SACRAMENTO STATE

Past Structural Racism and Present Home Prices*

A regression study to detect the contemporary home price consequence of the historic redlining maps of the Federal Home Owner Loan Corporation (HOLC)

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UC Center Sacramento Policy Presentation

on

Discriminatory Housing Policies and Practices, Wealth Inequality, and the Long Arm of History

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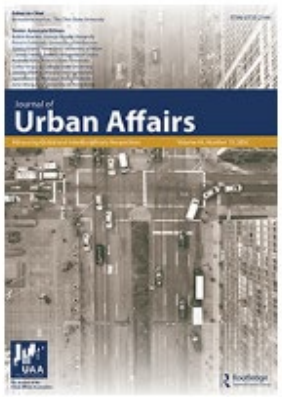
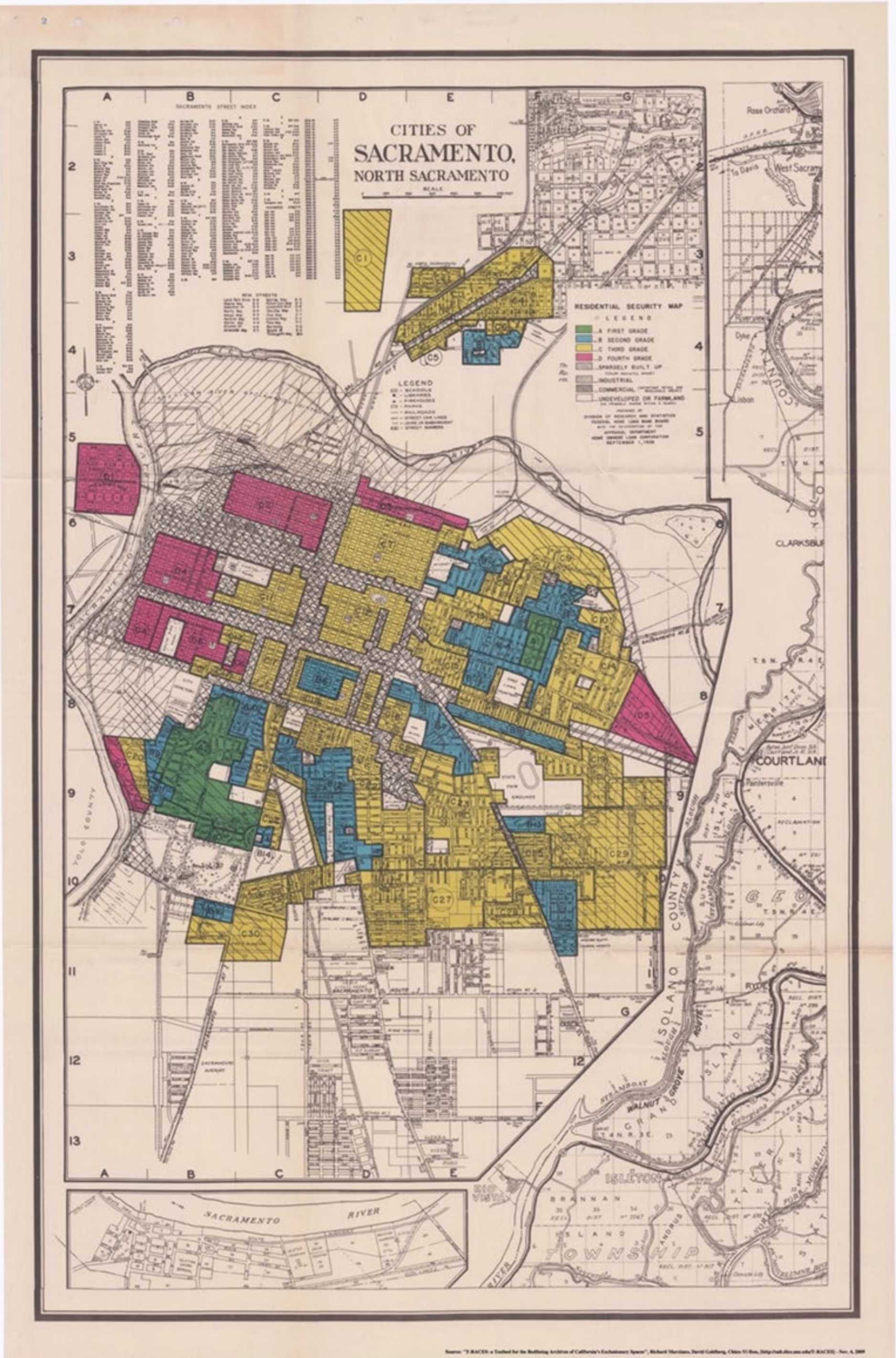
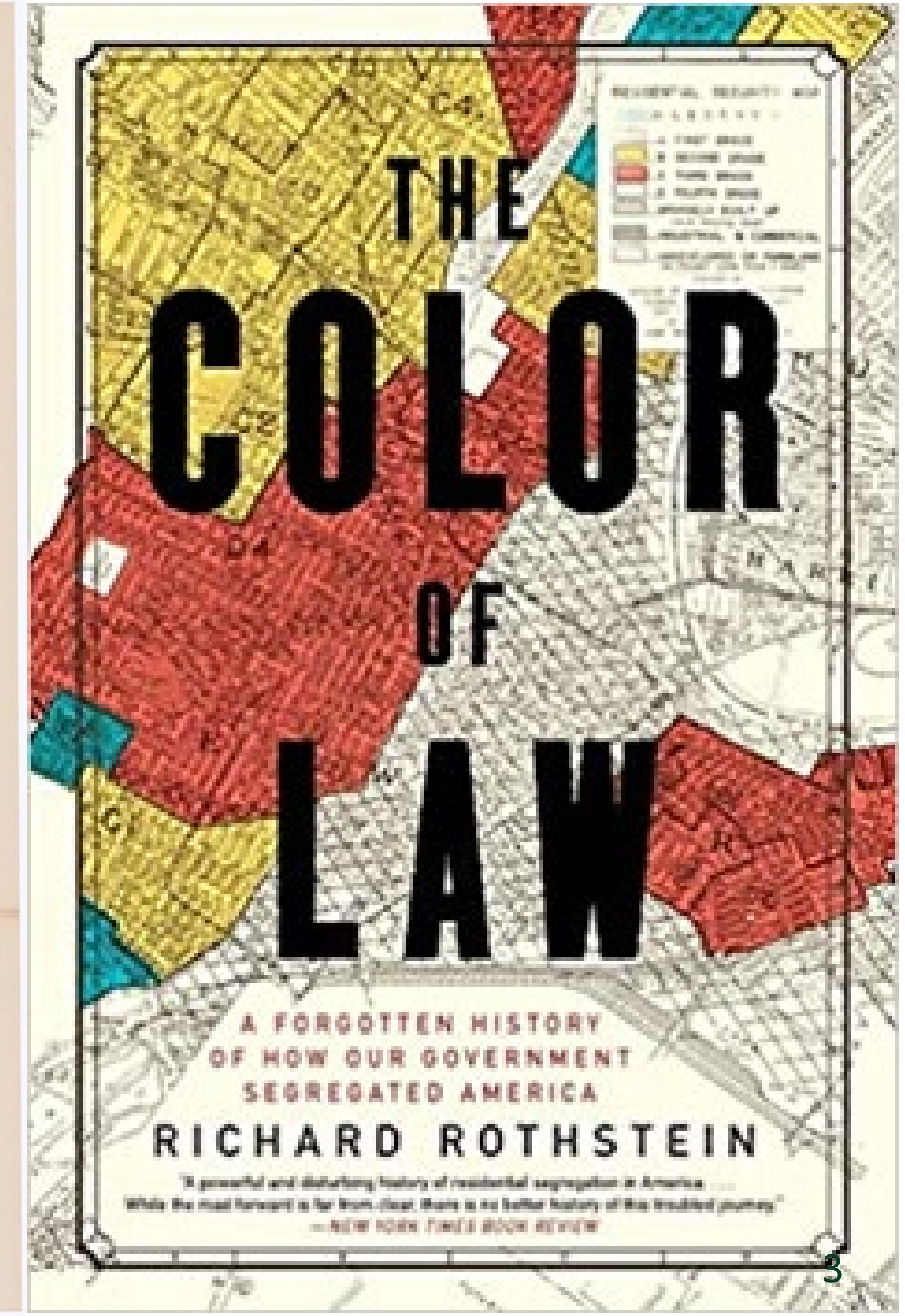


