



Comptroller of the Currency
Administrator of National Banks

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Statistical Analysis and Modeling for Risk Assessment

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ENSURING A SAFE AND SOUND
NATIONAL BANKING SYSTEM
FOR ALL AMERICANS

Overview of the OCC Fair Lending Process

Redlining Analysis in Fair Lending Exams

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Overview

- What is redlining? Legal context and definitions
- Important issues in modeling redlining
- An example of a redlining study during a Fair Lending exam



What is redlining?

- A form of discrimination based on location: disparities in loan marketing, underwriting or pricing by neighborhood racial composition



Legal Context

- **FHA: Fair Housing Act/Civil Rights Act (1968):**
 - Prohibits discrimination in sale, rental, and financing of housing based on race, religion, national origin, and sex
- **ECOA: Equal Credit Opportunity Act (1974):**
 - Prohibits all lending discrimination based on the inherent attributes such as race, gender or age
- **CRA: Community Reinvestment Act (1977):**
 - Addresses geographic discrimination
 - Encourages provision of credit to underserved populations



Types of Redlining

- Marketing (reflected in application volume)
- Underwriting
 - Denial Rates: otherwise comparable loans are more likely to be denied in minority vs. white neighborhood
 - Flow of mortgage funds: smaller flow of mortgage funds in comparable minority vs. white neighborhoods
- Pricing
 - Higher prices (APRs) on comparable loans in high minority neighborhoods



Defining the outcome of interest

Individual level

- Applicant's probability of denial
- Applicant's APR

Neighborhood level

- Application volume (adjusted for housing demand)



Definitions

- **Neighborhoods:** Census tracts within an MSA
- **Minority:** it is common to combine racial and ethnic minorities together when calculating % minority. We follow that convention, as well as look at presence of each minority individually
- **High Minority Neighborhood:** it is common to use “at least 80% minority population”. We try a variety of cutoffs and a continuous measure



Our question

“Is there evidence of redlining across census tracts, for each bank, in each MSA?”



Making neighborhoods “comparable”

- Neighborhoods differ in population size and housing demand and supply
 - Standardize (by population; number of owner-occupied units; number of 1-4 family units)
- Neighborhoods’ racial composition is correlated with other important characteristics
 - Credit worthiness (credit scores)
 - Market conditions (e.g. income, rent to value ratio, occupancy rate)

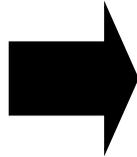


HMDA	+	Census	+	Credit Bureau data
Yearly		Every 10 yrs		Yearly
<ul style="list-style-type: none">•Denied/approved•Income•Loan amount•Rate spreads		<ul style="list-style-type: none">•Percent minority•Median income•Number 1-4 family houses•Number owner-occupied•Rent to value•Vacancy rate		<ul style="list-style-type: none">•Median credit score•Distribution of credit scores•Percent with missing scores

