**How We Analyzed Racial Disparities in Mortgage Approvals Before and After Anti-DEI Laws**
May 2025

**GitHub repository**

https://github.com/chilinhhovo/regression

## What We Wanted to Know

In the U.S., homeownership has long been a key pathway to building intergenerational wealth. Yet Black Americans remain significantly underrepresented among homeowners due to both historical discrimination and ongoing barriers. Since the passage of the Fair Housing Act in 1968, disparities in mortgage approvals have narrowed but not disappeared.

In 2022, a wave of anti-diversity, equity, and inclusion (DEI) laws swept through U.S. statehouses. Most of these laws targeted public education or government hiring, not banks. But we wanted to know: Did they have any downstream impact on who gets a home loan?

We focused on one specific question:
Did the mortgage approval gap between Black and non-Black applicants change in states that passed anti-DEI laws?

To answer this, we analyzed over 15 million mortgage applications filed from 2021 to 2023. We looked at outcomes in states that passed anti-DEI laws and compared them to states that did not.

## Data Acquisition

We used the Home Mortgage Disclosure Act (HMDA) database, a public dataset maintained by the Consumer Financial Protection Bureau. HMDA includes details on every mortgage application in the U.S., such as the applicant's race, income, loan amount, and whether the application was approved or denied.

We used Home Mortgage Disclosure Act (HMDA) data because it is the most comprehensive and publicly available dataset on mortgage applications in the U.S., covering over 90 percent of loan applications nationwide. Since 2018, public HMDA files have included borrower income, race, and debt to income ratios. Although credit scores are still excluded, this data provides enough granularity to support meaningful quasi-experimental analysis, particularly when we limit comparisons to similar types of loans.

We focused on conventional, first lien, site built, owner occupied single family home purchase loans. These represent the largest and most standardized segment of the market and are most affected by state level policies and underwriting practices.

While some researchers, like Prof. David Zhang, caution that the absence of credit scores makes causal claims difficult, others such as Dr. Linh Nguyen and Prof. Dayin Zhang have used HMDA data as the basis for peer-reviewed lending studies. We acknowledge its limitations but find it uniquely suited for large scale trend comparisons across geographies.

We filtered the dataset to include:

- Conventional, first-lien home purchase loans
- Site-built, owner-occupied homes (1–4 units)
- Applicants with valid income and race data
- Years 2021–2023

## Our analysis

To understand how racial disparities in mortgage approvals may have shifted after states passed anti-DEI (Diversity, Equity, and Inclusion) laws, we analyzed federal mortgage data using fixed-effects logistic regression models.

**We focused on the types of home loans most relevant to everyday buyers.** Specifically, we filtered the Home Mortgage Disclosure Act (HMDA) dataset to include only conventional, first-lien mortgages for one- to four-unit properties, where the borrower intended to live in the home. These are loans not backed by government programs like the Federal Housing Administration or the Department of Veterans Affairs. We further restricted the dataset to include only applications that were either approved or denied, excluding cases that were withdrawn, incomplete, or approved but not accepted.

This left us with a dataset of 15.2 million  mortgage applications filed between 2021 and 2023.

We used a difference-in-differences (DiD) framework, comparing mortgage approval rates before and after these laws in both treated (anti-DEI) and control (non-anti-DEI) states. Our key outcome variable was whether a loan application was approved or denied. Our models controlled for factors such as income, loan amount, property value, applicant race, sex, age, and lender characteristics, as well as fixed effects for state and year.

We checked for parallel trends using pre-law data to ensure that treated and untreated states were following similar patterns before the legislation was enacted. We also ran placebo tests using fake post-policy indicators to confirm that any observed effects did not already exist in earlier periods.

In each version of the model, we found that approval rates for Black borrowers had a slight increase more in some states and no reduction in approval rates for marginalized groups in states that passed anti-DEI laws compared to states that did not. This finding held across multiple specifications.