*Forthcoming in the *Journal of Urban Affairs*

Introduction

- Desired reduction in foreclosure rate following Great Depression
  - 1933-36 Federal Homeowner's Loan Corporation (HOLC)
    - Purchased selected mortgages and reissued at
      - Lower interest rate
      - Extended payment schedule
      - **Amortization of principle**
    - Devised appraisal practices
  - 1938 created neighborhood-specific mortgage default risk maps for 249 central cities
    - Asked local real estate agents and mortgage bankers to formulate a map indicating their consensus "perceived risk"
      - D Grade (red) – riskiest
      - C Grade (yellow)
      - B Grade (blue)
      - A Grade (green) – safest
    - Nelson, et al. (2021), *Mapping Inequality*
  - Visual representation of overt **Institutional/Structural Racism**
    - Higher risk assigned for the then (or likely future) presence of non-white residents
      - Rothstein, (2018), *The Color of Law*


CITIES OF
SACRAMENTO,
NORTH SACRAMENTO
RESIDENTIAL SECURITY MAP
COURTLAND
SACRAMENTO RIVER


THE
COLOR
OF
LAW
A FORGOTTEN HISTORY
OF HOW OUR GOVERNMENT
SEGREGATED AMERICA
RICHARD ROTHSTEIN

NS FORM 8
10-1-37

AREA DESCRIPTION - SECURITY MAP OF Sacramento, Cal.

1. AREA CHARACTERISTICS:
   a. Description of Terrain. Level with favorable grades - no construction hazards.
   b. Favorable Influences. Convenient to transportation, trading areas, schools, churches, etc. Homogeneity of improvements and social and income levels. Adequate deed restrictions. Charm of location and high standard of construction and up-keep.
   c. Detrimental Influences. High percent of land improvement leaves little margin for future growth. Limited market from J Street to Folsom owing to improvements being above popular price range. This does not apply north of J, as residences are more moderate in price.
   d. Percentage of land improved 90 %; e. Trend of desirability next 10-15 yrs. Up to static

2. INHABITANTS:
   a. Occupation Professional and business executive type; b. Estimated annual family income $ 3600 to 10,000 and up
   c. Foreign-born families None %; Americans predominating; d. Negro 0 ; ___ %
   e. Infiltration of Deed protected; f. Relief families None
   g. Population is increasing Slowly; decreasing ___; static ___

3. BUILDINGS:

		PREDOMINATING 90 %	OTHER TYPE ___ %	OTHER TYPE ___ %
a.	Type	6 to 7 rooms		
b.	Construction	Frame, stucco & brick		
c.	Average Age	12 Years	Years	Years
d.	Repair	Good (excellent)		
e.	Occupancy	100 %	%	%
f.	Home ownership	87 %	%	%
g.	Constructed past yr.	(1937) 3		
h.	1929 Price range	$ 7500-20,000 100%	$ 100%	$ 100%
i.	1935 Price range	$ 6000-16,000 80 %	$ %	$ %
j.	1938 Price range	$ 6750-18,000 90 %	$ %	$ %
k.	Sales demand	$ 6750-10,000 good	$	$
l.	Activity	Good		
m.	1929 Rent range	$ 50-100 100%	$ 100%	$ 100%
n.	1935 Rent range	$ 40-80 80 %	$ %	$ %
o.	1938 Rent range	$ 50-95 95 %	$ %	$ %
p.	Rental demand	$ 50-70 good	$	$
q.	Activity	Good		

4. AVAILABILITY OF MORTGAGE FUNDS: a. Home purchase Ample; b. Home building Ample

5. CLARIFYING REMARKS: Development in area began in 1924, and has shown steady growth since that time. In addition to having deed restrictions, it is zoned single-family residences. Is a high degree of homogeneity as to architectural types and standard of construction. Is the city's most popular district, that portion on 45th and 46th Sts. from J to ½ of a block north of Folsom Blvd. being particularly high grade. Although area has a 90% land improvement, it will remain "tops" for many years to come. Population density in area is very much below average for the city as a whole. Area is accorded a "high green" grade.

