Table 1
Descriptive statistics for aggregated and appended HMDA data variables

	All Loan Terms		30 Year Loans	
	Mean	SD	Mean	SD
Tract Applicant Average				
Rate spread	0.82	0.59	0.72	0.41
Interest rate	4.92	11.59	4.80	6.69
Income (1,000s)	90.57	43.70	90.35	43.60
Loan amount (10,000s)	23.94	14.81	24.65	14.79
Total loan costs (1,000s)	4.96	4.54	5.01	4.74
Total points and fees (1,000s)	2.62	3.01	3.33	3.14
Origination charges (1,000s)	1.62	0.84	1.62	0.85
Discount points (1,000s)	1.61	1.15	1.61	1.17
Lender credits (1,000s)	0.87	1.63	0.88	1.64
Loan term (months)	344.80	21.83	360.00	0.00
DTI*	38.33	4.50	38.64	4.44
LTV	86.85	7.36	87.88	7.31
Proportion of Tract Applicants/Loans				
Black	0.09	0.17	0.08	0.17
White	0.70	0.23	0.71	0.23
Asian	0.06	0.13	0.06	0.13
Pacific Islander	0.00	0.02	0.00	0.02
Native American	0.01	0.04	0.01	0.03
Hispanic	0.12	0.21	0.12	0.21
Female	0.24	0.13	0.24	0.14
Fannie Mae purchased	0.13	0.09	0.13	0.09
Ginnie Mae purchased	0.12	0.10	0.13	0.11
Freddie Mac purchased	0.10	0.08	0.10	0.08
Private purchased	0.01	0.02	0.01	0.02
Conventional loan	0.67	0.22	0.62	0.25
Manufactured	0.07	0.15	0.02	0.07
Denied for DTI	0.03	0.05	0.02	0.04
Denied for credit	0.03	0.06	0.05	0.21
Denied for employment	0.00	0.01	0.00	0.01
Percent denied	0.10	0.11	0.09	0.09
HOEPA status	0.00	0.01	0.00	0.01
Meet conforming loan limit	0.05	0.13	0.05	0.13
HMDA Appended Census Data				
Tract minority population	37.26	30.38	37.14	30.30
MSA median income	73.06	16.79	73.10	16.79
Tract to MSA median income	1.01	0.43	1.02	.43
Other Variables				
Lender market share	0.17	0.13	.17	.13
Majority black	0.05	0.21	0.03	0.06
Quarter black	0.10	0.31	0.10	0.30

This table presents means and standard deviations for the aggregated or appended tract-level variables. In the first panel, the average value of the applicants in the tract is presented (*) with the exception of DTI which is the median. The second panel shows the proportion of applicants/applicant loans that meet the given criteria. The third panel shows appended census data that was present in the original HMDA data. Lastly, the fourth panel shows the market share of the most prominent lender and the two binary variables marking if a given tract has over 50% black applicants and 25% black applicants, respectively.

Table 2
Regression models of rate spread on aggregated HMDA variables
Dependent variable: Rate Spread

Variables	Race	Borrower	Tract	FE
	(1)	(2)	(3)	(4)
Majority Black	0.525***	0.212***	0.175***	0.118***
	(0.01)	(0.01)	(0.01)	(0.01)
Income (1,000s)		-0.001***	-0.001***	-0.001***
		(0.00)	(0.00)	(0.00)
Loan amount (10,000s)		-0.008***	-0.009***	-0.009***
		(0.00)	(0.00)	(0.00)
Female		0.227***	0.170***	0.139***
		(0.01)	(0.01)	(0.01)
DTI		0.007***	0.008***	0.004***
		(0.00)	(0.00)	(0.00)
LTV		0.012***	0.012***	0.009***
		(0.00)	(0.00)	(0.00)
Origination charges (1,000s)		0.068***	0.072***	0.068***
		(0.00)	(0.00)	(0.00)
Discount points (1,000s)		-0.035***	-0.037***	-0.027***
		(0.00)	(0.00)	(0.00)
Conventional loan		-0.211***	-0.127***	-0.350***
		(0.01)	(0.01)	(0.01)
Loan term (months)		-0.003***	-0.002***	-0.002***
		(0.00)	(0.00)	(0.00)
Manufactured		1.909***	1.696***	1.617***
		(0.01)	(0.01)	(0.01)
Asian		0.092***	0.061***	-0.017
		(0.01)	(0.01)	(0.01)
Native American		0.206***	0.204***	0.227***
		(0.05)	(0.05)	(0.05)
Hispanic		0.387***	0.357***	0.343***
		(0.01)	(0.01)	(0.01)
Pacific Islander		-0.563***	-0.531***	-0.162**
		(0.08)	(0.08)	(0.08)
Fannie Mae purchased			-0.389***	-0.390***
			(0.02)	(0.02)
Freddie Mac purchased			-0.303***	-0.481***
			(0.02)	(0.02)
Ginnie Mae purchased			-0.187***	-0.278***
			(0.02)	(0.02)
Denied for credit			0.547***	0.115***
			(0.04)	(0.03)
Tract to MSA median income			-0.004***	-0.002***
			(0.00)	(0.00)
Lender market share			-0.058***	0.245***
			(0.01)	(0.01)
Constant	0.796***	0.455***	0.424***	
	(0.00)	(0.04)	(0.04)	
Observations	71,232	68,139	68,139	68,139
R^2	0.03	0.70	0.71	0.61
Adjusted R^2	0.03	0.70	0.71	0.59

The table on the previous page presents OLS estimates for 4 models of rate spread. Table 1 includes descriptive statistics for all variables seen above. Column (1) solely includes the binary variable of whether over 50% of the applicants are black. Column (2) adds borrower and loan characteristics. Column (3) additionally includes tract characteristics. Column (4) includes the previous variables and adds fixed effects on county. Standard errors are shown in parentheses.
Note: *p<0.1; **p<0.05; ***p<0.01

Results

Table 2 shows the results of the rate spread regression model. The first three specifications can be characterized by the equation:

$$y_i = \alpha X_i + \epsilon_i \tag{1}$$

where *y* is the average rate spread in tract *i* and *X* represents the tract-level variables in the model described above. The first specification only includes the binary variable "Majority Black" which indicates that over half the applicants in a tract are black. This is included to showcase the rate gap before adjusting for borrower and loan characteristics. The second specification includes borrower and loan characteristics, for example applicant race and loan term. The difference in the estimated coefficient for this specification and specification one can be attributed to statistical discrimination on the basis of weaker borrower characteristics and taste for riskier loan types, like manufactured housing, for black borrowers.

The third specification further includes tract characteristics like the prominence of the GSEs, the market share of the largest lender and the credit proxy variable measuring the proportion of applicants denied on the basis of credit. Lastly, the fourth specification includes county level fixed effects. This specification can be characterized by the equation:

$$y_{i,j} = \alpha X_i + w_j + \epsilon_{i,j} \tag{2}$$

where *X* and *y* are the same as equation (1) and with w_j representing the county fixed effects. These fixed effects capture idiosyncratic differences across geographical regions and their effect on rate spreads.