Towards Standards in Mapping ACS Data

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Objective:

1) Acknowledge we have a problem

2) Establish standardized measure of map reliability

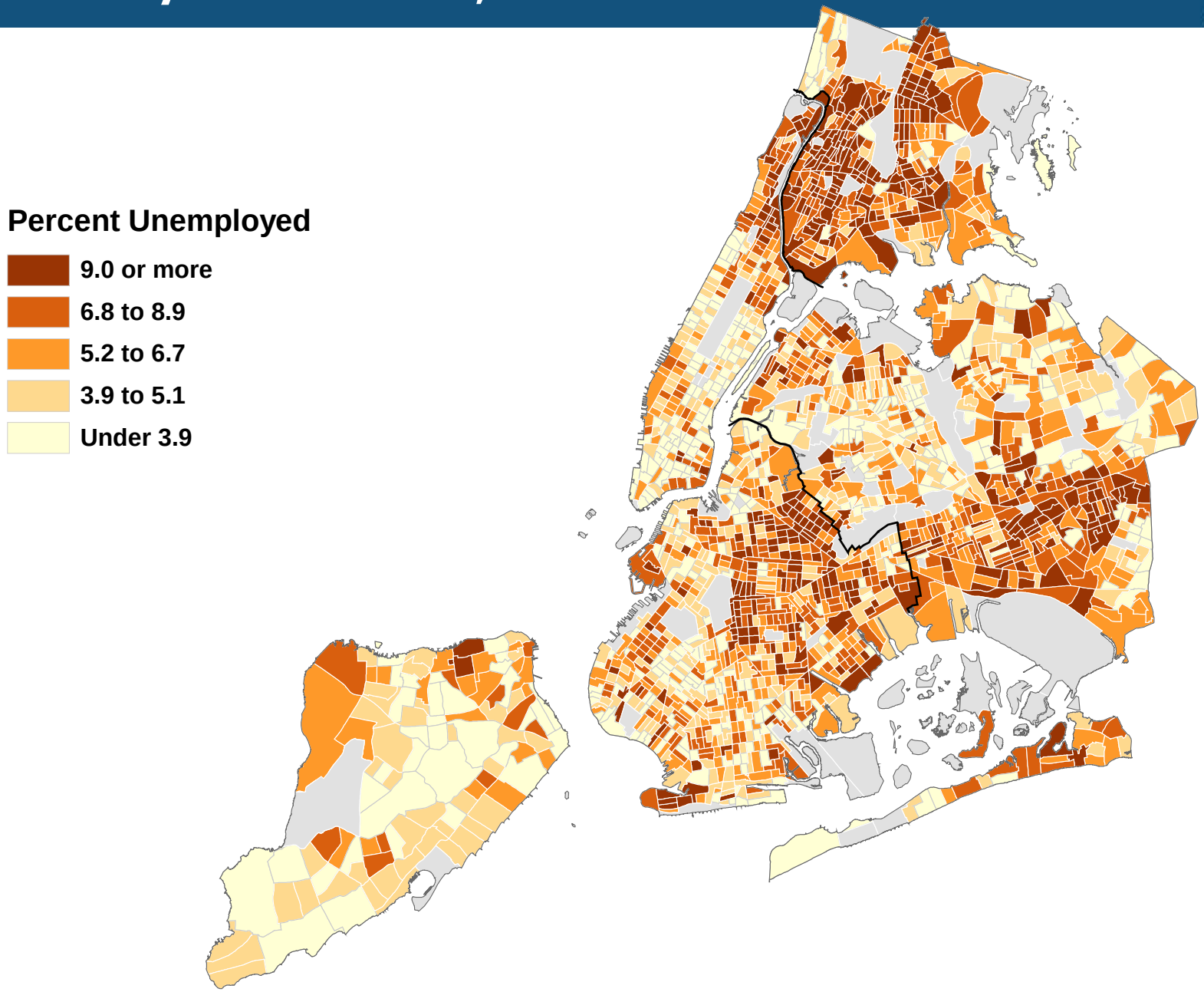
3) Delineate acceptable thresholds

4) Evaluate cross-section of ACS estimates