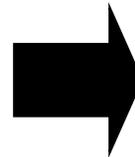


The role of Risk Analysis Division (RAD) in redlining exams

Examiner identifies the
bank/MSA pairs for further
review



Examiner may ask
RAD for assistance in
a redlining exam



RAD models redlining
using additional data
and methods



An example of a redlining study

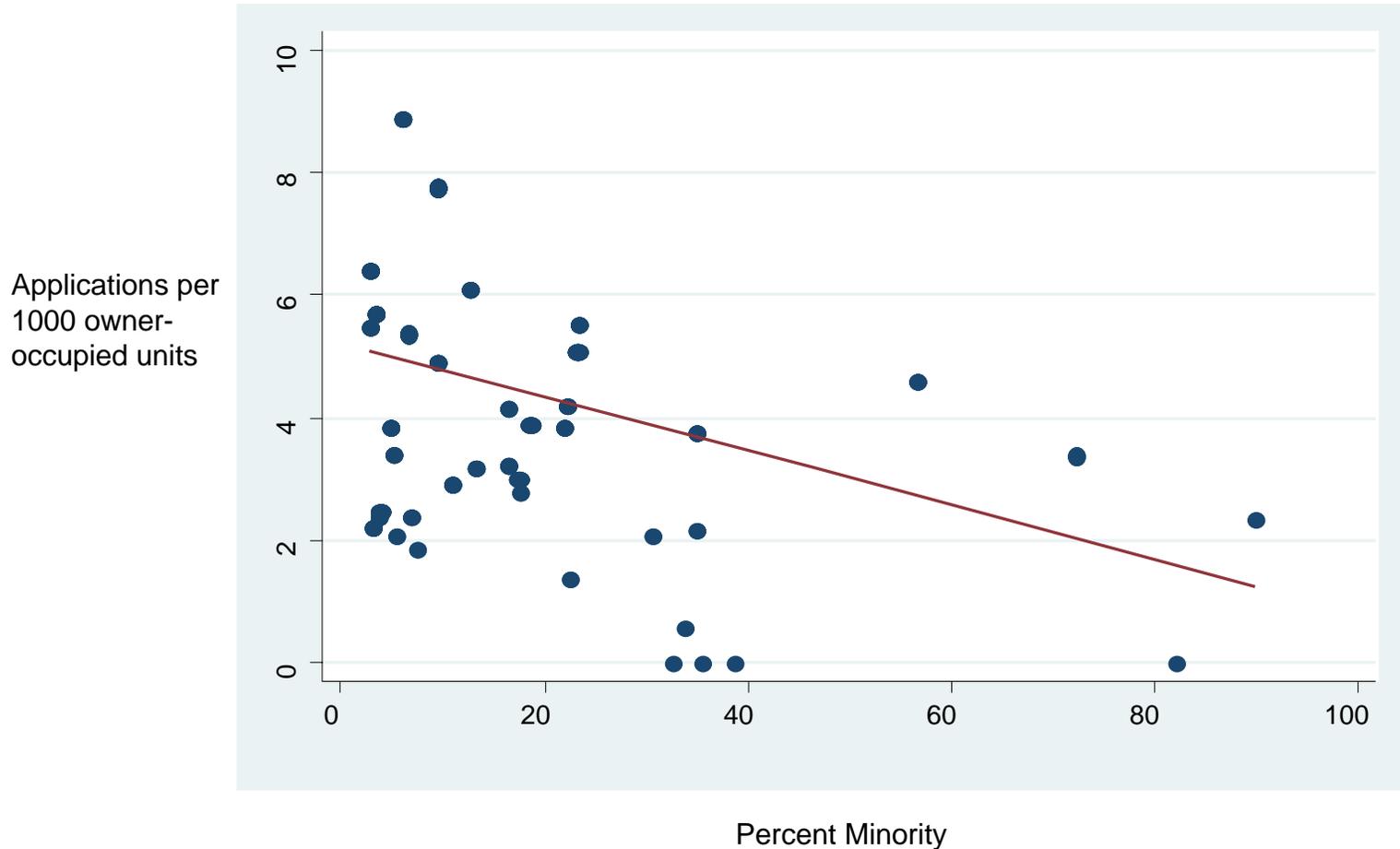


Definitions in this example

- **Minority:** all ethnic and racial minorities
- **High minority:** all ethnic and racial minorities jointly comprise over 80% of the population

