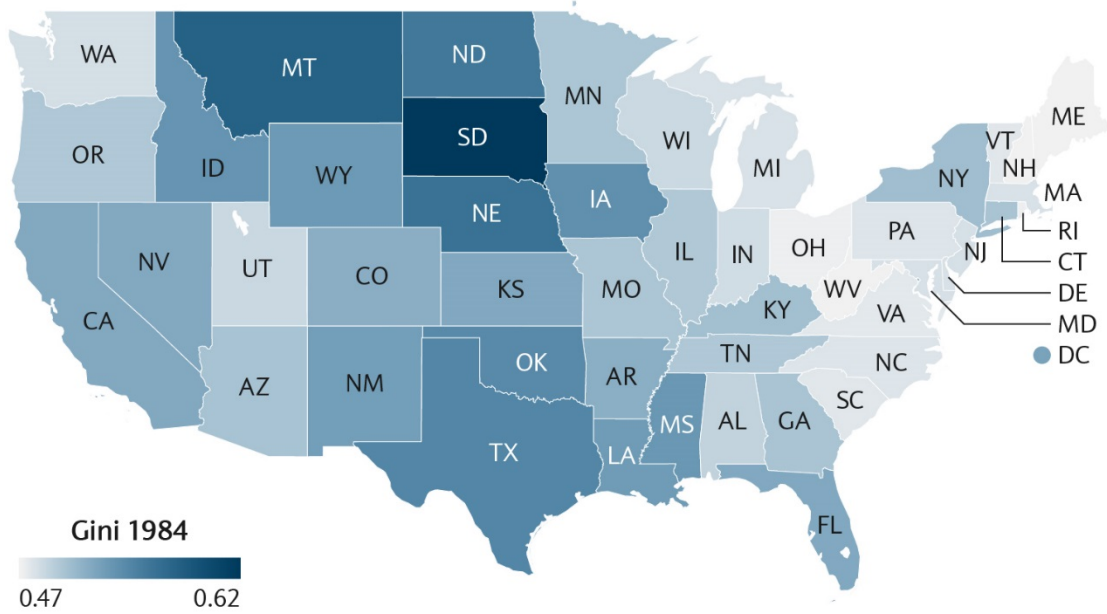
In our model, variation comes from two sources: (1) inequality across states; and (2) inequality over time. To illustrate the former, in Figure 11 and Figure 12 we draw a map of the US, where each state is coloured differently based on the intensity of income inequality. Darker shading signifies more unequal states and lighter signifies less unequal states.

We present results for two separate cross-sections: in 1984 and in 2015. There is considerable heterogeneity across states, as evidenced by the palette of tones; importantly, the composition of the most and least unequal states is substantially different for the two cross-sections. For example, our map shows that the most unequal state in 1984 was South Dakota (Gini coefficient = 0.62) and the least unequal was New Hampshire (Gini coefficient = 0.47). To compare, in 2015 the most unequal state was New York (Gini coefficient = 0.71) and least unequal was West Virginia (Gini coefficient = 0.54).

¹⁵ On a more technical level, when state and time fixed effects are not explicitly accounted for in the estimation, then they will be part of the composite error term $u(s,t) = \alpha(s) + \delta(t) + \varepsilon(s,t)$. Income inequality will likely be correlated with $u(s,t)$, which means that regression coefficients calculated using standard methods, such as Ordinary Least Squares (OLS), will be biased.

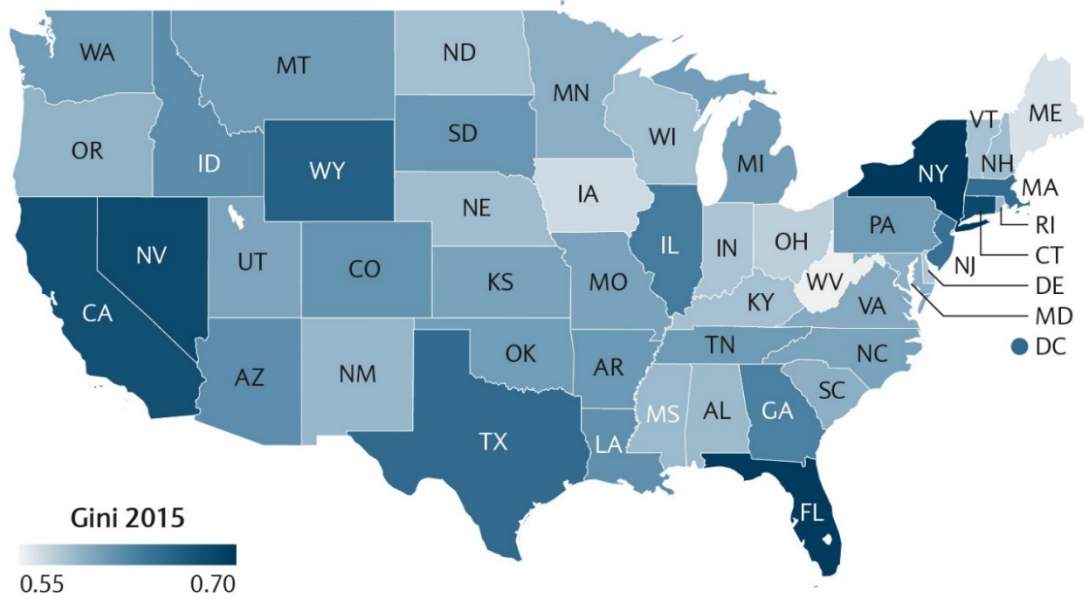
¹⁶ In the Robustness Section, we augment the baseline panel model with state time-varying controls ($X(s,t)$), which could potentially be correlated with the Gini coefficient.

