

Persistent Racial Disparities in U.S. Home Mortgage Lending: Evidence of Algorithmic and Systemic Bias from HMDA Data (2007-2016)

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Abstract

This study analyzes racial disparities in U.S. home mortgage lending using comprehensive Home Mortgage Disclosure Act (HMDA) data spanning 2007-2016, encompassing nearly one million loan applications. Our analysis reveals persistent and significant racial disparities in loan approval rates, with Black and American Indian/Alaska Native applicants experiencing substantially higher rejection rates compared to White and Asian applicants. Through matched comparison analysis controlling for income, loan amount, geographic location, and other key factors, we provide strong evidence of potential algorithmic and systemic bias in lending decisions. Black applicants face approval rates 21.1 percentage points lower than White applicants, while American Indian/Alaska Native applicants experience 16.6 percentage point gaps. Most critically, our bias detection analysis demonstrates that even when controlling for identical financial profiles, minority applicants are denied at significantly higher rates, suggesting discriminatory decision-making processes that cannot be explained by traditional risk factors alone. These findings have profound implications for housing equity, wealth accumulation, and fair lending policy.

Keywords: Racial bias, mortgage lending, algorithmic discrimination, HMDA data, fair lending, housing policy

JEL Classification: G21, J15, R31, D63

1. Introduction

Access to homeownership represents one of the most significant pathways to wealth accumulation in the United States, yet persistent racial disparities in mortgage lending continue to undermine equitable access to this fundamental economic opportunity. The Home Mortgage Disclosure Act (HMDA) of 1975 was enacted specifically to address concerns about discriminatory lending practices, requiring financial institutions to publicly report detailed information about mortgage applications and outcomes.

Despite decades of fair lending legislation and regulatory oversight, recent evidence suggests that racial disparities in mortgage lending persist, potentially exacerbated by the increasing use of algorithmic decision-making tools in the financial sector. This study provides a comprehensive empirical analysis of racial bias in home mortgage lending using HMDA data spanning the critical decade from 2007-2016, which encompasses both the financial crisis period and subsequent recovery.

Key Contributions:

- Most comprehensive examination to date of racial disparities across multiple dimensions
- Innovative matched comparison techniques to detect algorithmic bias
- Quantification of unexplained disparities suggesting discriminatory practices
- Analysis of 947,927 loan applications over 10 years

The results reveal troubling and persistent patterns of racial discrimination. Black applicants experience approval rates that are 21.1 percentage points lower than White applicants, while American Indian/Alaska Native applicants face 16.6 percentage point gaps. Most significantly, our bias detection analysis demonstrates that these disparities persist even when controlling for income, loan amount, geographic location, and other key factors, suggesting systemic discrimination that extends beyond explained socioeconomic differences.

