Unfair Lending:

The Effect of Race and Ethnicity on the Price of Subprime Mortgages

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Brief Synopsis

This study extends previous analyses of home loan pricing disparities by supplementing HMDA data with additional loan-level information from a large, proprietary subprime database. By merging the datasets, we were able to evaluate whether race and ethnicity affect subprime loan pricing after controlling for key risk factors, including credit scores and loan-to-value ratios. The results show that African-American and Latino borrowers are more likely to receive higher-rate subprime home loans than white borrowers, even when we control for legitimate risk factors.

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I. EXECUTIVE SUMMARY

Last year, for the first time, lenders were required to report details on the costs of subprime home loans—mortgages intended to serve borrowers with blemished credit or other high-risk characteristics. Lenders disclosed pricing information related to the most expensive subprime loans (referred to here as "higher-rate" loans), while lower-rate loans in the subprime market and virtually all prime loans were exempt from this reporting requirement. Several analyses of this information, collected under the Home Mortgage Disclosure Act (HMDA), have shown that African-American and Latino borrowers received a disproportionate share of higher-rate home loans, even when controlling for factors such as borrower income and property location.

A number of concerned groups have pointed to these disparities as evidence of discrimination that slows economic progress among groups who already lag far behind in homeownership and wealth. Others contend, however, that the pricing disparities are not meaningful, since they do not fully account for legitimate differences in credit risks. In this report, we attempt to move the debate forward by providing a more detailed examination of pricing patterns in the subprime home loan market. Our study analyzed subprime home loan prices charged to different racial and ethnic groups while controlling for the effects of credit scores, loan-to-value ratios, and other underwriting factors. To our knowledge, this is the first full research report that examines 2004 HMDA data to assess the effects of race and ethnicity on pricing in the subprime market while controlling for the major risk factors used to determine loan prices.

Our findings show that, for most types of subprime home loans, African-American and Latino borrowers are at greater risk of receiving higher-rate loans than white borrowers, even after controlling for legitimate risk factors. The disparities we find are large and statistically significant: For many types of loans, borrowers of color in our database were more than 30 percent more likely to receive a higher-rate loan than white borrowers, even after accounting for differences in risk.

This analysis was possible because we supplemented the 2004 HMDA data with information from a large, proprietary subprime loan dataset. Individually, both databases lack certain pieces of data that would be helpful for an in-depth comparison of subprime loan pricing. By combining loan information from both sources, however, we obtain more complete information on a large set of loans. Using a combined dataset of over 177,000 subprime loans, we analyzed whether borrowers of color are at greater risk of receiving higher-rate subprime loans than similarly-situated white borrowers.

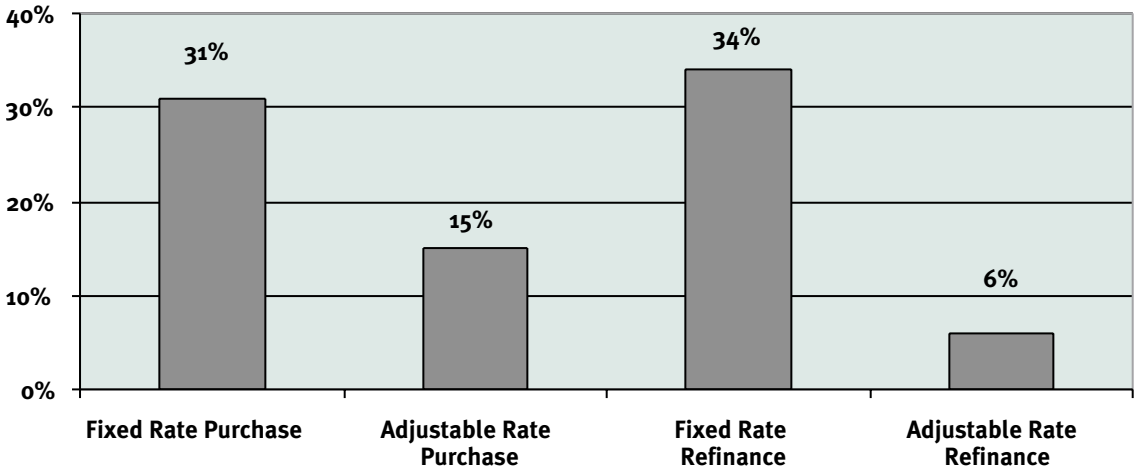
Our basic findings are outlined here:

1) African-Americans were more likely to receive higher-rate home purchase and refinance loans than similarly-situated white borrowers, particularly for loans with prepayment penalties.

- The effect of being an African-American borrower on the cost of credit was greatest for loans containing penalties for early payoff, which comprised over 60 percent of the loans we examined.

- As shown in the chart below, African-American borrowers with prepayment penalties on their subprime home loans were 6 to 34 percent more likely to receive a higher-rate loan than if they had been white borrowers with similar qualifications. Results varied depending on the type of interest rate (i.e., fixed or adjustable) and the purpose (refinance or purchase) of the loan.

Increased Likelihood that African-American Borrowers Received a Higher-Rate Subprime Loan with a Prepayment Penalty* versus Similarly-Situated White Borrowers

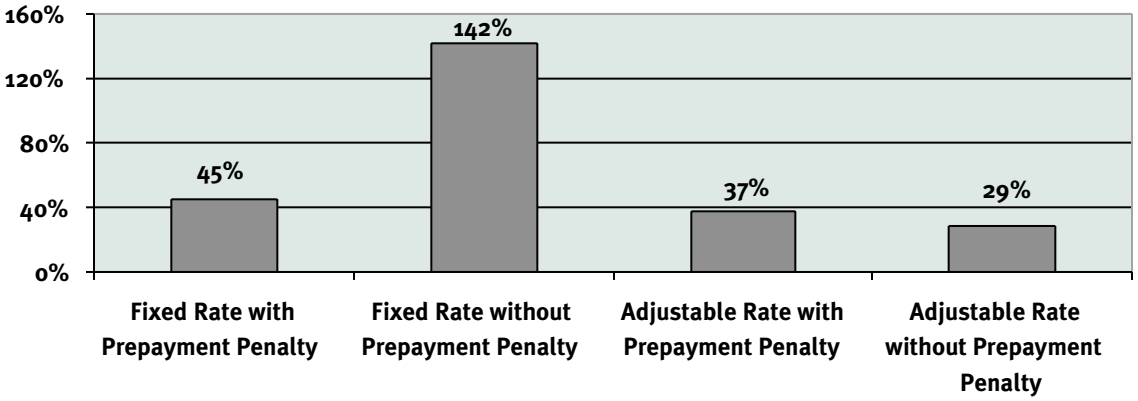


* During 2004, approximately two-thirds of all home loans in the subprime market had prepayment penalties.

2) Latino borrowers were more likely to receive higher-rate loans than similarly-situated non-Latino white borrowers for mortgages used to purchase homes. Differences for refinance loans were not significant at a 95 percent confidence level.

- Latino borrowers purchasing homes were 29 to 142 percent more likely to receive a higher-rate loan than if they had been non-Latino and white, depending on the type of interest rate and whether the loan contained a prepayment penalty.
- Pricing disparities between Latinos and non-Latino white borrowers for refinance loans were not significant at the 95 percent confidence level in our dataset.

Increased Likelihood that Latino Borrowers Received a Higher-Rate Subprime Purchase Loan versus Similarly-Situated White Borrowers



This analysis does not allow us to estimate precisely how much race and ethnicity increase the prices charged to borrowers. It is also beyond the scope of this paper to determine definitively why these disparities exist. However, we do posit several possible causes, including the considerable leeway mortgage originators have to impose charges beyond those justified by risk-based pricing.

A notable and pervasive example of discretionary pricing occurs through "yield-spread premiums," which are monetary incentives for mortgage brokers to inflate rates on subprime loans. Other causes of pricing disparities may include the inconsistent application of objective pricing criteria, targeting of families of color by higher-rate lenders or brokers, and lack of investment by lower-cost lenders in these communities. It is likely that all of these factors contribute to making subprime home loans more costly than necessary.

While these results are particularly disturbing for borrowers of color, the results have negative implications for all borrowers in the subprime market, since common business practices such as discretionary pricing can affect anyone.

For African-Americans, the most striking disparities that emerged in our research were associated with prepayment penalties; for Latinos, the greatest disparities related to loan type (purchase versus refinance). Examining these differences, we discuss several hypotheses. First, we believe the larger disparities observed for African-Americans in subprime loans with prepayment penalties may be related to yield-spread premiums, since lenders are often more willing to pay these premiums on loans that include prepayment penalties. Mortgage originators routinely make exceptions to guidelines, but it may be that African-Americans receive fewer favorable exceptions than white borrowers. Second, we believe that the disparities evidenced for Latinos on purchase mortgages might arise from a greater concentration of recent immigrants among this borrower pool. If so, the higher disparities in the purchase market may be a result of higher-cost lenders targeting recent immigrants.

While these results are particularly disturbing for borrowers of color, the results have negative implications for all borrowers in the subprime market, since common business practices such as discretionary pricing can affect anyone. The cost of mortgages matters more than the cost of typical consumer goods. Whether or not families receive fairly priced home loans is a major factor in their fundamental financial security. Higher loan costs will both dissuade some potential borrowers from investing in homeownership and increase the risk of foreclosure for those who do.

Lenders and policymakers can take a number of constructive actions to help ensure more equitable pricing for all borrowers. These include:

- Curtailing steering by requiring objective pricing standards;
- Holding lenders and brokers responsible for providing loans that are suitable for their customers;
- Amending HMDA to expand the disclosure requirements for risk and pricing information;
- Ensuring that adequate resources are dedicated to fully enforcing fair lending laws; and
- Creating incentives and supporting a policy framework that lead the market to better serve African-American and Latino communities.

II. BACKGROUND

A. HMDA

In 1975, Congress enacted the Home Mortgage Disclosure Act (HMDA). HMDA was a legislative response to the widespread practice of mortgage "redlining," that is, the systematic exclusion of neighborhoods of color when marketing or originating home loans.[1] Shortly thereafter, Congress passed the Community Reinvestment Act (CRA) to encourage lending in previously neglected communities,[2] and amended the Equal Credit Opportunity Act (ECOA), to prohibit discrimination based on race and national origin, among other criteria.[3] While CRA mandated that financial institutions help meet the credit needs of their entire communities and ECOA outlawed discrimination in the extension of financial credit, the original HMDA aided in the implementation of both laws by requiring regulated institutions to disclose summaries of their mortgage lending by census tracts.

These laws focused on access to credit, and they were enacted during a time when there was less concern about discriminatory disparities in mortgage pricing, partly because nearly all states had regulatory limits on interest rates and points charged for mortgages. That situation changed in 1980 with the passage of the Depository Institutions Deregulation and Monetary Control Act (DIDMCA), which preempted state laws governing interest rates and points on first-lien loans unless states explicitly chose to opt out of the law.[4] By deregulating most mortgage lending, DIDMCA laid the groundwork for a high-priced subprime mortgage refinance market, and resulted in a market segment with a much wider range of loan prices than was found in the prime market.[5]

Meanwhile, disclosure requirements under HMDA have evolved over time to reflect the changing nature of mortgage lending and discriminatory practices, broadening both the range of lenders under its purview and the information those lenders are required to disclose.[6] Specifically, HMDA's scope has expanded to encompass non-depository institutions, such as mortgage companies, which have significantly increased their share of the mortgage market over the past three decades. In addition, the disclosure requirements of lenders have evolved to include a wide range of loan application data on loan approval decisions, borrower demographics, and property characteristics.[7]

One of the most important changes to HMDA is the recent inclusion of limited pricing information related to the annual percentage rate (APR) of certain loans.[8] For loans originated in 2004, lenders were required to report the spread between the APR of designated loans and the yield on a U.S. Treasury security of comparable maturity. Specifically, lenders submitted this information on first-lien loans if the spread was at or above three percentage points, and they submitted this information on subordinate liens if the spread was at least five points. Throughout this paper, we refer to loans with APRs high enough to require the disclosure of this spread as "higher-rate" loans.

This information on higher-rate loans makes it possible for the first time to use HMDA not just to detect disparities in loan dispositions (i.e., the proportion of loans that were approved or denied) between demographic groups, but also differences in loan pricing.[9] Since borrowers can be vulnerable to discrimination at both the underwriting and pricing stages of the loan process, the ability to detect discriminatory patterns in both areas is critical for ensuring that all racial and ethnic communities have an equal opportunity to build home equity.

Select HMDA Studies on Racial and Ethnic Disparities in Mortgage Lending

Though analyses of mortgage pricing based on HMDA data have not been possible prior to the release of the 2004 data, many studies have examined HMDA data to evaluate other issues related to possible inequities in the mortgage market. Such studies have tended to focus on differences in loan disposition (i.e., whether loan applications have been approved or denied) by race and ethnicity or on whether certain groups are disproportionately served by subprime lenders.

1) Impact of Race and Ethnicity on Loan Decisions

Because HMDA has long been the primary source of public information on loan applications and underwriting decisions, it has been used extensively to analyze whether certain groups of borrowers are more or less likely to have their application for a home loan denied. The most famous research of this kind was published in 1996 by the Federal Reserve Bank of Boston, "Mortgage Lending in Boston: Interpreting HMDA Data," often referred to simply as the "Boston Fed Study."[10] This study combined publicly-available HMDA data from the Boston area with a number of additional variables, including information on credit history collected from area lenders. The study found that the risk of loan denial for African-Americans and Latinos was about 80 percent greater than that of white applicants, controlling for a host of applicant, loan, property, and neighborhood characteristics.[11]

2) Impact of Race and Ethnicity on Loan Originations

Several studies have used HMDA data to analyze whether specific racial and ethnic groups receive a disproportionate share of subprime loans. Because HMDA data does not specifically identify subprime loans, most of these studies have approximated which loans were subprime by using annual lists of predominately subprime lenders published by the U.S. Department of Housing and Urban Development (HUD).

A 2000 joint report by HUD and the U.S. Department of Treasury explored the relationship between subprime lending and neighborhood racial composition.[12] Relying on HMDA data, the study reported that subprime lending accounted for 51 percent of all refinance loans in predominately African-American communities in 1998, compared to only nine percent in predominately white neighborhoods. The study also found that these disparities persisted even when controlling for neighborhood income.

A 2002 national study by the Center for Community Change analyzed the proportion of borrowers receiving subprime refinance loans by race and ethnicity and found pervasive disparities among African-American, Latino and white borrowers.[13] In addition, the authors found that disparities persisted within income categories and actually increased as income went up. Specifically, while lower-income African-American borrowers were 2.4 times as likely to receive a loan from a subprime lender as lower-income white borrowers, upper-income African-American borrowers were 3.0 times as likely to receive such loans as upper-income white borrowers. At the same time, lower-income Latino borrowers were 1.4 times as likely to receive a subprime loan as lower-income white borrowers, and upper-income Latinos were 2.2 times as likely to receive such loans as upper-income whites.

In "The Neighborhood Distribution of Subprime Mortgage Lending," Paul Calem, Kevin Gillen and Susan Wachter controlled for variables included in HMDA data as well as census tract-level risk information to evaluate the effect of borrower race and neighborhood racial composition on receiving subprime loans in Chicago and Philadelphia.[14] Specifically, the authors combined HMDA data with variables such as foreclosure rates and information on the credit scores of the tracts' populations and found that both the race of individual borrowers and neighborhood racial composition have statistically-significant impacts on the likelihood of receiving a loan from a subprime lender, even after controlling for the borrower information available in HMDA and tract-level risk factors.

B. The 2004 HMDA Data: Pricing Disparities Surface

In September 2005, the Federal Financial Institutions Examination Council (FFIEC) released the 2004 data for all HMDA reporters in electronic form, making it possible to analyze the entire U.S. mortgage market.[15] The release of this data has contributed valuable information to the debate on whether the mortgage market extends credit equally and fairly to borrowers of all races and ethnicities. Organizations such as the National Community Reinvestment Coalition (NCRC), the Association of Community Organizations for Reform Now (ACORN), and the Consumer Federation of America (CFA) have pointed to the existence of large disparity ratios (i.e., the ratios between the proportion of borrowers of color that received higher-rate loans to the proportion of whites receiving such loans) as potential evidence of unfair pricing.[16] Others have dismissed such claims, asserting that raw disparity ratios are meaningless since they do not control for differences in legitimate risk factors, such as credit histories and loan-to-value ratios, among different racial and ethnic groups.[17]

The most comprehensive analysis of the 2004 HMDA data to date, conducted by staff to the Board of Governors of the Federal Reserve System (Fed), found that pricing disparities persist even after controlling for borrower-specific information such as income, origination amount, gender, property location and presence of a co-applicant.[18] In "New Information Reported Under HMDA and Its Implication for Fair Lending Enforcement," the Fed authors first confirmed the existence of large raw disparities between the proportion of African-American and Hispanic white borrowers receiving higher-rate loans to that of non-Hispanic white borrowers in both the home purchase and refinance markets.[19]

The Fed authors next made a series of adjustments to account for differences between white borrowers and borrowers of color by controlling for the following demographic information contained in HMDA data: borrower income, loan amount, location (MSA) of the property, presence of a co-applicant, and gender. Essentially, these adjustments estimated the portion of loans to African-American and Hispanic borrowers that would be expected to be higher-rate if, on average, the observed borrower traits were the same for these borrowers as for non-Hispanic white borrowers. These adjustments lowered observed disparity ratios between borrowers of color and whites by seven to 17 percent, but large disparities still existed.[20] The authors also adjusted for differences in lender composition between the groups. This second set of adjustments estimated the proportion of loans to African-Americans and Hispanic white borrowers that would be expected to be higher rate if the distribution of these loans among individual lenders were the same as the distribution of loans for non-Hispanic white borrowers. Interestingly, these "lender adjustments" reduced the disparity ratios considerably, though significant differences remained.[21]

Table 1. Federal Reserve Evaluation of the Disparities in the Incidence of Higher-Rate Loans* for Site-Built Properties: Black and White Hispanic Borrowers vs. Non-Hispanic White Borrowers

Borrower Race/ Ethnicity	Loan Purpose	Raw Disparity Ratio	Disparity Ratio Controlling for HMDA Borrower Characteristics	Disparity Ratio Controlling for HMDA Borrower Characteristics Plus Originating Lender
Black/African-American	Purchase	3.7	3.1	1.4
Black/African-American	Refinance	2.7	2.3	1.8
Hispanic or Latino	Purchase	2.3	1.9	1.3
Hispanic or Latino	Refinance	1.5	1.4	1.1

* Here we summarize findings only for conventional, owner-occupied, first-lien mortgages.
Source: Avery et al. (see note 18), Table 10.

However, the Fed's analysis of HMDA data did not control for several important risk factors, such as credit scores or loan-to-value ratios (LTVs), since these variables are not part of HMDA's disclosure requirements. The paper does, however, present partial results from an analysis conducted by the Credit Research Center (CRC). CRC analyzed data, including FICO scores and LTVs, from eight subprime lenders and found little disparity between the proportions of borrowers of different races and ethnicities getting higher-rate loans, seemingly in contrast with findings presented later in this paper. However, the Fed's paper does not fully explain CRC's methodology, and the data is likely limited in ways that make it of questionable value in understanding the disparity ratios in HMDA data and broader patterns in the subprime market. For more information about the CRC study, see Appendix 1.