5) Summarize key findings

The Problem:
Unreliable ACS Maps

Percent Unemployed
New York City Census Tracts, 2010-2014 ACS



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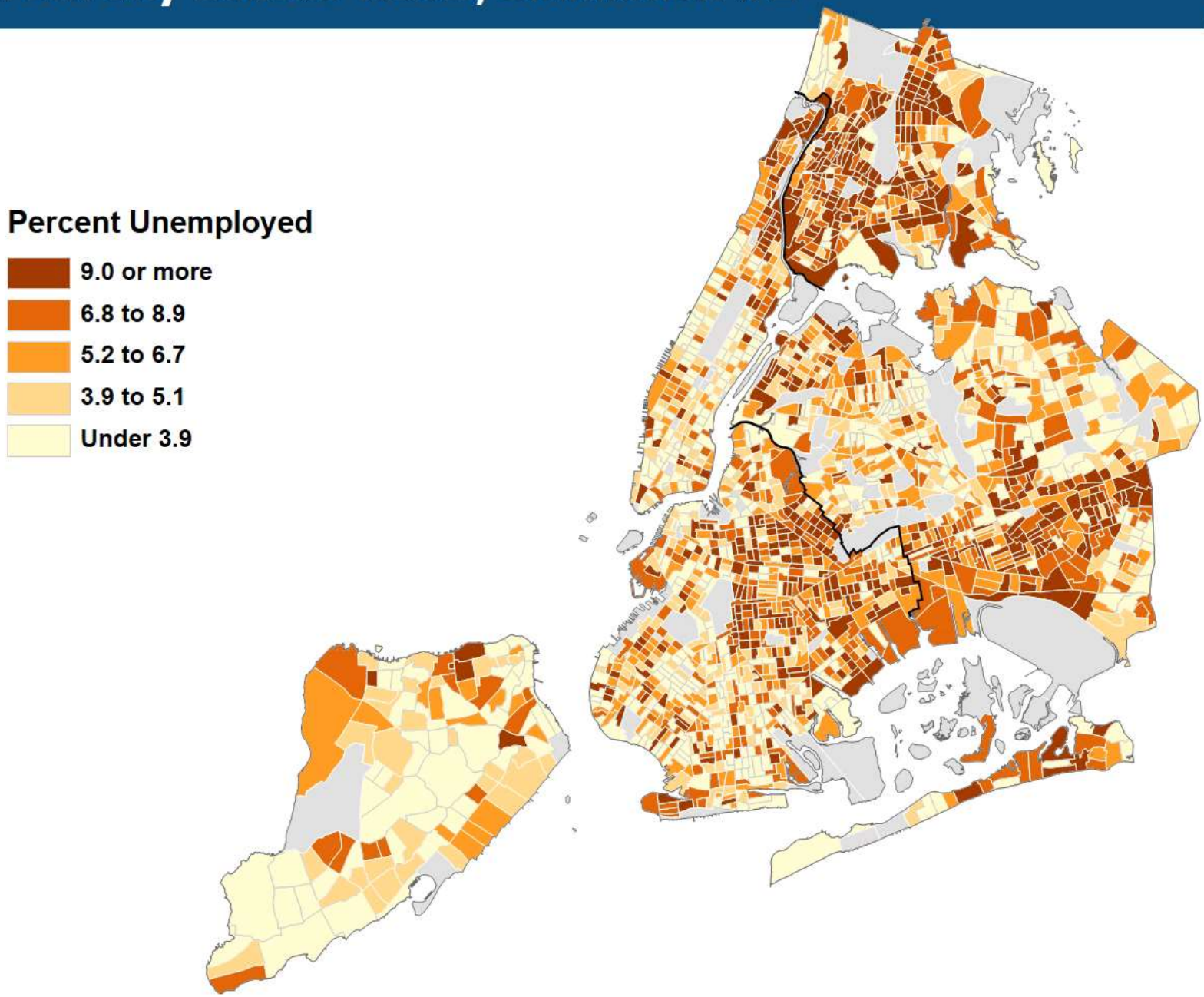
Percent Unemployed
New York City Census Tracts, Simulation #1