FIGURE 11
Income Inequality Across US States in 1984



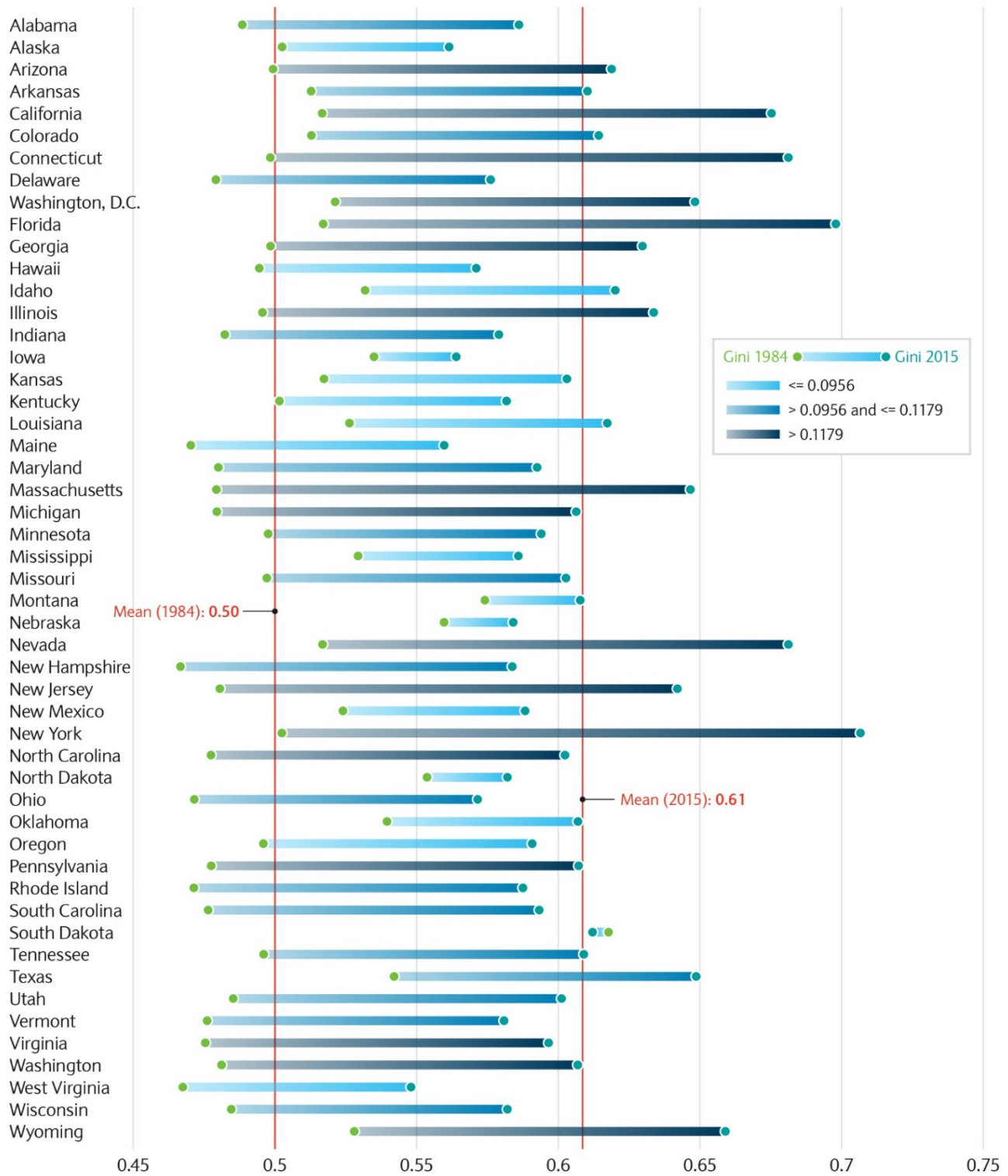
Source: Frank-Sommeiller-Price Series (1984-2015)

FIGURE 12
Income Inequality Across US States in 2015



Source: Frank-Sommeiller-Price Series (1984-2015)

FIGURE 13
Income Inequality Over Time 1984-2015



Source: Frank-Sommeiller-Price Series (1984-2015)

Next, we turn to variation over time. In Figure 13, we show yearly state-level Gini coefficients over the period from 1984 to 2015, alongside with the mean Gini value at the beginning and at the end of our sample. Each horizontal bar represents a different state and is color-coded such that darker colours reflect more intense inequality.

We document two important trends. First, judging by the dispersion of Gini coefficients around the mean, it appears that states were closer together at the beginning of our sample and grew more apart over time.

Second, although the absolute level of income inequality has increased over time, different states have been on different paths. To demonstrate this, for each state, we first calculate the difference between the Gini coefficients in 2015 and 1984. Then, based on the calculated difference, we split states into three groups using the 33rd and 66th percentile values as cut-offs.

The three groups are: states with little to no increase in Gini (light blue), states with moderate increase in Gini (blue) and states with a high increase in Gini (dark blue). On one side of the distribution, states such as California, Florida and New York have become increasingly unequal, whereas states such as Nebraska, Iowa and Montana have changed little over the last few decades. This substantial variation across states supports the validity of our model and gives us confidence that the results we report in the following section are not mechanically driven by trends in our data or the presence of a few outlier states.

Affordable Housing Goals

The 1992 GSE Act called for the Secretary of the Department of Housing and Urban Development (HUD) to establish affordable housing goals for Fannie Mae and Freddie Mac. Before that time, the GSEs had only been required to buy mortgages that institutional investors would buy, which raised concerns among housing market specialists and regulators that the GSEs were not adequately facilitating affordable housing for low- and moderate-income households.

The act codified one of the main public goals of the GSEs, namely “*an affirmative obligation to facilitate the financing of affordable housing for low and moderate-income families in a manner consistent with their overall public purposes, while maintaining a strong financial condition and a reasonable economic return*”¹⁷. Low and moderate-income borrowers are defined as borrowers with incomes below the median income for the metropolitan statistical area where they live.

After introducing the GSEs’ mandate on affordable housing, HUD established *numerical* targets for each subsequent year, expressed as a percentage of the GSEs’ mortgage purchases¹⁸. These purchases include loans purchased for portfolio as well as loans that serve as collateral for mortgage-backed securities by the GSEs.

Initially, legislation required that 30% or more of Fannie’s and Freddie’s loan purchases be related to “affordable housing”. This means that of all the loans the GSEs bought, 30% had to be made to people at or below the median income in the communities where they lived. This was set as a “transitional target” to apply for the first two years (1993-1995).