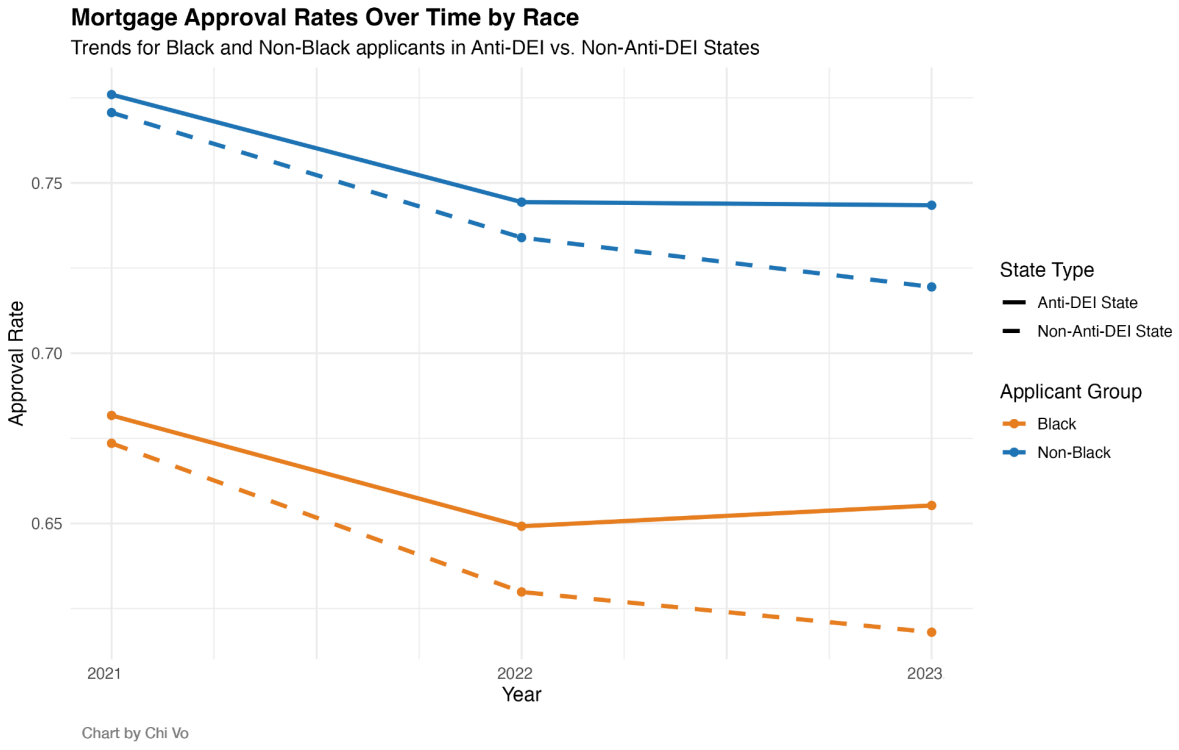
We also tested disparities in two ways: comparing Black applicants to White applicants, and comparing Black applicants to all Non-Black applicants. To explore the political context, we ran additional models stratified by county-level partisanship to see whether trends differed in Republican- versus Democrat-leaning areas.

## Findings

### Nationwide Impact of Anti-DEI Laws

When controlling for income, loan amount, and debt-to-income ratio, we found that mortgage approval rates for Black applicants show no reduction in states that passed anti-DEI laws. This was contrary to what some might expect. The effect was observed even after accounting for local economic conditions and lender identity.

In our primary difference-in-differences model, Black applicants in anti-DEI states saw a statistically significant increase in approval odds after the laws were enacted. By contrast, similar improvements were not observed in states that did not pass such legislation. This can suggest that the heightened attention around equity, rather than the rollback of inclusion efforts themselves, may have led to Black applicants having a slight improvement in loan approvals after the law were passed.