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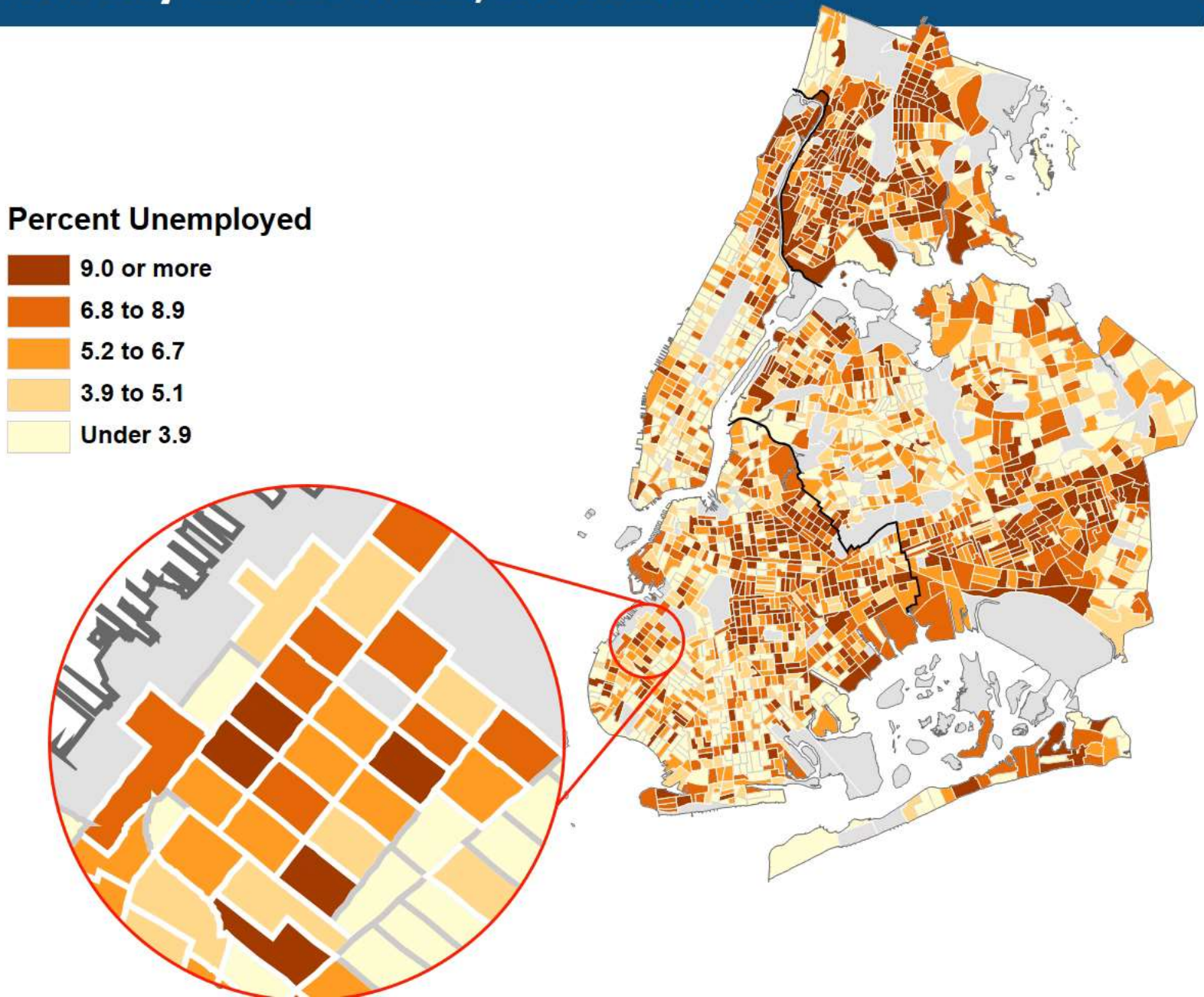
Percent Unemployed
New York City Census Tracts, Simulation #1