¹⁷ See 12 U.S.C. § 4501(7)

¹⁸ Including both loans purchased for the GSEs’ own portfolio and loans purchased to serve as collateral for mortgage-backed securities issued by the GSEs. The targets are determined based on activity in the “conventional conforming market” i.e. excluding loans owned or guaranteed by FHA, VA and Rural Housing Service, “B & C” loans, loans above the conforming limit (\$417,000 prior to 2008).

HUD gradually increased the goals through three sets of targets, which became effective by regulation in 1996, 2001 and 2005, respectively. The rationale for these increases was that the GSEs should “lead the market” in their acquisitions of such mortgages for qualifying households. Targets are shown in Figure 14. According to performance reports, both GSEs have been consistently close to/on housing targets.

FIGURE 14
GSEs Affordable Housing Goals

Years	Goals	Years	Goals	Years	Goals
1993-1995	30 %	1996	40 %	2009	43 %
<i>Transitional Period</i>		1997-2000	42 %	2010	27 %
		2001-2004	50 %	2011	27 %
		2005	52 %	2012	23 %
		2006	53 %	2013	23 %
		2007	55 %	2014	23 %
		2008	56 %	2015	24 %

Source: HUD Reports (1996-2008), FHFA Annual Performance Reports (2009-2015)

After the financial crisis of 2007-2008, authority over the housing goals of the GSEs was transferred from HUD to the Federal Housing Finance Agency (FHFA), which on 6 September 2008 placed Fannie and Freddie into conservatorship.

Although the GSEs remain under conservatorship to this day, they continue to have an obligation to support a stable and affordable market for residential mortgage financing. Given unstable market conditions after the financial crisis, FHFA determined that the previously set affordability goals were infeasible, which led to those benchmarks being gradually revised down to levels around 25%. FHFA has continued to set annual housing goals for the GSEs and to monitor their performance during the conservatorship.

Higher income inequality, lower homeownership

The Housing and Community Development Act provides us with a setting to study the impact of introducing affordable housing goals on homeownership rates in an environment of increasing income inequality. To do so, we split our sample into two sub-samples: a pre-policy sample (1984-1995) and a post-policy sample (1996- 2015). Figure 15 presents the estimates of regressing homeownership rates on income inequality and a set of state and time dummies.

Across states and over time, homeownership rates and income inequality are significantly negatively correlated; an increase in income inequality is associated with a decrease in homeownership.

Comparing the results for the pre- and post-policy sample reveals an interesting relationship. Before the introduction of GSEs’ mandate, a 1 percentage point in income inequality decreased homeownership levels by 0.39 percentage points. These estimates are in sharp contrast to the ones we compute on the post-policy sample, where a 1 percentage point increase in the Gini coefficient correlates with only a 0.13 percentage points decrease in homeownership. In other words, the negative impact of income inequality is substantially (although not entirely) compensated by a higher involvement of the GSEs on the mortgage market.

FIGURE 15
Panel Regression Model

	Homeownership 1984-1995	Homeownership 1996-2015
Gini coefficient, β	-0.39*** [-0.49, -0.28]	-0.13*** [-0.18, -0.07]
Controls	No	No
State Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	612	1020
Data	1984-1995	1996-2015

Source: Barclays Research, Data: US Census Bureau, FRB New York (1984-2015)

Note: The table gives the result of estimating the model:

$Y_{s,t} = \alpha_s + \delta_t + \beta \text{Gini}_{s,t} + \epsilon_{s,t}$, where s denotes US states and t time period. Significance at the 95 % confidence level is denoted by ***. Standard errors are adjusted for heteroscedasticity.

One additional benefit of our model is that it provides us with a tool to calculate the impact of inequality on homeownership in the counterfactual scenario of no affordability goals. This is given by the difference in the regression coefficients between the pre-and post-policy samples, scaled by the actual change in income inequality over 1996-2015. Given an increase of 4.23 percentage points in the Gini coefficient, all else equal, our baseline model predicts:

$$[-0.39 - (-0.13)] \times 4.23 \% = -1.09 \%$$

Absent the policy, homeownership rates would have been 1.09 percentage points lower because of income inequality alone, according to our estimates. This effect is robust to different regression specifications, control variables and sub-sample periods¹⁹. Depending on the model we employ, we predict that, absent the subsidy, income inequality would have reduced the homeownership rate by 0.60pp-1.09pp.

To gauge the true economic magnitude of our results, it is important to consider that government support for housing in the US is multi-faceted and encompasses a variety of federal and state-level policies. In this report, we focus on one *particular* dimension – affordability targets for GSEs –and one *particular channel*– income inequality.

Evaluated through the lens of income inequality, the policy introduction was worth 109bp improvement in homeownership. Although our analysis shows that income inequality was a major channel through which the Housing Affordability Act affected homeownership, it is also possible that the policy operated through other economic channels.

Furthermore, our choice of policy test is motivated by identification concerns and data-availability limitations. While it is true that the establishment of affordability targets for the GSEs was one of the milestones of US housing subsidy policy, we don't exclude the possibility that other policies, which were simultaneously introduced, had a similarly important impact.

That being said, in reality, the *total* effect of housing subsidies is likely to be additive and to reflect the contributions of all individual housing policies and economic channels. If this is correct, the true magnitude of the effect is likely to be higher than 109bp.

¹⁹ Running two separate regression models means that all coefficients are allowed to differ between the two periods i.e. this is equivalent to a model *fully* interacted with a "subsample"-dummy. Our results still hold if we estimate a more restrictive specification, where we work with the full sample from 1984-2015 and only interact the "subsample"-dummy with the Gini coefficient.

An interpretation consistent with this argument is that our estimates can serve as a conservative lower bound of the true effect.

The Level of Affordability Targets Matters

Our baseline specification does not consider differences in the *level* of housing goals. Focusing on the post-1996 period, we use these data to evaluate in greater depth the joint effect of increasing income inequality and increasing GSEs involvement. We estimate a specification that includes an interaction of the Gini coefficient with the affordable housing target:

$$Y_{s,t} = \alpha_s + \beta \text{Gini}_{s,t} + \theta \text{Gini}_{s,t} \times \text{Target}_t + \phi Z_t + \gamma X_{s,t} + \varepsilon_{s,t}$$

Note that adding an interaction term drastically changes the interpretation of all the coefficients. The idea behind a statistically significant interaction term is that the effect of income inequality on homeownership is different for different values of the housing targets. Thus, the unique effect of Gini on homeownership is not limited to β , but also depends on the values of θ and Target. The total effect of a 1 percentage point increase in Gini on homeownership, for a given level of Target is given by $\beta + \theta \times \text{Target}_t$.

