Background

The following abstract appeared in Alicia H. Munnell, Geoffrey M.B. Tootell, Lynn E. Browne, and James McEneaney (1996), “Mortgage Lending in Boston: Interpreting HMDA Data,” *American Economic Review*86, 25-53.

*The Home Mortgage Disclosure Act was enacted to monitor minority and low-income access to the mortgage market. The data collected for this purpose show that minorities are more than twice as likely to be denied a mortgage as whites.  Yet variables correlated with both race and creditworthiness were omitted from these data, making any conclusion about race’s role in mortgage lending impossible. The Federal Reserve Board of Boston collected additional variables important to the mortgage lending decision….*

As discussed in Munnell et al (1996), the HMDA data indicate whether an applicant’s mortgage application was approved and provide several demographic characteristics.  In 1990, following the request of the Federal Reserve Board of Boston, lending institutions in the Boston area provided additional information relevant to mortgage lending decisions.  In light of the relatively small number of mortgage loan applications made by minorities, these extra variables were collected for all applications by blacks and Hispanics and for a random sample of those by whites.

The data set includes the following variables:

APPROVE = 1 if mortgage loan was approved, = 0 otherwise

GDLIN = 1 if credit history meets guidelines, = 0 otherwise

LOANPRC = loan amount/purchase price

OBRAT = other obligations as a percent of total income

MALE = 1 if male, = 0 otherwise

MARRIED = 1 if married, = 0 otherwise

BLACK = 1 if black, = 0 otherwise

HISPAN = 1 if Hispanic, = 0 otherwise

(All applicants are non-Hispanic white, non Hispanic black, or Hispanic.  [In 1990 about 94% of Boston residents were white, Black, or Hispanic. (Links to an external site.)](http://www.bostonplans.org/getattachment/83972a7a-c454-4aac-b3eb-02e1fddd71e3/))

Assignment

Write an article for an applied economics journal that targets economists interested in real-world issues. Assume that your audience is familiar with basic microeconomic and econometric concepts.

Present and discuss the descriptive statistics for the entire sample and for each racial/ethnic group.

Controlling for relevant characteristics, is race/ethnicity associated with the outcome of a mortgage loan application? To address this question, estimate and present appropriate probit and logit models of loan approval. Discuss the signs and statistical significance of the coefficients. Also discuss the robustness of the results across the probit and logit models; do not compare the coefficients but focus on the signs and significance levels.

For the logit models, compute, present, and interpret the odds ratios associated with each of the independent variables.  For both models, present predicted probabilities of loan approval for a few prototypical individuals.

Can we conclude that mortgage lending institutions discriminate against minorities?  Explain fully.

How does your analysis relate to current issues? See the articles below.

[Sample R Code](https://seattleu.instructure.com/courses/1586832/files/64905064/download?wrap=1)

[More Sample R Code (Generates Log-likelihood and Conducts Overall LR Test)](https://seattleu.instructure.com/courses/1586832/files/64905057/download?wrap=1)

Data Files

[Excel FilePreview the document](https://seattleu.instructure.com/courses/1586832/files/64904572/download?wrap=1)

[CSV FilePreview the document](https://seattleu.instructure.com/courses/1586832/files/64904577/download?wrap=1)

Deadlines

**November 12**

Exploratory Data Analysis, Sample Selection Criteria, Descriptive Statistics by  Race/Ethnicity, and Reading

In particular, please:

* conduct exploratory data analysis (EDA)
* apply appropriate sample selection criteria based on EDA
* compute, review, and submit [descriptive statistics overall and by race/ethnicityPreview the document](https://seattleu.instructure.com/courses/1586832/files/64905003/download?wrap=1) (*make sure there are no remaining problems with the data before proceeding*)
* read *New York Times* and *Boston Globe* articles on more recent issues related to mortgage lending:

["Women and Subprime Crunch" (BG 10/22/07) (Links to an external site.)](http://www.boston.com/business/personalfinance/articles/2007/10/22/women_and_the_subprime_crunch/)

["What's Behind the Race Gap?" (NYT 11/4/07) (Links to an external site.)](http://www.nytimes.com/2007/11/04/weekinreview/04bajaj.html)

["Judge Allows Redlining Suits to Proceed" (NYT 5/5/11) (Links to an external site.)](http://www.nytimes.com/2011/05/06/business/06redlining.html)

["Countrywide Will Settle a Bias Suit" (NYT 12/21/11) (Links to an external site.)](http://www.nytimes.com/2011/12/22/business/us-settlement-reported-on-countrywide-lending.html?_r=0)

["Blacks Face Bias in Bankruptcy, Study Suggests" (NYT 1/20/12) (Links to an external site.)](http://www.nytimes.com/2012/01/21/business/blacks-face-bias-in-bankruptcy-study-suggests.html)

["Debt Burden Lifting, Consumers Open Wallets a Crack" (NYT 4/18/12) (Links to an external site.)](http://www.nytimes.com/2012/04/20/business/not-exactly-a-miracle-but-us-debt-levels-are-falling.html)

["Black, Latino Mortgage Rejection Rates Still High" (BG 12/21/15) (Links to an external site.)](https://www.bostonglobe.com/business/2015/12/21/blacks-latinos-still-rejected-for-mortgages-higher-rates/kng3Kuc4v3uIK1pmDqBSjO/story.html)

[Machines, too, Discriminate against Black and Latino Homebuyers (11/18/18)Preview the document](https://seattleu.instructure.com/courses/1586832/files/65021801/download?wrap=1)

* listen to the NCPR report on racial disparities in mortgage lending

[Blacks and Latinos Denied Mortgages at Rates Double Whites (2/15/18) (Links to an external site.)](https://www.wunc.org/post/blacks-and-latinos-denied-mortgages-rates-double-whites#stream/0)

For extra credit, participate in the corresponding [discussion](https://seattleu.instructure.com/courses/1586832/discussion_topics/7736990).

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**November 19**

Logit Estimates and Odds Ratios; Probit Estimates

In particular, please:

* address my comments on your first step
* convert loan to value to percentage terms
* develop an appropriate model of loan approval
* estimate this model using MLE, first as a probit model and then as a logit model
* compute odds ratios associated with the logit coefficients
* make sure you know how to interpret the odds ratios

*Please bring a copy of your results for each member of your group.*

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**November 26**

Predicted Probabilities and One More Assigned Article

In particular, please:

* revise your models based on my feedback and/or the in-class discussion
* compute predicted probabilities for select prototypical individuals
* prepare a table of predicted probabilities ([see the example discussed in classPreview the document](https://seattleu.instructure.com/courses/1586832/files/64905066/download?wrap=1))
* read an article on discrimination in mortgage lending from last year ["Minority Homebuyers Face Widespread Statistical Lending Discrimination" Phys.Org (11/15/18) (Links to an external site.)](https://phys.org/news/2018-11-minority-homebuyers-widespread-statistical-discrimination.html)

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**December 3**

[Final Results TablesPreview the document](https://seattleu.instructure.com/courses/1586832/files/64904561/download?wrap=1) (Logit Estimates and Odds Ratios; Probit Estimates; Log-likelihoods; LR Tests (Test Statistic and p-value for the overall model); Predicted Probabilities)

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**December 5**

Final Paper, Summary of Contributions, Confidential Peer Reviews, and Class Discussion