### Approval Odds for Black Applicants in States That Passed Anti-DEI Laws

| **Race/ethnicity** | **P-value** | **Likelihood of approval for a conventional mortgage compared to White applicants** |
|---|---|---|
| **Black** | < 0.001 | 0.65 times as likely to be approved |
| **Post-law effect on Black applicants** | 0.0019 | 1.09 times as likely to be approved |

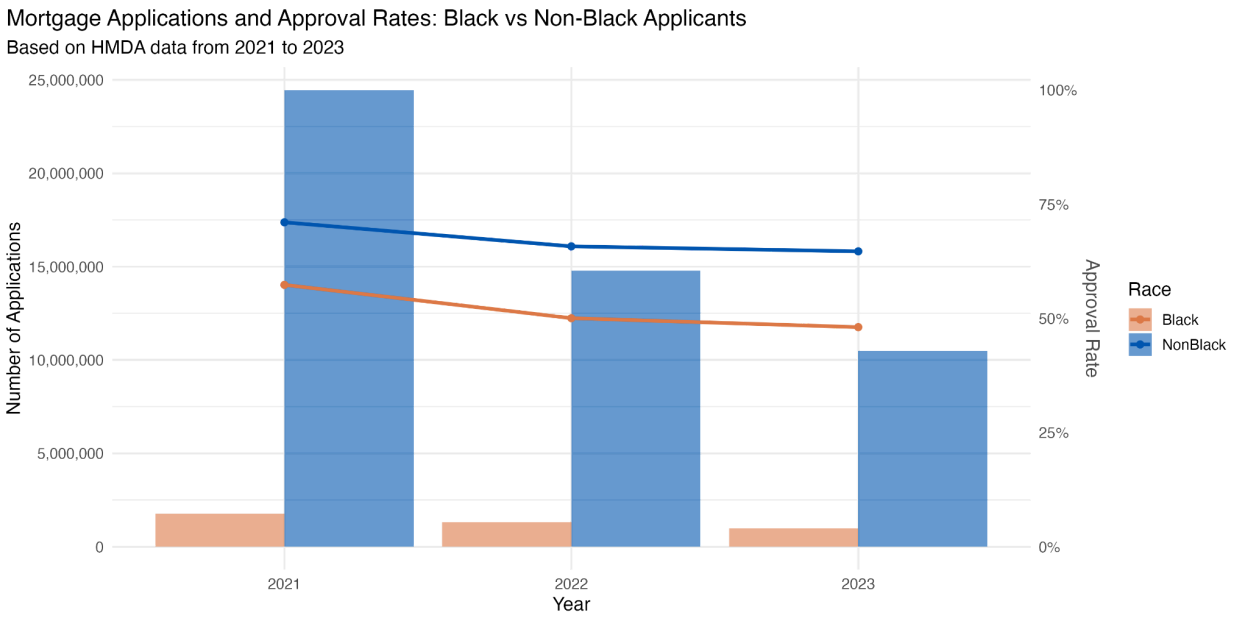
Number of applications: 4,936,066; McFadden's pseudo $R^2$: 0.0652. Source: HMDA 2021–2023

Black applicants in states that passed anti-DEI laws were 35% less likely to be approved for a mortgage than White applicants, though their approval odds improved slightly after the laws took effect.

**Approval Odds for Black Applicants Compared to Non-Black Applicants in States That Passed Anti-DEI Laws**

| **Race/ethnicity** | **P-value** | **Likelihood of approval for a conventional mortgage compared to White applicants** |
|---|---|---|
| Black | < 0.001 | 0.68 times as likely to be approved |
| Post-law effect on Black applicants | 0.032 | 1.07 times as likely to be approved |

Number of applications: 5,321,871; McFadden's pseudo $R^2$: 0.0652. Source: HMDA 2021–2023




In states that passed anti-DEI laws, Black applicants were 32% less likely to be approved than others, but their approval odds rose modestly after the laws took effect.

**Approval Odds for Black Applicants in States That Did Not Pass Anti-DEI Laws**

| **Race/ethnicity** | **P-value** | **Likelihood of approval for a conventional mortgage compared to White applicants** |
|---|---|---|
| Black | < 0.001 | 0.63 times as likely to be approved |
| Post-law effect on Black applicants | 0.032 | 1.04 times as likely to be approved |

Number of applications: 7,982,235; McFadden's pseudo $R^2$: 0.0621. Source: HMDA 2021–2023