In this specification we do not include time fixed effects δ_t , since this would absorb some of the variation over time in Target_t ²⁰. Instead, we introduce an extensive list of time-varying control variables at the country level Z_t , and the state level $X_{s,t}$, which should allow us to isolate sufficiently well the effect of the affordable housing targets from other demographic and economic developments.

Our country (macro) variables are: gross domestic product (GDP), unemployment rate, industrial production, average household size, federal funds target rate, average mortgage rate and total mortgage debt outstanding. Our state-level controls are median income, population count and new housing permits. For a detailed discussion of these variables, refer to the **Robustness Section**.

The positive and statistically significant coefficient of the interaction term suggests that higher affordability targets mitigate more the negative impact of income inequality on homeownership²¹ (Figure 16).

For example, when Target = 20% a 1 pp increase in Gini reduces homeownership by $-0.14 + 0.089 \times 0.20 = -0.1222$ pp. In the extremes, when Target = 0% a 1 pp increase in Gini reduces homeownership by 0.14 pp; when Target reaches the maximum of 100%, the effect is still negative, but considerably lower $-0.14 + 0.089 \times 1 = -0.051$ pp.

²⁰ This is justified because targets were not updated every year and hence, there is little variation in the time domain (Revisit Figure 13). For example, the target between 1997 and 2000 remained at 42 %.

²¹ In robustness checks, we find that based on different specifications of the control variables the magnitude of the coefficient ranges between 0.06 and 0.11. The coefficient remains positive in all our specifications.

FIGURE 16
The Level of Affordability Targets

	Homeownership 1996-2015
Gini coefficient	-0.14** [-0.19, -0.08]
Gini × Target	0.089** [0.02, 0.16]
Controls	Yes
State Fixed Effects	Yes
Year Fixed Effects	No
Observations	1020
Data	1996-2015

Source: Barclays Research, Data: US Census Bureau, FRB New York (1996-2015)

Note: The table gives the result of estimating the model:

$Y_{s,t} = \alpha_s + \beta \text{Gini}_{s,t} + \theta \text{Gini}_{s,t} \times \text{Target}_t + \phi Z_t + \gamma X_{s,t} + \epsilon_{s,t}$ where s denotes US states and t time period. Significance at the 95 % confidence level is denoted by ***. Standard errors are adjusted for heteroscedasticity.

In summary, we find that depending on the level of Target, the effect of a 1 pp increase in Gini on homeownership ranges between [-0.14 pp, -0.051 pp]. Although our model predicts that the drag of income inequality on homeownership cannot be fully compensated by higher housing goals, the result still highlights the positive overall effect from higher housing goals for the GSEs.

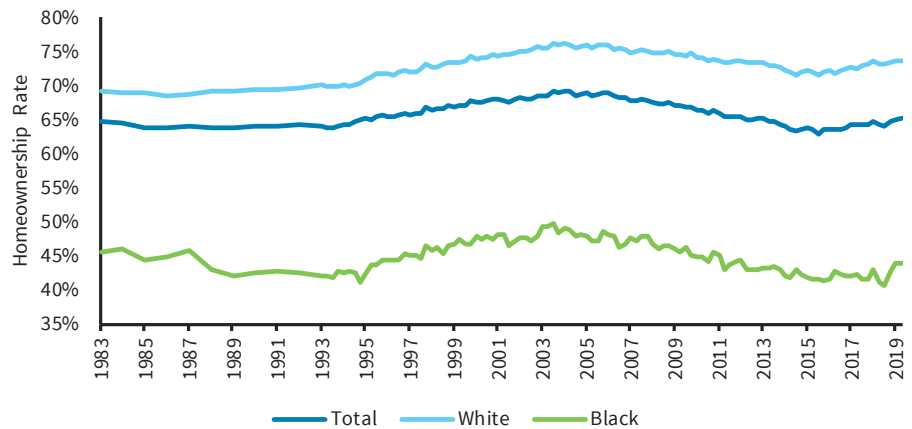
Income Inequality and Housing – A Divide by Race

Persistent racial disparities in US homeownership have existed for decades, and have attracted a plethora of research from academia and policy makers alike²².

In light of the current social climate in the US, and its likely effect on the debate about housing finance reform, we examine if the relationships between homeownership, income inequality, and the affordability targets vary by race – and particularly if they are stronger for the Black population.

²² Recent research includes but is not limited to Acolin, Lin and Wachter (2019); Brown and Dey (2019); Choi, McCargo, Neal, Goodman and Young (2019).

FIGURE 17
Homeownership by Race



Source: Census Bureau – Current Population Survey (2019)

Note: Total refers to homeownership for all races: Black, White, Hispanic, Asian and Native American. Data for 1994-2020 is quarterly, data for 1983-1993 is annual. The annual data come from the March demographic supplement of the Current Population Survey. For the quarterly data, the source is the corresponding three monthly Current Population Surveys/Housing Vacancy Surveys.