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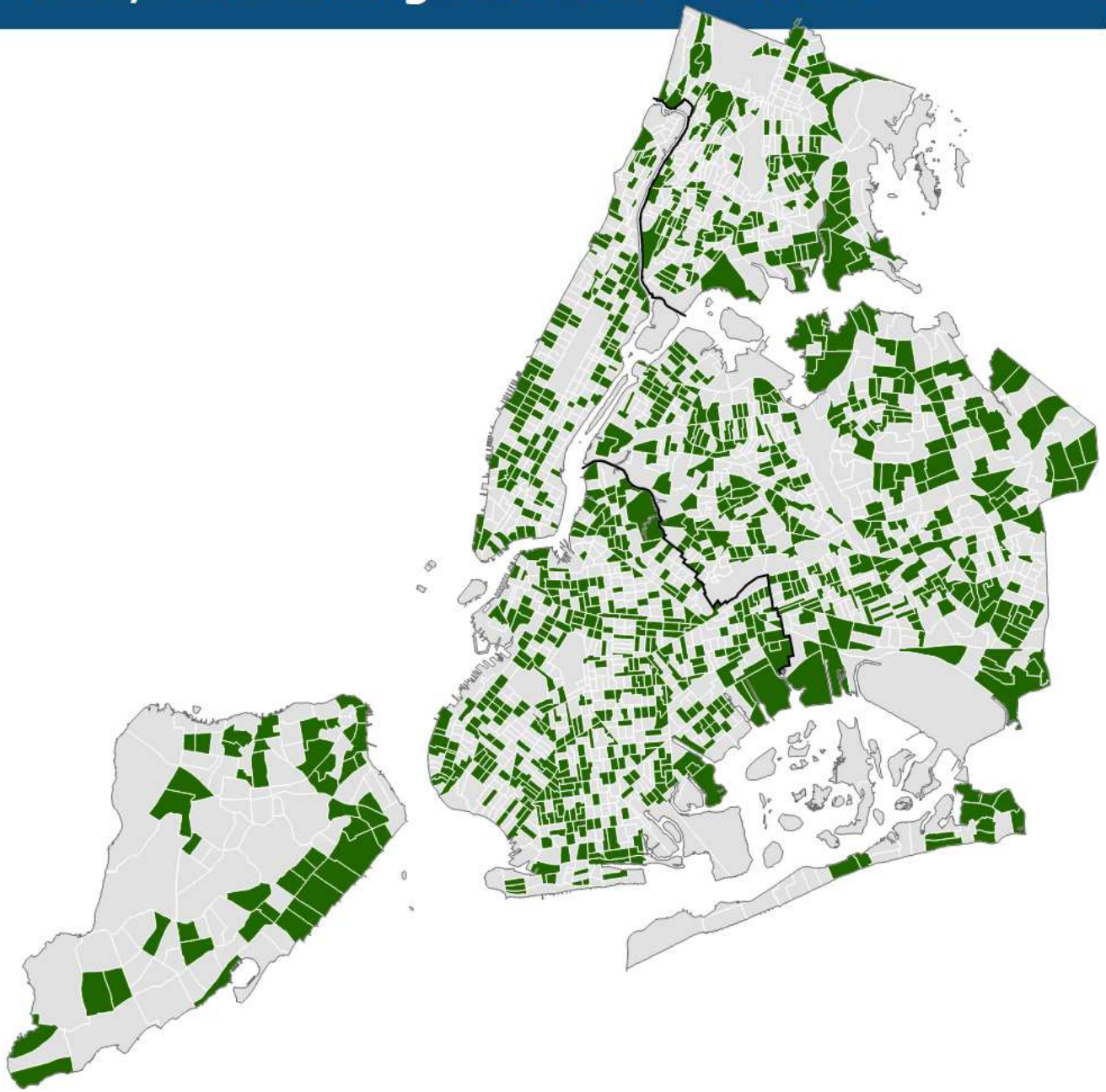
Percent Unemployed
New York City Tracts, Class Changed in Simulation #1