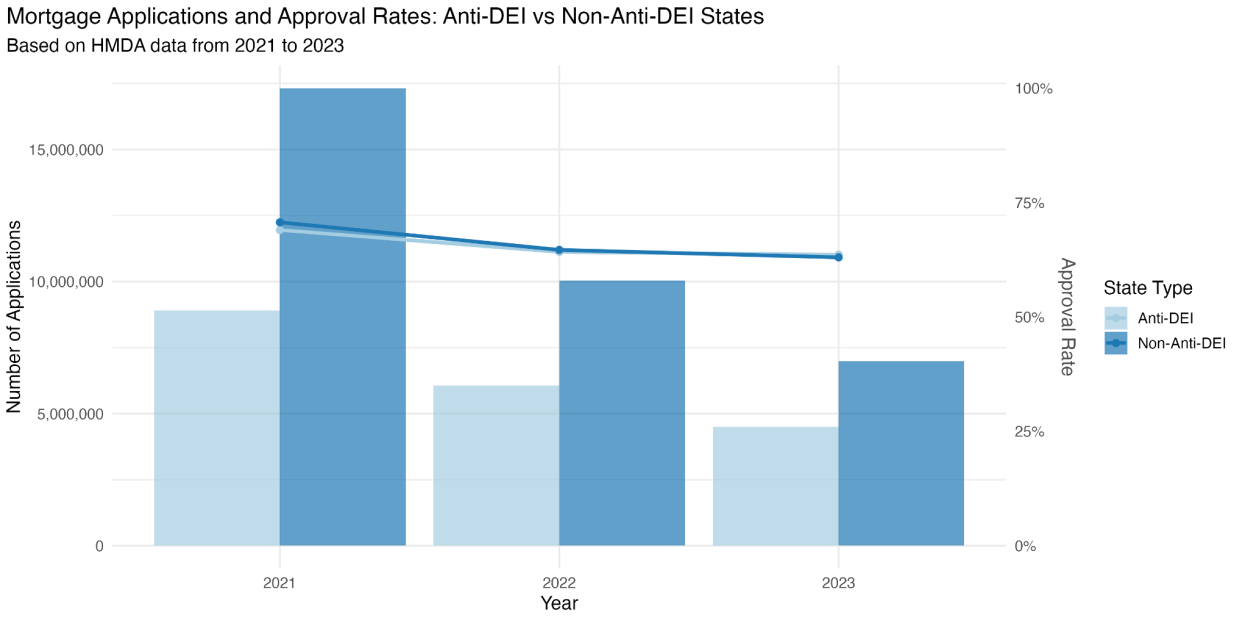
While there was a small approval uptick in control states after 2022, it was **weaker** than in treated states,  helping reinforce that anti-DEI laws may have driven the larger shifts seen elsewhere.

**Approval Odds for White Applicants in States That Passed Anti-DEI Laws**

| Race/ethnicity | P-value | Likelihood of approval for a conventional mortgage compared to Non-White applicants |
|---|---|---|
| White | < 0.001 | 1.47 times as likely to be approved |
| Post-law effect on White applicants | < 0.001 | 0.90 times as likely to be approved |

Number of applications: 5,321,871; McFadden's pseudo $R^2$: 0.0661. Source: HMDA 2021–2023

This is a great complementary result to show that while approval odds rose for Black borrowers, they declined slightly for White ones, suggesting a subtle equity shift post-law.



