

# The Case of Missing Mortgages: Are Minorities Still Being Disproportionately Denied a Loan and for What Reasons?

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PD&R

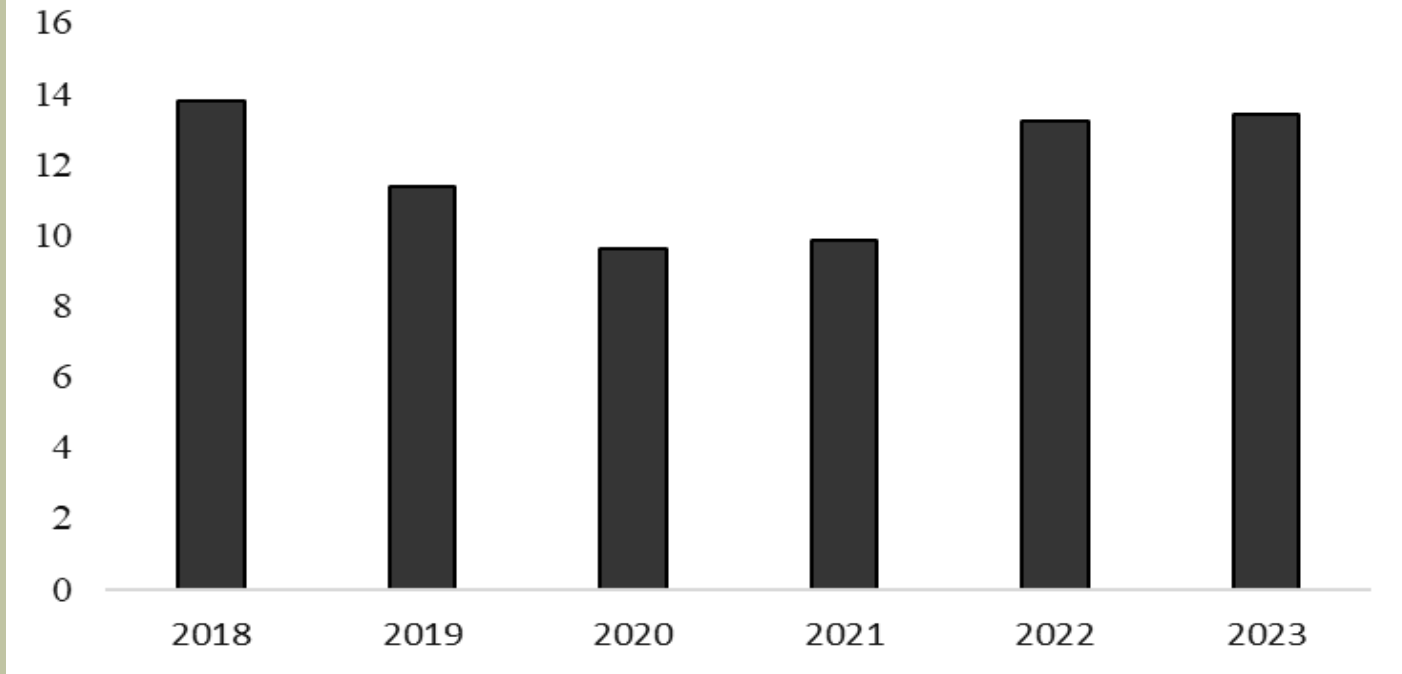
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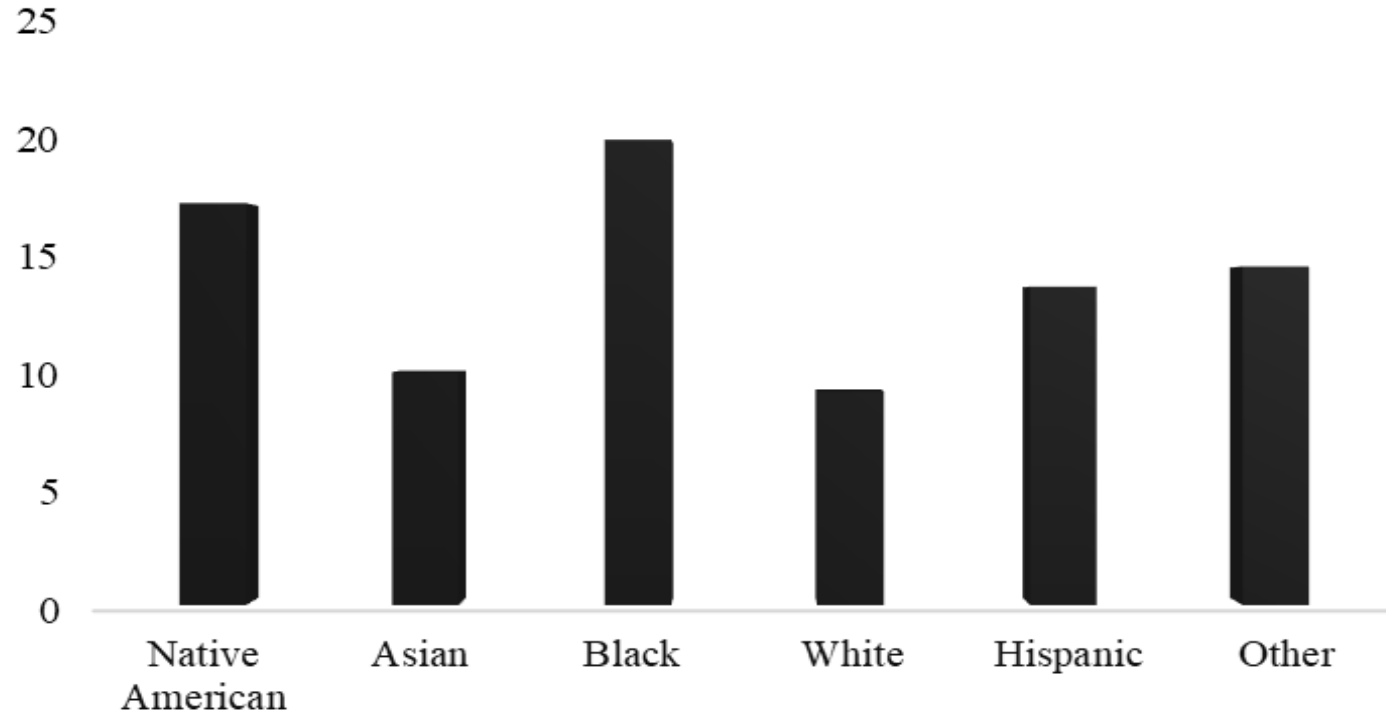
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## Loan Denials by Year