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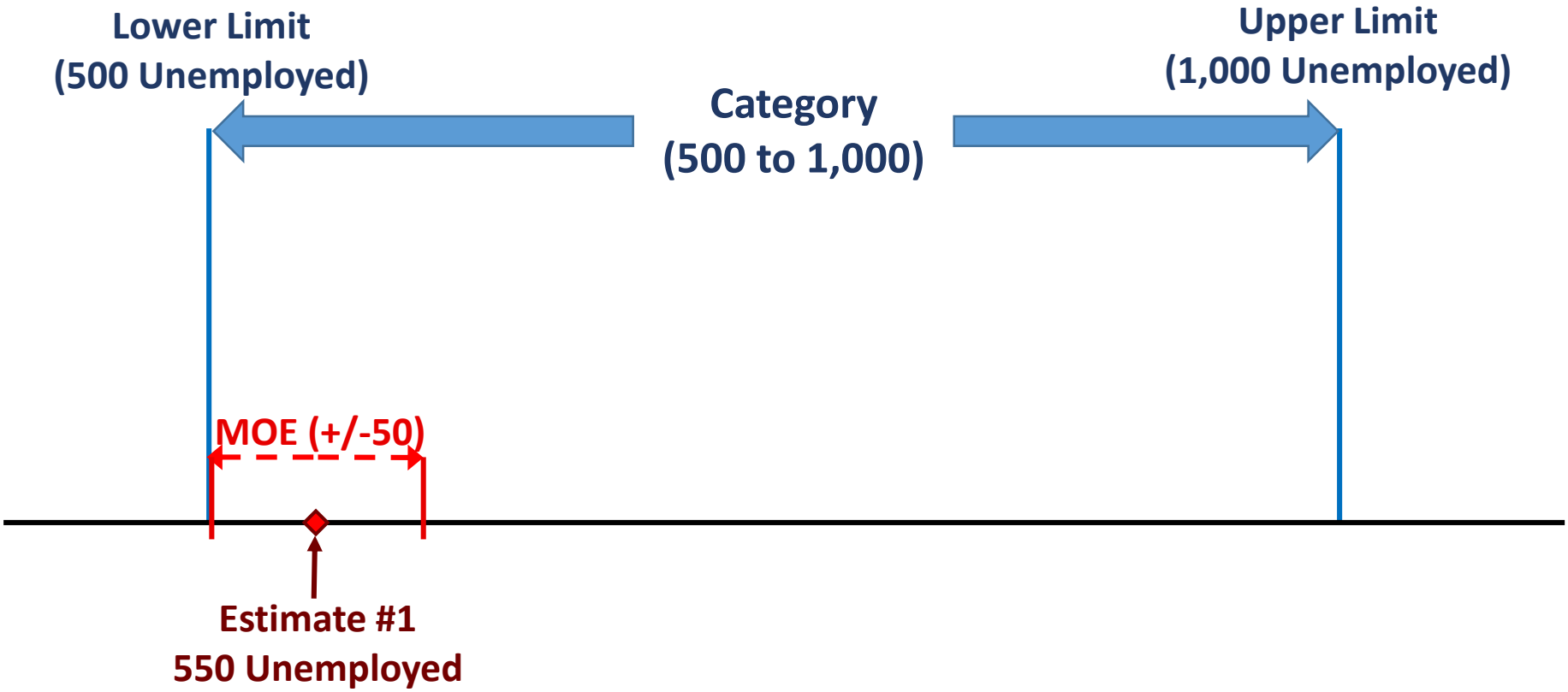
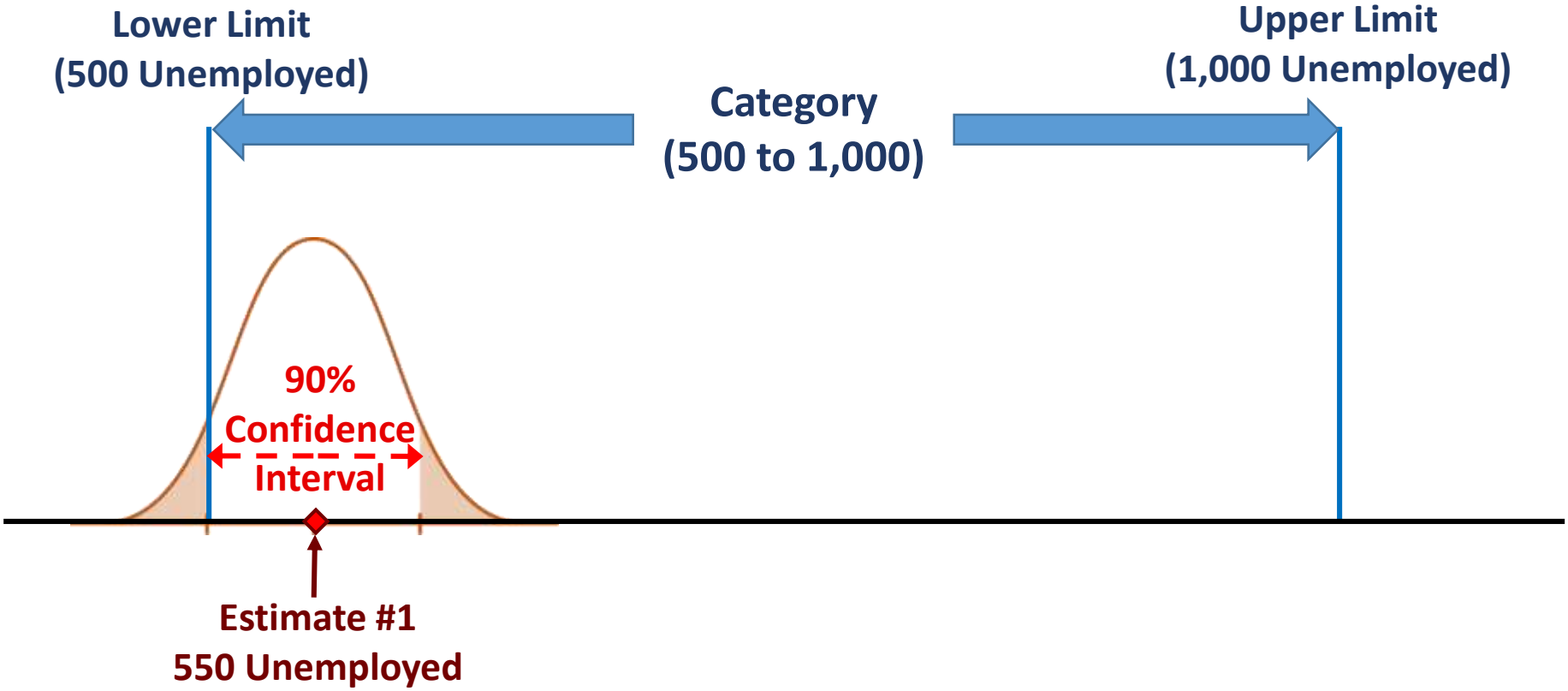
Calculating Map Reliability and Delineating an Acceptable Threshold