6. NAME AND LOCATION Part of East Sacramento-45th-47th H to Folsom SECURITY GRADE A+ AREA NO. 1

NS FORM 8
10-1-37

AREA DESCRIPTION - SECURITY MAP OF Sacramento, Cal.

1. AREA CHARACTERISTICS:
   a. Description of Terrain. Level with favorable grade and no construction hazards.
   b. Favorable Influences. Proximity to industrial employment and trading centers. Adequate transportation and grade schools. Walking distance to city center.
   c. Detrimental Influences. Population density considerably lower than city average. Encroachment of industry and commerce. Heterogeneous population. Age and obsolescence of residential structures. Western Pacific Railroad renders abutting residential properties practically unsaleable, except at a great discount.
   d. Percentage of land improved 90 %; e. Trend of desirability next 10-15 yrs. Downward

2. INHABITANTS:
   a. Occupation Common and semi-skilled laborers; b. Estimated annual family income $ 1000-2400
   c. Foreign-born families 50 %; Latin races predominating; d. Negro Few families ; ___ %
   e. Infiltration of has occurred; f. Relief families Many
   g. Population is increasing ___; decreasing ___; static Yes

3. BUILDINGS:

		PREDOMINATING 90 %	OTHER TYPE ___ %	OTHER TYPE ___ %
a.	Type	5 - 6 room		
b.	Construction	Frame		
c.	Average Age	40 Years	Years	Years
d.	Repair	Fair		
e.	Occupancy	97.5 %	%	%
f.	Home ownership	20 %	%	%
g.	Constructed past yr.	2		
h.	1929 Price range	$ 3000-3500 100%	$ 100%	$ 100%
i.	1935 Price range	$ 2250-2750 70 %	$ %	$ %
j.	1938 Price range	$ 2400-3000 80 %	$ %	$ %
k.	Sales demand	$ Poor	$	$
l.	Activity	Slow		
m.	1929 Rent range	$ 25 - 30 100%	$ 100%	$ 100%
n.	1935 Rent range	$ 17.50-22.50 70 %	$ %	$ %
o.	1938 Rent range	$ 22.50-27.50 90 %	$ %	$ %
p.	Rental demand	$ All prices - good	$	$
q.	Activity	Good		

4. AVAILABILITY OF MORTGAGE FUNDS: a. Home purchase Limited; b. Home building Limited

5. CLARIFYING REMARKS: Old area is without deed restrictions, and while zoned general commercial & multi-family residential, the improvements are predominantly single-family, five and six room, frame dwellings of cheap to medium quality construction. These dwellings are, as a rule, quite old, but for a district of this kind have been well maintained. Population is very mixed. Italians predominate but with a sprinkling of Mexicans, Negroes, and Orientals. The subversive character of population constitutes the area's principal hazard. The area is accorded a "medial red" grade.

6. NAME AND LOCATION Part of Old City SECURITY GRADE D AREA NO. 2

Information from Written Evaluation Sheets Submitted by HOLC Evaluators in Support of Neighborhoods Given Green (A – highest) or Red (D – lowest) Grades

Grade/Neighborhood	Foreign Born Families	Black Families	Relief Families	Deed Protected	Relevant "Remarks" on "NS Form 8" (Area Description completed by HOLC Evaluators*
A or Green (highest)					
A1 – East Sacramento	None	None	None	Yes	*In addition to having deed restrictions, it is zoned single-family residences. Is a high degree of homogeneity…*
A2 – Swanston Park & Land Park Terrace	None	None	None	Yes	*[H]omogeneity of social and income levels is fair to good.*
A3 – College Trac and Land Park Tract	None	None	None	Yes	*[H]as adequate deed restrictions and is zoned single-family residential.*
D or Red (lowest)					
D1 – Washington in Yolo County**	30%	None	Many	NA	*The particular hazard is "racial"; 30% of the population is foreign, including Orientals, Mexicans, and low-class Italians.*
D2 – Old City	50%	Few	Many	No	*[W]ithout deed restrictions… Italians predominate, but with a sprinkling of Mexicans, Negros, and Orientals.*
D3 – Old City	Few	None	NA	Minimal	*Subversive races a definite hazard. An area without deed restrictions … with the exception of the extreme eastern portion.*
D4 – Old City	75%	10%	Many	No	*[M]elting pot… [C]ontains the principal Japanese colony and the greatest concentration of Negros in the city. [No] deed restrictions.*
D5 – (Unnamed)	None	None	Few	No	*[N]o deed restrictions, and zoning permits 2-family residences… [H]owever, improvements consist of … old and obsolete [dwellings].*
D6 – Old City	30% – 40%	2%	Many	No	*Is the "bon ton" Oriental and Negro residential district in the city. Many diverse influences, from a mortgage standpoint…*
D7 – West End Bath Tract	50%	None	Few	NA	*Infiltration of Orientals, slowly occurring.*

*All information available at Nelson et al. (2021).

**House sales data from this HOLC area is not included in the analyses performed here because it is currently part of the City of West Sacramento. It is offered here as another example of the mindset of Sacramento-area HOLC evaluators who put together their ratings for Sacramento in 1938.