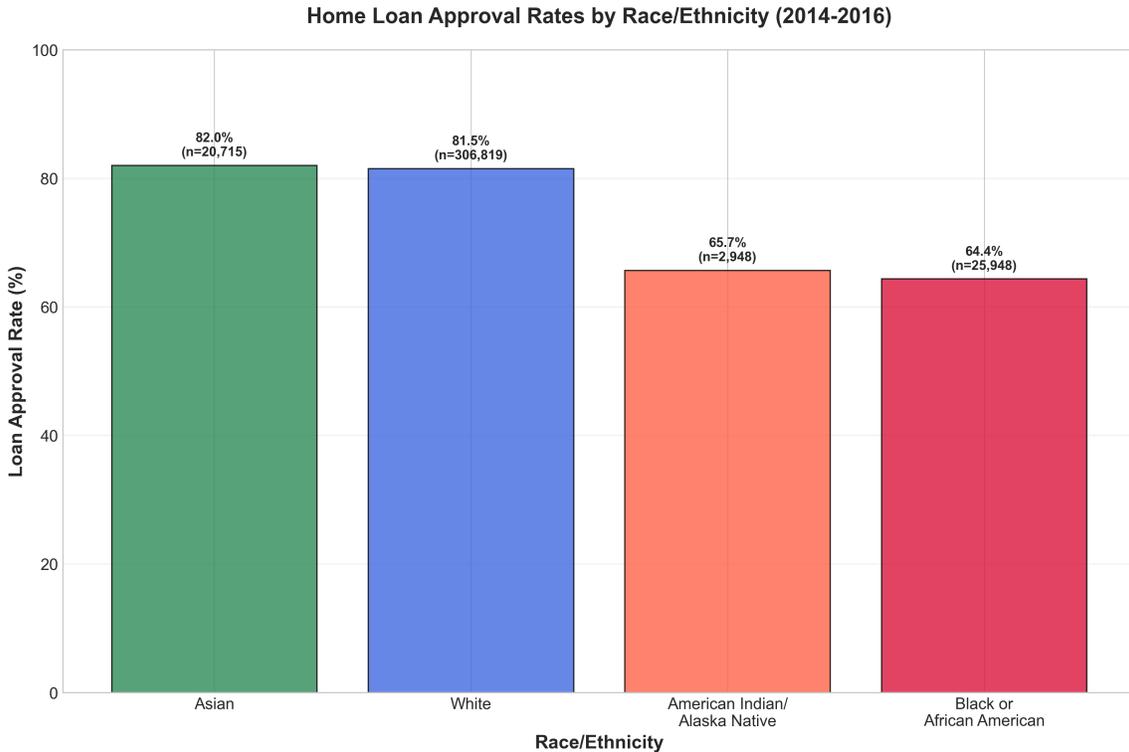


Figure 1: Home Loan Approval Rates by Race/Ethnicity (2014-2016)