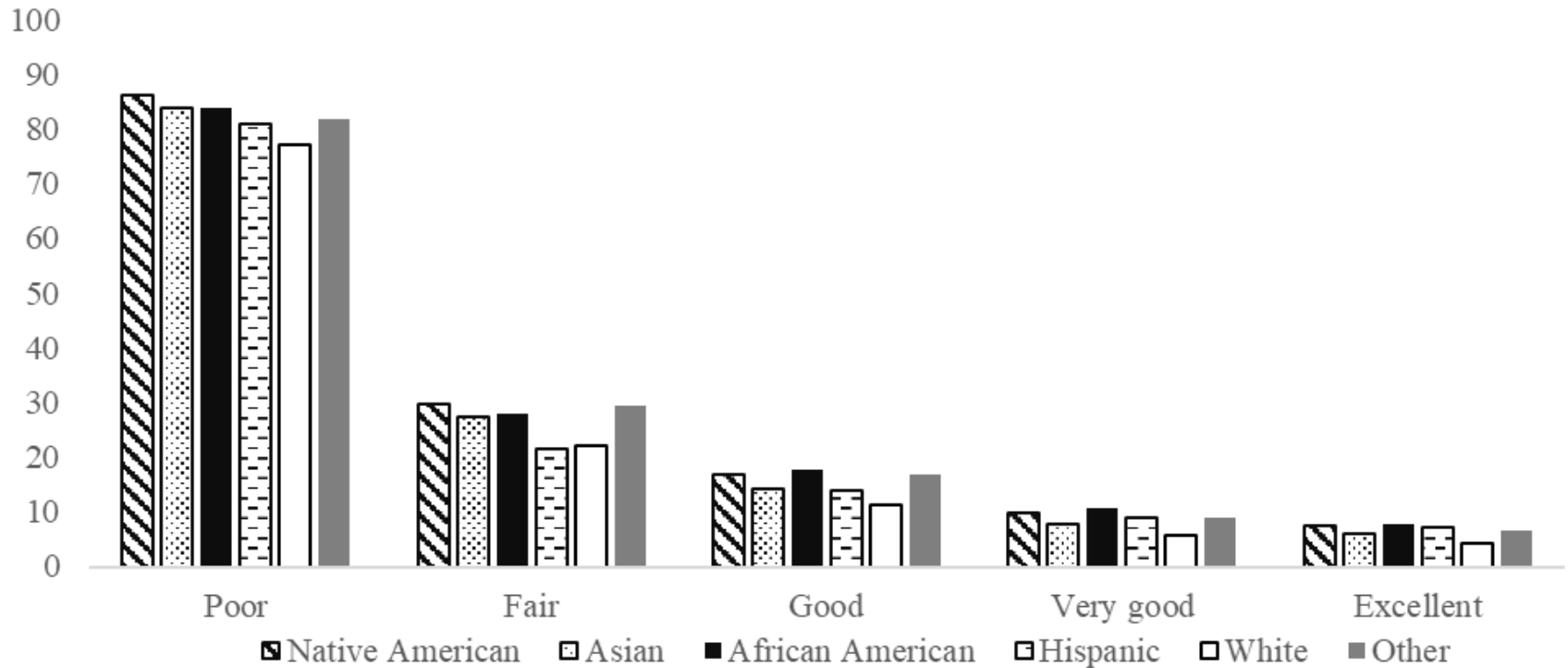
Every year about 10%-14% of residential mortgage applications are denied by the lender. Most often the reasons are poor credit scores or high debt-to-income (DTI), i.e. risk-related.