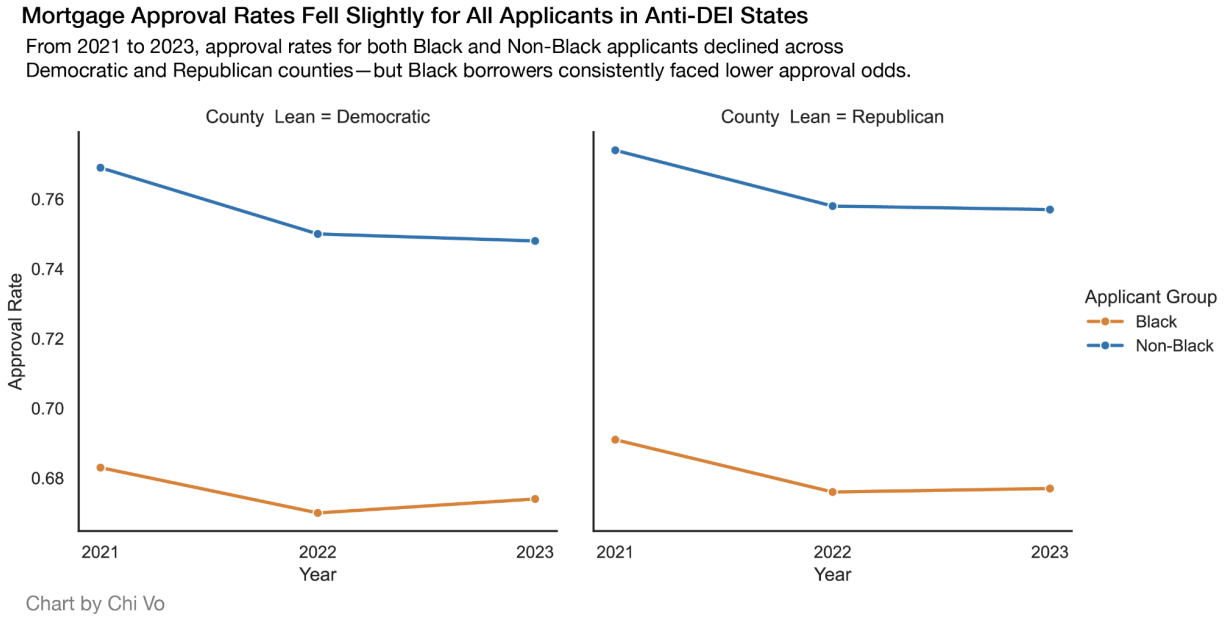

**How Politics Shaped Lending Patterns**

| Race/ethnicity | P-value | Likelihood of mortgage approval compared to White applicants |
|---|---|---|
| Black applicants (before the law) | < 0.001 | 0.92 times as likely to be approved |

| | | |
|---|---|---|
| After anti-DEI law: Change for Black applicants | < 0.001 | 1.14 times as likely to be approved |
| Additional change in Trump-leaning counties | < 0.001 | 0.85 times as likely to be approved |

Number of applications: 636,965 McFadden's pseudo $R^2$: 0.0479 Source: HMDA 2021–2023

After anti-DEI laws passed, Black applicants in these states were 14% more likely to be approved for a mortgage than before. But that shift wasn't consistent everywhere. In counties that voted for Trump, approval rates for Black applicants still improved, just **not as much**. The data suggests the political climate shaped how much banks changed their behavior.