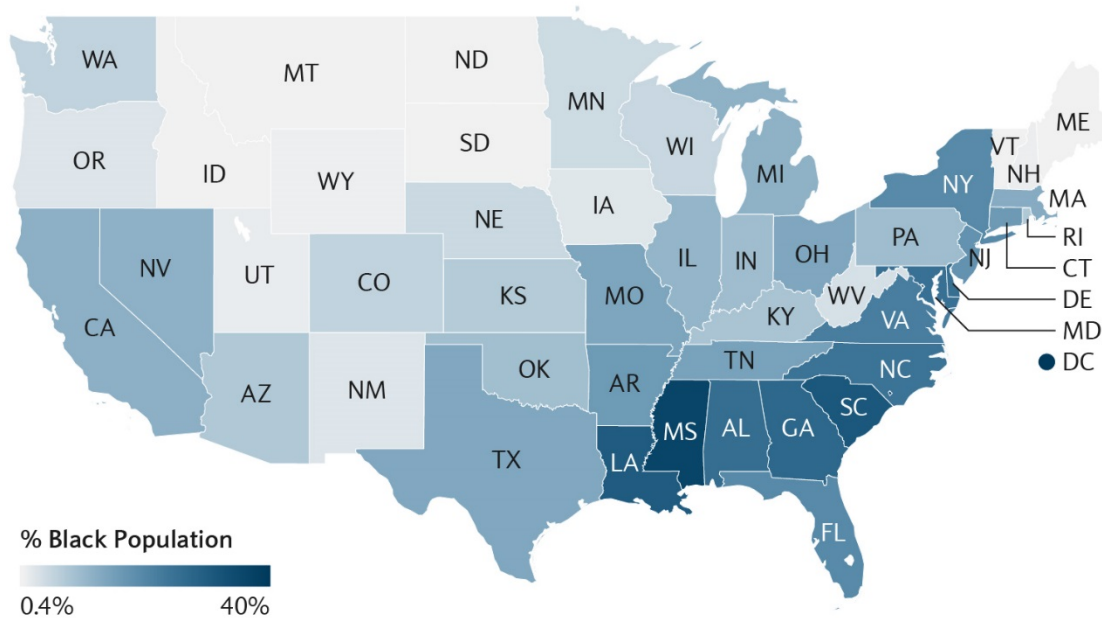
Figure 17 displays the nationwide homeownership rate²³ (total) and compares this to the homeownership rate for white and Black households separately. According to the American Community Survey, the homeownership rate for white households has hovered around 70%, whereas the rate for Black households is persistently lower at about 45%. Since the Great Recession, the gap has increased, and is now at 30 percentage points. That is wider than it was before the passage of the Fair Housing Act of 1968, which made race-based discrimination in housing illegal.

The goal of the GSEs’ affordability targets is to promote homeownership among underrepresented and underserved groups, including minorities. Although we do not have individual level data to test if those targets actually met those goals, we can look at the state level to test if the policy had a differential impact on states with a larger Black population.

We collect data on the percentage of the population that is Black for each state-year. In Figure 18, we show a map of US states based on the percentage of Black residents in 1996. It ranged from as low as 0.4% in states such as Montana (MT), Idaho (ID), North Dakota (ND) and South Dakota (SD) to close to 40% in Mississippi (MS), South Carolina (SC), Louisiana (LA) and Georgia (GA).

²³ Total includes all races/ethnicities: Black, White, Hispanic, Asian and Native American.

FIGURE 18
% Black Population Across US States in 1996



Source: American Community Survey – Intra-decennial Census (1990-2000)

We augment the panel model from the previous section by including two additional interaction terms: (1) the interaction between Gini and the percentage of Black population in a given state-year and (2) the triple interaction between Gini, the percentage of Black population and the level of the affordability target:

$$Y_{s,t} = \alpha_s + \beta \text{Gini}_{s,t} + \theta \text{Gini}_{s,t} \times \text{Target}_t + \lambda \text{Gini}_{s,t} \times \text{Blacks}_{s,t} + \mu \text{Gini}_{s,t} \times \text{Blacks}_{s,t} \times \text{Target}_t + \phi Z_t + \gamma X_{s,t} + \epsilon_{s,t}$$

Including the interaction terms allows us to simultaneously test for several hypotheses. The idea behind the first interaction term is that the effect of income inequality on homeownership varies with the level of the Black population in a given state. The idea behind the triple interaction term is that the benefit from the targets would also depend on the level of the Black population. We report the precise point estimates and confidence intervals in Figure 19.

The negative effect of income inequality on homeownership is considerably more pronounced for states with a higher Black population ($\beta < 0$ and $\lambda < 0$). For simplicity, let's set $\text{Target} = 0\%$ and compare the effect of income inequality assuming a Black population of 0% and 40% (roughly the high to low range across states). In the first case, increasing income inequality by 1 pp decreases homeownership by 0.07 pp. In the second case, the effect equals to $-0.07 - 0.24 \times 0.40 = -0.166$ pp. This means that the negative effect of income inequality on homeownership is a 2.4 times stronger for states with the highest percentage of Black residents than for those with the lowest percentage.

However, the same states benefit more from increasing the targets than other states ($\theta > 0$ and $\mu > 0$). Interestingly, although the interaction term $\theta \text{Gini}_{s,t} \times \text{Target}_t$ remains positive, its statistical significance vanishes after we include the triple interaction term $\mu \text{Gini}_{s,t} \times \text{Blacks}_{s,t} \times \text{Target}_t$. This suggests that the positive effect on homeownership we document is almost entirely driven by these states.

FIGURE 19
Homeownership, Income Inequality and Race

	Homeownership 1996-2015
Gini coefficient	-0.07*** [-0.12, -0.01]
Gini × Target	0.03 [-0.23, 0.27]
Gini × % Black Population	-0.24** [-0.28, -0.10]
Gini × Target × % Black Population	0.15** [0.03, 0.28]
Controls	Yes
State Fixed Effects	Yes
Year Fixed Effects	No
Observations	1020

Source: Barclays Research, Data: US Census Bureau, FRB New York (1996-2015)

Note: The table gives the result of estimating the model:

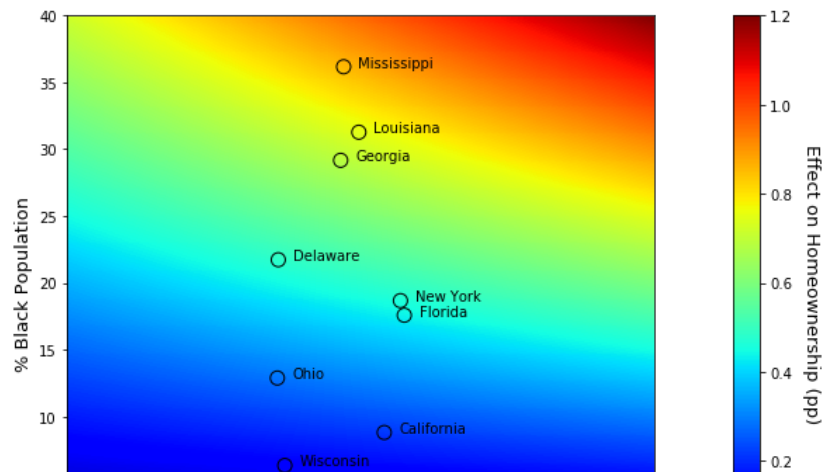
$Y_{s,t} = \alpha_s + \beta \text{Gini}_{s,t} + \theta \text{Gini}_{s,t} \times \text{Target}_t + \lambda \text{Gini}_{s,t} \times \text{Black}_{s,t} + \mu \text{Gini}_{s,t} \times \text{Black}_{s,t} \times \text{Target}_t + \phi Z_t + \gamma X_{s,t} + \varepsilon_{s,t}$ where s denotes US states and t time period. Significance at the 95 % confidence level is denoted by ***. Standard errors are adjusted for heteroscedasticity.