Our analysis adds significantly to this body of research by supplementing HMDA data with information from a proprietary database. By combining information from each of these two datasets, we were able to incorporate important risk factors into a multivariate analysis of mortgage pricing.

III. A MORE IN-DEPTH LOOK AT PRICING DISPARITIES

A. Data

To include additional information on risk factors that might account for higher prices charged to African-American and Latino borrowers, we combined the 2004 HMDA data with a large, proprietary database of subprime loans. Like HMDA data, the other database contains specific information on individual loans, including borrower and property characteristics. Several types of information can be found in both datasets, including data on the location of the property, the originating lender, lien status, loan purpose, property type, and loan amount.

However, each dataset contains some information that the other does not. For example, the proprietary database includes critical pieces of information on loan risk at origination that are not included in HMDA, such as the LTV, credit score (FICO), and whether the loan was covered by private mortgage insurance. On the other hand, HMDA contains information on the race and ethnicity of borrowers. In addition, while HMDA contains information on APR spreads (which incorporates information on certain fees), the proprietary database has information on the mortgage note rate and whether the loan includes a prepayment penalty, but no information on APRs or up-front fees. (See Appendix 5 for information about the limitations of APR.) Finally, while the proprietary database we use is among the largest subprime home loan datasets available, accounting for an estimated 87 percent of U.S. subprime originations in 2004,[22] it only contains securitized subprime loans. For its part, the HMDA dataset is the single largest publicly-available dataset on U.S. mortgage originations, and it includes both prime and subprime loans for covered lenders.

Using information common to both HMDA and the proprietary database, we were able to match loans from the two databases, creating a new dataset of 177,487 subprime loans originated in 2004.[23] This merged dataset includes individual loan information on borrower characteristics (race, ethnicity, income, FICO credit score, income documentation level); loan characteristics (LTV, loan amount, purpose, existence and duration of prepayment penalties); property characteristics (location, property type); and pricing (APR spread for higher-rate loans).[24] To complement this loan-level data, we added publicly-available information on prevailing interest rates and state-specific information on housing prices, demographics and state judicial foreclosure and deficiency judgment laws.[25]

Using this combined dataset, we first examined the distribution of first-lien subprime loans that carried APRs above the three-percentage-point HMDA rate-reporting threshold ("higher-rate" loans). More specifically, we tabulated raw disparity ratios by categories of LTV and credit score. ("Disparity ratios" are the proportions of higher-rate loans received by borrowers of color divided by those of white borrowers.) This allowed for a simple analysis of whether overall disparity ratios might be attributable to differences in the LTV and credit scores between racial and ethnic groups.

A note on racial and ethnic designation:

The HMDA data allows borrowers to report both an ethnicity designation (either "Hispanic or Latino" or "Not Hispanic or Latino") and up to five racial designations (including both "white" and "African-American or Black"). To simplify notation and serve our research purposes, we coded and refer to any borrower who was identified as "Hispanic or Latino" as "Latino," and any borrower who was identified as "African-American or Black" in any of the race fields as "African-American." We coded borrowers and refer to them as "white" if they were associated with "Not Hispanic or Latino" and only identified as "white" in the race fields. The remaining loans were not coded into racial or ethnic categories and were excluded from the analysis. In practice, the Latino and African-American categories are not mutually exclusive, but the overlap in our merged dataset is small (about two percent), and using this method ensures maximum inclusion for members of each group.

Tables 2 and 3 show disparity ratios for African-American and Latino borrowers versus white borrowers. For African-Americans, disparity ratios in every LTV/FICO category exceeded one, while for Latinos disparity ratios exceeded one in the majority of categories. For example, for home purchasers with credit scores of 680 or higher and loan-to-value ratios of 90 percent or higher, disparity ratios for Latinos and African-Americans were 1.28 and 1.37, respectively. In other words, Latinos and African-Americans were 28 percent and 37 percent more likely, respectively, to receive a higher-rate subprime loan than whites.

We note that the disparities listed in Tables 2 and 3 differ from the Fed's results listed in Table 1 for at least two reasons. First, we are making a somewhat different comparison. While the Fed calculations use the proportion of higher-rate loans to all other loans for each group, Figures 2 and 3 use the proportion of higher-rate loans to all other subprime loans. In other words, while the Fed was able to look at pricing disparities across the entire market, data limitations require us to focus on disparities within the subprime sector. Second, Tables 2 and 3 group loans into combinations of FICO credit score and LTV, which effectively introduces a measure of control for risk.

Table 2. Subprime Purchase Loan Disparity Ratios by LTV/FICO Combination

LTV Percent	FICO Range	Borrower Race/Ethnicity	Number of Observations	Proportion of Loans that are High Cost	Disparity Ratio (vs. White Borrowers)
Less than 80	Less than620	African-American	326	64.4	1.20
		Latino	339	54.9	1.03
		White	1,279	53.1	NA
	620-679	African-American	152	30.9	1.53
		Latino	289	27.0	1.34
		White	847	20.2	NA
	680+	African-American	101	8.9	1.65
		Latino	358	13.4	2.50
		White	1,515	5.4	NA
80-89	Less than 620	African-American	1,700	62.6	1.26
		Latino	1,309	46.5	0.94
		White	4,223	49.7	NA
	620-679	African-American	1,351	35.7	1.60
		Latino	2,783	25.7	1.12
		White	5,483	22.9	NA
	680+	African-American	731	21.34	2.85
		Latino	2,615	14.5	1.93
		White	5,900	7.5	NA
90+	Less than 620	African-American	2,351	83.7	1.06
		Latino	1,709	75.7	0.96
		White	5,001	79.0	NA
	620-679	African-American	2,004	67.4	1.15
		Latino	3,115	59.8	1.02
		White	6,382	58.5	NA
	680+	African-American	931	46.8	1.37
		Latino	2,372	43.8	1.28
		White	3,936	34.1	NA

Table 3. Subprime Refinance Loan Disparity Ratios by LTV/FICO Combination

LTV Percent	FICO Range	Borrower Race/Ethnicity	Number of Observations	Proportion of Loans that are High Cost	Disparity Ratio (vs. White Borrowers)
Less than 80	Less than 620	African-American	2,904	62.8	1.05
		Latino	2,973	56.8	0.95
		White	12,314	59.6	NA
	620-679	African-American	731	20.0	1.18
		Latino	1,303	16.0	0.94
		White	4,957	17.0	NA
	680+	African-American	316	8.5	2.24
		Latino	976	5.3	1.39
		White	4,055	3.8	NA
80-89	Less than 620	African-American	2,496	68.4	1.11
		Latino	2,021	58.2	0.95
		White	9,365	61.5	NA
	620-679	African-American	818	27.5	1.22
		Latino	1,205	22.3	0.99
		White	4,808	22.6	NA
	680+	African-American	252	14.3	1.70
		Latino	586	8.5	1.01
		White	2,007	8.4	NA
90+	Less than 620	African-American	1,481	71.8	1.05
		Latino	977	63.2	0.93
		White	5,319	68.1	NA
	620-679	African-American	1,159	51.9	1.17
		Latino	1,219	45.1	1.02
		White	4,858	44.2	NA
	680+	African-American	264	29.6	1.21
		Latino	455	31.7	1.30
		White	1,557	24.4	NA

Because disparities between racial and ethnic groups persisted within a majority of LTV-FICO combinations, the results suggested the need for a more in-depth approach to determine how much conventional risk factors explain pricing variations between groups.

B. Statistical Analysis

Our statistical analysis adapts a mortgage pricing model created by Brent Ambrose, Michael LaCour-Little and Anthony Sanders in their study, "The Effect of Conforming Loan Status on Mortgage yield-spreads: A Loan Level Analysis."[26] In that study, the authors examined whether conforming to the conventional loan guidelines set by Fannie Mae and Freddie Mac had an impact on mortgage prices. Although our purpose is different and, consequently, the specific variables that we analyze are not identical to those included in their study, we adapted their general analytical approach.

Like Ambrose et al., we used multiple regression analysis to estimate the impact of different borrower, property, loan and geographic factors on the APR spread of a loan. Multiple regression allows the effect of individual factors (the "independent variables") on an outcome of interest (the "dependent variable") to be isolated from the effect of all other independent variables included in the models. In our case, we were interested in separating the effect of race and ethnicity on APR spreads from the effect of genuine risk factors such as LTVs and credit scores. However, whereas Ambrose et al. had the actual APR spread for all of the loans in their database, we only have the spread for those loans that exceeded HMDA's APR spread-reporting threshold. As a result, while the Ambrose study was able to use regression analysis to estimate the actual APR spread, our analysis allowed us to compare

the odds and likelihoods of different racial and ethnic groups receiving higher-rate loans, but did not allow us to estimate the magnitude of differences in APR spreads themselves.

To examine the effects of race and ethnicity, we conducted two distinct analyses. First, we used an initial "base" logistical regression model to estimate how much borrowers' race or ethnicity affected whether their loans were higher-rate, holding constant a host of borrower, property, loan, and geographic independent variables. However, logistic regression procedures assume that there is no "reverse-causation" between the dependent and independent variables. In other words, this method assumes that, while the independent variables may affect the dependent variable, the reverse is not true. We recognize that this assumption may not be valid in our case since a loan's APR may affect some of the variables we hold constant, namely LTV, loan amount, and whether the loan carried a prepayment penalty. For example, a borrower's decision to borrow a certain dollar amount might be, in part, based on the rate quoted. Therefore, like the Ambrose study, our final analysis includes statistical adjustments to account for the possible interdependence of these variables, providing a more reliable estimate of the effect of race and ethnicity on the risk of receiving a higher-rate loan.

1. The Base Model

As mentioned above, we first conducted logistic regressions to estimate whether race and ethnicity affected the risk of receiving a higher-rate loan. Table 4, below, lists the specific variables that were included in this base model.

Table 4. Logistical Specification for Base Model

Dependent Variable	Variable Description
HMDA_Threshold	Dummy variable=1 if APR spread is reported in HMDA, else=0
Independent Variables	
Borrower Characteristics	
BLACK	Dummy variable =1 if the borrower is African-American, else=0
LATINO	Dummy variable =1 if the borrower is Latino, else=0
MONTHLY INCOME	Monthly income, in dollars
FICO[27]	FICO credit score
FULL_DOC	Dummy variable=1 if the borrower provided full documentation of income, else=0
Loan/Property Characteristics	
LTV	Loan-to-value ratio at origination
ORIG_AMT	Loan origination amount, in dollars
PREPAY	Dummy variable=1 if the loan carries a prepayment penalty, else=0
MULTI	Dummy variable=1 if the loan is secured by a property with 2-4 units, else=0
CONDO	Dummy variable=1 if the loan is secured by a condominium, else=0
AGENCY CODES[28]	Categorical dummy variables representing the regulatory agency of the originating lender
Economic Variables:	
CREDIT_SPREAD	Monthly difference between AAA and Baa bond yields
YIELD_CURVE	Monthly difference between 10-year and 1-year Treasury yields
HPI_VOL	8 quarter standard deviation in the OFHEO state Housing Price Index
RATE_VOL	15 month standard deviation in 1-year Treasury yield
Q2-Q4	Categorical dummy variables for the second, third and fourth quarters of 2004
Geographic Variables:	
CDIV2-CDIV9	Categorical dummy variables for the Census division in which the property is located
STATELAW2-STATELAW4	Categorical dummy variables for state laws created by Ambrose et al. based on rules pertaining to judicial foreclosure and deficiency judgment
N_CCITY	Dummy variable=1 if the property is located in an MSA but outside of a central city, else=0
RURAL	Dummy variable=1 if the property is located outside an MSA, else=0
BLACK_STATE	Proportion of state population that is African-American
LATINO_STATE	Proportion of state population that is Latino

2. Expanded Model: Final Analysis

Our final model used more sophisticated techniques to analyze the same variables while accounting for potential interdependence of APR and some of the independent variables. Appendix 4 explains our methodology in more detail, but in the simplest terms, this model removed statistical problems that might be caused by reverse causation (i.e., two-way effects) between a loan's price and LTV, origination amount, and the existence of a prepayment penalty.

3. Analyses for Different Loan Categories

Recognizing that loan prices may depend in part on the type of interest rate (adjustable or fixed) and/or the loan purpose (purchase or refinance), we performed all analyses separately for each of the following four loan categories: 1) Purchase fixed-rate mortgages (FRMs); 2) Purchase adjustable-rate mortgages (ARMs); 3) Refinance FRMs; and 4) Refinance ARMs. In addition, to limit variations in loan products within each category, we included only the dominant types of ARM and fixed-rate loans.[29]

Specifically, our analysis of ARM loans included only 2/28 hybrid ARMs (loans with a fixed interest rate for two years followed by a 28-year term with semi-annual interest rate adjustments calculated by adding a margin to an index based on six-month LIBOR rates), with either no prepayment penalty or a prepayment penalty of two years. Our analysis of fixed-rate mortgages included all 30-year loans, with either no prepayment penalty or a prepayment penalty with a term of three years.[30] All analyses were further restricted to loans secured by first-liens on owner-occupied, single-family properties. Finally, we also excluded loans secured by manufactured housing units, those backed by private mortgage insurance, those with non-standard amortization schedules, and those with origination amounts exceeding the jumbo loan thresholds.[31]

4. Presentation of Findings: Odds and Likelihoods

When using logistic regressions to predict whether an event will happen or not, it is conventional to express the results in terms of "odds ratios." In this case, we are essentially trying to understand whether race or ethnicity help explain whether a borrower receives a higher-rate home loan, even after controlling for conventionally accepted risk factors. Odds ratios are simply the odds of one group receiving a higher-rate loan divided by the odds of a reference group. (In our case, the reference group is similarly-situated white borrowers.)

Odds ratios include two important features: magnitude and significance. The magnitude is simply the value of the ratio. An odds ratio of 1.0 indicates there is no disparity. A ratio above 1.0 indicates that, for instance, the odds of getting a higher-rate loan were greater for African-American and Latino borrowers than the odds for similar white borrowers, while a ratio under 1.0 indicates that the odds for these groups was lower than for white borrowers. For example, if the odds ratio between African-American borrowers and white borrowers is 1.3, it means that the odds of an African-American borrower receiving a higher-rate loan is 30 percent greater than the odds for a similarly-situated white borrower. If, however, the odds ratio were 0.7, the odds of an African-American borrower receiving a higher-rate loan would be 30 percent lower than that of a similarly-situated white borrower. The significance shows whether an odds ratio was different from 1.0 by a statistically-significant amount. Statistical significance is the conventional method in social science research for judging whether observed differences represent meaningful disparities or are the result of random variation.

While odds ratios are conventionally used when presenting information from logistic regressions,[32] it is often more intuitive to think in terms of probabilities or likelihoods. Therefore, we used the information from our models to predict the likelihoods that the African-American and Latino borrowers in our dataset received a higher-rate loan and compared that to the expected likelihood if those same borrowers had been white. By comparing these two predicted probabilities, which are estimated based on identical risk factors between groups, we were able to isolate the effect of race and ethnicity on the likelihood of receiving a higher-rate loan for borrowers in our dataset. See Appendix 7 for a more detailed explanation of odds and likelihoods.

5. Limitations

Like all statistical analyses, the study presented here has limitations. First, APR spread is an imperfect measure for examining pricing data, since it essentially blends interest rates with points and fees in a way that assumes that borrowers will keep the loan for its entire term and, consequently, it tends to underemphasize costs arising from fees.[33] However, in the context of this study, it is unlikely this limitation would undercut our basic findings, since it is unlikely that preferences for fee-rate tradeoffs systematically vary by race or ethnicity in ways that are uncorrelated with credit score, income, LTV, or other factors already included in our analysis. Moreover, to the extent that borrowers of color are targeted for high-fee predatory lending,[34] such patterns would tend to lead to underestimated pricing disparities between these borrowers and white borrowers since, again, APR tends to minimize the costs of fees.[35]

Second, because HMDA only provides APR-spread information for higher-rate loans, our analysis is limited to comparing the relative odds and likelihoods of receiving these higher-rate loans. Unlike Ambrose et al., we did not estimate the magnitude of the differences in APRs between loans.

Third, unlike the Fed study, our database was not large enough to control for metropolitan statistical area or for individual lenders. However, our analysis does account for general correlations between APR, on the one hand, and location, race, and ethnicity on the other by controlling for state housing prices, census regions, state laws regarding judicial foreclosure and deficiency judgment and state racial and ethnic compositions. In addition, by including regulating agencies as independent variables, we essentially control for lender type.

Fourth, since our merged data only contains subprime loans, this analysis neither allows for an evaluation of pricing disparities that includes the prime market, nor provides any insight into how different borrowers end up with prime rather than subprime lenders.

Finally, our models may omit information that is correlated with both APR and the race and ethnicity of borrowers (e.g., employment tenure). Though we were able to control for the majority of risk-based characteristics that lenders generally use to price loans, at least according to rate sheets, it is nevertheless possible that omitted variables could influence our results. This limitation applies to virtually all empirical social science research.

IV. FINDINGS

First, we note that—apart from the findings for race and ethnicity—the results for our explanatory variables were consistent with rational risk-based pricing practices in the mortgage industry. For example, coefficients on LTV were consistently positive and significant, showing that higher LTVs increase the likelihood of receiving a higher-rate loan. Also, estimates on credit scores were negative and significant, showing that borrowers with lower credit scores were also more likely to receive higher-rate loans. We also note that our models did a good job overall of predicting whether borrowers would receive a higher-rate loan. Appendix 6 presents the full results, including model-fit statistics for all models.

African-American borrowers were 31 percent more likely to receive a higher-rate loan on fixed-rate purchases.

In general, our analyses show that race and ethnicity were significant factors in determining whether borrowers received higher-rate home loans. That is, African-American and Latino borrowers were more likely to receive higher-rate loans than white borrowers with similar risk factors for many categories of subprime loans. The significance of race was particularly consistent for loans with prepayment penalties, while the impact of ethnicity was concentrated in loans for home purchases.

A. Effect of Race on Subprime Loan Pricing

1. Purchase Loans: Our estimates show that race had a significant effect on the risk of receiving a higher-rate loan for most fixed-rate and all adjustable-rate subprime purchase mortgages. Specifically:

• Fixed-Rate Purchase Loans:

Our base model estimated that the odds of receiving a higher-rate, fixed-rate purchase loan for African Americans were 71 percent greater than for whites. In our final model, the increase in the odds for African-American borrowers on loans without prepayment penalties continued to be positive, but was no longer significant at a 95 percent confidence level. However, for the more than 60 percent of fixed-rate purchase loans that did contain prepayment penalties, the increase in odds for African-American borrowers rose to 84 percent and was statistically-significant. Based on our likelihood simulation, we estimated that these African-American borrowers were 31 percent more likely to receive a higher-rate loan than if they had been white borrowers.*

Table 5. Effect of Race on Risk of Receiving a Higher-Rate Subprime Purchase Loan (African-American vs. White)

Models		FRMs			ARMs		
		Number of Observations	Odds Ratio	Increased Likelihood	Number of Observations	Odds Ratio	Increased Likelihood
Base Model	**All Loans**	3,679	**1.71**	**28.7%**	17,978	**1.24**	**9.0%**
Final Model	**Loans without Prepayment Penalties**	1,444	1.64	30.9%	4,657	**1.40**	**16.3%**
	Loans with Prepayment Penalties	2,235	**1.84**	**30.8%**	13,321	**1.41**	**15.3%**

*Bolded results are statistically significant at a 95 percent confidence level.