## Share denied by Race/Ethnicity



But even accounting for risk metrics, minorities are still denied a loan at a higher rate than Caucasians.

## Probability of Denial by Credit Score and Race/Ethnicity



There are discrepancies even after correlating with applicant credit scores.

# The Objective

Use expanded HMDA data (2018-23) to study rates and reasons for denials for minority groups in three parts:

- Evaluate the contribution of demographic factors to the probability of loan denial once loan factors associated with riskiness are accounted for.
- Consider individual reasons for denial and how race, ethnicity or gender contribute to their likelihood.
- Explore whether minorities are more likely to be offered a high-cost loan if approved.

# The Literature on Loan Disparities

- The existing literature documents higher denial rates for minorities even accounting for risk metrics – Avery, Canner and Cooke (2005), Bayer, Fereira and Ross (2014) and Munnell, Tootell, Browne, McEneaney (1996).
- The reasons for these disparities are:
  - Underlying racial disparities in credit worthiness (Ards, Ha and Mazas, 2015).
  - Difference in financial literacy (Gerardi, Willen, and Zhang 2023).
  - Sorting into different loan options (Zhang and Willen, 2021, and Bhutta and Hizmo 2020).

# Methodology of Risk and Denial

- The model estimates Denial as a function of the true Risk\* vector metric.

$$Denial = \beta_0 + \beta_1 Risk^* + \beta_2 Y_i + \varepsilon$$

- However, lenders make decisions based on perceived Risk based on data at hand:

$$Risk^* = \gamma_0 + \gamma_1 X_i + \gamma_2 Risk + \omega$$

- Then denial is related to the perceived risk as:

$$Denial = \beta_0 + \beta_1 \gamma_0 + \gamma_1 \beta_1 X_i + \beta_1 \gamma_2 Risk + \beta_2 Y_i + \varepsilon + \beta_1 \omega$$

$$Denial = \delta_0 + \delta_1 X_i + \delta_2 Risk + \beta_2 Y_i + \pi$$

- Since *Risk* is unobservable, it is proxied by loan characteristics associated with riskiness such as high debt-to-income ratio (DTI) and subpar credit scores.
- The probability of denial is estimated as a *probit* regression.