Next, we use the regression coefficients to consider in more detail the economic magnitude of higher affordability targets. We evaluate the model separately for two counterfactual levels of the targets – at 20% and at 40% – along a fine grid of income inequality and Black population combinations, holding all other control variables fixed. The difference between the model predictions at a target level of 40% and at 20% tells us by how much increasing the targets by 20pp compensates the negative drag of income inequality on homeownership²⁴. We plot this difference in Figure 20. The heat map clearly shows that while increasing the targets produces a positive effect across the entire grid, the largest benefits to homeownership accrue to the states with higher Black populations.

As an example, on the same chart we plot model predictions for select US states, evaluated at the mean of Gini and Black population values over the period 1996-2015. For states with large Black population, such as Mississippi, Louisiana and Georgia, increasing the targets reduces the negative impact of income inequality on homeownership the most (between 0.80pp and 1.1pp). On the other hand, for states with low Black populations and low income inequality such as Wisconsin and Idaho the improvement is limited (between 0.30pp and 0.40pp). For states with high income inequality, but relatively low Black populations (e.g. New York or Florida) the predicted uplift is between 0.50pp and 0.80pp.

²⁴ Please note that we *only* evaluate the policy through the lens of income inequality. Our model cannot predict the *total* overall effect on homeownership from increasing the affordability targets.

FIGURE 20
Benefit from the Affordability Targets by Gini and % Black Population



Source: Barclays Research

Note: Model predictions for Target going from 20 % to 40 %. Gini and % Black Population for the select US states are evaluated at the mean over the period 1996-2015.

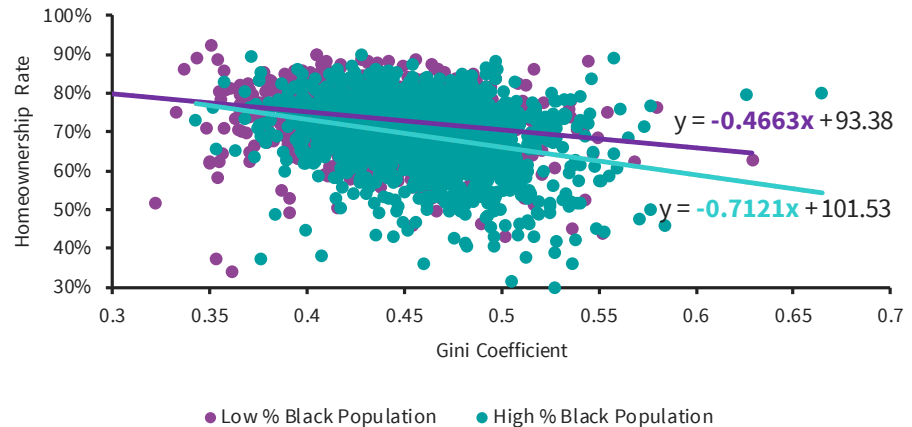
An Additional Reality Check: County-Level Data

One potential limitation of our model is that it cannot address *within-state* differences in the level of income inequality or Black population. For example, as of 2018, 41% of the population of the State of Mississippi was Black. However, on a county level this number ranges from as low as 2.5% to as high as 87.5%. To partly remedy this, we look into *county-level* data covering more recent years. We use survey data from Census Bureau – American Community Survey 2018 (ACS-5 year estimates) – which contains detailed economic data available on a county level, collected over the 5-year period from 2014 to 2018. We collected data on Gini coefficients, homeownership levels and Black populations for 3,142 US counties²⁵. This level of detail allows us to get a very granular picture of the US housing market, which, however, comes at the cost of lower precision of the estimates.

We first divide counties into two groups based on whether the percentage of Black residents falls below or above the mean. Then, in Figure 21, we draw scatterplots of homeownership against income inequality for the two groups. The negative slopes of both of the regression lines indicate that for all counties, higher income inequality is associated with lower homeownership. Moreover, the fact that the slope for the high Black population counties is steeper (in absolute terms) than the slope for the low Black population counties suggests that the effect is more pronounced for states with higher Black populations.

²⁵ 3,007 counties + 135 county-equivalents

FIGURE 21
County Level Data – Black Populations



Source: US Census Bureau, American Community Survey 2018 (5-year estimates)

Note: Counties with lower (higher) Black population than the mean are classified as Low (High) % Black Population.

First, although limited data availability prevents us from evaluating the effect of the affordability targets with county-level data, this new evidence renders additional support to our main finding. While we are confident that our model estimates the *average effect* of income inequality on homeownership reasonably well, we wish to point out that in reality, zooming in to a more granular geography level, the range of the effect could be considerably wider. Second, it is important to note that the model-predicted effect for a large state with a small Black population may be low, in reality the effect could still be economically meaningful as it affects a large number of households in absolute terms.

Finally, we wish to stress that although our analysis focuses in greater detail on the Black population, this does not imply that Black Americans are the only negatively impacted minority when it comes to housing outcomes.

Discussion and Policy Implications

The link we document between income inequality and homeownership likely depends on two factors. First, it requires that there be constraints on households with lower absolute incomes that keep them from owning homes, as opposed to simply owning less expensive homes. Second, it requires that the rise in inequality includes an increase in the proportion of the population at the lowest absolute incomes, rather than just an increase in the highest incomes. Under these circumstances, a rise in inequality would increase the number of households for which the constraints bind. We know that the second factor is satisfied in the US; the proportion of households with absolute incomes that qualify as “middle class” has shrunk, with both the lowest and the highest absolute incomes gaining share.