• Adjustable-Rate Purchase Loans: Both the base and final models estimated that African-Americans were more likely to receive a higher-rate adjustable rate purchase loan than similarly-situated whites. The base model estimated that the odds for African-Americans were 24 percent higher than for whites. In our final model, the increase in odds rose to 40 percent for loans without prepayment penalties and 41 percent for loans with prepayment penalties, both of which were statistically significant. Translated into likelihoods, African-Americans in our sample were 15 to 16 percent more likely to receive a higher-rate ARM purchase loan than if they had been white.

2. Refinance Loans: Our base model estimated that race had a positive and significant effect on the likelihood of receiving a higher-rate loan for all fixed-rate and adjustable-rate subprime refinance loans. In our final model, the increased odds persisted for loans with prepayment penalties.

• Fixed-Rate Refinance Loans: Our base model estimated that the odds of an African-American borrower receiving a higher-rate fixed-rate refinance loan were 44 percent greater than for a similarly-situated white borrower. Our final model showed that, for fixed-rate refinance loans without prepayment penalties, the impact of race was not detectable at a 95 percent confidence level. However, over two-thirds of fixed-rate refinance loans did have prepayment penalties, and our final model estimated that the odds of African-American borrowers with these loans receiving a higher-rate were 62 percent higher than for white borrowers. Translated into relative likelihoods, these African-American borrowers were 34 percent more likely to receive a higher-rate loan than if they had been white.

Table 6. Effect of Race on Risk of Receiving a Higher-Rate Subprime Refinance Loan (African-American vs. White)

Models		**FRMs**			**ARMs**		
		Number of Observations	Odds Ratio	Increased Likelihood	Number of Observations	Odds Ratio	Increased Likelihood
Base Model	**All Loans**	8,799	**1.44**	**22.9%**	18,470	**1.16**	**5.6%**
Final Model	**Loans without Prepayment Penalties**	2,881	1.24	11.2%	6,520	1.04	1.2%
	Loans with Prepayment Penalties	5,918	**1.62**	**34.3%**	11,950	**1.17**	**6.1%**

*Bolded results are statistically significant at a 95 percent confidence level.

• Adjustable-Rate Refinance Loans: Our base model estimated that the odds of an African-American borrower receiving a higher-rate adjustable-rate refinance loan were 16 percent greater than for a similarly-situated white borrower. Again, our final model showed different results for loans with and without prepayment penalties. Specifically, the final model showed a small and positive difference between African-Americans and whites in loans without prepayment penalties (only 35 percent of adjustable-rate subprime refinance loans in our analysis), though one that is not significant at a 95 percent confidence level. However, for the 65 percent of ARM refinance loans that do have prepayment penalties, the final model estimated that the odds of an African-American borrower receiving a higher-rate loan were 17 percent higher than the odds for a white borrower with similar risk features. Our likelihood simulation estimated that these borrowers were six percent more likely to receive higher-rate loans than if they had been white.

B. Effect of Ethnicity on Subprime Loan Pricing

1. Purchase Loans: All final model results showed that Latino borrowers were more likely to receive higher-rate subprime purchase loans than white borrowers.

• Fixed-Rate Purchase Loans: The base model estimated that the odds of a Latino borrower receiving a higher-rate, fixed-rate purchase loan were 60 percent greater than a similarly-situated white borrower. In our final model, the increase in odds rose to 189 percent for loans without prepayment penalties and 71 percent for those with prepayment penalties. Translated into relative likelihoods, the final model suggested that Latino borrowers of fixed-rate purchase loans without prepayment penalties in our sample were 142 percent more likely to receive higher-rate loans than if they had been white. Latino borrowers of fixed-rate purchase loans with prepayment penalties in our sample were 45 percent more likely to receive higher-rate loans than if they had been white.

Latino borrowers of fixed-rate purchase loans with prepayment penalties in our sample were 45 percent more likely to receive higher-rate loans than if they had been white.

Table 7. Effect of Ethnicity on Receiving a Higher-Rate Subprime Purchase Loan (Latino vs. White)

Models		FRMs			ARMs		
		Number of Observations	Odds Ratio	Increased Likelihood	Number of Observations	Odds Ratio	Increased Likelihood
Base Model	**All Loans**	3,679	**1.60**	**39.6%**	17,978	1.06	3.6%
Final Model	**Loans without Prepayment Penalties**	1,444	**2.89**	**141.9%**	4,657	**1.52**	**28.6%**
	Loans with Prepayment Penalties	2,235	**1.71**	**44.6%**	13,321	**1.66**	**37.4%**

*Bolded results are statistically significant at a 95 percent confidence level.

• Adjustable-Rate Purchase Loans: The base model estimated that the odds of a Latino borrower receiving a higher-rate adjustable-rate purchase loan were not different at a 95 percent confidence interval from a similarly-situated white borrower. However, the final model indicated that the increased risk for Latino borrowers was, in fact, statistically significant. Specifically, the odds of Latino borrowers receiving a higher-rate on adjustable-rate purchase loans were 52 percent greater for loans with prepayment penalties and 66 percent greater for those without prepayment penalties than for similarly-situated whites. For our sample, Latino borrowers of ARM purchase loans with and without prepayment penalties were, respectively, 37 percent and 29 percent more likely to receive higher-rate loans than if they had been white.

2. Refinance Loans: Our models did not find evidence of an impact of ethnicity on loan prices in the refinance market at a 95 percent confidence level.

• Fixed-Rate and Adjustable-Rate Refinance Loans: Neither the base nor the final model found a difference in the odds of Latinos receiving a higher-rate subprime refinance loan compared to white non-Latino borrowers that was significant at a 95 percent confidence level. This was true both for fixed-rate and adjustable-rate subprime refinance loans.

V. DISCUSSION

The pricing disparities revealed by our results point to underlying market inefficiencies that have implications for all borrowers. While disparities highlight disadvantages faced by borrowers of color, this by no means suggests that the subprime market is delivering uniformly desirable or good outcomes for white borrowers. To the contrary, we believe that evidence of disparate pricing for borrowers of color is likely a symptom of a larger set of issues in a market that has gained notoriety as a magnet for predatory lenders. The point is further underscored by the scale of legal settlements related to widespread predatory lending by subprime lenders. For example, Household Finance entered a settlement agreement in 2002 for $484 million that stands as the largest consumer restitution agreement in U.S. history.[36] Sizeable settlements also have been entered into by Citigroup and, most recently, Ameriquest.[37]

We believe that evidence of disparate pricing for borrowers of color is likely a symptom of a larger set of issues in a market that has gained notoriety as a magnet for predatory lenders.

Efficient financial markets should provide similarly-situated borrowers with equally competitive prices on subprime home loans. In fact, subprime lenders construct complicated pricing matrices in the form of "rate sheets" in an effort to meet this challenge. These rate sheets describe how to calculate applicable interest rates from a borrower's credit score, the amount of equity held by the borrower in the home, and several other factors that measure risk. Lenders' internal fair lending compliance operations aim to ensure that these criteria are valid and not based on impermissible discriminatory factors. This investment is prudent, since lenders face serious legal and reputational risks if they violate fair lending standards.

Yet, in multiple analyses that control for the major factors lenders explicitly use to set prices, we find that borrowers' race and ethnicity continue to exert a statistically-significant influence on the cost of their subprime mortgages. For several types of loan products, borrowers of color in our database were more than 30 percent more likely to receive a higher-rate loan than white borrowers, even after accounting for differences in risk. Disparities tended to be larger for fixed-rate loans than for their adjustable-rate counterparts.

Our findings indicate that African-American and Latino borrowers face the highest risks for pricing disparities under different circumstances. Relative to white borrowers, African-American borrowers were at greatest risk of receiving a higher-rate loan when their subprime mortgage included a prepayment penalty. Specifically, African-American borrowers with prepayment penalties on their subprime home loans were 6 to 34 percent more likely to receive a higher-rate loan than similarly-situated white borrowers, depending on the type of interest rate (i.e., fixed or adjustable) and the purpose (refinance or purchase) of the loan. Latino borrowers were at greatest risk when they used their

For several types of loan products, borrowers of color in our database were more than 30 percent more likely to receive a higher-rate loan than white borrowers, even after accounting for differences in risk.

mortgage to purchase a home rather than to refinance an existing home loan. In these cases, they were 29 to 142 percent more likely to receive a higher-rate loan than similarly-situated white borrowers, depending on the type of interest rate and whether the loan contained a prepayment penalty.[38]

While no empirical analysis is without limitations,[39] the rich data used here, the stability of our findings in analyses that examine different combinations and forms of explanatory variables (see Appendix 6), and the consistency of findings across multiple product lines all indicate that the pricing disparities we identify are genuine and significant. What then could explain these results?

One explanation for the disparities could stem from differences in how individual lenders price loans. This explanation involves specific lenders charging borrowers of color rates that are higher than those charged similarly-situated white borrowers—i.e., "disparate loan pricing." In an alternative explanation, pricing disparities would be expected if borrowers of color disproportionately received their loans from lenders whose loans are generally priced higher than lenders that primarily serve white borrowers. For convenience, we generally refer to such a pattern as "market segmentation."

We stress that data was not available that would allow us to distinguish between these two underlying reasons or quantify their effects. However, given that both represent plausible factors, it is worthwhile to consider both scenarios in more detail:

A. Disparate Loan Pricing

While rate sheets do present objective pricing schedules for calculating a loan's interest rate, they are not definitive statements of a loan's price for a given borrower. Discretionary yield-spread premiums and other up-front charges, as well as negotiated exceptions to rate sheet guidelines, are common examples of how a loan's price can vary from prices displayed on a rate sheet. These variations could account for part or all of the differences in subprime loan pricing among white, African-American, and Latino borrowers.

1. Discretionary charges such as yield-spread premiums or other up-front charges are subjective elements that could lead to disparate pricing.

Frequently, mortgage originators adjust the interest rate on home loans without regard to any objective risk-based criteria. When these adjustments are used to increase the interest rate of a loan, they increase the value of the mortgage (also called the yield) to the lender. The difference between the new higher rate and the lowest rate for which the borrower qualified is called a "yield-spread." When a loan with an increased rate is sold to an investor or delivered by a broker to a lender, the investor or lender will pay a premium price for that loan. The difference between the price paid for this loan with an inflated interest rate and the price that would have been paid for the loan had the borrower received the lowest rate for which he or she qualified is called a yield-spread premium, or YSP for short.[40]

While YSPs theoretically can play a helpful role,[41] the exchange is a complicated one that is easily abused. Borrowers often wrongly assume or are misled into believing that mortgage brokers are working to find them the lowest-cost loan for which they qualify, even if they actually receive an over-priced or even predatory loan.[42] Even when borrowers are aware that brokers are not required to offer the best rate, determining whether a proposed loan carries a YSP, let alone performing the complex financial calculations necessary to compare prices across mortgages with and without YSPs, is surely overwhelming for many borrowers.[43]

We hypothesize that pricing disparities faced by African-American borrowers in the subprime market are at least partially driven by YSPs.

When YSPs are applied in ways that disparately affect borrowers in protected classes, including race and ethnicity, this form of discretionary pricing may carry serious fair lending implications. In fact, this is a prominent example of how borrowers may be "steered" into a higher-rate loan. In part, because of such concerns, a number of states have addressed YSPs in the context of predatory lending legislation.[44]

Unfortunately, it has been difficult to study the overall effects of YSPs. The precise amount paid in yield-spread premiums is disclosed only on the HUD-1/1A closing statement, which lenders must provide to borrowers. Though that information is generally unavailable to researchers, at least one researcher who has obtained copies of these documents has reached troubling conclusions. Examining loans from an affiliated set of lenders, Harvard Law School Professor Howell Jackson found that African-American and Latino borrowers paid mortgage brokers more for their services than other borrowers, and he hypothesizes that yield-spread premiums were at least partially responsible.[45]

Taking the results of Professor Jackson's research along with findings from this paper and previous research, we hypothesize that pricing disparities faced by African-American borrowers in the subprime market are at least partially driven by YSPs. On the one hand, we have the direct evidence from Professor Jackson and that is presented in this paper. On the other, we note that subprime lenders' rate sheets routinely stipulate that brokers can only maximize the amount of a YSP if the loan carries a prepayment penalty.[46] In practice, this linking of YSPs with prepayment penalties ensures that a lender will receive either extra-interest or penalty income sufficient to offset the up-front cash payment to a broker. Bocian and Zhai have previously shown that borrowers in communities of color were at greater risk of receiving a subprime loan with a prepayment penalty controlling for differences in credit quality, location, and property type.[47]

In addition to yield-spread premiums, non-interest up-front charges on home loans referred to as "points and fees" can vary over wide ranges.[48] Since the loan's APR reflects some (though not all) of these charges, variations in points and fees paid by borrowers of different races and ethnicities also may give rise to differences in APR spreads. Interestingly, recent research using some of the same data employed by Professor Jackson showed that borrowers paid the most when some of their brokers' compensation came from both yield-spread premiums and other up-front charges.[49] This evidence is consistent with brokers charging YSPs on top of, rather than in place of, other discretionary up-front fees.

2. Objective pricing criteria may be waived or modified disproportionately in favor of white borrowers.

Lenders appear to be under considerable pressure to deviate from objective pricing in order to secure loans originated by mortgage brokers. Accounting for an estimated 59 percent of subprime originations in 2005,[50] broker-originated mortgages comprise an important market segment. Lenders must compete against other lenders in the bid to provide loans to the large borrower base that obtain their mortgages from brokers. Available evidence suggests that the resulting pressure does indeed lead to exceptions to posted guidelines.

Select results from a recent survey of 2,400 mortgage brokers published by a leading industry trade publication suggested that the explicit discretion available to brokers in rate sheets may represent only part of subjective changes that occur in the pricing process.[51] In the survey, almost half (47 percent) of respondents said they dismissed rate sheets and automated pricing systems in favor of a phone call to determine the interest rate applicable to a loan. In addition, while the publication did not report specific statistics, it did affirm that brokers seek exceptions to the standard underwriting guidelines provided by lenders.

If such exceptions are made more for one group of borrowers than another, it would clearly have the potential to lead to disparate loan pricing between groups. This hypothesis is more than pure supposition. In closely related questions examined in matched-pair testing, Urban Institute researchers have found that borrowers of color received less favorable treatment in the mortgage application process.[52]

B. Market Segmentation

Borrowers of color also would be more likely to receive higher-rate subprime loans if they tended, on average, to receive their loans from lenders that generally charge more than the lenders predominately serving white borrowers. Such lenders might face a greater cost of funds, have higher overhead charges resulting from less streamlined operations, higher marketing expenses, or might simply demand greater returns.[53] While we generally expect that efficient markets will result in borrowers selecting for themselves loan options with the lowest costs,[54] substantial evidence, apart from the findings presented in this paper, exists to support the notion that borrowers are not finding their way to the best-priced home loan.[55] This section discusses three possible explanations for this pattern.

1. Higher-cost lenders may directly or indirectly target borrowers of color.

The most obvious explanation for why borrowers of color would disproportionately receive their loans from higher-rate lenders would be that higher-rate lenders target borrowers of color directly on the basis of race or ethnicity or indirectly on the basis of traits correlated with race or ethnicity. Some examples of the latter might include marketing targeted at borrowers living in certain geographic locations or who have education, wealth, unemployment rates, or other factors often associated with less financial sophistication.

Once identified, targeted borrowers who share these traits might be disproportionately subject to aggressive marketing techniques. In fact, William Apgar and Allegra Calder have noted that "even though mortgage loans are now readily available in low-income minority communities, by employing high-pressure sales practices and deceptive tactics, some mortgage brokers push minority borrowers into higher-cost subprime mortgages that are not well suited to their needs and can lead to

financial problems down the road." This observation is particularly troubling since it may be difficult even for an otherwise optimal market to correct such inefficiencies. That is, responsible lenders will be seriously challenged to compete for business in communities of color if unscrupulous lenders are using aggressive and deceptive tactics to persuade borrowers to accept their loans.[56]

Responsible lenders will be seriously challenged to compete for business in communities of color if unscrupulous lenders are using aggressive and deceptive tactics to persuade borrowers to accept their loans.

This sort of targeting might help explain the disparities observed among Latino borrowers in our dataset. We believe that the group of borrowers identified as Latino in HMDA data is broad, ranging from recent immigrants to fourth- or higher-generation Americans.[57] It might be the case, however, that Latinos who take a subprime mortgage to purchase a home are more likely to be recent immigrants. If so, the higher disparities we observe in the purchase market for Latinos may arise from the targeting of recent immigrants by higher-cost lenders. Under such a hypothesis, recent Latino immigrants might also face disparate outcomes in the refinance market that we are unable to capture since those results are blended with a broader Latino population.

Similarly, even if a lender is not directly involved in such targeting, it may be that mortgage brokers and other third parties involved in the transaction disproportionately refer borrowers to higher-cost lenders. Why? One explanation is that higher YSPs might motivate brokers to work with such lenders. Even if brokers or other third parties refer borrowers to lenders in a non-discriminatory way, if the brokers disproportionately serve borrowers of color and also disproportionately provide loans that cost more than retail loans, then borrowers of color would tend to get higher prices. As Apgar and Calder point out, this proposition is supported by empirical research:[58] A 2001 AARP survey of older borrowers found that 64 percent of African-American borrowers received their loan from a broker versus just 38 percent of white borrowers.[59] Also, Alexander et al. report that third-party subprime originations are more likely to default and that they therefore carry a higher rate than retail-originated loans.[60]

2. Relatively lower-cost subprime lenders might not compete aggressively for business in communities of color.

If brokers or other more expensive loan originators are disproportionately providing loans to borrowers of color, it is fair to ask whether lower-cost lenders are under-serving such customers. In this explanation, white borrowers receive disproportionately fewer higher-rate loans not because borrowers of color are targeted for such loans, but because the latter are excluded from lower-cost subprime loans. There is at least some anecdotal evidence that this problem continues to persist in the marketplace. For example, in 2004, the U.S. Department of Justice filed two cases against lenders for failing to lend in communities of color.[61]

The most potentially troubling hypothesis along these lines would be a scenario in which different affiliates of a lender essentially segmented their customers, with one disproportionately serving white borrowers with lower-cost subprime loans and the other marketing higher rates to communities of color. If this were the case, it is unclear whether the regulatory enforcement agencies have the infrastructure and resources necessary to detect and fully investigate such patterns.[62]

3. Higher-cost lenders may be more likely to flip borrowers.

A final possibility is that borrowers of color are no more likely to be served by higher-rate lenders than white borrowers—but are more likely to receive multiple loans within one year from a higher-rate lender. Because our dataset is comprised of loan transactions and not borrowers, we are unable to detect instances in which borrowers take multiple first-lien loans in a year. Loan flipping, where borrowers are repeatedly refinanced primarily for the purpose of generating income for the loan originators rather than for the benefit of the borrowers, has been identified as an important issue in the predatory lending context.[63] Recent research by Courchane, Surrette and Zorn indicates that borrowers' subsequent loans in the subprime market are explained in part by the market segment of their current loan: "We conclude, therefore, that previous mortgage segment is an important determinant of current market segment even after controlling for risk-related underwriting and demographic effects."[64] If rapid loan flipping (i.e., multiple loans within one calendar year) is concentrated in higher-rate subprime lenders, we note that it could contribute to the disparities we observe in refinance loans.