Introduction

- Sacramento maps published in 1938
- Racial-covenants prominent in Sac City home deeds
  - Absence of them offered as reason to downgrade neighborhood rating
  - Implicitly enforced by real estate agents, not legally challenged till late 1960s-70s
- Residents of Redlined neighborhoods documented claims of mortgage inability, primary renters, declining neighborhood quality
- Sacramento post HOLC history
  - Redlined neighborhoods remained non-white, subject to teardown and urban renewal, little vintage residential properties left
  - Greenlined neighborhoods affluent and white in 1938 and remain so
  - Blue and some Yellowlined neighborhoods remain largely intact
    - Mixed commercial
    - Vintage homes
    - Walkable

Introduction

- HOLC maps represent the **consequence of previous** structural racism and not the **cause of continuing** structural racism
  - Not as popularly understood
  - HOLC lending between 1933-36 not guided by their maps
    - In fact, evidence that disproportionately offered mortgages to Black Americans and the poor
  - HOLC maps nationally archived after creation with little recorded access
- Federal Housing Authority (FHA) created their own redlined maps to guide the eligibility of federally subsidized loan programs
  - Evidence that widely used to guide FHA mortgage offers
    - Pro-White bias in practices
    - Appropriately discussed as reason for BIPOC loss of intergenerational housing wealth
  - Why are the FHA maps not widely displayed and discussed (like HOLC maps)?
    - FHA anticipated multiple late 1960s lawsuits rightfully claiming racial ethnic discrimination
      - All purposefully destroyed (except one overlooked map for City of Chicago)
      - Xu (2021) compared Chicago FHA to HOLC Redlining maps
        - Little overlap
        - Significant explanatory power between aggregate (Census Tract) housing outcomes and FHA redlining map location
        - Non-significant explanatory power with HOLC redlining location

Literature Review

- HOLC Redlining & Housing Outcomes
  - Appel and Nickerson (2016): regression to determine average self-reported home value at the U.S. Census Tract level
    - In 1990 about 5% lower for neighborhoods with a worse HOLC rating relative to an adjacent area with a higher HOLC rating.
  - Krimmel (2021): difference-in-differences regression U.S. panel data
    - From 1970 to 2010, red relative to yellow Census Tracts experienced persistent reductions in housing supply and population density
- HOLC Redlining & Other Neighborhood Outcomes
  - Nardone et al. (2020 & 2021): lower HOLC grades more asthma visits and less current green space
  - Locke et al. (2021): rated D (red) have about half the tree canopy coverage as areas rated A (green)
  - Aaronson et al. (2021): growing up on C side of a C to B boundary, household income is 2.9 percent lower than growing up on the B side

Literature Review

- HOLC Redlining & Individual Outcomes
  - McClure et al. (2019): controlling for age, gender, and educational attainment, residents in redlined areas more likely to rate their overall health negatively
  - Krieger et al. (2020a & b): same controls as above, greater risk for pre-term birth or a late-stage diagnosis of cancers associated with living in a formerly redlined area
  - Benns et al. (2020): controlling for race and poverty, rate of gunshot victims living in a formerly redlined zone is five times greater
  - Lukes and Cleveland (2021): historically redlined (D) neighborhoods receive less funding per student than those in A, B, and C rated and schools have lower standardized test scores
- ***Do these previously found negative outcomes in D & C relative to B & C neighborhoods show up in recent selling prices for a single home?***
  - Unable to locate a hedonic regression study that tested
    - Started as a class project for a master's level applied regression course (PPA 207)

Introduction

- Racial differences in U.S. intergenerational wealth
  - Net worth of the average White household ($171,000) ten times greater than average Black household ($17,150) (McIntosh, Moss, & Nunn, 2020)
  - 70+ percent of White households owned their homes since the mid-1990s, while less than half of Black households owned homes in early 2020 (Tanzi, 2020)
- HOLC's structurally racist practices tied anecdotally and with simple correlations to housing, wealth, and other outcomes decades later
  - Wanted to add a direct regression test of influence of historic HOLC designation on current selling price

Regression Model

- Hedonic home price model
  - *Does the "same" home in a HOLC-rated "A" or "B" neighborhood, sell for more than in a "C" or "D" neighborhood?*
    - Constrained by available MLS data
    - Note Zip Code and School District (SD) controls

Home Selling Price$_i$ = f (Neighborhood Characteristics$_i$, Home Characteristics$_i$, Selling Characteristics$_i$), (1)

where,

Neighborhood Characteristics$_i$ = f ([HOLC A Category Dummy$_i$], HOLC B Category Dummy$_i$, HOLC C Category Dummy$_i$, HOLC D Category Dummy$_i$, [Sacramento City SD Dummy$_i$], Natomas SD Dummy$_i$, San Juan SD Dummy$_i$, Twin Rivers SD Dummy$_i$, Folsom Cordova SD Dummy$_i$, Group of Relevant Zip Code Dummies), (2)

Home Characteristics$_i$ = f (Primary Home Square Footage$_i$, Secondary Home Square Footage$_i$, Years Old$_i$, Lot Square Footage Thousands$_i$, Bedrooms$_i$, Full Bathrooms$_i$, Half Bathrooms$_i$, Fireplace Number$_i$, Pool Dummy$_i$, Condominium Dummy$_i$, Halfplex Dummy$_i$, Raised Foundation Dummy$_i$, No Central AC Dummy$_i$, Roof Composite Dummy$_i$, CC&R Dummy$_i$, HOA Dummy$_i$, HOA Dues$_i$, One Story Dummy), (3)

Selling Characteristics$_i$ = f (Days on the Market$_i$, August Sale Dummy$_i$, September Sale Dummy$_i$, OctoberSale Dummy$_i$, November Sale Dummy$_i$, December Sale Dummy$_i$, January Sale Dummy$_i$, [February Sale Dummy$_i$]). (4)

Data and Regression Analysis

- Data
  - 465 home sales
    - Between August 2019 and February 2020 (Pre Pandemic)
    - Homes only from within Sacramento City HOLC-classified neighborhoods determined through GIS mapping
- Regression Analysis
  - Functional form: Log dependent – Linear explanatory
  - Robust regression coefficient standard errors clustered by zip code
  - Dummy variables representing home location in
    - A (greenlined), B (bluelined), C (yellowlined), or D (redlined)
    - AB or CD

Variable Name	*Mean HOLC A*	*Mean HOLC B*	*Mean HOLC C*	*Mean HOLC D*	*Mean HOLC A or B*	*Mean HOLC C or D*
Dependent Variable						
Selling Price	750,479	687,984	451,063	648,639	697,506	464,783

Hedonic Regression Results (Log Home Selling Price Dependent Variable)