# Probability of Denial: FRM Mortgages

<i>Probit estimation</i>	Conventional		FHA	
	Purchase	Refinance	Purchase	Refinance
Fair credit	-1.489***	-1.285***	-1.209***	-0.610***
Good credit	-1.991***	-1.865***	-1.442***	-0.842***
Very good credit	-2.237***	-2.192***	-1.498***	-0.893***
Excellent credit	-2.281***	-2.325***	-1.461***	-0.842***
DTI 37%-43%	-0.024***	-0.010***	-0.053***	-0.121***
DTI 43%-50%	0.122***	0.179***	-0.019***	-0.113***
DTI 50%+	2.186***	2.201***	0.466***	0.312***
LTV 80%-90%	0.122***	0.258***	-0.150***	0.021***
LTV 90%-95%	0.134***	0.528***	-0.104***	0.160***
LTV 95%+	0.203***	1.479***	-0.229***	0.185***
High-cost area	-0.026***	-0.038***	-0.072***	-0.083***

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



# Probability of Denial: FRM Mortgages (cont.)

<i>Probit estimation</i>	Conventional		FHA	
	Purchase	Refinance	Purchase	Refinance
Lender 50-100 appl.	-0.055***	0.068***	-0.036***	0.072***
Lender 100-200 appl.	-0.075***	0.159***	-0.021***	0.184***
Lender 200-400 appl.	-0.092***	0.290***	-0.111***	0.315***
Lender 400-1000 appl.	0.021***	0.235***	-0.152***	0.349***
Lender +100 appl.	0.289***	0.381***	-0.276***	0.230***
Autom. Under.	-0.697***	-0.759***	-1.141***	-1.294***
AU X African American	0.084***	-0.120***	-0.070***	-0.095***
AU X Hispanic	0.103***	-0.159***	0.023*	0.114***
AU X Asian American	0.099***	-0.057***	-0.038	0.007
AU X Native American	-0.146***	-0.236***	0.703***	0.823***
AU X Mixed Race	0.026**	-0.096***	0.280***	0.327***
AU X Mixed Race	0.003	-0.194***	-0.102***	0.052***

Note: Coefficients shown. P-values in brackets. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