VI. POLICY RECOMMENDATIONS

Our research shows that, for most types of subprime mortgages, borrowers of color are more likely to receive higher-rate loans, and objective risk factors fail to explain the disparities. We have discussed several reasons that could explain this phenomenon related, broadly, to disparate loan pricing and the possible effects of market segmentation. It is likely that all of the factors discussed play some role in making subprime home loans more costly than necessary for people of color. In addition, the business practices that support excessive charges could apply equally to individual white borrowers in the subprime market who may lack the bargaining ability or financial experience to fully protect themselves.

Given the importance of wealth-building to all Americans, and the current wealth gap that exists between white Americans and communities of color,[65] these pricing disparities in the subprime market call for reform in the mortgage market. To encourage fair pricing of home loans that is based only on legitimate risk factors and facilitates economic progress for all borrowers, we recommend the following:

1. Curtail steering by requiring objective pricing standards.

Today, through advances in technology, lenders have a stronger ability than ever to apply risk-based pricing. Increasing the fairness and objectivity of the subprime home loan origination process would significantly improve outcomes for all families. Given the many explicit ways that American public policy supports homeownership, it is especially important that borrowers representing equivalent risks receive similar treatment from mortgage professionals. We believe the best way to reach this end is to eliminate discretionary pricing in the subprime loan market, prompting lenders to adopt transparent, market-driven prices for mortgages representing similar risks.

Eliminating discretionary pricing in the subprime loan market would not necessarily mean eliminating yield-spread premiums. We believe homeowners should retain the right to pay for home loans through a variety of mechanisms, including yield-spread premiums when they truly benefit borrowers.[66] A number of sound options exist for achieving more rational pricing in the subprime market while still permitting broker compensation through YSPs where appropriate:

• **Include YSPs in laws designed to protect homeowners from abusive lending practices.** The Federal Reserve has the discretion to include YSPs in the calculation whether or not a loan is high-cost under the Home Ownership and Equity Protection Act (HOEPA),[67] and therefore eligible for special protections. Given the prevalence of YSPs in documented cases of predatory lending,[68] it makes no sense to ignore these fees in a law specifically designed to protect borrowers from predatory lending. This is a glaring loophole that affects all subprime loans originated by mortgage brokers, well over half the market.

• **Prohibit the combination of YSPs and prepayment penalties in the same subprime home loan.** Prepayment penalties and YSPs work together in ways that are contrary to borrowers' interests: prepayment penalties allow lenders to lock in an above-market yield, making them more willing to pay inflated YSPs to brokers for over-priced loans. We believe that's why our previous research revealed the counterintuitive result that borrowers with subprime loans that include prepayment penalties fail to receive lower interest rates than similarly-situated borrowers without prepayment penalties.[69] With prepayment penalties attached to overpriced loans, lenders benefit either way—they get paid either through payment of penalties at early payoff or through the higher-than-necessary interest paid out over time. Without the prepayment penalty, borrowers who realize they paid too much for their mortgage could quickly refinance into a lower-cost loan, and, as the lender understands, has every incentive to do so.

The combination of YSPs and prepayment penalties also creates opportunities for deceptive marketing. Prepayment penalties are commonly justified as an option by which borrowers may lower the interest rate, while YSPs are commonly justified as an option offered to exchange a higher interest rate for reduced closing costs. Given the link between higher YSPs and prepayment penalties, the YSP may in fact counter the benefits borrowers supposedly receive from prepayment penalties. The net result, indeed, may be that a borrower pays twice for little or no benefit.[70] Even if either a YSP or a prepayment penalty had a benefit to the borrower, the combination of the two in a subprime loan creates a serious impediment to informed borrower choice, and may be an indicator of potential abuse.[71]

• **Improve transparency of YSPs by requiring checks for YSPs to be written jointly to borrowers and brokers.** Currently, borrowers see YSPs as a cryptic entry on a closing form—if they see the charge at all. A joint-payee provision would mean that brokers could not cash a check without a borrower's endorsement, helping to ensure the borrower has full knowledge of the broker's compensation.

In general, reining in discretionary pricing in the subprime market would simplify an incredibly complicated mortgage process, remove an opportunity to discriminate against unsuspecting borrowers, and promote competition.

2. Follow the lead of the securities industry and hold lenders and brokers responsible for providing loans that are suitable for a given borrower.

Investment professionals have long had an affirmative duty to ensure that the products they recommend are suitable for their customers. Buying a home is the biggest investment that most families ever make, and, since the home's equity is the major source of wealth for most families, refinancing is an investment decision of more relevance to most families than stock purchases. Arguably today's mortgage transactions are at least as complicated as financial decisions made with investment professionals, yet families do not have a similar assurance that their lender or broker will deal fairly with them by offering them loans that are suitable given their needs and circumstances. A securities broker who steers a borrower into an inappropriate investment risks punishment; a mortgage broker who does the same may reap higher compensation with no negative consequences. To protect homebuyers and homeowners, lenders and brokers should be required to recommend loans that are suitable and reasonably advantageous for borrowers.[72]

Mortgage brokers, in particular, should have a fiduciary duty to borrowers to use best efforts to obtain the best available loan for the borrower. Brokers now originate nearly 60 percent of subprime mortgages.[73] Borrowers expect their brokers to represent their best interests, and brokers should be held to that standard. The stakes are too high to allow misplaced incentives to harm families' chances of paying a fair price for their home and building their net worth.

3. Discourage pricing discrimination by requiring subprime lenders to disclose more detailed pricing and underwriting information in their HMDA data.

The collection of APR information, as described in this report, is a positive first step in assessing pricing information, but it is of only limited value without a full disclosure of points and fees on subprime mortgages, including up-front fees, yield-spread premiums, and prepayment penalties. Not all up-front fees are captured in the APR. Further, in most cases, the APR understates the true costs of even those fees it captures because it amortizes them over the term of the loan, typically fifteen or thirty years. In fact, the vast majority of subprime home loans are paid off within the first two-to-five years. As a result, although two loans might have the same APR, a loan with high up-front fees typically costs borrowers much more. Information on points and fees would allow for a more accurate analysis of what families pay for their home loans.

In addition, as this research shows, HMDA data currently lacks information that would be helpful in evaluating how lenders serve their markets. HMDA should be modified to include the disclosure of factors such as loan-to-value ratios and credit scores of borrowers. In addition, HMDA should include the origination channel for each loan, so that researchers could better assess pricing differences or similarities among broker, correspondent and retail originations. Working in good faith, interested parties can produce a workable mechanism for providing critical information without unduly compromising privacy.[74]

4. Ensure regulators have adequate resources and authority, and are held accountable, for fully enforcing fair lending laws.

Fair lending violations are serious concerns. One of the main goals of HMDA is to help identify potential discriminatory lending patterns and to enforce anti-discrimination laws. Last year, based on the raw disparities evident in the 2004 HMDA data, the Fed referred some 200 lenders to federal and state regulators for further investigation. These 200 lenders accounted for 48 percent of owner-occupied loans reported under HMDA in 2004.[75] To date, no information about the outcome of those referrals has been made public. In the meantime, lenders already have submitted 2005 HMDA data to their federal regulators and early reports suggest that disparities have increased since 2004.[76]

It is important that regulators review and act on the information available to them in a timely and transparent fashion. Whether or not the regulators find that lenders have violated applicable laws, borrowers and the larger public need to know that the investigation process is fair and effective. To this end, we recommend that each regulator report annually on the number of fair lending examinations performed and for each examination provide publicly-available information, including: (1) the indicators of potential discriminatory activity identified (if any); (2) the protected class or classes (e.g., gender, race) believed to be potentially disadvantaged by such activity; and (3) the outcome of each review (i.e., any actions taken).

In addition, turf battles should not impede efforts to protect borrowers. In the wake of the release of the 2004 HMDA data, at least one federal regulator has put significant energy into a court action to

prevent a state attorney general from having access to information necessary to evaluate potentially discriminatory practices by lending institutions.[77] We wish it were clear that the same energy has been put into getting to the root of racial and ethnic disparities in home lending. It will take concerted efforts from all interested parties to ensure that similarly-situated families receive fairly-priced loans.

5. Create incentives and support a policy framework that leads the market to better serve communities of color.

Some of the key goals of HMDA include determining whether financial institutions are serving the housing needs of their communities and helping public officials to make public investments in a way that attracts private investment in areas that need it. Over time, it has become clear that not all credit is good credit. As discussed above, one reason African-American and Hispanic families are more likely to receive higher-rate loans may be that they tend to receive loans from lenders that generally charge more. Policymakers should review whether lower-cost lenders need additional incentives to help meet the credit needs of communities of color. Conversely, regulatory enforcers of fair lending laws should actively evaluate whether the higher-cost lenders "reverse red-line" by targeting communities of color for high-priced products unrelated to individual borrower risk.

When unscrupulous lending practices go unchecked, borrowers are not the only ones who suffer harm; lower-cost lenders and honest brokers also are placed at a disadvantage. They cannot compete with lenders or brokers who make loans on unfair or deceptive terms or who push-market loans that are not in a borrower's best interest. Laws and regulations that prohibit predatory, irresponsible subprime lending have proven effective in reducing the number of abusive loans while maintaining a vibrant market for subprime home loans.

A recent study by the Center for Responsible Lending showed that lenders have responded to strong state laws not by reducing the availability of subprime loans, but rather by making subprime home loans that do not contain the terms targeted by the laws.[78] Furthermore, the interest rates on subprime home loans were about the same or even lower than the rates in states that did not target those abusive loan terms.[79] Policymakers should endorse legislation that builds on the proven methods for protecting families from abusive lending while retaining access to subprime credit. Recognizing that new abuses continue to emerge, such laws should ensure that all those responsible for representing and protecting families have authority to act to address new problems.

APPENDIX 1: Credit Research Center Study

The Federal Reserve's report on 2004 HMDA data included research conducted by the Credit Research Center (CRC). In their analysis of loan data, the CRC found almost no disparities in the proportions of borrowers receiving higher-rate loans by race or ethnicity, after making adjustments for risk factors such as LTV and FICO scores. These findings have been erroneously cited to support the proposition that risk factors fully explain pricing disparities in the subprime market.[80] Even without considering the contradictory evidence presented in this paper, there are two reasons to be skeptical of this claim:

1. The data used in the CRC analysis does not appear to be representative of the subprime market.

CRC's analysis relied on 2004 HMDA data from eight unidentified subprime lenders, supplemented by proprietary information provided by those lenders. No information is provided on how these lenders were chosen nor whether they were representative of the subprime market as a whole. In fact, there is evidence that the composition of loans from these lenders is fundamentally different from that of the overall subprime market. For example, over 80 percent of both the purchase loans and refinance loans analyzed by CRC were higher-rate. However, CRL estimates that less than 50 percent of subprime lending falls into this category.[81] Since the data appears to be fairly non-representative of the subprime market, it is difficult to believe that the findings should be generalized to describe that market.

2. The methodology used in the CRC analysis is unclear and appears to be specified in a way that would limit disparities arising from brokered transactions.

The Fed's report does not contain important information on CRC's methodology, and it does not provide results for the control variables that were used in the analysis. This lack of clarity makes it difficult to understand the context for CRC's results and, consequently, what conclusions one can reasonably draw. Also of importance, CRC controlled for whether the loan was originated by a broker. This may be useful for isolating the impact of race and ethnicity on loan pricing on the one hand from the impact of the type of originator on the other. However, we believe that broker participation in loans itself is a potential source of disparities through discretionary up-selling by use of yield-spread premiums. The CRC's inclusion of the broker category as a control variable entirely ignores the effect that the broker plays in pricing loans to African-Americans or Latinos in a manner unrelated to risk, and therefore makes it impossible to assess whether these borrowers receive higher-cost mortgages than white borrowers unrelated to commonly-accepted risk factors.

APPENDIX 2: *Matching HMDA Data with Another Database*

We chose a conservative methodology to match HMDA reports and loans in the proprietary database in order to minimize the potential number of "bad matches." That is, we were willing to settle for a smaller number of loan matches in order to be confident that we were correctly matching specific loans. Below is a table outlining our matching process.

Process	Observations
Step 1: Select HMDA Loans: We first selected 2004 home purchase or refinance loan originations secured by owner-occupied, 1- to 4-unit or manufactured housing from selected HMDA lenders[82]	5,337,495 unique loan records
Step 2: Add Zip Code to HMDA: Next, we identified a dataset that provides a list of every census tract/zip code combination for the entire U.S. That is, for every census tract, there is a separate observation for every zip code that overlaps that tract. We merged our HMDA loans from step 1 with this census tract/zip code dataset	12,421,598 representing the 5,337,495 HMDA loans (there are multiple observations for loans with census tracts that overlap more than one zip code)
Step 3: Remove Non-Unique Loans: In step 3, we identified and removed HMDA loans that did not have unique combinations of the variables that were common to both datasets, namely lender name, state, zip code, loan purpose, property type, lien status, and loan amount.	9,292,170 (there are still multiple observations for loan with census tracts that overlap zip codes)
Step 4: Remove Overlapping Census Codes: To ensure that we had the right zip code for all of the loans in our analysis, in step 4 we deleted all loans that were not in census tracts that are completely encompassed within a single zip code.	1,968,148 unique HMDA loan records
Step 5: Select Loans: We then selected home purchase or refinance loans secured by owner-occupied 1-4 unit or manufactured housing originated in 2004 from the proprietary database.[83]	1,842,228 unique loan records from proprietary database
Step 6: Remove Non-Unique Loans: Next, we identified and removed loans from the proprietary database that did not have unique combinations of the following variables: i.e. state, zip code, loan purpose, property type, lien status, and loan amount.[84] Keep only loans from lenders in this dataset with more than 1,000 observations.	535,030 unique loan records from the proprietary database (includes loans in all census tracts, not just those fully encompassed in single zip codes)
Step 7. Merge HMDA and proprietary database sub-datasets: Finally, we merged the sub-datasets created in steps 4 and 6 by lender,[85] state, zip code, loan purpose, property type, lien status and loan amount. We kept only those loans that appeared in both datasets.	177,487 unique loan records in merged datasets

Using the 535,030 loans from the proprietary database that we tried to merge with HMDA as the denominator, we achieved a match rate of 33 percent. Since many of the loans in the proprietary database that we tried to match may have been removed from the HMDA loans eligible for matching due to "non-unique characteristics," this match rate seemed reasonable.

To check the validity of our matches, we selected a random sample of loans from the merged dataset. We searched for these loans in a third database called Leads-To-Loans.[86] We used data from the proprietary database to set the parameters in the following Leads-To-Loans search fields: origination date, origination amount, loan type, loan purpose, zip code and lender. Small ranges were used in the origination amount and date parameters, to account for slight variations in rounding or date entry. Loan information such as census tract and gender of borrower/co-borrower were then compared to comparable HMDA fields. Due to the limitations in Leads-To-Loans coverage, many of the loans that we randomly generated could not be found in Leads-To-Loans but, of the first 100 that were found, 93 were confirmed as matches.

APPENDIX 3: Comparison of Proprietary Database and Merged Dataset Mean Values by Loan Product

Table A.1 All Owner-Occupied Purchase Loans

Variable	All 2004 Loans in Proprietary Database (n = 725,262)	Merged Dataset Mean (n = 75,764)
FICO	663.7	652.6
LTV	86.3	87.0
TERM	340.6	341.0
ORIGINATION AMOUNT	181,252	191,792
INITIAL RATE	7.2	7.5
LOW/NO DOC STATUS (%)	46.4	44.0
PREPAYMENT PENALTY (%)	61.8	65.6
CENTRAL CITY (%)	33.3	33.4
OUTSIDE CENTRAL CITY (%)	58.4	58.2
RURAL (%)	8.3	8.4

Table A.2. All Owner-Occupied Refinance Loans

Variable	All 2004 Loans in Proprietary Database (n = 1,116,966)	Merged Dataset Mean (n = 101,723)
FICO	620.8	612.7
LTV	78.1	77.2
TERM	343.0	345.9
ORIGINATION AMOUNT	185,912	199,923
INITIAL RATE	7.1	7.3
LOW/NO DOC STATUS (%)	34.4	33.7
PREPAYMENT PENALTY (%)	66.3	68.0
CENTRAL CITY (%)	30.4	30.0
OUTSIDE CENTRAL CITY (%)	59.1	59.7
RURAL (%)	10.5	10.5

APPENDIX 4: The Expanded Models: Three-Stage, Least-Squares Model Specifications

Using our merged dataset, we employed logistical regressions to estimate the impact of race and ethnicity on the likelihood of a borrower receiving a "higher-rate" loan, that is, a loan that exceeds HMDA's APR spread reporting threshold.[87] Our "expanded" models (Models 2 and 3) correct for possible interdependence (or "endogeneity") between APR spread and several independent variables, namely LTV, origination amount, and prepayment penalties. As mentioned in the text of the report, the methodology and models are largely based on those used by Brent Ambrose, Michael LaCour-Little and Anthony Sanders, though modifications were made based on the availability of data and to reflect the different objectives of our analysis.[88]

To correct for possible the endogeneity of LTV and origination amount, which are continuous variables, with APR spread, we ran a Three-Stage, Least-Squares (3SLS) analysis:

1. First Stage: In the first stage, LTV and origination amount were each estimated using ordinary least squares regressions with the following independent variables, or "instruments": black, Latino, FICO, monthly_income, monthly_income2, refi, credit_spread, yield_curve, hpi_vol, rate_vol, hpi, subprime_rate,[89] prepay, full_doc, cdiv2-cdiv9, statelaw2-statelaw9, qtr2-qtr4, condo, n_ccity, rural, black_state, Latino_state, agency2-agency5. The estimations from these two regressions led to two new variables for each loan: LTV_instrumented and Orig_Amt_instrumented.

2. Second Stage: In the second stage, the actual LTV and origination amount variables were simultaneously estimated, using the following equations:

(A) ORIG_AMT = black Latino LTV_instrumented sub_rate monthly_income monthly_income2 HPI full_doc

(B) LTV = black Latino ORIG_AMT_instrumented FICO sub_rate monthly_income monthly_income2 HPI full_doc

3. Third Stage: In the third stage, the two equations in the second stage were automatically re-estimated, correcting for correlations between their error terms.

In the final logistic regression model we used the estimated LTV and origination amount variables from the third stage of the three-stage least squares regression instead of the actual LTVs and origination amounts. All other independent variables are identical to those in the base model. Using the estimated LTV and origination amount variables, rather than the actual values, avoids problems that would occur if these LTV and origination amount were, in fact, jointly-determined or "endogenous" with the APR of the loan.