Variable	*All Homes Controlling for all HOLC Categories*	*All Homes Controlling for A/B and C/D HOLC Categories*
Neighborhood Characteristics		
HOLC B Category Dummy	-0.024	--
HOLC C Category Dummy	-0.151***	--
HOLC D Category Dummy^	-0.194***	--
HOLC C/D Category Dummy	--	-0.133***
San Juan SD Dummy	0.006	0.003
Twin Rivers SD Dummy^^	-0.111***	-0.112***
Zip Code 95811 Dummy	-0.034	-0.053
Zip Code 95814 Dummy	-0.225***	-0.255***
Zip Code 95815 Dummy	-0.750***	-0.748***
Zip Code 95816 Dummy	-0.082***	-0.083***
Zip Code 95817 Dummy	-0.427***	-0.426***
Zip Code 95818 Dummy	-0.160***	-0.161***
Zip Code 95820 Dummy	-0.604***	-0.603***
Zip Code 95821 Dummy	-0.374***	-0.372***
Zip Code 95822 Dummy	-0.370***	-0.370***
Zip Code 95833 Dummy^^^	-0.573***	-0.571***
Home Characteristics		
Primary Home Sq Feet Thou	0.262***	0.261***
Second Home Sq Feet Thou	-0.0091	-0.0097
Years Old	-0.0003	-0.0003
Lot Square Feet Thou	0.012***	0.012***
Bedrooms	-0.033**	-0.032*
Full Bathrooms	0.093***	0.093***
Half Bathrooms	0.133***	0.132***
Fireplace Number	0.027	0.028
Pool Dummy	0.092***	0.093***
Halfplex Dummy	-0.347***	-0.341***
Condominium Dummy	0.021	0.023
Raised Foundation Dummy	0.042***	0.042***
No Central AC Dummy	-0.204***	-0.204***
Roof Composite Dummy	-0.088***	-0.090***
CC&R Present Dummy	-0.049***	-0.047***
HOA Present Dummy	-0.251***	-0.248***
HOA Dues	0.0004***	0.0004***
One Story Dummy	0.009	0.009
Selling Characteristics		
Days on the Market	-0.0005**	-0.0005**
August Sale Dummy	-0.046	-0.048
September Sale Dummy	-0.040	-0.042
October Sale Dummy	-0.058**	-0.059**
November Sale Dummy	-0.004	-0.006
December Sale Dummy	-0.047	-0.047
January Sale Dummy^^^^	-0.017	-0.020
Constant	13.10***	13.08***
Observations	465	465
R-Squared	0.856	0.856

P values: *** < 0.01, ** < 0.05, *** < 0.10

Regression Results

- Compared to an A (greenlined) neighborhood, a similar home, controlling also for zip code and school-district amenities, sold in late 2019 for
  - 19.4% less if in a D (redlined) neighborhood
  - 15.1% less if in a C (yellowlined) neighborhood
  - No difference if in a B (bluelined) neighborhood
- Compared to an A or B (green or bluelined) neighborhood, a similar home, controlling also for zip code and school-district amenities, sold in late 2019 for
  - 13.3% less if in a C or D (yellow or redlined) neighborhood
- Also **Blinder-Oaxaca** (wa - HAW – Kah) **Decomposition**
  - Indicates explained and unexplained components of zones' average prices
    - **Explained Component:** When both groups (A/B & C/D) receive the same treatment for same characteristics
    - **Unexplained Component**: One group (A/B) is more favorably treated than the other (C/D) given the same characteristics
      - Considered a measure of "discrimination" by labor economists

Blinder-Oaxaca Decomposition

Variable	*Coefficient*	*Percentage of Difference*
Overall		
HOLC A/B Group	13.32***	
HOLC C/D Group	12.94***	
Difference	0.383***	
Explained	0.250***	65.3%
Unexplained	0.133***	34.7%

- Natural log 13.32 = $611,360 (mean predicted A/B home value)
- Natural log 12.94 = $416,779 (mean predicted C/D home value)
- Natural log 0.383 = $194,582 (mean predicted difference A/B to C/D)
  - 2/3 of difference explained due to differences in house, zip, school differences
  - 1/3 due to “discrimination”
    - **But could also be attributable to omitted explanatory variables**

Conclusion

- 80+ years after HOLC's **race-based** neighborhood categorizations, I detect an influence of them in current home prices
- Further evidence federally-sanctioned (***de jure***) racism as part of U.S. history with measurable effects on home values disproportionately affecting generations of BIPOC Americans
  - Empirical evidence in support of *Big Ideas for Racial Equity*
    - 21st Century homestead act, baby bonds, education finance reform, ending the war on drugs, financial assistance to entrepreneurs of color, voting rights, free college, guaranteed jobs, workforce investment, universal health coverage (cash reparations)
    - *Reparative City Planning*
    - Curbing ability of local jurisdictions to keep affordable housing out through laws, regulation, zoning, and practices meant to preserve the higher residential property values documented here due to past structural racism
      - Wassmer & Williams (2021)

Conclusion

- How to fund?
  - California Real Estate Transfer Tax
    - CA $1.1 per $1K sales price ($5M house = $5.5K)
  - CA localities also levy their own
    - Los Angeles $5.6 per $1K sales price ($5M house = $28K)
  - Los Angeles Measure ULA (***Homelessness & Housing Solutions Tax***)
    - In effect since April 2, 2023
    - Home sales price $5 to $10M (> $10M) add an additional 4% (5.5%)
      - ($5M house = $200K)
- Perhaps?
  - A "ULA-type" real-estate transfer tax throughout all of CA, on property sales (above median price?) in Green and Bluelined neighborhoods held by same household for long-period (25+ years?) and funds made available for down payment on new home purchase by a household that lived in a Red or Yellowlined neighborhood for same long period
  - Different than proposed all taxpayer generated reparations to slave descendants because a direct connection of payment from those benefiting in housing wealth from redlining to those hurt from it

Ethno-Racial and Credit Worthiness Disparities in Access to Mortgage Credit

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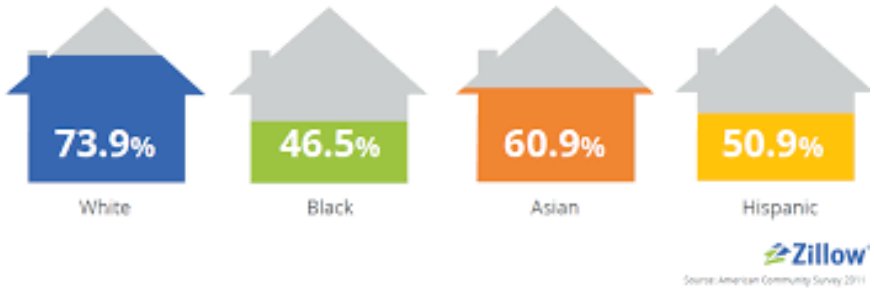
Introduction