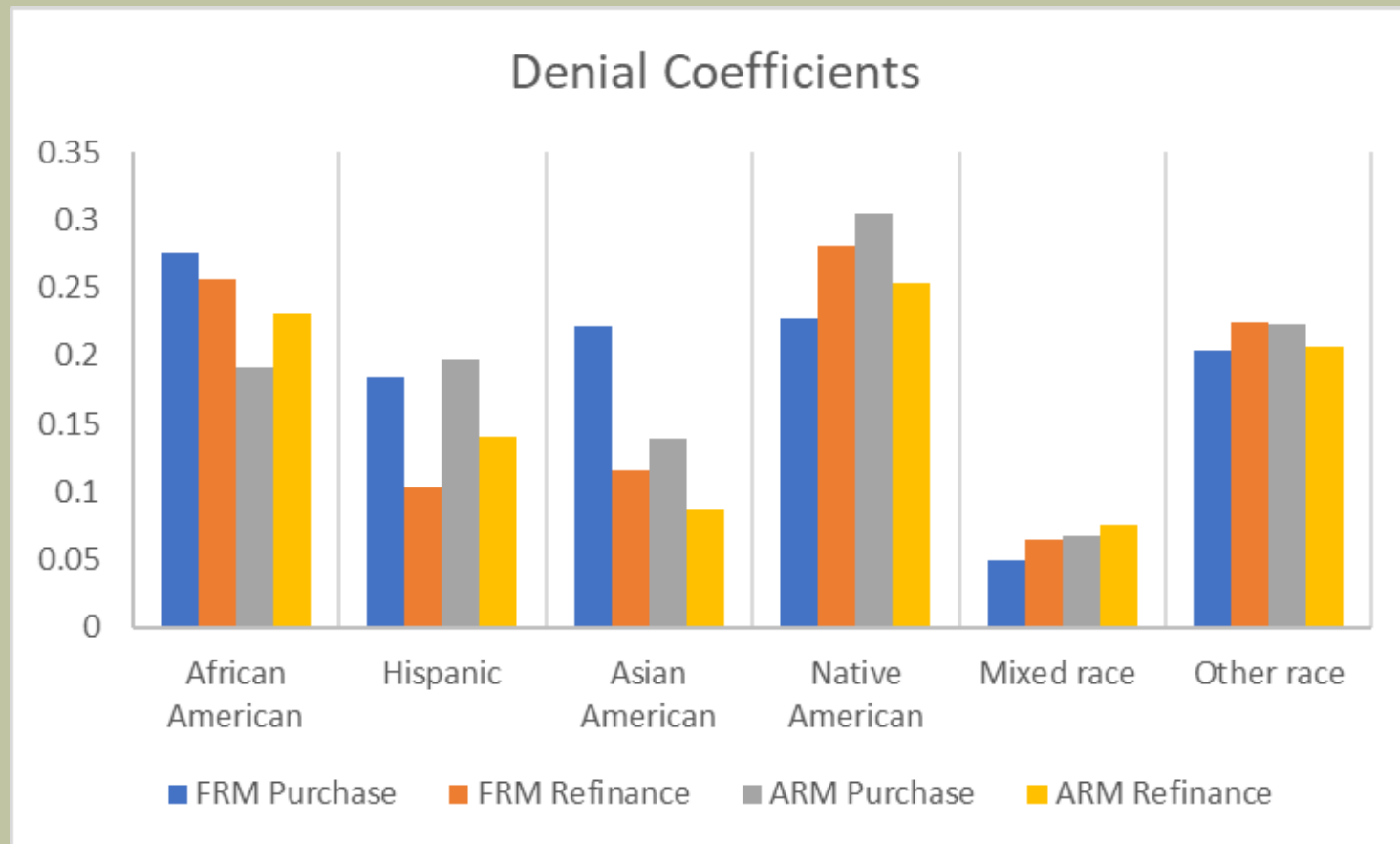


# Probability of Denial: FRM Mortgages (cont.)

<i>Probit estimation</i>	Conventional		FHA	
	Purchase	Refinance	Purchase	Refinance
African American	0.184***	0.340***	0.319***	0.288***
Hispanic	0.077***	0.259***	0.087***	-0.100***
Asian American	0.131***	0.163***	0.250***	0.216***
Native American	0.337***	0.472***	-0.510***	-0.560***
Mixed race	0.024***	0.147***	-0.234***	-0.290***
Other race	0.194***	0.402***	0.311***	0.162***
Female	-0.045***	-0.076***	-0.030***	-0.026***
Mixed gender	-0.147***	-0.205***	-0.077***	-0.166***
Year FE	Yes	Yes	Yes	Yes
Constant	0.915***	1.292***	1.224***	1.412***
Observations	10,992,342	15,121,308	3,363,826	1,273,087

Note: Coefficients shown. P-values in brackets. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .





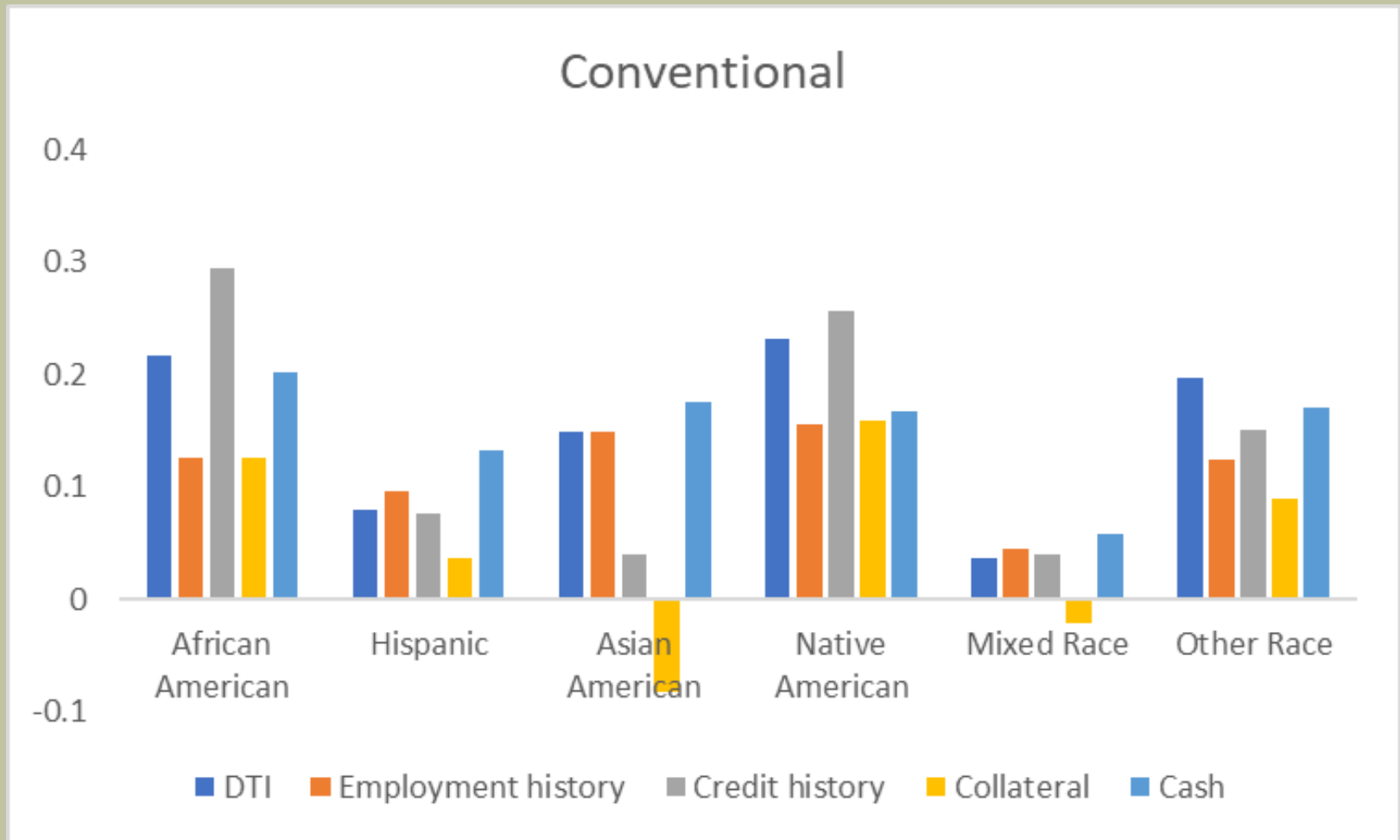
FRM new purchase mortgages are least favorable for many minorities.