Data Stratification for Binary Variable Prepayment Penalty

To correct for the potential endogeneity between APR spread and the existence of prepayment penalties (which is a binary variable), we ran the above expanded model specification separately for loans with and without prepayment penalties.[90] Specifically, Model 2 ran the model on loans without prepayment penalties and Model 3 ran the identical model on loans with prepayment penalties.

Variations on Methodology

To test the robustness of our model specification, we tried a few variations on our base model. Variations fell into three categories:

1. Less rigid restrictions on included loans: In one set of variations, we relaxed the criteria by which we included the matched data into our analysis dataset. Specifically, we allowed all matched loans to be included, regardless of whether the census tract was completely encompassed within a single zip code or overlapped multiple zip codes. This variation essentially doubled our sample size but slightly increased the chances that there would be "false" matches.

2. Changes in included independent variables: We also tried altering our model by modifying the independent variables that we included in the analysis. In one set, we removed the three state law dummy variables and replaced them with 49 state dummy variables. In another set, we added an interaction variable between FICO and LTV.

3. Altered functional form: Finally, we altered the functional form of two independent variables, using the logarithmic rather than the natural forms of LTV and origination amount.

Importantly, none of these variations altered the basic findings of our analysis. That is, estimates of the impact of race and ethnicity on the odds of receiving a higher-rate loan were largely consistent with our principal analysis.

APPENDIX 5: The Limitations of APR

While information on the APR spread is essential to understanding patterns of loan pricing, it is not sufficient. Without discrete information on the points, fees, and interest rates associated with loans, it is impossible to fully evaluate the actual cost of credit to the average borrower.

Consider two 30-year loans: Loan A carries a note rate of 10 percent and has no points or fees; Loan B carries a note rate of 9 percent but has financed fees equal to 10 percent of the loan principal. Both of these loans have APRs roughly equal to 10 percent (10.0 percent for loan A versus 10.1 percent for loan B), but the actual cost of the loans would likely be very different since a typical subprime loan might remain outstanding for only two years. In fact, if both loans are repaid at the 24th month, the Loan B, high-fee, borrower will have paid a total of $29,668 in interest and fees versus just $19,891 for the Loan A, no fee borrower. In other words, the Loan B borrower will pay 49 percent more than the Loan A borrower, despite having almost the same APR. This counterintuitive result is produced because APR assumes that points and fees are spread out and repaid over the full loan term.

The fact that APR hides the size of fees for most borrowers is not merely of academic concern. Since the rate spread between APR and Treasury securities is the only price information that lenders are required to report under HMDA, there is an incentive for lenders to shift some of their compensation from rates to fees, since they can obtain much greater compensation without changing the APR. This result is exactly the opposite of what responsible lending principles would dictate. Loan pricing is the most important issue in understanding the fairness of the mortgage market, and it is essential that the loan pricing information collected provide an accurate and complete picture of the cost of credit. Although abusive lending is often thought to be associated with high interest rates, the primary issue is high fees charged to borrowers.

Because of incentives to rely on fees for compensation, it is important that lenders be held accountable for charging fees that are fair and equitable. As noted in the policy recommendations of our report, we strongly urge the Federal Reserve to include mortgage fee information in the data collected under HMDA.

APPENDIX 6: Model Estimates and Descriptive Statistics

Table A.3. 30-Year Fixed-Rate Purchase Loans

Dependent Variable: 1 if APR_Spread Exceeds HMDA Reporting Threshold; 0 otherwise.									
Independent Variables	Model 1: Base Model			Model 2: Expanded Model, No Prepayment Penalties			Model 3: Expanded Model, With 3-Year Prepayment Penalties		
	Coeff	Std Err	P-Value	Coeff	Std Err	P-Value	Coeff	Std Err	P-Value
INTERCEPT	7.2747	2.3130	0.0017	7.7156	6.6300	0.2445	6.2408	2.7267	0.0221
BLACK	0.5378	0.1393	0.0001	0.4919	0.2578	0.0564	0.6078	0.1744	0.0005
HISPANIC	0.4675	0.1434	0.0011	1.0599	0.3279	0.0012	0.5361	0.1664	0.0013
MONTHLY INCOME	0.000013	0.000015	0.4029	0.000714	0.000088	<.0001	0.000049	0.000020	0.0143
LTV	0.0973	0.00548	<.0001	0.0905	0.0430	0.0355	0.1013	0.00846	<.0001
FICO	-0.0257	0.00114	<.0001	-0.0234	0.00226	<.0001	-0.0239	0.00143	<.0001
ORIG_AMT	-0.00001	1.092E-6	<.0001	-0.00007	6.874E-6	<.0001	-0.00002	1.871E-6	<.0001
CREDIT_SPREAD	1.2211	2.1943	0.5779	0.1043	4.2675	0.9805	2.2961	2.6639	0.3887
YIELD_CURVE	0.6371	0.6708	0.3423	1.1143	1.3226	0.3995	0.5051	0.7970	0.5263
HPI_VOL	0.0106	0.0103	0.3037	0.0988	0.0243	<.0001	0.0339	0.0142	0.0170
RATE_VOL	3.4599	3.0742	0.2604	8.5546	5.9516	0.1506	2.0903	3.7311	0.5753
CDIV2	0.0751	0.2866	0.7932	0.1996	0.6436	0.7565	-0.0295	0.3756	0.9374
CDIV3	0.1270	0.3274	0.6981	-0.7542	0.7577	0.3196	0.3642	0.4201	0.3860
CDIV4	0.2396	0.3564	0.5014	-0.0403	0.7453	0.9568	-0.2470	0.4938	0.6170
CDIV5	-0.1123	0.3219	0.7273	-1.5140	0.8702	0.0819	-0.0987	0.3777	0.7938
CDIV6	-0.3128	0.3923	0.4252	-1.6956	1.0246	0.0979	-0.2250	0.4862	0.6435
CDIV7	0.2936	0.4260	0.4907	-2.9589	1.0777	0.0060	0.5705	0.5572	0.3059
CDIV8	-0.1582	0.3791	0.6765	-1.1203	1.1593	0.3339	-0.2941	0.4496	0.5131
CDIV9	-0.5227	0.3302	0.1135	-0.9371	0.7636	0.2198	-0.6083	0.4102	0.1381
STATELAW2*	-0.1989	0.2090	0.3413	0.5323	0.3742	0.1549	-0.5116	0.3142	0.1035
STATELAW3*	-0.3619	0.1688	0.0320	-0.5712	0.2994	0.0564	-0.5702	0.2369	0.0161
STATELAW4*	-0.6954	0.3410	0.0414	-0.8977	0.8857	0.3108	-0.8500	0.4194	0.0427
CONDO	-0.0642	0.1888	0.7338	-0.3173	0.3639	0.3832	-0.0123	0.2375	0.9588
MULTI	0.4119	0.2282	0.0711	0.4756	0.3472	0.1708	0.2431	0.3059	0.4268
N_CCITY	-0.0956	0.1128	0.3970	-0.5587	0.2446	0.0223	0.0570	0.1326	0.6674
RURAL	0.3171	0.1535	0.0389	0.4609	0.2782	0.0976	0.2733	0.1916	0.1539
FULL_DOC	-1.2570	0.1218	<.0001	-1.4716	0.2660	<.0001	-1.4544	0.1503	<.0001
PREPAY	0.1595	0.1274	0.2106	NA	NA	NA	NA	NA	NA
BLACK_STATE	0.0268	0.0114	0.0185	0.0767	0.0256	0.0027	0.0187	0.0151	0.2137
HISPANIC_STATE	-0.0164	0.00762	0.0309	0.00565	0.0203	0.7811	-0.0198	0.00991	0.0453
AGENCY_CODE1**	-0.2057	0.1410	0.1447	-0.8857	0.2501	0.0004	0.6608	0.1904	0.0005
AGENCY_CODE2**	-0.3757	0.2818	0.1825	-0.2665	0.5122	0.6029	-0.1138	0.3391	0.7372
AGENCY_CODE3**	0.3726	0.2296	0.1047	0.7211	0.4529	0.1114	0.4145	0.2703	0.1252
AGENCY_CODE4**	0.4420	0.4692	0.3462	0.2114	0.9763	0.8286	0.6225	0.5634	0.2692
Q2	-1.0418	0.2134	<.0001	-0.8919	0.4047	0.0275	-1.0755	0.2560	<.0001
Q3	-0.3995	0.3964	0.3136	-0.8245	0.7662	0.2819	-0.2711	0.4780	0.5706
Q4	-0.0828	0.6104	0.8921	-1.1322	1.1487	0.3243	0.1919	0.7493	0.7979
Summary Statistics									
Number of Lenders	34			31			29		
Number of Observations	3679			1444			2235		
System R-Squared (3SLS Only)	NA			0.4522			0.4654		
Nagelkerke R-Squared	0.6150			0.6821			0.5748		
Cox-Snell R-Squared	0.4480			0.4661			0.4273		
KS Statistic[91] (all)	66.68			76.90			62.47		
KS Statistic (Black=1)	60.15			58.71			62.63		
KS Statistic (Hispanic=1)	66.59			73.26			64.11		
KS Statistic (Black=0, Hispanic=0)	67.24			80.42			60.93		

Table A.4. Descriptive Statistics for Table A.3 Analyses

DESCRIPTIVE STATISTICS FOR LOANS INCLUDED: 30-Year Fixed-Rate Purchase Loans						
Independent Variables	Model 1: Base Model		Model 2: Expanded Model, No Prepayment Penalties		Model 3: Expanded Model, With 3-Year Prepayment Penalties	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
HMDA_THRESHOLD	0.3571623	0.4792283	0.2617729	0.4397519	0.4187919	0.4934716
BLACK	0.1592824	0.3659890	0.1551247	0.3621489	0.1619687	0.3685045
HISPANIC	0.1777657	0.3823674	0.1239612	0.3296515	0.2125280	0.4091879
MONTHLY INCOME	5320.20	3989.15	5704.64	3689.36	5071.81	4153.32
LTV	83.1778391	11.7312862	82.1244598	10.7256256	83.8584116	12.2919362
FICO	659.5216091	68.7125013	687.5948753	71.3951747	641.3838926	60.3506785
ORIG_AMT	132112.62	73693.26	138620.21	76339.48	127908.16	71635.35
CREDIT_SPREAD	0.7607774	0.0470407	0.7580956	0.0482189	0.7625101	0.0461917
YIELD_CURVE	2.4402800	0.4311356	2.3756163	0.4511046	2.4820582	0.4124714
HPI_VOL	13.5382162	10.2578874	14.0250821	10.0373188	13.2236595	10.3880042
RATE_VOL	0.2311453	0.1253267	0.2477549	0.1299524	0.2204140	0.1210684
CDIV2	0.1195977	0.3245346	0.1738227	0.3790882	0.0845638	0.2782937
CDIV3	0.1361783	0.3430244	0.1675900	0.3736312	0.1158837	0.3201570
CDIV4	0.0554499	0.2288873	0.0983380	0.2978742	0.0277405	0.1642651
CDIV5	0.1891818	0.3917062	0.2590028	0.4382389	0.1440716	0.3512409
CDIV6	0.0470236	0.2117182	0.0325485	0.1775131	0.0563758	0.2306977
CDIV7	0.1889100	0.3914903	0.0858726	0.2802729	0.2554810	0.4362288
CDIV8	0.0603425	0.2381527	0.0526316	0.2233742	0.0653244	0.2471527
CDIV9	0.1427018	0.3498161	0.0796399	0.2708287	0.1834452	0.3871177
STATELAW2*	0.3549878	0.4785747	0.2409972	0.4278368	0.4286353	0.4949916
STATELAW3*	0.3547160	0.4784922	0.3871191	0.4872600	0.3337808	0.4716680
STATELAW4*	0.0350639	0.1839663	0.0311634	0.1738194	0.0375839	0.1902302
CONDO	0.1002990	0.3004391	0.1170360	0.3215746	0.0894855	0.2855071
MULTI	0.0524599	0.2229829	0.0630194	0.2430820	0.0456376	0.2087446
N_CCITY	0.4514814	0.4977080	0.4736842	0.4994800	0.4371365	0.4961434
RURAL	0.1527589	0.3598038	0.1731302	0.3784909	0.1395973	0.3466463
FULL_DOC	0.7088883	0.4543367	0.6952909	0.4604436	0.7176734	0.4502322
PREPAY	0.6075020	0.4883730	NA	NA	NA	NA
BLACK_STATE	11.9206578	7.8753342	13.4023546	8.5182927	10.9633557	7.2735417
HISPANIC_STATE	13.2127752	11.9050320	10.5168283	10.3609508	14.9545861	12.5006922
AGENCY_CODE1**	0.3234575	0.4678592	0.6038781	0.4892598	0.1422819	0.3494172
AGENCY_CODE2**	0.0277249	0.1642059	0.0221607	0.1472569	0.0313199	0.1742198
AGENCY_CODE3**	0.0456646	0.2087850	0.0332410	0.1793274	0.0536913	0.2254579
AGENCY_CODE4**	0.0097853	0.0984487	0.0062327	0.0787282	0.0120805	0.1092700
Q2	0.3574341	0.4793093	0.3247922	0.4684594	0.3785235	0.4851276
Q3	0.2962762	0.4566763	0.2915512	0.4546342	0.2993289	0.4580666
Q4	0.1788529	0.3832812	0.2257618	0.4182278	0.1485459	0.3557198

Table A.5. 2/28 Adjustable-Rate Purchase Loans

Dependent Variable: 1 if APR_Spread Exceeds HMDA Reporting Threshold; 0 otherwise.									
Independent Variables	Model 1: Base Model			Model 2: Expanded Model, No Prepayment Penalties			Model 3: Expanded Model, With 2-Year Prepayment Penalties		
	Coeff	Std Err	P-Value	Coeff	Std Err	P-Value	Coeff	Std Err	P-Value
INTERCEPT	10.0637	0.9600	<.0001	4.5718	2.2035	0.0380	9.4497	1.1802	<.0001
BLACK	0.2184	0.0545	<.0001	0.3344	0.1032	0.0012	0.3400	0.0666	<.0001
HISPANIC	0.0592	0.0529	0.2632	0.4173	0.1174	0.0004	0.5075	0.0637	<.0001
MONTHLY INCOME	0.000010	6.701E-6	0.1322	0.000253	0.000029	<.0001	0.000341	0.000019	<.0001
LTV	0.0954	0.00264	<.0001	0.1713	0.0186	<.0001	0.1250	0.00704	<.0001
FICO	-0.0198	0.000450	<.0001	-0.0173	0.00101	<.0001	-0.0197	0.000596	<.0001
ORIG_AMT	-0.00001	3.868E-7	<.0001	-0.00003	2.385E-6	<.0001	-0.00004	1.278E-6	<.0001
CREDIT_SPREAD	-4.6146	0.8896	<.0001	-3.4968	1.6435	0.0334	-5.1180	1.0552	<.0001
YIELD_CURVE	-0.4503	0.2741	0.1004	-0.6806	0.5271	0.1966	-0.3402	0.3199	0.2876
HPI_VOL	0.0125	0.00407	0.0022	0.0581	0.01000	<.0001	0.0570	0.00524	<.0001
RATE_VOL	6.9312	1.2519	<.0001	5.7033	2.3425	0.0149	7.4766	1.4789	<.0001
CDIV2	0.1567	0.0984	0.1111	-0.2896	0.2311	0.2102	-0.1611	0.1505	0.2845
CDIV3	0.3828	0.1140	0.0008	-0.3992	0.3165	0.2072	-0.0549	0.1374	0.6893
CDIV4	0.6123	0.1239	<.0001	-0.0276	0.3064	0.9282	-0.5489	0.1560	0.0004
CDIV5	0.0965	0.1165	0.4074	-0.0727	0.3750	0.8462	-0.6686	0.1315	<.0001
CDIV6	0.1045	0.1530	0.4946	-0.7111	0.4851	0.1427	-0.7180	0.1754	<.0001
CDIV7	0.8475	0.1863	<.0001	-0.2746	0.5652	0.6271	-0.4771	0.2280	0.0364
CDIV8	0.1630	0.1402	0.2447	-0.6998	0.4803	0.1451	-0.8667	0.1667	<.0001
CDIV9	-0.0857	0.1235	0.4879	-0.1901	0.3069	0.5356	-1.1120	0.1522	<.0001
STATELAW2*	-0.1685	0.0849	0.0471	-0.7476	0.1712	<.0001	0.0826	0.1125	0.4631
STATELAW3*	-0.0411	0.0593	0.4884	-0.1405	0.1135	0.2157	-0.4484	0.0816	<.0001
STATELAW4*	-0.4508	0.1269	0.0004	-0.4470	0.2462	0.0694	-0.6028	0.1923	0.0017
CONDO	-0.0760	0.0659	0.2487	-0.1318	0.1235	0.2856	-0.0216	0.0778	0.7809
MULTI	0.4716	0.0830	<.0001	0.3591	0.1250	0.0041	0.5669	0.1115	<.0001
N_CCITY	-0.1470	0.0448	0.0010	-0.0853	0.0921	0.3541	-0.1407	0.0514	0.0062
RURAL	0.1509	0.0694	0.0296	0.1060	0.1335	0.4273	0.1642	0.0809	0.0424
FULL_DOC	-1.3165	0.0476	<.0001	-1.8540	0.1053	<.0001	-1.5877	0.0608	<.0001
PREPAY	-0.2295	0.0539	<.0001	NA	NA	NA	NA	NA	NA
BLACK_STATE	0.00567	0.00461	0.2190	-0.0146	0.0124	0.2376	0.00967	0.00600	0.1074
HISPANIC_STATE	-0.0144	0.00348	<.0001	0.00595	0.00936	0.5251	-0.0205	0.00429	<.0001
AGENCY_CODE1**	0.1873	0.0774	0.0156	0.2146	0.1709	0.2093	0.3614	0.0877	<.0001
AGENCY_CODE2**	1.4713	0.1707	<.0001	1.9051	0.2958	<.0001	1.3998	0.2063	<.0001
AGENCY_CODE3**	3.9680	0.1027	<.0001	4.1063	0.3032	<.0001	3.9572	0.1114	<.0001
AGENCY_CODE4**	-3.5262	0.2976	<.0001	-3.4359	0.7603	<.0001	-3.4687	0.3232	<.0001
Q2	-1.0721	0.0857	<.0001	-0.9739	0.1601	<.0001	-1.0746	0.1010	<.0001
Q3	-1.2467	0.1588	<.0001	-1.2600	0.2933	<.0001	-1.1533	0.1885	<.0001
Q4	-1.4299	0.2356	<.0001	-1.5617	0.4299	0.0003	-1.5209	0.2804	<.0001
Summary Statistics									
Number of Lenders	35			33			32		
Number of Observations	17978			4657			13321		
System R-Squared (3SLS Only)	NA			0.3273			0.4162		
Nagelkerke R-Squared	0.5247			0.4484			0.5393		
Cox-Snell R-Squared	0.3932			0.3358			0.4042		
KS Statistic (all)	58.52			54.30			59.63		
KS Statistic (Black=1)	59.88			57.64			60.84		
KS Statistic (Hispanic=1)	57.00			51.88			58.68		
KS Statistic (Black=0, Hispanic=0)	57.97			53.51			59.15		