Calculating Map Uncertainty
Example – Mapping Unemployment



Calculating Map Uncertainty
Example – Mapping Unemployment



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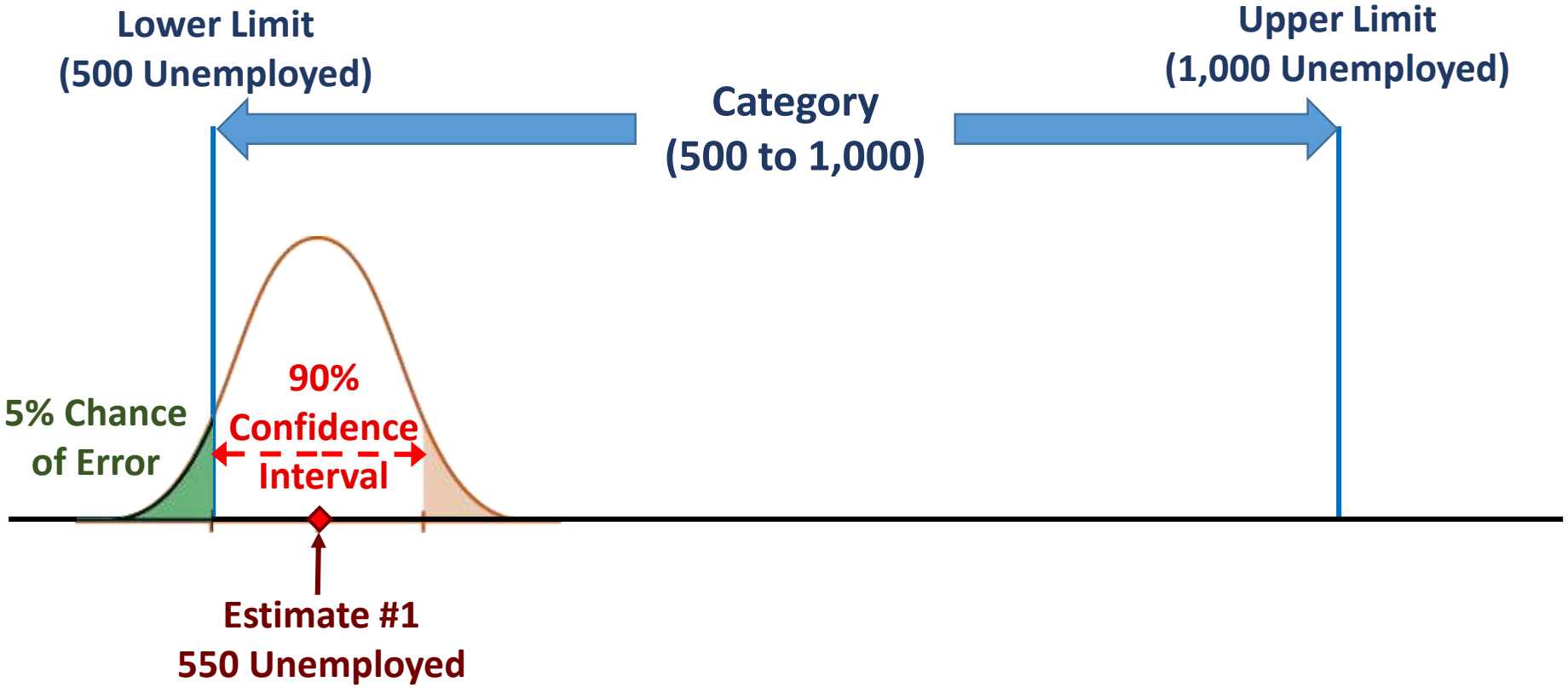
Calculating Map Uncertainty
Example – Mapping Unemployment