Although our results provide strong evidence that they exist, we don’t fully understand the constraints that bind on lower income households. That said, the affordability targets would not be effective unless access to mortgage credit played a role.

Figure 22 contains a summary of mortgage characteristics split by income quintiles. Households in the bottom of the distribution are clearly different from households at the top. Low-income households have lower FICO scores, and are correspondingly more likely to become delinquent. They also tend to make lower down payments (between 3 – 5%). This

could result from having lower wealth, such that making a larger down payment is not possible.

Participation in programs designed to help low-income borrowers, such as FHA first-time home buyer support, could also play a role, as these often require lower down payments²⁶. Regardless, these factors increase the risk profile of loans to these borrowers, and could create a gap between rates that are affordable and rates that generate a fair market return, which effectively acts as a constraint on access to credit.

FIGURE 22
Mortgage Characteristics across Income Quintiles

	Income Quintiles				
	1 st	2 nd	3 rd	4 th	5 th
Median Down Payment, %	3-5	3-5	6-10	6-10	11-15
Median FICO Score	664-688	704-716	726-753	753-775	775 -790
Late Payments, %	6.4	5.9	4.7	3.7	3.0

Source: US Census Bureau, Calem and Wachter (2003) (FICO), FRB Minneapolis Survey (FICO)

Note: Late payments are defined as mortgage payments more than 1 month due. FICO scores are computed by matching the results of Calem and Wachter (2003) and FRB Minneapolis Survey.

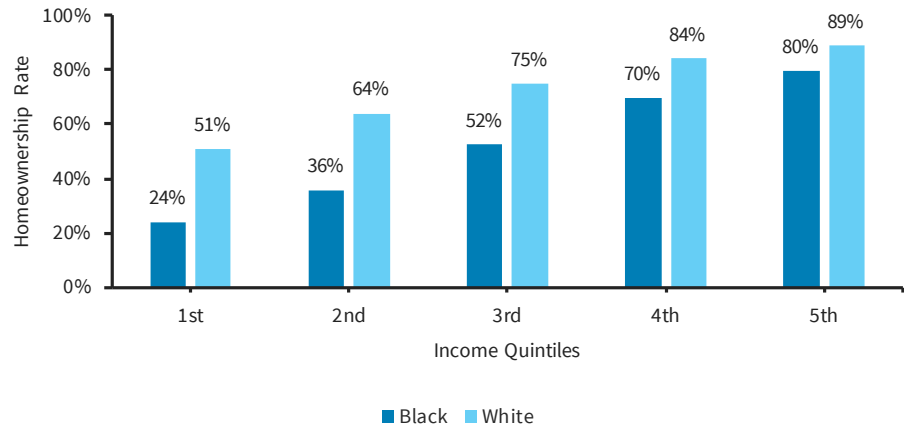
Our research shows that these constraints could be even more binding for Black households. Since we only have state-level data (rather than individual data), we cannot rule out that lower income borrowers of all races have lower homeownership in the states with high Black populations. Although technically possible, our specifications have state fixed effects, which should capture any state-specific characteristics affecting lower income residents. It is also possible that outright racism is responsible for any heightened sensitivity of Black homeownership to income inequality (such as lenders being less willing to lend to Black Americans than to white Americans with the same income and wealth).

While that may play a role, we believe it is more likely that the experience of lower income Black Americans is different from that of white Americans, in a way that is relevant to access to mortgage credit. Some possibilities include different levels of inter-generational support, a greater likelihood to have single-income households, and more volatile wages²⁷. Regardless, the effect is clear – although Black Americans have lower homeownership across all income quintiles, the gap to white homeownership is far greater at the lower income quintiles (Figure 23).

²⁶ These two factors are likely related. For example, the programs may require lower down payments because these borrowers lack liquid assets sufficient to make down payments – possibly a program that required 20% down wouldn't have any qualified borrowers.

²⁷ The Urban Institute (2020) "Breaking Down the Black-White Homeownership Gap".

FIGURE 23

Homeownership Rate by Household Income

Source: American Housing Survey (2017)

Note: Data for Black households is compared against data for white households only. Comparisons between other races/ethnicities are omitted for brevity.

We emphasize that these results do not translate into support for the status quo. The current system is a patchwork of explicit and implicit subsidies, and it is likely that many of these do not contribute meaningfully to homeownership. For example, the GSEs explicitly target below-market returns from lower-income borrowers and above-market returns from higher-income borrowers. Yet despite this cross-subsidization model, high-income borrowers still participate in the GSE market – meaning they must get cheaper rates than they would in the private market. One possible explanation is that the GSEs have a structural advantage over the private sector, possibly due to the government backstop, lower capital requirements, or their exemption from state taxes. As a result, both high-income and low-income borrowers are subsidized, although in absolute terms high-income borrowers receive a smaller proportion of the subsidy. In other words, the GSEs do not seemingly depend on overcharging high quality borrowers to finance their subsidies of lower quality borrowers; instead, they appear to undercharge all borrowers, just at differential amounts. Given that high-quality borrowers almost surely would retain access to mortgage credit absent this support, at reasonable rates, it is difficult to justify retaining the support the GSEs provide them.

Instead, that a program as simple as the affordability targets was able to mitigate about half of the effect of inequality leads us to conclude that well-structured government intervention can address some of the constraints facing lower income households. It also indicates that other forms of support for these households – notably the FHA – are not sufficient. If they were, then the introduction of the affordability targets would not have such a distinct effect. Without additional support, the reform of housing finance may result in lower homeownership for lower income and minority households.

This is particularly important in the current environment. Although racial and economic disparities in homeownership existed long before the COVID-19 pandemic, new data from the US Census Bureau shows that the economic fallout from the pandemic is widening these divides even further. We use new data from the Household Pulse Survey published by the US Census Bureau to evaluate how the pandemic is affecting people's housing. The Pulse Survey is administered weekly nationwide by text and email. Depending on the survey week, results are based on a comprehensive sample of between 100,000 to 150,000 responses. The Pulse survey reveals substantial differences in the ability to pay mortgages between Black and white

households. For example, at the end of June, 30% of Black homeowners did not make a mortgage payment compared to only 10% of white homeowners.