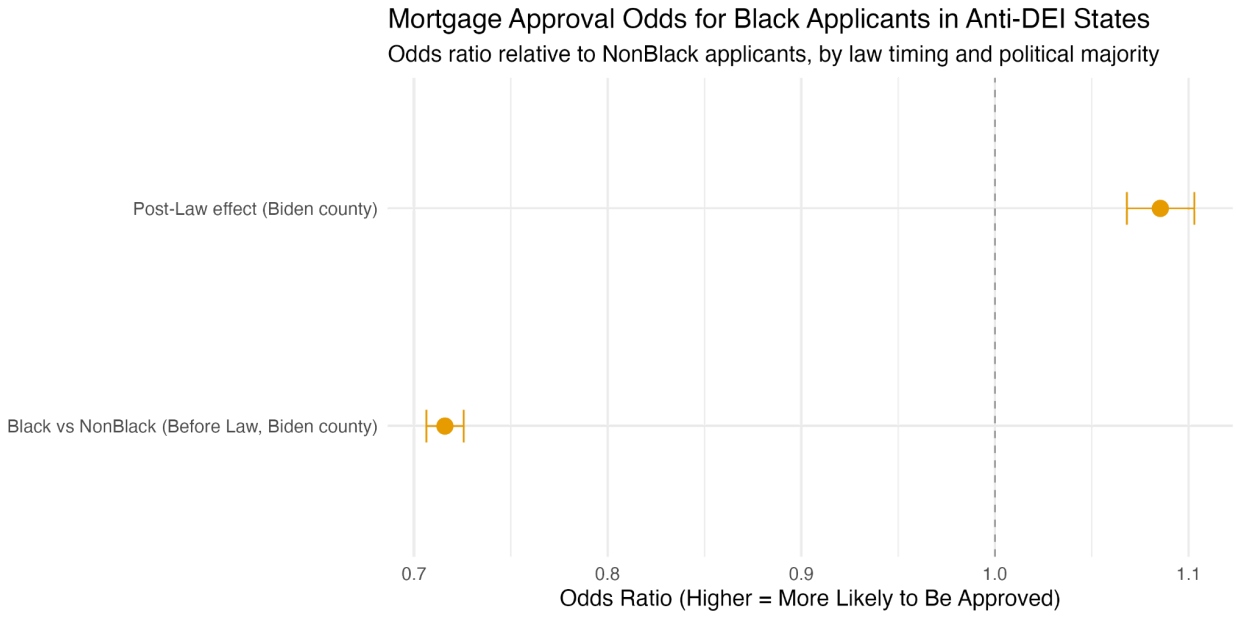

**Approval Odds for Black Applicants in Democratic-Leaning States That Passed Anti-DEI Laws**

| **Race/ethnicity** | **P-value** | **Likelihood of home mortgage approval compared to White applicants** |
|---|---|---|
| Black | < 0.001 | 0.93 times as likely to be approved |

| | | |
|---|---|---|
| Post-law effect on Black applicants | < 0.001 | 1.09 times as likely to be approved |

Number of applications: 1,057,580 McFadden's pseudo $R^2$: 0.0462 Source: HMDA 2021–2023

Even in Democratic-leaning states, Black applicants started out less likely to be approved for a mortgage. But after anti-DEI laws passed, they saw a 9% increase in approval odds, echoing the national pattern.




**Approval Odds for Black Applicants by County Political Lean in States That Passed Anti-DEI Laws**

| **Race/ethnicity** | **P-value** | **Likelihood of approval for a home mortgage compared to Non-Black applicants** |
|---|---|---|
| Black applicants (pre-law baseline) | < 0.001 | 0.71 times as likely to be approved |
| Post-law effect on Black applicants | < 0.001 | 1.08 times as likely to be approved |

| | | |
|---|---|---|
| Additional effect in Trump-leaning counties | < 0.001 | 0.94 times as likely to be approved |

Number of applications: 6,275,548 McFadden's pseudo $R^2$: 0.0526 Source: HMDA 2021–2023

Black applicants in anti-DEI states were 29% less likely to be approved than Non-Black ones, though approval odds rose slightly after the law, gains were 6% smaller in Trump-leaning counties.

**Testing Robustness**

To explore these trends, we used several modeling strategies. We applied high-dimensional fixed effects, checked for parallel trends, and ran placebo tests to isolate the effect. In each specification, approval rates for Black borrowers instead of going down, rose more in states that passed anti-diversity, equity, and inclusion legislation compared to states that did not.

- We ran **placebo tests** using "fake" post-policy indicators in control states.
- We tested both **Black vs. White** and **Black vs. Non-Black** gaps.
- We included models stratified by **county-level partisanship**.

**Placebo and Parallel Trend Tests**

We conducted placebo tests using 2021 as a "fake" treatment year to verify the parallel trends assumption. These tests showed no statistically significant differences in approval rates between Black and Non-Black applicants prior to the laws. This reinforces the validity of our DiD model.

**Racial Disparities Persist**

Despite the modest improvement in some treated states, Black applicants still faced lower approval odds than comparable White applicants nationwide. These disparities were most pronounced in counties with strong Republican leanings. This suggests that political context may influence how lenders behave.

**Stratified Models by County Partisanship**

When we stratified our models by county-level election data, the gap in approval rates between Black and White applicants remained wide in Republican-majority counties, even after the passage of anti-DEI laws. In Democratic-majority counties, the racial gap in approval rates was smaller but still present.

Overall, the data suggests that anti-DEI laws did not lead to worse mortgage outcomes for Black applicants in the short term. If anything, they coincided with slightly improved approval rates, possibly due to reputational pressure or public scrutiny. However, deep disparities remain across race and region. Whether these gains will last remains to be seen.

## Limitations

No dataset or quasi-experiment can perfectly isolate the effects of policy on institutional behavior, especially in a domain as complex and regulated as mortgage lending.