- Homeownership central to financial security for most Americans
  - Hedge against inflation
  - Tax favored form of savings and investment (via appreciation)

- Differential access to homeownership is key contributor to racial and ethnic inequality
  - Homeowners on average have better access to higher quality neighborhoods and schools
  - Important source of massive inequality in inheritance



Theoretical Background: Racial and Ethnic Disparities in Homeownership

- Life-cycle and human capital perspectives
  - Homeownership reflects differential tastes and preferences, subject to financial constraints
  - However, large ethno-racial differences in homeownership rates remain after accounting for these characteristics
- Racial and Ethnic Stratification perspectives
  - Long history of discrimination in mortgage industry
  - Disparate treatment at both individual and community levels

The importance of credit worthiness: debt-to-income level

- The debt-to-income (DTI) ratio is an important factor in determining eligibility for a mortgage
  - Measures an applicant's monthly short-term debt obligations relative to their monthly gross income
  - Commonly used by lending institutions to determine an applicant's financial risk
- Tremendous variation in DTI levels across applicants
  - About 40 percent of applicants have excellent DTI levels
  - About 25 percent of applicants have poor DTI levels

Credit Worthiness, Race and Ethnicity, and Housing

- Including applicant's credit worthiness allows for a more accurate study of ethno-racial stratification in housing
  - Most prior studies on a national scale, use income and loan amount as proxies for credit worthiness
  - For the few studies that do include credit worthiness, they focus on a specific municipality, thus limiting the studies to any generalizability
  - Failing to account for credit worthiness could distort and overestimate our evaluation of the relative position of different ethno-racial groups

Research Question

- What are the ethno-racial disparities in institutional mortgage outcomes when considering the credit worthiness of mortgage applicants (2018 - 2019)?
  - More generally: How does a more accurate accounting of economic risk indicators shape our view of ethno-racial stratification overall?
- To answer this, I will:
  - Examine descriptive statistics across ethno-racial and credit worthiness combinations
  - Evaluate, net of borrower and loan characteristics, differential loan outcomes across ethno-racial and credit worthiness

Data: Home Mortgage Disclosure Act (HMDA)

- Federal Public Dataset detailing mortgage transactions from CRA (Community Reinvestment Act) lending institutions for the years 2018 and 2019
  - Each mortgage transaction contains:
    - Borrower and Co-Borrower demographic and economic indicators
    - Institutional Characteristics: Name of Lender, Loan status, and Type of Loan Purchase
    - Loan Characteristics: Amount, Type, Purpose (Owner-Occupancy) AND outcome of application and reason for denial
  - Limitations:
    - Does not contain marital status, borrower credit score, and wealth, ~~***down payment amount, sales price or home value, or interest rate***~~

Data: Home Mortgage Disclosure Act (HMDA)

- Restrict HMDA data to non-institutional applicants requesting financing for owner-occupied single-family homes (1-4 units) in the U.S. through a conventional or jumbo mortgage
  - A total of ***3.3 million*** complete mortgage applicants are considered for this study

Model Specification

- Dependent variable
  - Mortgage Outcome: Conventional Loan Origination (Reference), High-Cost Loan, and Mortgage Denial

- Primary Independent Variables
  - Race, ethnicity of the primary borrower: NH (Non-Hispanic) White, NH Black, NH Asian, and Latino
  - Debt-to-Income (DTI) Ratio: DTI <36% ~ Excellent, DTI between 37% -40% ~ Above Average, DTI between 41%-45% ~ Below Average, and DTI >45% ~ Poor