Table A.6. Descriptive Statistics for Table A.5 Analyses

DESCRIPTIVE STATISTICS FOR LOANS INCLUDED: 2/28 Adjustable						
Independent Variables	Model 1: Base Model		Model 2: Expanded Model, No Prepayment Penalties		Model 3: Expanded Model, With 2-Year Prepayment Penalties	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
HMDA_THRESHOLD	0.5238625	0.4994441	0.5323169	0.4990081	0.5209068	0.4995815
BLACK	0.2020247	0.4015217	0.2447928	0.4300104	0.1870730	0.3899848
HISPANIC	0.2364557	0.4249170	0.2061413	0.4045766	0.2470535	0.4313143
MONTHLY INCOME	5343.82	3514.17	5810.80	4215.86	5180.56	3217.36
LTV	85.1187657	9.0612566	84.8905025	9.2225980	85.1985662	9.0031550
FICO	626.4640116	56.2751246	630.4109942	58.6704740	625.0841528	55.3491950
ORIG_AMT	148115.69	75359.67	159016.83	80526.92	144304.67	73088.10
CREDIT_SPREAD	0.7636333	0.0474368	0.7610436	0.0483879	0.7645387	0.0470679
YIELD_CURVE	2.3808088	0.4306069	2.3530170	0.4432163	2.3905247	0.4256998
HPI_VOL	16.2474764	11.3368526	18.0448063	10.8214964	15.6191328	11.4455784
RATE_VOL	0.2509125	0.1248711	0.2583326	0.1271226	0.2483185	0.1239745
CDIV2	0.1185338	0.3232481	0.3231694	0.4677370	0.0469935	0.2116328
CDIV3	0.1698743	0.3755328	0.2370625	0.4253266	0.1463854	0.3535054
CDIV4	0.0574035	0.2326184	0.0609835	0.2393257	0.0561519	0.2302235
CDIV5	0.1742686	0.3793508	0.2001288	0.4001396	0.1652278	0.3714000
CDIV6	0.0366559	0.1879208	0.0141722	0.1182132	0.0445162	0.2062467
CDIV7	0.1087440	0.3113264	0.0092334	0.0956563	0.1435328	0.3506285
CDIV8	0.0793192	0.2702438	0.0380073	0.1912344	0.0937617	0.2915079
CDIV9	0.1464568	0.3535734	0.0429461	0.2027574	0.1826439	0.3863888
STATELAW2*	0.3020358	0.4591535	0.1477346	0.3548748	0.3559793	0.4788269
STATELAW3*	0.3487040	0.4765733	0.4584496	0.4983241	0.3103371	0.4626489
STATELAW4*	0.0310936	0.1735754	0.0543268	0.2266858	0.0229712	0.1498174
CONDO	0.1104684	0.3134814	0.1047885	0.3063136	0.1124540	0.3159361
MULTI	0.0733674	0.2607459	0.1183165	0.3230172	0.0576533	0.2330955
N_CCITY	0.5213038	0.4995598	0.5780545	0.4939229	0.5014639	0.5000166
RURAL	0.1139726	0.3177869	0.1185312	0.3232708	0.1123790	0.3158440
FULL_DOC	0.5921682	0.4914453	0.5267339	0.4993384	0.6150439	0.4866032
PREPAY	0.7409612	0.4381191	NA	NA	NA	NA
BLACK_STATE	11.2625987	7.3445345	13.9992270	8.1215011	10.3058779	6.7979462
HISPANIC_STATE	12.9946379	10.9334054	10.7371699	8.1750870	13.7838451	11.6433459
AGENCY_CODE1**	0.0730893	0.2602903	0.0459523	0.2094042	0.0825764	0.2752512
AGENCY_CODE2**	0.0136278	0.1159431	0.0193257	0.1376820	0.0116358	0.1072438
AGENCY_CODE3**	0.1232618	0.3287466	0.0839596	0.2773570	0.1370017	0.3438621
AGENCY_CODE4**	0.0086773	0.0927494	0.0073008	0.0851416	0.0091585	0.0952642
Q2	0.2995884	0.4580904	0.2883831	0.4530589	0.3035057	0.4597889
Q3	0.3478696	0.4763076	0.3459309	0.4757219	0.3485474	0.4765282
Q4	0.2077539	0.4057110	0.2329826	0.4227766	0.1989340	0.3992133

Table A.7. 30-Year Fixed-Rate Refinance Loans

Dependent Variable: 1 if APR_Spread Exceeds HMDA Reporting Threshold; 0 otherwise.									
Independent Variables	Model 1: Base Model			Model 2: Expanded Model, No Prepayment Penalties			Model 3: Expanded Model, With 3-Year Prepayment Penalties		
	Coeff	Std Err	P-Value	Coeff	Std Err	P-Value	Coeff	Std Err	P-Value
INTERCEPT	15.8297	1.4007	<.0001	11.6955	2.5423	<.0001	16.0805	1.7312	<.0001
BLACK	0.3631	0.0841	<.0001	0.2117	0.1364	0.1207	0.4801	0.1091	<.0001
HISPANIC	0.1008	0.0991	0.3095	0.2537	0.1617	0.1167	0.0688	0.1286	0.5929
MONTHLY INCOME	0.000015	0.000011	0.1433	-1.91E-6	0.000021	0.9265	-2.32E-6	0.000011	0.8345
LTV	0.0414	0.00243	<.0001	0.0667	0.00537	<.0001	0.0547	0.00346	<.0001
FICO	-0.0252	0.000736	<.0001	-0.0250	0.00118	<.0001	-0.0265	0.000953	<.0001
ORIG_AMT	-0.00002	7.162E-7	<.0001	-0.00001	1.599E-6	<.0001	-0.00001	8.293E-7	<.0001
CREDIT_SPREAD	1.7978	1.3217	0.1738	0.0965	2.2935	0.9664	2.8682	1.6516	0.0824
YIELD_CURVE	-0.9365	0.3945	0.0176	0.0820	0.7003	0.9068	-1.4983	0.4870	0.0021
HPI_VOL	-0.00865	0.00665	0.1934	-0.00866	0.0144	0.5480	-0.00168	0.00907	0.8531
RATE_VOL	-1.1198	1.8260	0.5397	2.5437	3.1980	0.4264	-2.9463	2.2781	0.1959
CDIV2	0.4600	0.1742	0.0083	0.7075	0.4341	0.1032	0.1009	0.2254	0.6545
CDIV3	0.2478	0.1990	0.2130	-0.4372	0.5200	0.4005	0.5203	0.2494	0.0370
CDIV4	0.2166	0.2099	0.3021	0.7391	0.4952	0.1355	-0.1361	0.2843	0.6320
CDIV5	0.5643	0.1961	0.0040	0.3421	0.6355	0.5904	0.5536	0.2197	0.0117
CDIV6	0.3284	0.2463	0.1824	0.0935	0.7645	0.9026	0.3345	0.2948	0.2565
CDIV7	0.4656	0.2785	0.0946	-0.0738	0.7595	0.9226	0.3011	0.3513	0.3914
CDIV8	0.0417	0.2382	0.8609	-0.0877	0.8053	0.9133	0.0119	0.2890	0.9671
CDIV9	-0.1919	0.2097	0.3601	-0.1810	0.5917	0.7596	-0.2426	0.2507	0.3332
STATELAW2*	-0.2214	0.1322	0.0939	-0.1506	0.2686	0.5751	0.0631	0.1815	0.7279
STATELAW3*	-0.2917	0.1060	0.0059	-0.3247	0.2060	0.1150	-0.1812	0.1391	0.1927
STATELAW4*	-0.0467	0.2154	0.8284	0.2262	0.5089	0.6567	0.1131	0.2588	0.6620
CONDO	0.0690	0.1345	0.6079	0.2613	0.2348	0.2658	0.0367	0.1682	0.8274
MULTI	0.2138	0.1649	0.1947	0.1121	0.2613	0.6678	0.3787	0.2159	0.0795
N_CCITY	-0.0760	0.0713	0.2868	-0.0291	0.1261	0.8178	-0.1521	0.0885	0.0858
RURAL	0.2939	0.0984	0.0028	0.5225	0.1679	0.0019	0.1335	0.1252	0.2863
FULL_DOC	-1.0787	0.0771	<.0001	-1.2074	0.1353	<.0001	-1.1375	0.0967	<.0001
PREPAY	-0.3831	0.0775	<.0001	NA	NA	NA	NA	NA	NA
BLACK_STATE	-0.00150	0.00693	0.8281	0.0224	0.0199	0.2600	-0.00345	0.00844	0.6826
HISPANIC_STATE	-0.00438	0.00525	0.4035	0.0123	0.0145	0.3954	-0.0171	0.00706	0.0156
AGENCY_CODE1**	0.0117	0.1200	0.9226	-0.4147	0.2034	0.0414	0.2008	0.1536	0.1911
AGENCY_CODE2**	-0.0886	0.1293	0.4932	-0.1293	0.2030	0.5242	-0.1307	0.1708	0.4443
AGENCY_CODE3**	0.2738	0.1460	0.0608	0.00968	0.2701	0.9714	0.3091	0.1762	0.0794
AGENCY_CODE4**	0.5487	0.2944	0.0623	0.8479	0.4803	0.0775	0.3273	0.3880	0.3989
Q2	-0.7977	0.1233	<.0001	-0.9243	0.2193	<.0001	-0.7621	0.1524	<.0001
Q3	-0.2754	0.2427	0.2565	-0.5904	0.4226	0.1624	-0.1372	0.3045	0.6522
Q4	-0.2275	0.3787	0.5480	-0.3493	0.6351	0.5823	-0.2133	0.4840	0.6594
Summary Statistics									
Number of Lenders	37			35			28		
Number of Observations	8799			2881			5918		
System R-Squared (3SLS Only)	NA			0.4703			0.5405		
Nagelkerke R-Squared	0.5426			0.5480			0.5357		
Cox-Snell R-Squared	0.3857			0.4057			0.3679		
KS Statistic (all)	61.97			60.55			63.19		
KS Statistic (Black=1)	58.58			55.23			64.82		
KS Statistic (Hispanic=1)	65.99			62.10			66.94		
KS Statistic (Black=0, Hispanic=0)	60.86			61.74			60.96		

Table A.8: Descriptive Statistics for Table A.7 Analyses

DESCRIPTIVE STATISTICS FOR LOANS INCLUDED: 30-Year Fixed-Rate Refinance Loans						
Independent Variables	Model 1: Base Model		Model 2: Expanded Model, No Prepayment Penalties		Model 3: Expanded Model, With 3-Year Prepayment Penalties	
Mean	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
HMDA_THRESHOLD	0.3116263	0.4631843	0.4026380	0.4905142	0.2673200	0.4425982
BLACK	0.1635413	0.3698798	0.1975009	0.3981825	0.1470091	0.3541449
HISPANIC	0.1663825	0.3724448	0.1516834	0.3587761	0.1735384	0.3787440
MONTHLY INCOME	5027.29	3753.60	5224.43	4042.48	4931.33	3601.05
LTV	74.3785794	17.0294092	74.7270878	15.4111633	74.2089186	17.7627082
FICO	622.1256961	61.5483839	617.7913919	64.7890156	624.2357215	59.7994058
ORIG_AMT	144755.23	75417.42	134762.92	74586.43	149619.68	75346.79
CREDIT_SPREAD	0.7598307	0.0470648	0.7587851	0.0469742	0.7603396	0.0471045
YIELD_CURVE	2.4846414	0.4291438	2.4466366	0.4417362	2.5031430	0.4216777
HPI_VOL	16.3065975	11.3412298	12.5721322	10.4541944	18.1246094	11.3119061
RATE_VOL	0.2179913	0.1247948	0.2280747	0.1287663	0.2130825	0.1225259
CDIV2	0.1170588	0.3215086	0.2054842	0.4041251	0.0740115	0.2618117
CDIV3	0.1138766	0.3176794	0.1277334	0.3338507	0.1071308	0.3093056
CDIV4	0.0429594	0.2027772	0.0527595	0.2235917	0.0381886	0.1916675
CDIV5	0.1717241	0.3771619	0.1818813	0.3858136	0.1667793	0.3728102
CDIV6	0.0371633	0.1891726	0.0156196	0.1240199	0.0476512	0.2130452
CDIV7	0.1525173	0.3595421	0.2877473	0.4527913	0.0866847	0.2813962
CDIV8	0.0640982	0.2449417	0.0430406	0.2029838	0.0743494	0.2623609
CDIV9	0.2007046	0.4005503	0.0458174	0.2091252	0.2761068	0.4471081
STATELAW2*	0.3811797	0.4857042	0.4015967	0.4903063	0.3712403	0.4831774
STATELAW3*	0.3420843	0.4744346	0.3703575	0.4829843	0.3283204	0.4696418
STATELAW4*	0.0281850	0.1655105	0.0114544	0.1064288	0.0363298	0.1871254
CONDO	0.0634163	0.2437241	0.0541479	0.2263485	0.0679284	0.2516442
MULTI	0.0505739	0.2191385	0.0558834	0.2297362	0.0479892	0.2137614
N_CCITY	0.5247187	0.4994170	0.4887192	0.4999595	0.5422440	0.4982543
RURAL	0.1297875	0.3360886	0.1384936	0.3454773	0.1255492	0.3313686
FULL_DOC	0.7371292	0.4402179	0.7125998	0.4526284	0.7490706	0.4335846
PREPAY	0.6725764	0.4692999	NA	NA	NA	NA
BLACK_STATE	11.2374702	7.7395043	13.5127039	7.4202481	10.1298412	7.6497172
HISPANIC_STATE	14.7443232	12.2263634	16.7137452	12.6442809	13.7855694	11.9013573
AGENCY_CODE1**	0.0814865	0.2735964	0.1263450	0.3322955	0.0596485	0.2368545
AGENCY_CODE2**	0.0636436	0.2441308	0.0694203	0.2542117	0.0608314	0.2390409
AGENCY_CODE3**	0.0479600	0.2136938	0.0395696	0.1949796	0.0520446	0.2221358
AGENCY_CODE4**	0.0100011	0.0995100	0.0124957	0.1111027	0.0087868	0.0933328
Q2	0.3809524	0.4856485	0.3668865	0.4820388	0.3877999	0.4872897
Q3	0.2634390	0.4405235	0.2776814	0.4479331	0.2565056	0.4367410
Q4	0.1572906	0.3640952	0.1794516	0.3837966	0.1465022	0.3536388

Table A.9. 2/28 Adjustable-Rate Refinance Loans

Dependent Variable: 1 if APR_Spread Exceeds HMDA Reporting Threshold; 0 otherwise.									
Independent Variables	Model 1: Base Model			Model 2: Expanded Model, No Prepayment Penalties			Model 3: Expanded Model, With 2-Year Prepayment Penalties		
	Coeff	Std Err	P-Value	Coeff	Std Err	P-Value	Coeff	Std Err	P-Value
INTERCEPT	16.2362	0.8645	<.0001	12.7901	1.4367	<.0001	16.0448	1.0979	<.0001
BLACK	0.1486	0.0532	0.0052	0.0386	0.0845	0.6481	0.1599	0.0689	0.0202
HISPANIC	-0.0679	0.0569	0.2328	-0.1694	0.0958	0.0771	-0.0613	0.0711	0.3891
MONTHLY INCOME	0.000018	5.524E-6	0.0015	1.769E-6	3.22E-6	0.5827	-0.00001	6.581E-6	0.0579
LTV	0.0297	0.00152	<.0001	0.0600	0.00373	<.0001	0.0641	0.00319	<.0001
FICO	-0.0210	0.000446	<.0001	-0.0225	0.000771	<.0001	-0.0249	0.000619	<.0001
ORIG_AMT	-9.27E-6	3.472E-7	<.0001	-5.89E-6	5.056E-7	<.0001	-4.77E-6	2.799E-7	<.0001
CREDIT_SPREAD	-5.3585	0.8370	<.0001	-4.8445	1.3923	0.0005	-6.0564	1.0591	<.0001
YIELD_CURVE	-0.4180	0.2455	0.0887	0.0104	0.4135	0.9800	-0.6611	0.3071	0.0314
HPI_VOL	0.00714	0.00399	0.0733	0.00904	0.00897	0.3136	0.0142	0.00513	0.0057
RATE_VOL	7.1831	1.1513	<.0001	8.2869	1.9114	<.0001	6.6298	1.4509	<.0001
CDIV2	0.3503	0.0908	0.0001	0.3687	0.2216	0.0961	0.4139	0.1377	0.0027
CDIV3	0.4561	0.1126	<.0001	0.2167	0.2940	0.4610	0.7458	0.1390	<.0001
CDIV4	0.3843	0.1158	0.0009	0.4965	0.2816	0.0779	0.4343	0.1501	0.0038
CDIV5	0.3924	0.1163	0.0007	0.6267	0.3485	0.0722	0.3383	0.1324	0.0106
CDIV6	0.5309	0.1566	0.0007	-0.0242	0.4663	0.9585	0.7907	0.1809	<.0001
CDIV7	0.8109	0.1841	<.0001	1.2648	0.4375	0.0038	0.7804	0.2288	0.0006
CDIV8	0.3328	0.1407	0.0180	0.6997	0.4382	0.1103	0.3919	0.1729	0.0234
CDIV9	0.3854	0.1233	0.0018	1.0825	0.3095	0.0005	0.2833	0.1557	0.0689
STATELAW2*	-0.0306	0.0792	0.6997	-0.1880	0.1674	0.2613	0.000409	0.1061	0.9969
STATELAW3*	-0.1378	0.0549	0.0121	-0.1398	0.0971	0.1498	-0.0689	0.0786	0.3808
STATELAW4*	-0.0598	0.1127	0.5957	-0.0372	0.2178	0.8645	0.2412	0.1903	0.2050
CONDO	-0.1800	0.0704	0.0105	-0.0442	0.1312	0.7361	-0.1988	0.0841	0.0181
MULTI	0.1116	0.0861	0.1950	0.2234	0.1225	0.0683	0.0703	0.1232	0.5684
N_CCITY	0.0159	0.0441	0.7194	-0.0136	0.0819	0.8681	0.0221	0.0531	0.6777
RURAL	0.0774	0.0660	0.2408	0.2139	0.1134	0.0593	0.0145	0.0822	0.8595
FULL_DOC	-0.7106	0.0427	<.0001	-0.6839	0.0727	<.0001	-0.7708	0.0537	<.0001
PREPAY	-0.3096	0.0486	<.0001	NA	NA	NA	NA	NA	NA
BLACK_STATE	0.00227	0.00416	0.5859	-0.00314	0.0115	0.7845	0.000933	0.00528	0.8599
HISPANIC_STATE	-0.0148	0.00358	<.0001	-0.0240	0.00892	0.0072	-0.0122	0.00476	0.0100
AGENCY_CODE1**	-0.4308	0.0951	<.0001	-0.5866	0.2003	0.0034	-0.4432	0.1097	<.0001
AGENCY_CODE2**	1.0246	0.1226	<.0001	0.9463	0.2015	<.0001	1.0933	0.1557	<.0001
AGENCY_CODE3**	3.1346	0.1028	<.0001	3.4348	0.2349	<.0001	3.0866	0.1169	<.0001
AGENCY_CODE4**	-1.5514	0.1403	<.0001	-1.4069	0.2626	<.0001	-1.6542	0.1667	<.0001
Q2	-1.1222	0.0778	<.0001	-1.1334	0.1308	<.0001	-1.1306	0.0978	<.0001
Q3	-1.2237	0.1507	<.0001	-1.3236	0.2479	<.0001	-1.1872	0.1912	<.0001
Q4	-1.3254	0.2291	<.0001	-1.3604	0.3858	0.0004	-1.3964	0.2875	<.0001
Summary Statistics									
Number of Lenders	32			32			30		
Number of Observations	18470			6520			11950		
System R-Squared (3SLS Only)	NA			0.4013			0.4115		
Nagelkerke R-Squared	0.4443			0.4199			0.4582		
Cox-Snell R-Squared	0.3304			0.3086			0.3421		
KS Statistic (all)	52.97			52.50			53.33		
KS Statistic (Black=1)	53.47			50.73			55.66		
KS Statistic (Hispanic=1)	55.70			60.69			53.27		
KS Statistic (Black=0, Hispanic=0)	52.22			51.21			52.63		