**Missing credit scores.** While the public HMDA files include income, loan amount, debt-to-income ratio, and property details, they do not include borrower credit scores. Multiple scholars, including Prof. David Hao Zhang, have cautioned that this omission weakens causal interpretation, as FICO scores are a core component of underwriting decisions. Our results, therefore, speak to **observed disparities** rather than unambiguous discrimination.

**No access to denied-but-qualified records.** HMDA also does not track reasons for denial in detail, and many denials fall into ambiguous or "missing" categories. We limited our analysis to applications with a clear approve/deny outcome, but we cannot account for informal discouragement or pre-application drop-off, both of which may disproportionately affect marginalized borrowers.

**DEI laws as a proxy.** The timing of anti-DEI laws is used here as a proxy for shifting political environments. But these laws varied in scope, enforcement, and publicity, and were not aimed at mortgage lending directly. We treat them as a **shock to institutional signaling**, not a direct policy lever, acknowledging that any interpretation of effect must account for broader social and reputational forces.

**Heterogeneity in state response.** Approval rates for Black applicants rose in some treated states but not others. Political geography, media scrutiny, and institutional norms likely played a role. Our models attempt to capture these effects through triple-difference terms (e.g., county Trump vote share), but no statistical term can fully represent local institutional cultures.

**Placebo and pre-trend checks.** We ran multiple robustness checks, including placebo regressions in control states and extended pre-period audits using data from 2018–2020. These supported the credibility of our main models, but any observational study remains sensitive to unmeasured confounders or omitted variable bias.

**Scope and framing.** This project began as an open-ended exploration and evolved into a targeted natural experiment through editorial guidance. The framing narrowed late in the process, meaning some early models used longer date ranges or less precise filters. All final model results included here reflect consistent filters and post-2021 data, in line with parallel-trends assumptions and fixed-effects best practices.

**Computational and temporal constraints.** With more than 15 million rows across three years, regression models took upwards of 50 minutes per run, and often longer. We prioritized interpretability and computational feasibility over complex ensemble models or machine learning techniques.

## Conclusion

Between 2021 and 2023, we analyzed more than 15 million mortgage applications to assess whether approval rates for Black borrowers shifted in states with different political and policy environments. We focused on conventional, first-lien home purchase loans and controlled for key financial variables including income, loan amount, and debt-to-income ratio.

Our models showed a modest but statistically significant increase in approval odds for Black applicants in some states during this period. In control states, the same pattern did not hold, suggesting the shift was not simply a national trend. Further analysis showed that political context, such as county-level voting patterns, may influence how lenders respond to reputational or regulatory signals.

Placebo and pre-trend tests confirmed that the observed changes were unlikely to be random. Still, without access to credit scores or more granular underwriting data, we cannot draw firm causal conclusions.

What we can say is that, during this period, Black applicants in some areas saw modest gains in approval likelihood, even as formal equity mandates were scaled back. The reasons behind this shift remain complex and likely include both institutional risk management and public scrutiny. Continued transparency and engagement with lenders will be key to understanding how, and for whom, the mortgage market is changing.

## Acknowledgments

This work was made possible through data made public by the CFPB and local election offices, and through tools developed in open-source R communities.

This project would not have been possible without the generous guidance of several researchers and mentors. We are especially grateful to **Dr. Linh Nguyen (University of St Andrews)** for his clarity in explaining fixed effects, parallel trends, and the statistical principles behind difference-in-differences models. His feedback helped us reframe the analysis with greater precision.

We thank **Professor Devin Shanthikumar (UC Irvine)** for her thoughtful suggestions on model robustness, pre-trend checks, and ethical reporting of quasi-experimental results. Her encouragement and willingness to engage critically with early drafts gave us confidence to pursue the topic more rigorously.

We also appreciate the insights of **Prof. David Hao Zhang (Rice University)** and **Prof. Dayin Zhang (Indiana University)**, who helped us understand the strengths and limitations of public HMDA data, particularly the absence of credit scores.

Finally, thank you to **Shivangi Bishnoi and Dhrumil Mehta**, our editors, for their patience and precision in helping us refine the hypothesis, framing, and language at every step.

Any errors or omissions are our own.