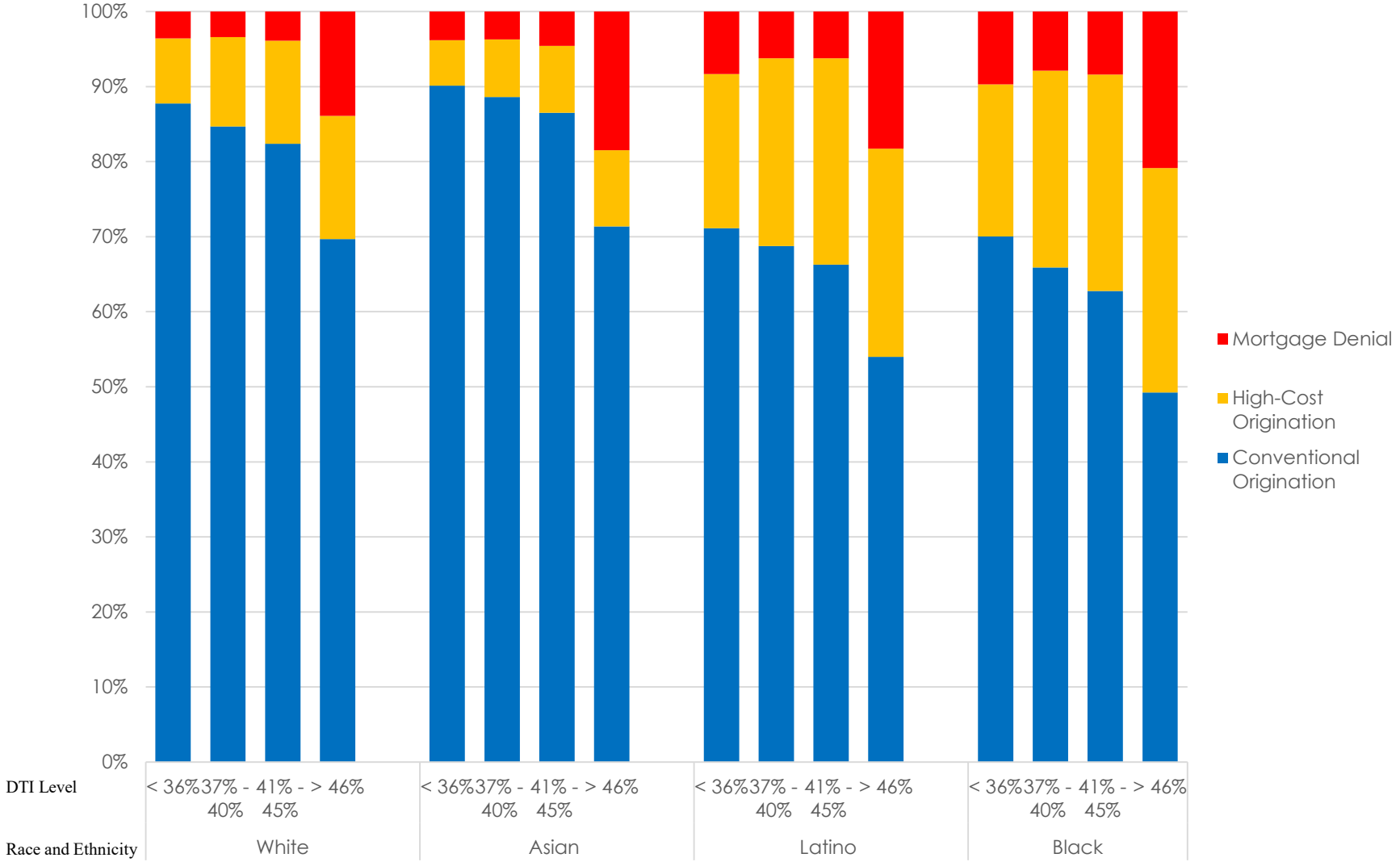
Model Specification

- Independent Variables
  - Economic
    - Household Income
    - Down Payment Percentage
  - Demographic
    - Gender
    - Co-applicant
    - Age
  - Loan
    - Loan Amount
    - Property value
    - Term Years
    - Interest Only Payment Loan
    - Balloon Payment Loan
  - Neighborhood
    - Region of Property
    - Avg Age of Housing of Neighborhood
    - Income Composition of Neighborhood (Average Income in Census Tract)
    - Minority Composition of Neighborhood (Percent of whites in Census Tract)
  - Locational
    - Average Unemployment rate (County)
    - Average House Price Index (MSA)
    - Average Experian Credit Score (MSA)

Methods

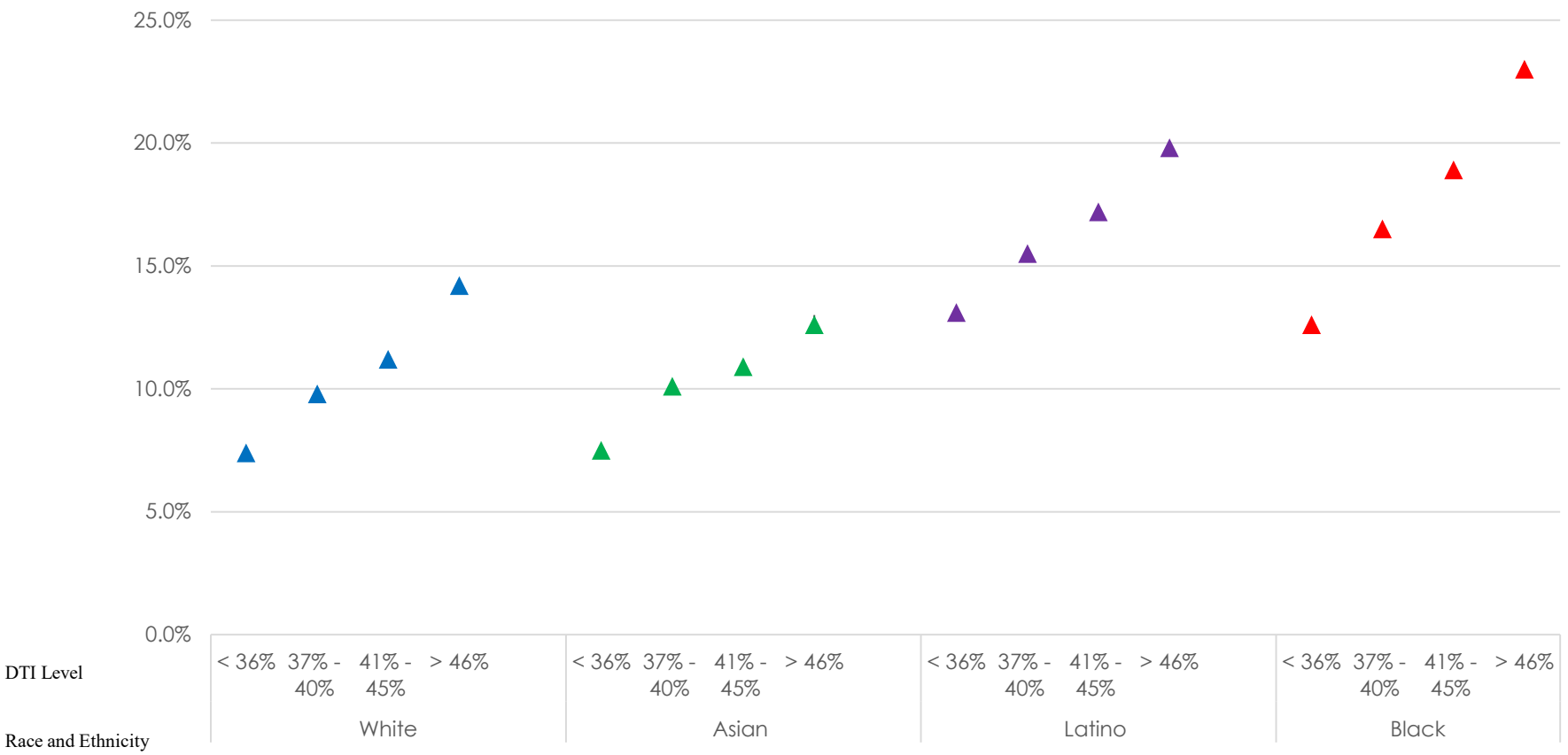
- Descriptive Statistics
  - Assess prevalence of DTI levels by race and ethnicity with respect to mortgage outcomes
- Multinomial Logistic Regression Model with Robust Standard Errors of mortgage outcomes
  - Benefits of Model:
    - Produces efficient coefficients
    - Corrects for some of the underestimation of standard errors that occurs from having neighborhood level covariates in the model
    - Utilizes the entire dataset (3.3 million observations)