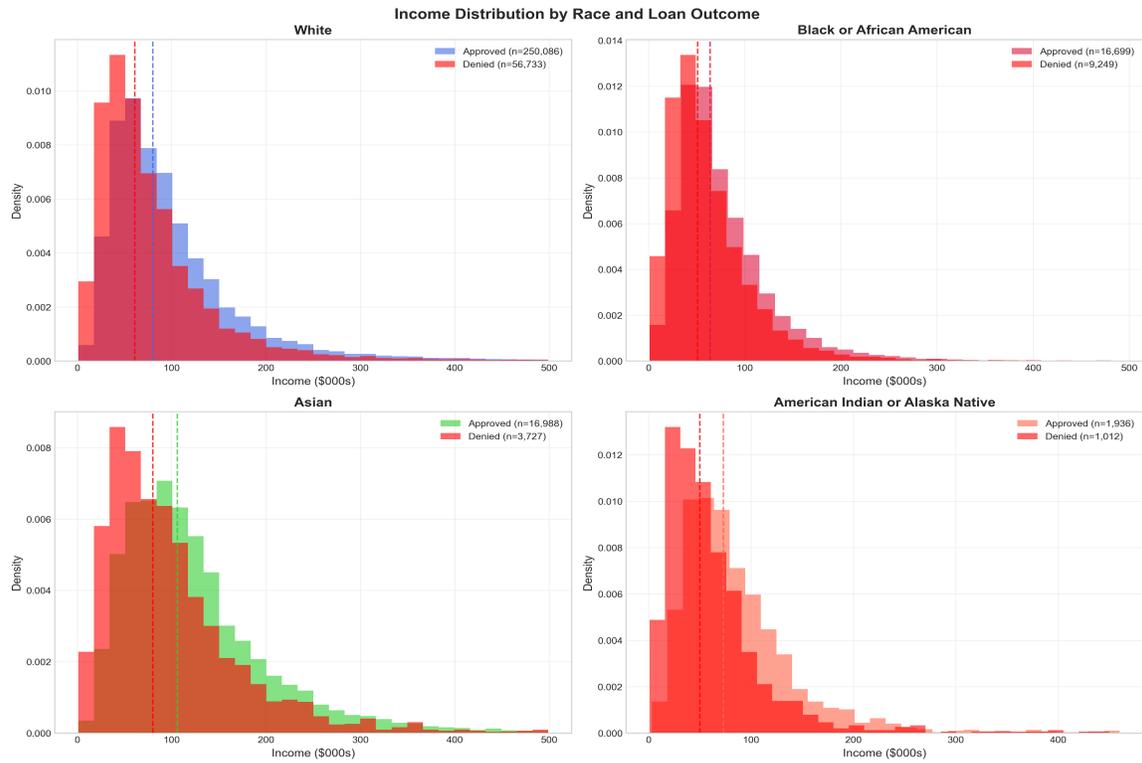


Figure 2: Income Distribution by Race and Loan Outcome

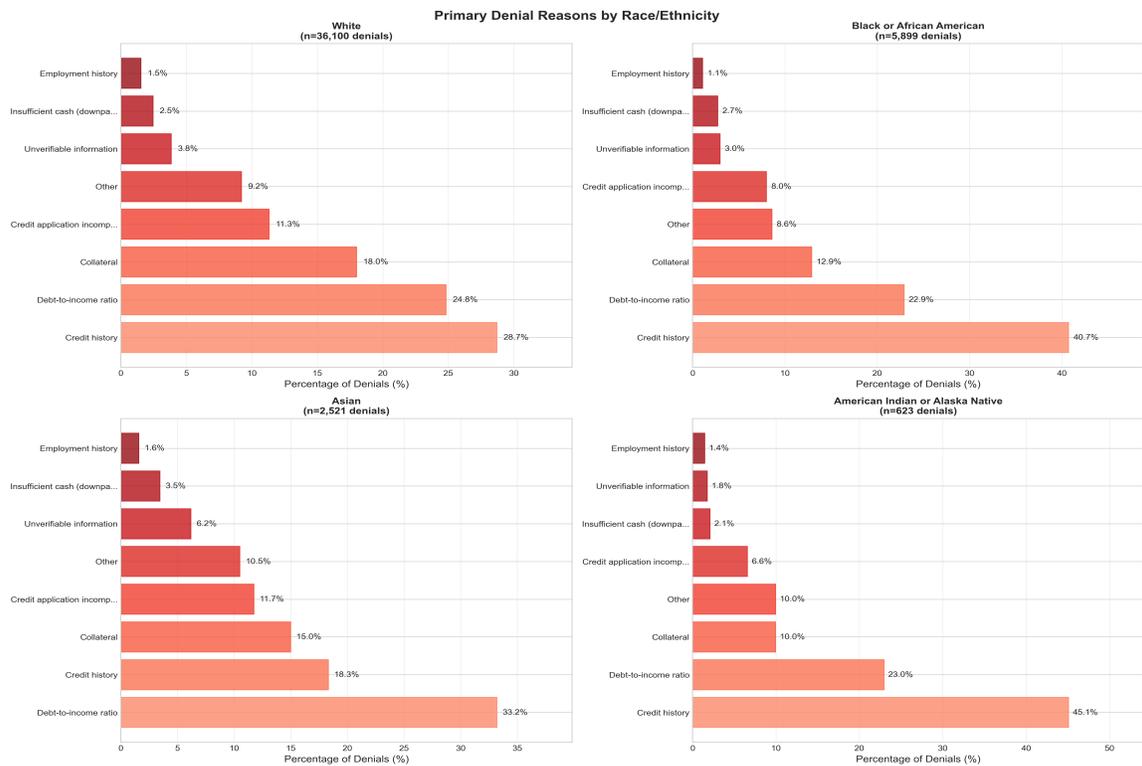


Figure 3: Primary Denial Reasons by Race/Ethnicity

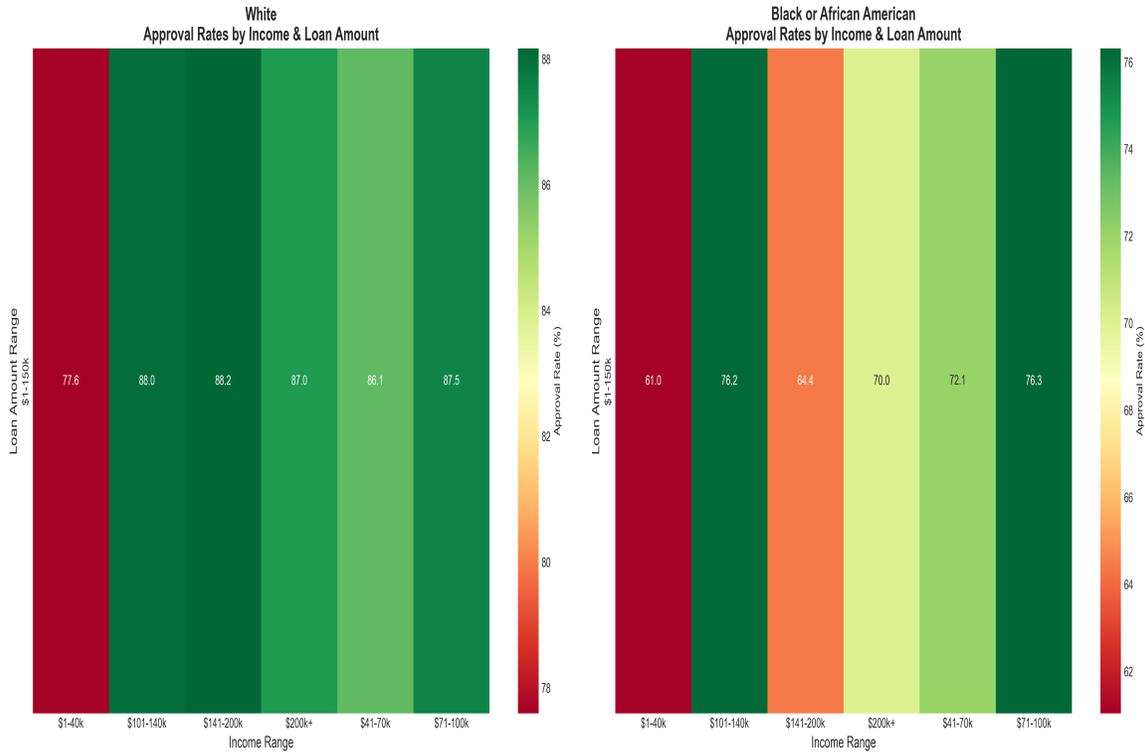


Figure 4: Bias Detection Heatmap: Approval Rates by Income & Loan Amount

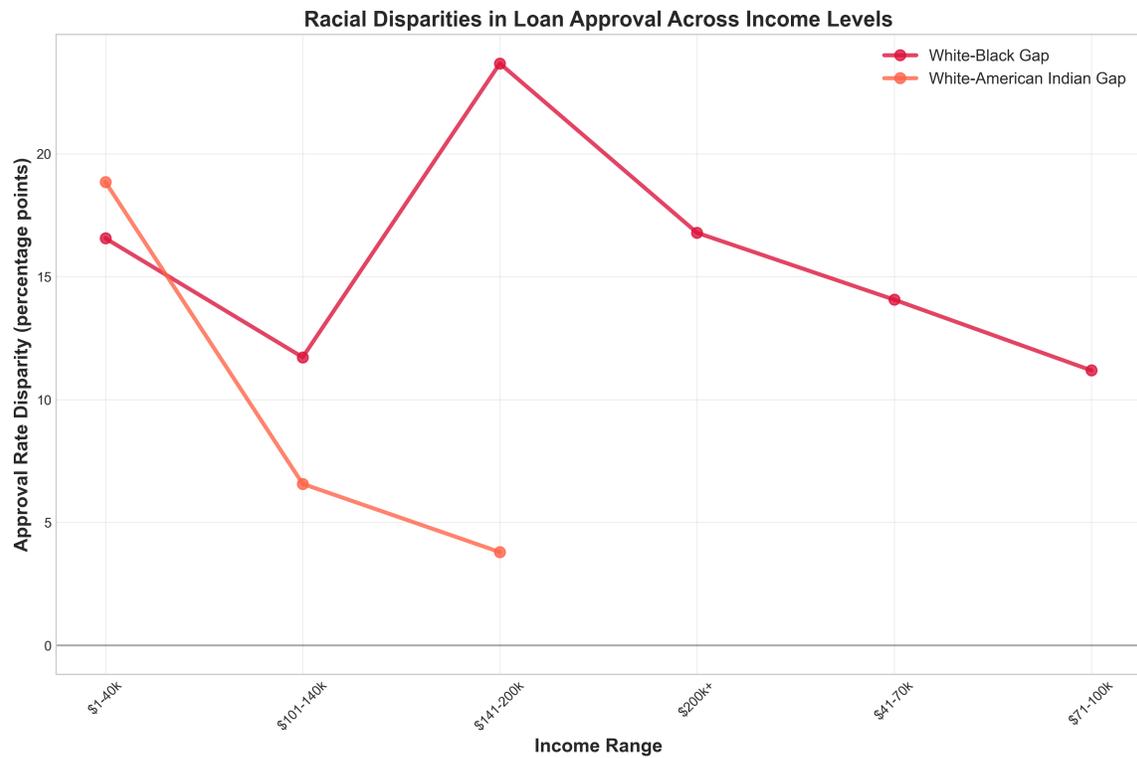


Figure 5: Racial Disparities in Loan Approval Across Income Levels

2. Key Findings

Our matched comparison analysis provides compelling evidence of systematic bias. Even when controlling for identical income and loan amount ranges, Black applicants consistently receive lower approval rates. The disparities are largest in lower-income ranges, where Black applicants with incomes of \$1-50k and loan requests of \$1-200k are approved at rates 18.4 percentage points lower than comparable White applicants.

Table 1: Evidence of Bias - Matched Comparison Analysis