Table A.10. Descriptive Statistics for Table A.9 Analyses

DESCRIPTIVE STATISTICS FOR LOANS INCLUDED: 30-Year Fixed-Rate Refinance Loans						
Independent Variables	Model 1: Base Model		Model 2: Expanded Model, No Prepayment Penalties		Model 3: Expanded Model, With 2-Year Prepayment Penalties	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
HMDA_THRESHOLD	0.5799675	0.4935771	0.6199387	0.4854388	0.5581590	0.4966268
BLACK	0.1720087	0.3773982	0.1993865	0.3995698	0.1570711	0.3638830
HISPANIC	0.1558744	0.3627460	0.1460123	0.3531456	0.1612552	0.3677816
MONTHLY INCOME	5353.42	7393.47	5642.15	9599.00	5195.88	5843.90
LTV	77.5913806	14.2486355	76.6494156	13.9957800	78.1053230	14.3592691
FICO	581.9901462	52.1422822	579.9953988	52.4949334	583.0784937	51.9187601
ORIG_AMT	158127.28	76419.73	157820.78	79767.94	158294.50	74532.41
CREDIT_SPREAD	0.7644564	0.0475109	0.7638696	0.0484686	0.7647766	0.0469792
YIELD_CURVE	2.3898370	0.4290033	2.3766656	0.4343851	2.3970234	0.4258848
HPI_VOL	17.1887053	11.3851665	16.7198476	11.1623787	17.4445172	11.4973055
RATE_VOL	0.2478475	0.1249930	0.2516119	0.1257642	0.2457937	0.1245275
CDIV2	0.1635625	0.3698881	0.3483129	0.4764723	0.0627615	0.2425437
CDIV3	0.1707634	0.3763123	0.1815951	0.3855400	0.1648536	0.3710639
CDIV4	0.0634001	0.2436878	0.0562883	0.2304954	0.0672803	0.2505174
CDIV5	0.1658365	0.3719439	0.1621166	0.3685860	0.1678661	0.3737630
CDIV6	0.0304277	0.1717657	0.0105828	0.1023349	0.0412552	0.1988883
CDIV7	0.0831619	0.2761342	0.1378834	0.3448040	0.0533054	0.2246513
CDIV8	0.0743368	0.2623252	0.0286810	0.1669211	0.0992469	0.2990057
CDIV9	0.1436925	0.3507871	0.0213190	0.1444566	0.2104603	0.4076526
STATELAW2*	0.2772063	0.4476313	0.2266871	0.4187206	0.3047699	0.4603292
STATELAW3*	0.3453167	0.4754843	0.4110429	0.4920607	0.3094561	0.4622888
STATELAW4*	0.0391987	0.1940727	0.0610429	0.2394274	0.0272803	0.1629059
CONDO	0.0795885	0.2706624	0.0633436	0.2435985	0.0884519	0.2839628
MULTI	0.0582025	0.2341323	0.0848160	0.2786290	0.0436820	0.2043952
N_CCITY	0.5621007	0.4961419	0.5857362	0.4926322	0.5492050	0.4975938
RURAL	0.1185707	0.3232914	0.1259202	0.3317849	0.1145607	0.3185043
FULL_DOC	0.6724418	0.4693354	0.6714724	0.4697138	0.6729707	0.4691477
PREPAY	0.6469951	0.4779171	NA	NA	NA	NA
BLACK_STATE	11.4531402	7.7867151	13.7248160	7.5573588	10.2136987	7.6292737
HISPANIC_STATE	12.3859394	10.6503757	13.2491411	10.0689991	11.9149707	10.9262702
AGENCY_CODE1**	0.0371413	0.1891131	0.0225460	0.1484624	0.0451046	0.2075422
AGENCY_CODE2**	0.0229561	0.1497677	0.0250000	0.1561369	0.0218410	0.1461703
AGENCY_CODE3**	0.0916622	0.2885563	0.0713190	0.2573767	0.1027615	0.3036598
AGENCY_CODE4**	0.0171088	0.1296805	0.0130368	0.1134408	0.0193305	0.1376897
Q2	0.2905793	0.4540420	0.2763804	0.4472415	0.2983264	0.4575426
Q3	0.3397401	0.4736337	0.3411043	0.4741167	0.3389958	0.4733882
Q4	0.2006497	0.4004973	0.2118098	0.4086221	0.1945607	0.3958787

*The state law variables rely on the categories created by Ambrose, LaCour-Little and Anthony Sanders in their paper "The Effect of Conforming Loan Status on Mortgage Yield Spreads: A Loan Level Analysis." These categories are based on the legal environment in states with regard to judicial foreclosure and deficiency judgement. The states are grouped as follows:

STATELAW2 = AK, AZ, CA, ID, OK, ME, MN, MT, NC, OR, SD, TX, WA
STATELAW3 = CT, DE, FL, IL, IN, KS, KY, NJ, OH, PA, SC, VT
STATELAW4 = LA, ND, WI
(reference category = AL, AR, DC, GA, HI, MO, IA, MA, MD, MI, MS, RI, NE, NH, NM, NV, NY, TN, UT, VA, WV, WY, CO)

*The agency codes reflect the regulatory agency to which the lender reports. The codes represent the following:
AGENCY_CODE1 = OCC
AGENCY_CODE2 = FRS
AGENCY_CODE3 = FDIC
AGENCY_CODE4 = OTS
(reference category = HUD)

APPENDIX 7: ODDS AND LIKELIHOODS

When logistical regressions are used to test the relationship between categorical independent variables and a binary dependent variable (in our case, the relationship between race, ethnicity and whether the APR spread exceeded HMDA's reporting threshold), the most straightforward measure of the "impact" of the independent variable on the dependent variable is the odds ratio. While not often used outside of this type of analysis, odds ratios are fairly easy to understand and are closely related to likelihood ratios.

Difference Between Odds and Likelihood

In analyses of social outcomes, likelihoods are often used to draw conclusions. The likelihood of a particular event happening is the same as the probability that that event will happen. For example, if 40 percent of all subprime borrowers received a high-APR loan in 2004, then the likelihood that a randomly chosen subprime borrower received such a loan is 40 percent. The odds of an event happening, however, is equal to the probability of the event happening divided by the probability that the event will not happen. Thus, the odds of that randomly-selected borrower receiving a high-APR loan is simply equal to the likelihood that he will receive a high-APR loan divided by the likelihood that he will not. To put it in basic mathematic terms:

Odds = P/(1-P), where P is the probability or likelihood of a particular event happening and (1-P) is, therefore, the probability of that event not happening.

In our example above, the odds of a randomly selected subprime borrower receiving a high-APR loan is equal to 0.4/(1-0.4), or 67 percent.

By extension, an odds ratio, therefore, is simply the ratio between the odds for different types of borrowers. If, hypothetically, the probability of an African-American borrower receiving a high-APR loan is 30 percent, the odds for that borrower is 0.3/0.7 or 0.43. If the probability for a similarly-situated white borrower receiving a high-APR loan is 20 percent, the odds for that borrower is 0.2/0.8 or 0.25. The odds ratio between black and white borrowers, therefore, is 0.43/0.25 or 1.72. The interpretation of this odds ratio is as follows: The odds of an African-American borrower receiving a high-APR loan are 72 percent greater than those of a similarly-situated white borrower.

Odds ratios can be directly computed from logistic regressions. However, the underlying odds and, therefore, likelihoods cannot be directly calculated. This is why odds ratios, despite being less intuitive measures than likelihoods, are generally used when describing results from logistic regressions.

To convert the results into likelihoods, which are more intuitive, we conduct a simulation where we use our model coefficients to compute the average predicted probabilities of receiving a higher-rate loan for the African-American and Latino borrowers in our dataset and compare those to the average predicted probabilities for the same borrowers if they had been white. So, for our example, if for a specific loan product the average predicted probability of receiving a higher-rate APR was 30 percent for the African-American borrower in our dataset but would have been 20 percent if those same borrowers had been white, our "increased likelihood" would be (0.3-0.2)/0.2 or 50 percent.

NOTES

1 12 U.S.C. § 2801 *et seq*.

2 12 U.S.C. § 2901 *et. seq*.

3 15 U.S.C. § 1691 *et seq*.

4 12 U.S.C. § 1735f-7a.

5 *See, e.g.*, Cathy Lesser Mansfield, *The Road to Subprime "HEL" Was Paved With Good Congressional Intentions: Usury Deregulation and the Subprime Home Equity Market*, Vol. 51, South Carolina Law Review, pp535–539, App. 1, pp576–587; Alan M. White, *Risk-Based Mortgage Pricing: Present and Future Research*, Vol. 15, Housing Policy Debate, pp512–513 (2004).

6 For a detailed timeline of key events in fair lending, see Fair Lending Timeline, Fried Frank (September 27, 2002), at www.ffhsj.com/fairlend/timtest.htm.

7 For a more detailed summary of the evolution of HMDA, see Joseph Kolar & Jonathan D. Jerison, *The Home Mortgage Disclosure Act: Its History, Evolution, and Limitations*, Buckley Kolar LLP (March 7, 2005), at http://www.buckleykolar.com/publications/documents/HomeMortgageDisclosureActbyJoeKolarandJonJerison.pdf.

8 For an overview of current HMDA reporting requirements, *see A Guide to HMDA Reporting: Getting it Right!*, Federal Financial Institutions Examination Council (December 2003), at http://www.ffiec.gov/hmda/pdf/2004guide.pdf.

9 In prior years, higher-cost loans were identified based on whether the originator was on a list produced by the U.S. Department of Housing and Urban Development (HUD) of predominantly subprime lenders. See *HUD Subprime and Manufactured Home Lender List*, U.S. Department of Housing and Urban Development (March 31, 2005), at http://www.huduser.org/datasets/manu.html. Although using lenders as a proxy for subprime loan status was useful, it risked some degree of misclassification since, for example, some predominantly prime lenders also originate subprime loans.

10 Alicia H. Munnell, Geoffrey M.B. Tootell, Lynn E. Browne & James McEneaney, *Mortgage Lending in Boston: Interpreting HMDA Data*, Vol. 86, No. 1, The American Economic Review pp25-53 (March 1996).

11 Critics of the Boston Fed study have suggested that the estimated impact on race and ethnicity could have been biased because of omitted variables, data errors, and potential problems with the model used. Nonetheless, the Boston Fed study remains one of the most comprehensive and robust analyses of discrimination in the mortgage market. For an excellent overview of the study and the critiques leveled against it, *see* Stephen L. Ross & John Yinger, *Does Discrimination in Mortgage Lending Exist? The Boston Fed Study and Its Critics, in Mortgage Lending Discrimination: A Review of Existing Evidence* (Margery Austin Turner & Felicity Skidmore, eds., The Urban Institute, June 1999), at http://www.urban.org/UploadedPDF/mortgage_lending.pdf.

12 *Curbing Predatory Home Mortgage Lending*, U.S. Department of Housing and Urban Development and U.S. Department of the Treasury (June 2000), at http://www.huduser.org/publications/hsgfin/curbing.html.

13 Calvin Bradford, *Risk or Race? Racial Disparities and the Subprime Refinance Market, Center for Community Change* (May 2002), at http://butera-andrews.com/legislative-updates/directory/Background-Reports/Center%20for%20Community%20Change%20Report.pdf.

14 Paul Calem, Kevin Gillen & Susan Wachter, *The Neighborhood Distribution of Subprime Mortgage Lending*, Vol. 29, No. 4, Journal of Real Estate Finance and Economics (December 2004).

15 As of March 1, 2005, lenders covered by HMDA were required to make their 2004 loan information available to the public within 30 days of receiving a request. While many lenders complied, sending electronic, easily accessible data to those who requested it, many others sent only hard copies, PDF files, or other formats that made it virtually impossible to conduct comprehensive analyses on national data. As a result, reports prior to the federal release of the data tended to focus on pricing disparities of specific lenders, not the market as a whole.

16 *The 2004 Fair Lending Disparities: Stubborn and Persistent*, National Community Reinvestment Coalition (April 2005), at http://www.ncrc.org/pressandpubs/press_releases/documents/HMDApricing_Report.pdf; The High Cost of Credit: Disparities in High-Priced Refinance Loans to Minority Homeowners in 125 American Cities, ACORN Fair Housing (September 27, 2005), at http://www.acorn.org/index.php?id=9758; and Allen Fishbein & Patrick Woodall, *Subprime Cities: Patterns of Geographic Disparity in Subprime Lending, Consumer Federation of America* (September 8, 2005), at http://www.consumerfed.org/pdfs/Subprimecities090805.pdf.

17 *See, e.g., Experts: Prepare for Legal, Regulatory Fallout From HMDA Data*, Mortgage Banking (October 2005), at http://www.allbusiness.com/periodicals/article/606224-1.html.

18 Robert B. Avery, Glenn B. Canner & Robert E. Cook, *New Information Reported Under HMDA and Its Implication in Fair Lending Enforcement, Federal Reserve Bulletin* (Summer 2005), at http://www.federalreserve.gov/pubs/bulletin/2005/3-05hmda.pdf.

19 The Fed study uses mutually exclusive categories when comparing borrowers by race and ethnicity. Specifically, they compare African-Americans, regardless of ethnicity, to Hispanic whites and non-Hispanic whites.

20 Specifically, the disparity ratios of higher-rate lending to African-Americans to that of whites drops approximately 15% in both purchase (3.7 to 3.1) and refinance (2.7 to 2.3) loans. For Latino white borrowers, the ratio drops 17% (2.3 to 1.9) for purchase loans and only 7% (1.5 to 1.4) in the case of refinance loans. *See* Tables 10A and 10B, Avery *et al,* note 18, p34.

21 Even after both the borrower and lender adjustments, African-American borrowers remain 40% and 80% more likely than white borrowers to receive a higher-cost loan for refinance and purchase purposes, respectively. For white Hispanic borrowers, the corresponding increased likelihoods decrease but persist at 10% (1.1 times) and 30% (1.3 times). See Tables 10A and 10B, Avery *et al.,* note 18, p34.

22 We made this estimation by comparing loan volume in the proprietary database with several estimates of overall subprime mortgage volume from third parties.

23 *See* App. 1 for detailed information on our matching methodology.

24 *See* App. 2 for comparisons of average values of variables between the proprietary database and the merged dataset.

25 Specifically, we merged in information on Treasury and corporate bond rates from the Federal Reserve, state race and ethnic composition from the 2000 Census, and state housing price index from the Office of Federal Housing Enterprise Oversight (OFHEO). Categories of state laws with respect to judicial foreclosure and deficiency judgment were from Brent Ambrose, Michael LaCour-Little & Anthony Sanders, *The Effect of Conforming Loan Status on Mortgage Yield Spreads: A Loan Level Analysis,* Vol. 32, No. 4, Real Estate Economics, pp541-569 (2004).

26 *See* Ambrose *et al.,* note 25.

27 We eliminated any loans with FICO scores less than 300 or greater than 850, assuming that such scores were erroneous.

28 Unlike the Fed paper, the sample size in this research was not large enough to permit controlling for originating lender. Instead, we control for the regulating agency of the originating lender, which controls for the type of lender if not the specific originator.

29 Limiting our original dataset to loans in these four product categories yielded 93,659 loans. When further selections were made to ensure loans were secured by a first-lien, lacked private mortgage insurance, were below jumbo threshold, and were made to either a Latino, African-American, or white borrower, we were left with 50,031 loans.

30 Like the Federal Reserve analysis in Avery, et al., New Information Reported under HMDA and Its Application in Fair Lending Enforcement (see note 18), we exclude from the analysis all loans in which the loan application was submitted prior to January 1, 2004. We also exclude loans for which the variables race, ethnicity and sex were all coded as "not applicable" as these loans are presumed to be for commercial, agricultural, or business purposes.

31 Jumbo loans are loans above the maximum limit for purchase by Fannie Mae and Freddie Mac. In 2004, the maximum limit was $333,700 in most states. *See Fannie Mae Announces Higher 2004 Conforming Loan Limit of $333,700; Higher Limit Will Bring Mortgage Savings to More Americans,* Fannie Mae (November 25, 2003), at http://www.fanniemae.com/newsreleases/2003/2860.jhtml.

32 Odds ratios are the convention because the exponential of the coefficient produced by the logistical regressions is the odds ratio corresponding to a one-unit change in the variable.

33 *See* App. 5 for more detail about APR.

34 For a discussion of this sort of targeting, *see* Elizabeth Renuart, *Toward One Fair and Competitive Mortgage Market: Suggested Reforms in a Tale of Three Markets Point in the Right Direction,* Vol. 82 Texas Law Review p421*et seq.* (December 2003), and Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets Revisited,* Vol. 82 Texas Law Review p439 et seq. (December 2003).

35 *See* App. 5 for an explanation of how APR tends to understate the cost of fees for borrowers. *See, also,* National Consumer Law Center, *The Cost of Credit: Regulation, Preemption and Industry Abuses* § 5.5.2.2.1 (3rd Ed. 2005) (example of a small mortgage with 10 points at 15% note rate, 25% APR; prepaid at two years costs borrower equivalent of 29.5%--nearly double the note rate and almost 5% more than the APR).

36 *2006 Predatory Lending Update: Breaking News on the Federal, State, and Local Fronts and How It Impacts You,* Inside Mortgage Finance Publications (transcript of remarks by Iowa Attorney General Thomas J. Miller during April 20, 2006 audio conference).

37 *See* untitled press release, Federal Reserve System Board of Governors (May 27, 2004) (announcing $70 million Citigroup settlement), at http://www.federalreserve.gov/boarddocs/press/enforcement/2004/20040527/default.htm; *Citigroup Settles FTC Charges Against the Associates Record-Setting $215 Million for Subprime Lending Victims,* U.S. Federal Trade Commission (September 19, 2002), at http://www.ftc.gov/opa/2002/09/associates.htm; and Press Release, *Ameriquest Announces Agreement with States,* Ameriquest (January 23, 2006), at http://www.ameriquestmortgage.com/releaseArticle.html?news=news20060123.