Measuring Income Inequality

Finally, our results touch on the important topic of how to measure income inequality. Traditionally, income inequality statistics, such as the Gini coefficient, have been derived from pre-tax personal income distributions (market incomes). Recently, more attention has been paid to inequality after accounting for taxes and transfers (disposable income). A report by the US Congressional Budget Office²⁸ shows that the average household income before accounting for federal taxes and transfers was \$21,000 for the lowest quintile and \$291,000 for the highest quintile. Including taxes and transfers, those averages were \$35,000 and \$214,000. Although implicit subsidies provided by the GSEs are not included in these calculations, our results show that they may be an important offset to inequality²⁹. Assessing the magnitude of the effect is more complicated than for outright transfers, as it requires valuing the benefits of access to mortgage credit in addition to any benefit that comes in the form of lower mortgage rates.

Robustness

Although we include state and time fixed effects, our baseline panel model does not control for state-level factors that vary over time. To dispel any doubts that our results are driven by spurious correlations, we need to explicitly account for variables which could potentially be correlated with the Gini coefficient.

Due to its statistical nature, a caveat in interpreting Gini is that the same value may result from very different income distributions. It is well known that the Gini coefficient is more sensitive to the changes in the middle of the income distribution than in the lower or higher tails of the distribution³⁰. This is because the derivation of the Gini coefficient depends on the ranking of the population, and the ranking is most likely to change at the densest regions of the income distribution, i.e. in its middle. To address this concern, we control for median disposable income across states.

Even if median household income remains stable, lower birth rates and population ageing could mechanically lead to higher income inequality due to income differences across age groups³¹. If income inequality correlates positively with age, then failing to control for the age structure across states could confound the magnitude of the impact of income inequality on *homeownership*.

Census Bureau statistics show that a larger fraction of people in the lower income quintiles tend to be older than 65 years. Some of these senior residents are likely to have “aged into” the lower end of the income distribution. Their contribution to the homeownership rate in their current quintile likely reflects a home purchase done during their prime earning years, when they were belonging to a higher income quintile.

Another aspect to consider is that elderly residents could choose to migrate to particular states after their retirement (e.g. Florida or Arizona), which could in its turn push upwards the income inequality coefficient in these states. To disentangle the effects of age and income inequality on homeownership, we include in the regressions the fraction of people above 65 years.

²⁸ <https://www.cbo.gov/publication/55413>

²⁹ Rental subsidies have been considered means-based support, but not support to purchase homes.

³⁰ Green et al. (1994)

³¹ The argument has been extensively discussed in Thomas Piketty's 2014 book *Capital in the 21st Century*.

In recent years, stronger demand for housing, coupled with historically low new-home construction has reduced the aggregate supply of for-sale homes. According to data from the Mortgage Bankers Association (MBA), at the end of our sample (2013-2015), housing supply was c.4.2 months, compared to c.10 months during the pre-crisis period. If states with heightened income inequality coincide with states with low housing supply, our model could overstate the impact of income inequality on homeownership. To capture time-varying changes in housing market supply across states, we control for the number of new housing permits. To adjust for differences in the population count across states, we normalize the number of permits by state-level population.

Finally, the process of urbanization and industrialization could affect our results in two important ways. First, since wages tend to be higher for urban jobs than rural work, high levels of urbanization could lead to higher income inequality and introduce systematic differences between more urban and more rural states. Second, data shows that states that have become more unequal over time have also become more urban and have seen larger increases in house prices. To ensure that the impact of income inequality on homeownership is not confounded by the presence of other factors, we also control for urban density, measured as number of persons per square mile.

Figure 24 presents the results of our robustness checks. All three control variables vary at the state-level and are log-transformed. Although adding these control variables reduces the magnitude of the estimates, the regression coefficient of income inequality remains statistically significant at the 95% confidence level for both sub-samples.

To compare with our baseline, a 1 percentage point increase in Gini reduces homeownership by 0.24% in the pre-policy sample and by 0.10% in the post-policy sample. As an additional check, in the third column of Figure 24, we limit the post-policy sample to the 10-year period between 1996-2005. A tighter event window does not change our conclusions on the impact of housing subsidies remain qualitatively unchanged. Throughout our robustness checks, the estimate of the pre-policy sample is 2.4 to 2.9 times higher than the estimate of the post-policy sample, which corroborates our baseline results.

FIGURE 24
Robustness Checks

	Homeownership 1984-1995	Homeownership 1996-2015	Homeownership 1996-2005
Gini coefficient, β	-0.29*** [-0.38, -0.19]	-0.11*** [-0.16, -0.05]	-0.12*** [-0.20, -0.03]
Controls	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	612	1020	510
Data	1984-1995	1996-2015	1996-2005

Source: Barclays Research, Data: US Census Bureau, FRB New York (1984-2015)

Note: The table gives the result of estimating the model:

$Y_{s,t} = \alpha_s + \delta_t + \beta \text{Gini}_{s,t} + \gamma X_{s,t} + \epsilon_{s,t}$, where s denotes US states and t time period. Significance at the 95 % confidence level is denoted by ***. Standard errors are adjusted for heteroscedasticity.

A final concern about our analysis relates to the fact that while homeownership is bounded between 0% and 100%, the linear panel model³² puts no restriction on the magnitude of the outcome variable. Theoretically, this means that the model could predict negative or greater than 100% homeownership rates. However, a comparison of the model-fitted versus the actual homeownership rates reveals that this is not a pressing concern in our case. Predicted homeownership values fall in the range between 38% and 78%, which is in fact very close to the actual range between 34% and 81%.

³² We verify in the data that the residuals from the panel model are centered at zero and follow a normal distribution, which fulfills the assumptions of the OLS model. As a conservative robustness check, instead of OLS, we estimate a Beta Regression (see Ferrari and Crebari-Neto (2004) for more details). The Beta Regression is appropriate when the outcome variable is continuously distributed in the interval [0,1] and exhibits skewness and heteroscedasticity, as is the case with homeownership. We estimate the model using Maximum Likelihood with a logit link function. We find that 1 pp increase in Gini decreases homeownership by 0.37 pp.

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