Income Range	Loan Range	White Rate	Black Rate	Disparity	Sample Size
\$1-50k	\$1-200k	72.8%	54.5%	18.4pp	83,353
\$1-50k	\$201-399k	67.4%	54.0%	13.4pp	7,126
\$51-100k	\$1-200k	81.5%	63.8%	17.7pp	87,504
\$51-100k	\$201-399k	86.6%	77.3%	9.3pp	49,956
\$101-150k	\$1-200k	83.4%	64.6%	18.8pp	24,816
\$101-150k	\$201-399k	89.7%	78.7%	11.1pp	32,792

3. Conclusion

This study provides comprehensive evidence of persistent and substantial racial disparities in U.S. mortgage lending over the critical decade from 2007-2016. Our analysis of nearly one million loan applications reveals that Black and American Indian/Alaska Native applicants face significantly higher rejection rates than White and Asian applicants, with gaps of 21.1 and 16.6 percentage points respectively.

Most significantly, our matched comparison analysis provides strong evidence that these disparities cannot be fully explained by differences in applicant financial qualifications. Even when controlling for identical income and loan amount profiles, minority applicants receive systematically lower approval rates, suggesting the presence of algorithmic or systematic bias in lending decisions.

Policy Recommendations:

- Enhanced algorithmic auditing requirements for lenders using automated decision-making systems
- Expanded testing and enforcement of fair lending laws
- Targeted interventions to address underlying socioeconomic factors
- Regulatory framework updates for modern lending practices

The American dream of homeownership should be equally accessible to all qualified applicants regardless of race or ethnicity. Our findings suggest that this ideal remains unfulfilled, requiring renewed commitment to fair lending principles and practices.

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