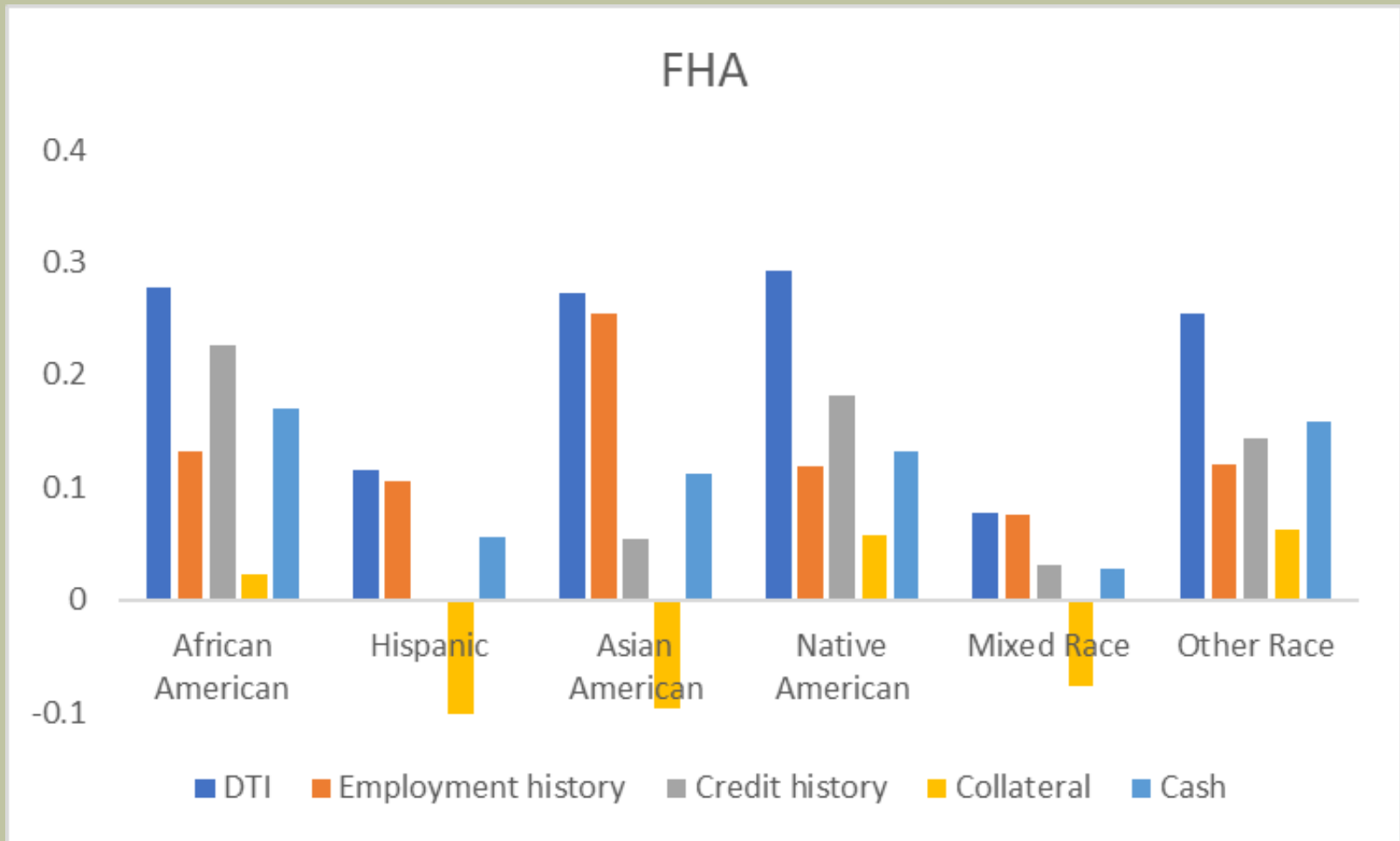
# How Many Missing Mortgages in 2018-23 Accounting for Risk?

	Percent	Number of Loans
African American	0.32	102,332
Hispanic	0.13	41,540
Asian American	0.08	26,340
Native American	0.04	12,530
Mixed Race	0.01	4,578
Other/Not stated	0.32	102,368
<b>All Minorities</b>	<b>0.90</b>	<b>289,657</b>

# Reason for Denial



# Reason for Denial



# Probability of High-Cost Loans

<i>Probit estimation</i>	Conventional		FHA	
	Purchase	Refinance	Purchase	Refinance
African American	-0.314***	0.020***	0.210***	0.170***
Hispanic	0.832***	0.347***	0.094***	0.160***
Asian American	0.291***	-0.148***	-0.240***	-0.068
Native American	0.167***	0.149***	-1.475***	-1.031***
Mixed race	-0.208***	-0.064***	-0.821***	-0.493***
Other race	0.100***	-0.069***	-0.012	-0.081**
Female	0.000	0.040***	0.014***	0.024***
Mixed gender	-0.017***	-0.046***	0.036***	0.052***
Year FE	Yes	Yes	Yes	Yes
Constant	-0.089***	0.330***	1.505***	1.498***
Observations	11,045,509	13,746,358	2,982,522	840,050



# Conclusion

- Low credit score, high DTI and CLTV rates are the biggest predictors of loan denials.
- Even accounting for risk metrics, African Americans, Native Americans and Hispanics tend to be turned down more often than their Caucasian counterparts.
- About 313,000 mortgages appear to be missing because of continued discrimination.
- But we still do not have the whole financial picture that lenders see so there may be some omitted variable bias.