**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 |
| R2 | 0.03 | 0.70 | 0.71 | 0.61 |
| Adjusted R2 | 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:

(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:

(2)

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