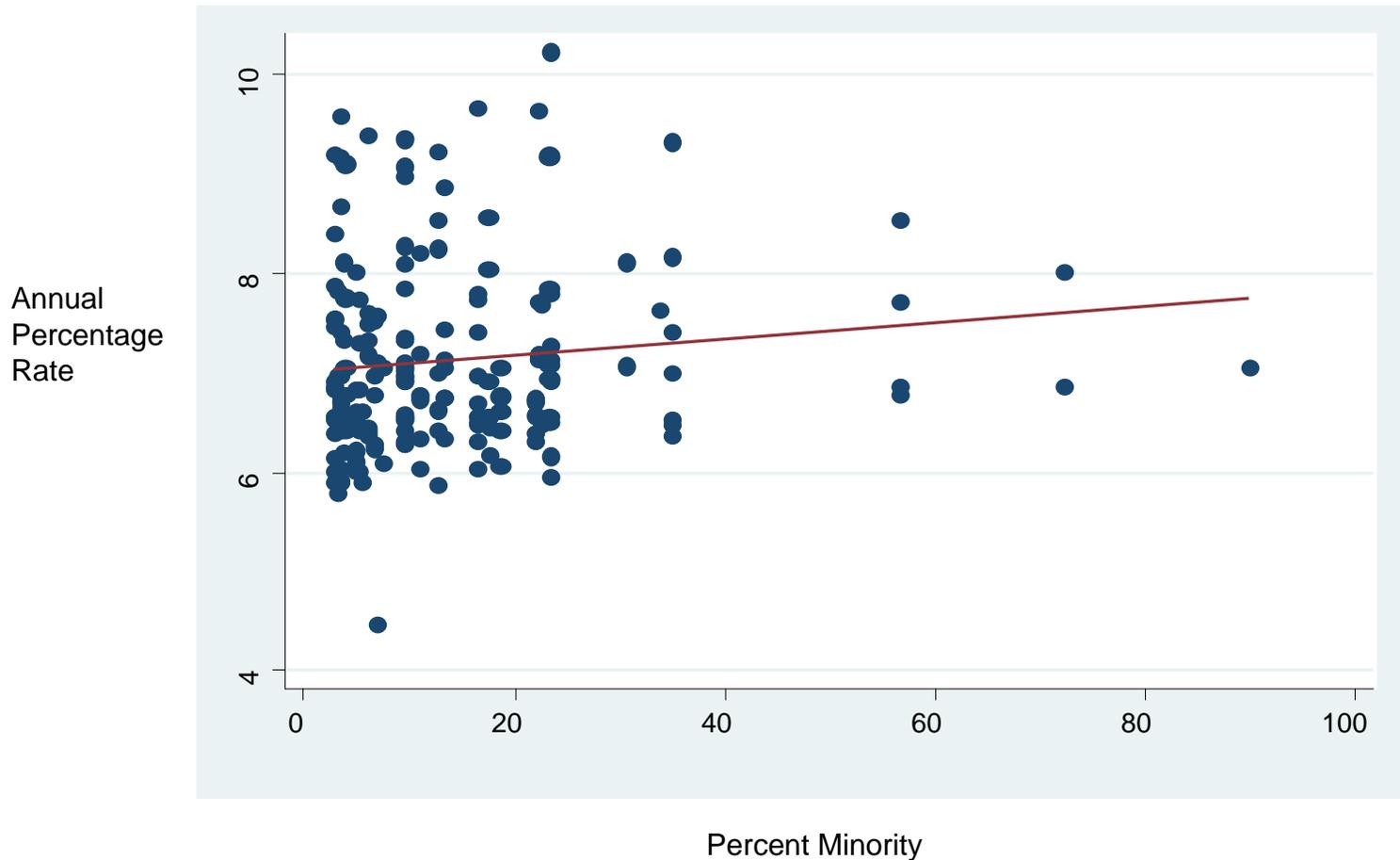


Bank A, MSA B: Application Volume by Census Tract



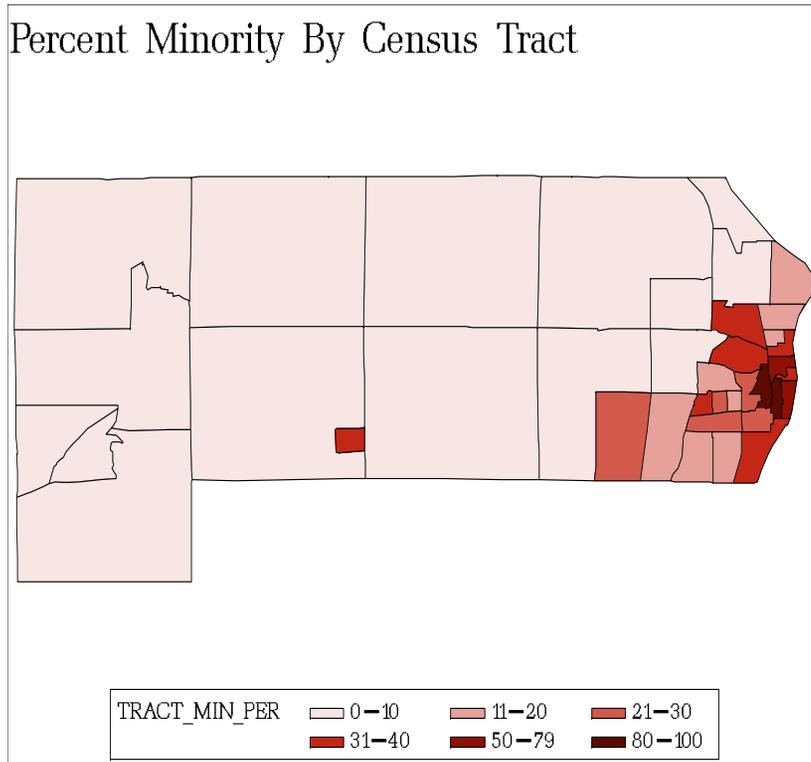


Bank A, MSA B: Pricing by Census Tract

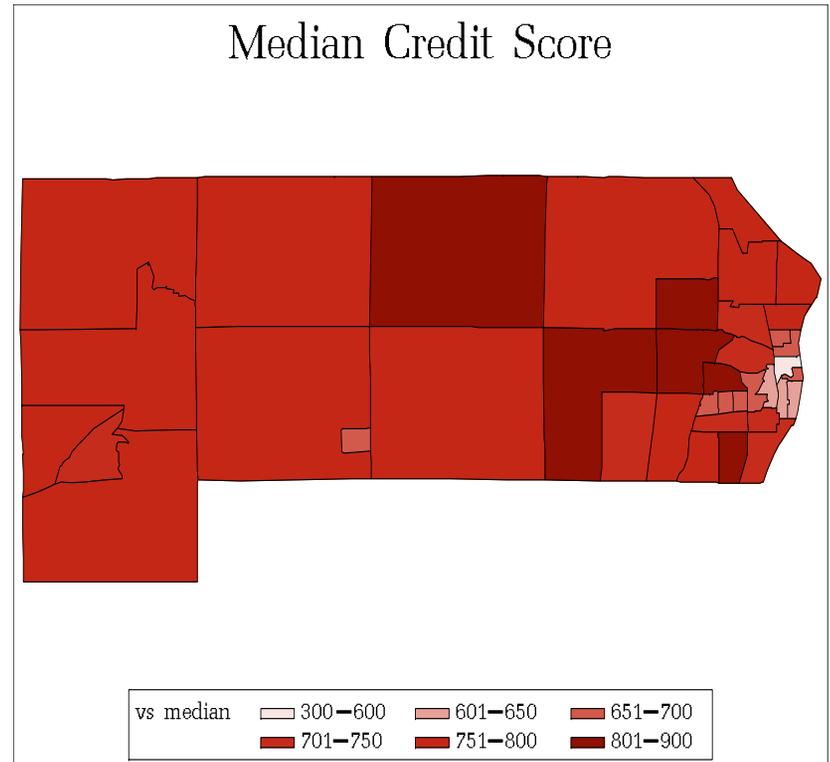




Percent Minority By Census Tract

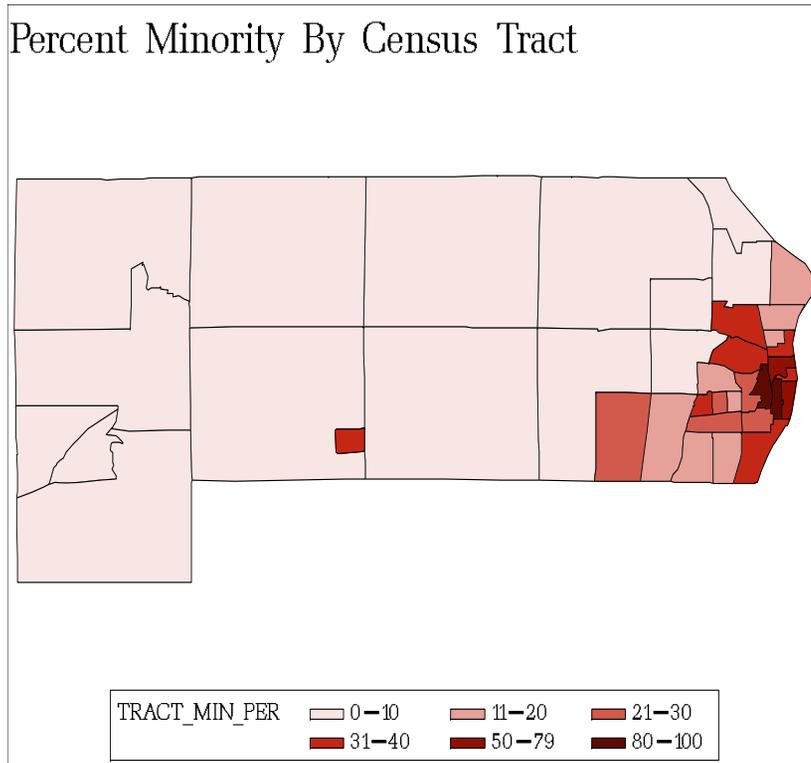


Median Credit Score

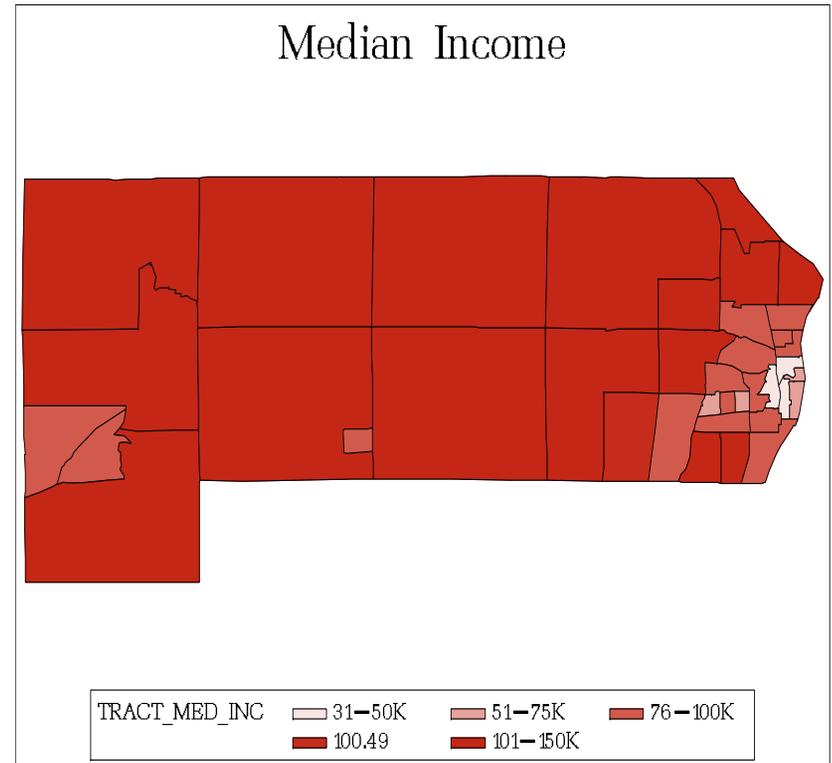