Mortgage Loan Outcomes by Race and Ethnicity and Debt to Income (DTI) Ratio; 2018-2019



Source: HMDA

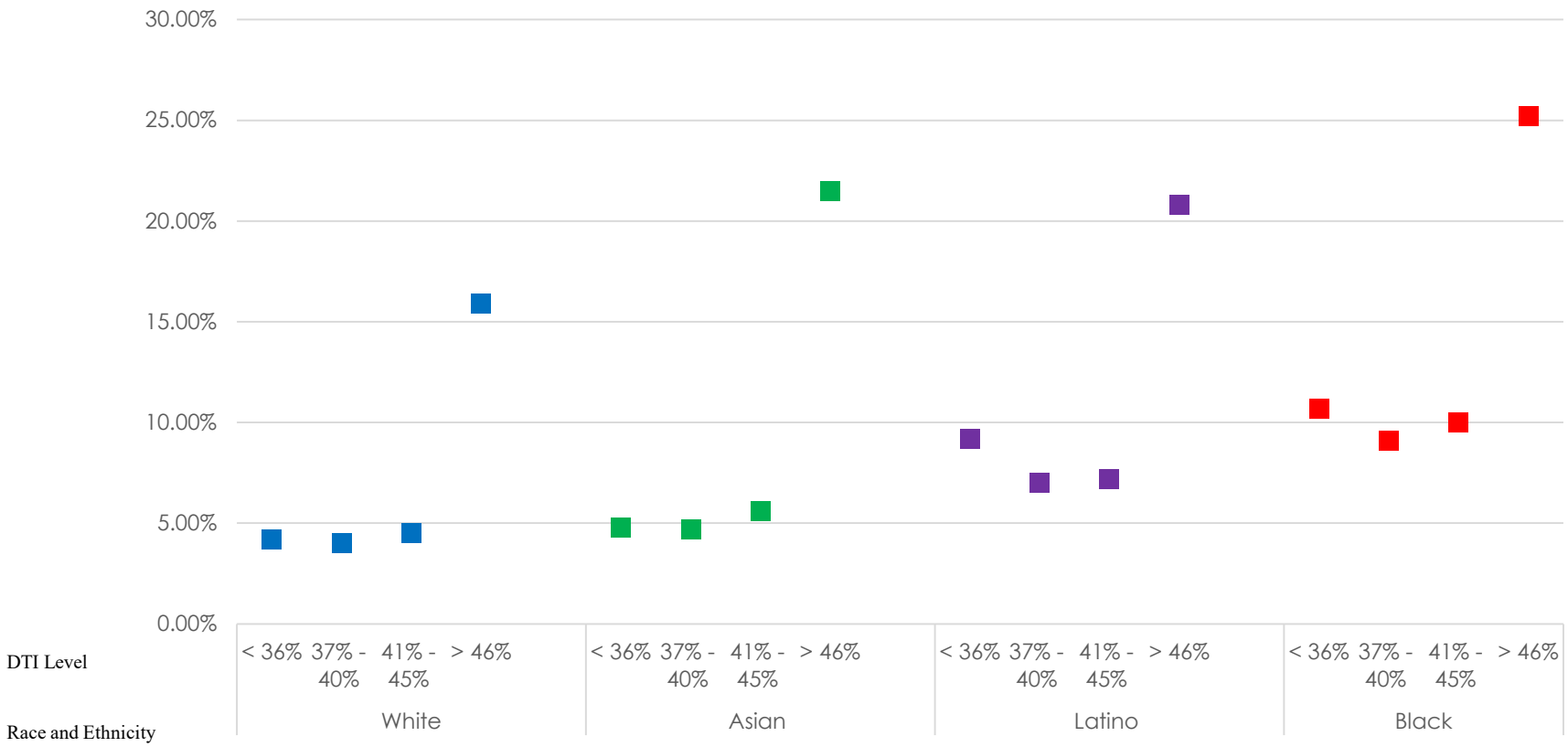
Adjusted Predicted Probabilities from Multinomial Logistic Regression Model Predicting Loan Application Outcomes: **High-Cost Loan Origination**; 2018 - 2019



(Ref: Using Means of Covariates from Table 1 and Reference Categories from Model in Appendix C)

(Source: Appendix D)

Adjusted Predicted Probabilities from Multinomial Logistic Regression Model Predicting Loan Application Outcomes: **Mortgage Denial**; 2018 - 2019



(Ref: Using Means of Covariates from Table 1 and Reference Categories from Model in Appendix C)

(Source: Appendix D)

Summary of Findings

- Tremendous variation in loan outcomes across credit worthiness
- Ethno-racial disparities in the mortgage market exist even after considering the applicant's credit worthiness
- There is important variation in loan outcomes by race/ethnicity and credit worthiness
  - Black and Latino applicants are more likely to be reject and obtain a high-cost origination across debt-to-income levels compared to white applicants
  - Depending on the adverse loan outcome, Asians perform similarly or slightly underperform compared to whites
  - When examining high-cost originations, blacks and Latinos with excellent credit worthiness perform similarly as whites and Asians with below average credit worthiness.

Implications

- Black and Latino home seekers generally have lower levels of credit worthiness making it more difficult for these minority groups to access credit products to accumulate assets and wealth
- Even black and Latino home seekers with excellent credit profiles find it difficult to obtain similar mortgages as whites and Asians
- Homeownership opportunities for blacks and Latinos is limited even among those with excellent credit worthiness
- Study supports and contradicts certain elements of theoretical ethno-racial hierarchies
  - Whites regardless of credit worthiness are generally the most advantaged
  - Blacks are generally the most disadvantaged in accessing mortgage credit
  - Asians perform similarly or slightly underperform compared to whites, while Latinos perform similarly or slightly outperform compared to blacks
- More attention to the ethno-racial hierarchy, and the relative positions in the system of ethno-racial stratification

Questions?

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