38 We caution that, while the ranges of African-American-to-white and Latino-to-white disparities presented here appear to differ in magnitude, the 95% confidence interval of the underlying odds ratio estimates frequently overlap (e.g., for the nine odds ratios that are significantly different from 1 and associated with the Latino or African-American variables, eight of them have a 95% confidence interval including 1.55). In other words, while the estimates presented here are helpful, the magnitude of African-American-to-white disparities are largely indistinguishable from Latino-to-white disparities.

39 *See* discussion above in Section III. Also, we recognize that our analytic framework treats the risk factors on rate sheets as legitimate factors and assumes that borrowers are in loan types (e.g., adjustable-rate mortgages) that reflect their true preference. As such, our methods are unlikely to detect discriminatory effects that might result from using certain factors to measure risk when they more directly serve as a proxy for race or ethnicity or from attempts to influence borrowers to accept more costly products. Also, we note that while researchers have found that borrowers of color are disadvantaged in the mortgage application process, our methods would be unable to detect disparities resulting from such differences. For example, if a white applicant received assistance and consequently was able to submit a stronger application than an identically-situated borrower of color who did not receive the same assistance, then the application could lead to a loan with a lower rate even though there was no substantive difference in the borrowers' qualifications. Since our analyses use data collected after the application process, we cannot detect such patterns. *See* Margery Austin Turner, Fred Freiberg, Erin Godfrey, Carla Herbig, Diane K. Levy & Robin R. Smith, *All other Things Being Equal: A Paired Testing Study of Mortgage Lending Institutions, The Urban Institute* (April 2002) (reporting differences in pre-application treatment of white borrowers and borrowers of color by mortgage lenders), at http://www.huduser.org/Publications/PDF/aotbe.pdf.

40 "Yield-spread premium" is a term usually reserved for brokered transactions. In loans wholly originated by a lender, the same type of premium is usually referred to as an "overage."

41 We acknowledge that, in some instances, yield-spread premiums may play a helpful function, allowing borrowers to close their mortgage without any out-of-pocket costs or increase in the amount borrowed. In this scenario, lenders effectively provide a borrower with a credit in exchange for their agreement to pay a higher interest rate than their risk profile warrants. This credit is then applied to pay a broker or other loan originator's fee and other costs such as fees for an appraisal or title insurance.

42 For example, in a $250,000 loan originated by a large nationwide subprime lender through a broker and reported to the Center for Responsible Lending by the borrower, the broker received $5,000 in up-front fees that were financed into the amount borrowed, an additional $5,000 yield-spread premium, and the lender received an additional $1,282.50 in fees—and the borrower still had to pay other closing costs. These amounts total more than 4.5% of the loan amount, 13 times higher than the 0.36% average initial points and fees reported for single-family conventional loans in the first three months of 2006. For information on points and fees, see Table 1 of *Monthly Interest Rate Survey,* Federal Housing Finance Board (April 2006), at http://www.fhfb.gov/GetFile.aspx?FileID=4587. See, also, Kellie K. Kim-Sung & Sharon Hermanson, *Experiences of Older Refinance Mortgage Loan Borrowers: Broker- and Lender-Originated Loans,* (AARP Public Policy Institute Data Digest No. 83 (2003) (70% of older borrowers with broker-originated loans relied "a lot" on brokers to find the best mortgage for them, and of those with broker-originated loans, 21% reported they did not receive the best loan for them, as compared to 9% with lender-originated loans, and 20% received worse loans than expected, as compared to 8% with lender-originated loans).

43 For a discussion of the complexity of consumer shopping behavior, see Jack Guttentag, *Another View of Predatory Lending,* Financial Institutions Center, The Wharton School, University of Pennsylvania (revised August 21, 2000), at http://fic.wharton.upenn.edu/fic/papers/01/0123.pdf. *See also* James M. Lacko & Janis K. Pappalardo, *The Effect of Mortgage Broker Compensation Disclosures on Consumers and Competition: A Controlled Experiment,* Federal Trade Commission Bureau of Economics (February 2004) (documenting consumer confusion with *simplified* disclosures), at http://www.ftc.gov/os/2004/01/030123mortgagefullrpt.pdf; Patricia A. McCoy, *A Behavorial Analysis of Predatory Lending,* Vol. 38, Akron Law Review (2005); Matthew A. Edwards, *Empirical and Behavioral Critiques of Mandatory Disclosure: Socio-Economics and the Quest for Truth in Lending,,* Vol. 14, Cornell Journal of Law & Public Policy, pp199, 229-239 (2005); Alan M. White & Cathy Lesser Mansfield, *Literacy and Contract,* Vol. 13.2, Stanford Law & Policy Review (2002).

44 *See, e.g.,* the Georgia Fair Lending Act, which measures both yield spread premiums and prepayment penalties in its assessment of points and fees to determine whether a loan is high cost and deserving of additional protections. Ga. Code § 7-6A-1 *et. seq.*

45 Howell E. Jackson & Jeremy Berry, *Kickbacks or Compensation: The Case of Yield Spread Premiums,* pp121-129 (January 8, 2002), at http://www.law.harvard.edu/faculty/hjackson/pdfs/january_draft.pdf Annual Review of Banking (forthcoming 2005). Similar findings have been made in the context of similar rate-based mark-ups in the automobile financing setting. *See, e.g.,* Mark A. Cohen, *Report on the Racial Impact of GMAC's Finance Charge Markup Policy* (August 29, 2003) (reporting that African Americans paid "more than 2 _ times the amount in subjective markup compared to whites,"), at http://www.consumerlaw.org/initiatives/cocounseling/gmacreport-bystate.shtml.

46 *See, e.g.,*White, note 5, pp510-11 (providing an example of a lender limiting YSPs to 1% of the loan amount in loans without prepayment penalties, 1.5% for loans with a one-year prepayment penalty, 2% for loans with a two-year prepayment penalty, and 3% for loans with a three-year prepayment penalty).

47 Debbie Gruenstein Bocian & Richard Zhai, *Borrowers in High Minority Areas More Likely to Receive Prepayment Penalties on Subprime Loans,* Center for Responsible Lending (January 2005), at http://www.responsiblelending.org/pdfs/rr004-PPP_Minority_Neighborhoods-0105.pdf.

48 Rate sheets provided by lenders to brokers frequently provide an overall cap for such charges, but we are aware of none that explicitly determines these origination charges.

49 Marsha J. Courchane, Douglas McManus & Peter M. Zorn, *An Analysis of Mortgage Closing Costs* (August 2004) (unpublished manuscript quoted with permission, on file with authors).

50 *Brokers Flex their Muscle in 2005, Powering Record Subprime Year,* Inside B&C Lending (March 17, 2006).

51 *Service Remains the Key to Wooing Mortgage Brokers,* IMF Poll Finds, Inside B&C Lending (January 6, 2006).

52 *See* Turner *et al.,* note 39 (reporting differences in pre-application treatment of white borrowers and borrowers of color by mortgage lenders).

53 We note that while we were not able to control for the specific identity of lenders due to data limitations, we did include a variable to control for the identity of the lenders' primary federal regulator. This adjustment, in essence, should control for differences in cost of funds that result from corporate form (e.g., national bank versus non-depository state lender).

54 While it is theoretically possible that these lenders are competing in beneficial ways on dimensions other than price, the loan products selected for analysis in this paper are quite standard—to the point where we may consider them commodities—and, consequently, the findings cannot be readily explained by observing that the loans represent unique options for borrowers.

55 Paul S. Calem, Jonathan E. Hersaff & Susan M. Wachter, *Neighborhood Patterns of Subprime Lending: Evidence from Disparate Cities,* Vol. 15, No. 3, Housing Policy Debate (2004), at http://www.fanniemaefoundation.org/programs/hpd/v15i3-index.shtml (reporting that borrower and neighborhood demographics are significant factors in determining whether a borrower receives a loan from a predominantly prime or a higher-cost, predominantly subprime lender). While not studying the role of race and ethnicity, recent research from Lax et al. shows that borrowers are not efficiently sorted between the prime and subprime sector and that up to one percentage point in interest rates charged in the subprime market could not be explained by risk. Howard Lax, Michael Manti, Paul Raca & Peter Zorn, *Subprime Lending: An Investigation of Economic Efficiency,* Vol. 15, No. 3, Housing Policy Debate, pp568-69 (2004), at http://www.fanniemaefoundation.org/programs/hpd/pdf/hpd_1503_Lax.pdf. In addition, Freddie Mac has publicly commented that more than one-in-five recent subprime borrowers in recent years could likely have qualified for a prime loan. Mike Hudson & E. Scott Reckard, *More Homeowners with Good Credit Getting Stuck with Higher-Rate Loans,* Los Angeles Times pA-1 (October 24, 2005). It stands to reason that such inefficiencies in borrower sorting might also be reflected in the present analysis that examines only the distribution of loans within the subprime sector.

56 William C. Apgar & Allegra Calder, *The Dual Mortgage Market: The Persistence of Discrimination in Mortgage Lending,* 2005 President and Fellows of Harvard College, W05-11, p1 (December 2005), at http://www.jchs.harvard.edu/publications/finance/w05-11.pdf.

57 In practice, HMDA regulations ensure among the broadest possible coverage of Latino borrowers. Under the rules, even in instances when such information is not provided by borrowers, lenders are required to report ethnicity, race, and gender "on the basis of visual observation or surname." See 12 C.F.R. § 203, App. B.

58 *See* Apgar *et al.,* note 56, pp4, 21.

59 Kim-Sung *et al.,* note 42.

60 William P. Alexander, Scott D. Grimshaw, Grat R. McQueen & Barrett A. Slade, *Some Loans Are More Equal than Others: Third-Party Originations and Defaults in the Subprime Mortgage Industry,* Vol. 30, No. 4, Real Estate Economics, pp667-697 (2002) (concluding that third-party originations are more likely to default and that they therefore carry a higher rate than retail originated loans). On this same point, Federal Reserve researchers examining the 2004 HMDA data reported that loans thought more likely to be brokered (because they were from outside of lenders retail assessment area established for Community Reinvestment Act purposes) were more likely to be high-APR loans. *See* Avery *et al.,* note 18.

61 *See* United States v. First American Bank (N.D. Ill.) (filed July 13, 2004) *and* United States v. Old Kent Financial Corporation and Old Kent Bank (E.D.S.D. Mich.) (filed May 19, 2004).

62 While lenders are screened for fair lending compliance, it is less clear that the lending patterns of affiliated lenders are scrutinized

on a consolidated basis. Indeed, the challenge of a review that would necessarily cut across regulatory agency lines is considerable. Consider the resources and coordination necessary to review an institution that has a bank holding-company structure, with a national bank (supervised by the Office of the Comptroller of the Currency), a state bank (supervised by a state regulator and the Federal Deposit Insurance Corporation), and a non-depository finance company (supervised by the Federal Reserve Board and a state regulator).

63 See e.g., Joint HUD/Treasury Report, note 12; Eric Stein, Quantifying the Economic Cost of Predatory Lending, Coalition for Responsible Lending (rev. October 30, 2001), at http://www.responsiblelending.org/pdfs/Quant10-01.pdf; and Elizabeth Renuart, An Overview of the Predatory Lending Process, Vol. 15, No. 3, pp467-502 (2004) at http://www.fanniemaefoundation.org/programs/hpd/pdf/hpd_1503_Renuart.pdf.

64 Marsha J. Courchane, Brian J. Surrette & Peter M. Zorn, *Subprime Borrowers: Mortgage Transitions and Outcomes*, Vol. 29, No. 4, Journal of Real Estate Finance and Economics pp365-392 (2004).

65 The median net worth of non-white and Latino households was just 17.6% that of white households in 2004. Brian K. Bucks, Arthur B. Kinnickell & Kevin B. Moore, *Recent Changes in U.S. Families Finances: Evidence from the 2001 and 2004 Survey of Consumer Finances*, Vol. 92 Federal Reserve Bulletin pA4 (February 2006).

66 See note 41.

67 15 U.S.C. § 1602(aa)(4)(D). Some courts have differed over whether YSPs are captured by the existing HOEPA definition of fees and points. *See generally*, National Consumer Law Center, *Truth in Lending § 9.2.6.3.4* (5th Ed. 2003 and 2005 supplement).

68 *See, e.g.*, USA v. Delta Funding Corp., No. CV 00 1872 (S.D.N.Y Mar. 30, 2000), *available at* www.usdoj.gov. Cf. USA v. Long Beach Mortgage Co., No. CV 96-6159 (C.D. Cal., settlement agreement and order filed Sept. 5, 1996) (discriminatory pricing resulting from related originator compensation practices). For litigation involving YSPs and overages *see generally*, National Consumer Law Center, *The Cost of Credit: Regulation and Legal Challenges* §§ 11.5.4.3, 12.2.1.5.1 - .6 (RESPA), 12.5 (text accompanying notes 475-476); National Consumer Law Center, *Credit Discrimination*, §§ Chap. 8, 12.4.1.5

69 Christopher A. Richardson & Keith Ernst, *Borrowers Gain No Interest Rate Benefits from Prepayment Penalties on Subprime Mortgages*, Center for Responsible Lending (2005), at www.responsiblelending.org/pdfs/rr005-PPP_Interest_Rate-0105.pdf.

70 The majority of borrowers with subprime loans with prepayment penalties do in fact pre-pay. For example, a CRL internal analysis of California subprime loans orginated in 2003 showed that 71% had prepaid within 24 months, the average term for most prepayment penalties. This analysis utilized data from MBS offerings, courthouse records, and the proprietary database used here. Similarly, an analysis by Ralph DeFranco and Paul Calem, *Why Have Subprime Loans Been Prepaying so Fast?* (August 2005) at http://www.sme-online.com/sme/efeature/efeature0509.html/) shows that subprime loans nationally have comparable prepayment rates.

71 The extent to which prepayment penalties and YSPs are actually explained and offered as genuine options to borrowers in the subprime market is the subject of dispute in any event. For example, false, misleading or deceptive representations concerning prepayment penalties were among the issues present in the states' actions against both Household and Ameriquest, and consequently were the subject of injunctive relief in the settlements against both.

72 For a thoughtful discussion of suitability standards in the securities framework and their adaptability to the mortgage context, see Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets: The Law and Economics of Predatory Lending*, Vol. 80 Texas Law Review pp1317-1363 (May 2002) *and* Engel & McCoy, note 34, p440.

73 *See Brokers Flex their Muscle*, note 50.

74 *See, e.g.*, Patricia A. McCoy, Banking on *Bad Credit: New Research on the Subprime Home Mortgage Market*, Remarks at 2005 Federal Reserve Research Conference (July 26, 2005) (arguing for such an arrangement), at http://www.chicagofed.org/cedric/files/2005_conf_discussant_session1_mccoy.pdf.

75 *HMDA Targets Big Lenders on "Predatory" Loans*, Vol. 4, No. 6, Home Equity Wire (November 15, 2005).

76 *See, e.g., Inner City Press' Community Reinvestment Reporter* (April 10, 2006), at http://www.innercitypress.org/crreport.html.

77 *See* Office of the Comptroller of the Currency v. Spitzer, 396 F. Supp. 2d 383 (S.D.N.Y. 2005), *appeal pending*.

78 *See* Li and Ernst, note 22, pp2, 11-14.

79 *See* Li and Ernst, note 22, pp3, 15-17.

80 *See, e.g.*, Ken Markison, Melissa Richards & Raymond Snytsheuvel, *Regulatory Update: Home Mortgage Disclosure Act (HMDA)*,

Ney-Kanjorski, RESPA Reform, State Predatory Lending and Licensing Laws, FACTA and FCRA, Data Security and RESPA Enforcement, Mortgage Bankers Association, PowerPoint presentation at MBA Residential Underwriting Conference 2005, at http://events.mortgagebankers.org/resundr2005/signatureconferences/resundr/images/img/Comprehensive.PPT.

81 Keith S. Ernst & Deborah N. Goldstein, *Comment on Federal Reserve Analysis of Home Mortgage Disclosure Act Data*, p5 (Sept. 14, 2005), at http://www.responsiblelending.org/pdfs/cb001-FRB-091505.pdf.

82 HMDA lenders were chosen to correspond to originators with more than 1,000 loans for 2004 in the proprietary database.

83 Though included in the matching process, jumbo loans and loans secured by manufactured housing ultimately were not included in the final analyses.

84 Because of a high incidence of missing lender names in the proprietary database, a loan was considered "non-unique" and removed if state, zip code, loan purpose, property type, lien status and loan amount were the same as another loan, regardless of the lender name.

85 Unlike HMDA, the proprietary database does not have a consistent format for the names of lenders. Therefore, we relied on key words in the lender identification fields of the two databases when matching the loans.

86 *See* LeadsToLoans at http://www.leadstoloans.com.

87 Beginning with the 2004 HMDA data, borrowers can report multiple racial categories. In addition, HMDA contains an ethnicity variable indicating whether the borrower is Latino that is distinct from the race variables. We coded any borrower who listed "Black or African American" as one or more of the racial designations as black regardless of how they identified their ethnicity. Similarly, we coded all borrowers who indicated their ethnicity was "Hispanic or Latino" as Latino, regardless of their racial categorization. Finally, we coded borrowers who chose only "white" in the racial categories and only "Not Latino or Latino" in the ethnicity category as "white." The remaining records were not coded into racial and ethnic categories and are excluded from the analysis.

88 While Ambrose *et al.* (note 25) included age as an independent variable in their interim models, we did not have that information. However, we included information not in the Ambrose model, such as level of documentation. In addition, we stratified our data by loan purpose, which Ambrose *et al.* did not. Finally, whereas Ambrose and his colleagues model only conforming fixed-rate loans, we also analyze adjustable rate loans, which dominated the subprime market.

89 HPI is the state quarterly Housing Price Index from OFHEO, and the subprime rate is the 30-year, B-credit, 80 percent LTV rate from *Inside B&C Lending*.

90 Unlike the LTV and origination amount variables, which are continuous, whether or not a loan had a prepayment penalty is binary. As a result, 3SLS cannot be used to correct for potential endogeneity between APR spread and prepayment penalty status. However, by running separate models for loans with and without prepayment penalties, any potential endogeneity is eliminated.

91 KS is a non-parametric statistic that measures the maximum deviation of empirical distribution between two samples. Here KS statistics provide a relative goodness-of-fit measurement of the logistic regression model. A model with KS statistics of 0 has no predictive power, a model with a KS statistics of 100 predicts the data perfectly, and good models tend to have a KS statistic greater than 50. For the "ALL" group, the KS statistic was calculated for all data in the model; for "Black," KS was calculated for the Black borrowers, etc. This is used to demonstrate that the model fits the data equally well for all racial and ethnic groups. See Lax et al., note 55.

About the Center for Responsible Lending

The Center for Responsible Lending is a nonprofit, nonpartisan research and policy organization dedicated to protecting homeownership and family wealth by working to eliminate abusive financial practices. CRL is affiliated with Self-Help, one of the nation's largest community development financial institutions.

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