Percent Minority By Census Tract

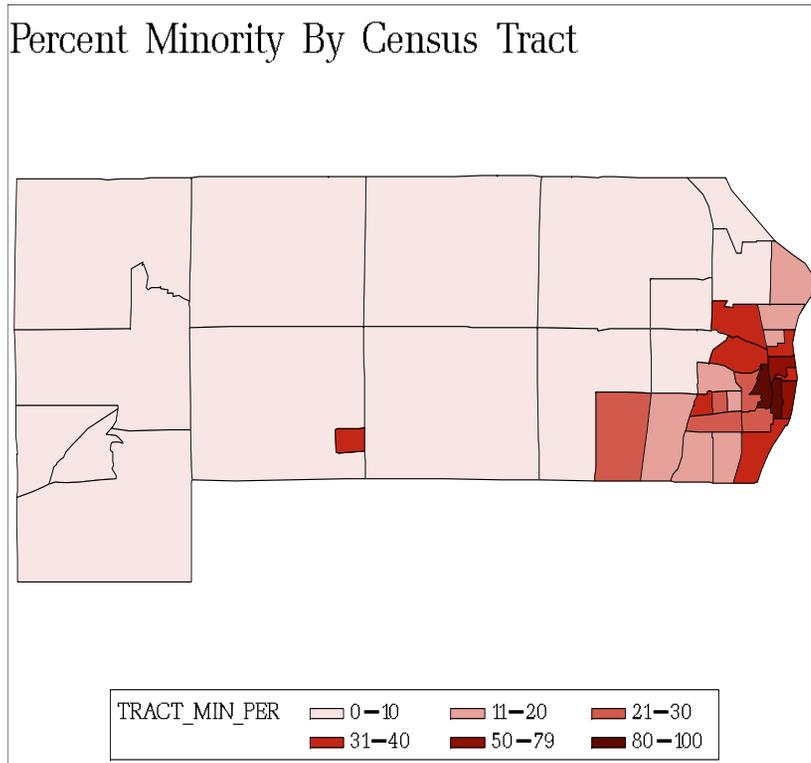


Median Income

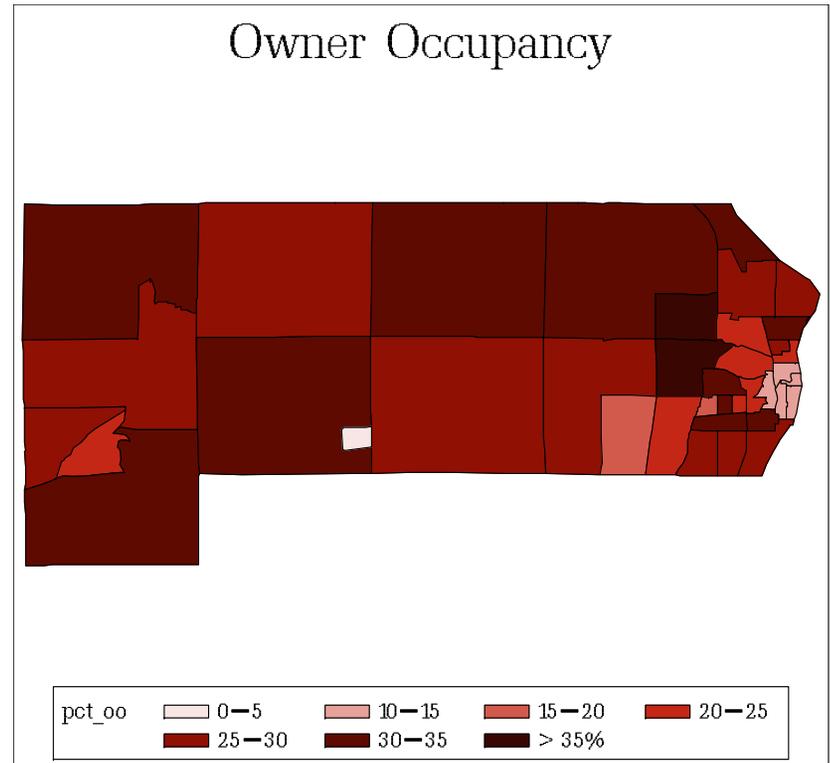




Percent Minority By Census Tract



Owner Occupancy





Results: effect of applying in a high-minority census tract

Applicant's probability of denial	Applicant's APR	App volume (per 1000 owner-occupied units)
<i>Before controlling for census tract characteristics</i>		
0.0002*	0.008*	-3.77***
<i>After controlling for census tract characteristics</i>		
0.00001	0.002	-0.08



New data and methods

- Use American Community Survey which will start providing annual tract level data in 2010
- Explore alternative model specifications (e.g. simultaneous equation models that aim to distinguish supply from demand)



Take Away Points

- RAD uses statistical models to look for evidence of redlining
- RAD analysis is based on HMDA combined with census and credit bureau data
- Our models aim to disentangle legitimate factors from any potential effects of the neighborhood's minority composition on lending
- RAD is constantly looking for new data and methods to enhance its analysis