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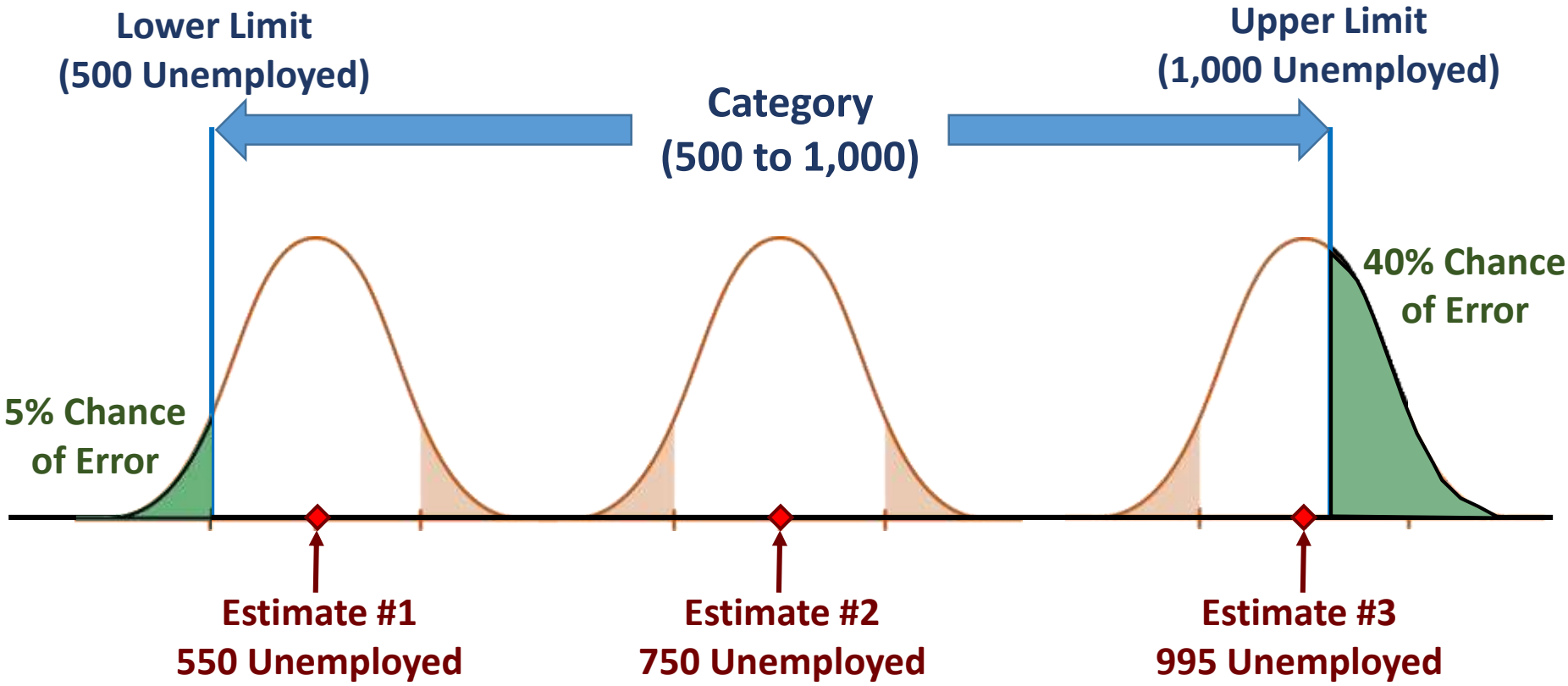
Calculating Map Uncertainty
Example – Mapping Unemployment



15% chance
one of the estimates
is erroneously classed

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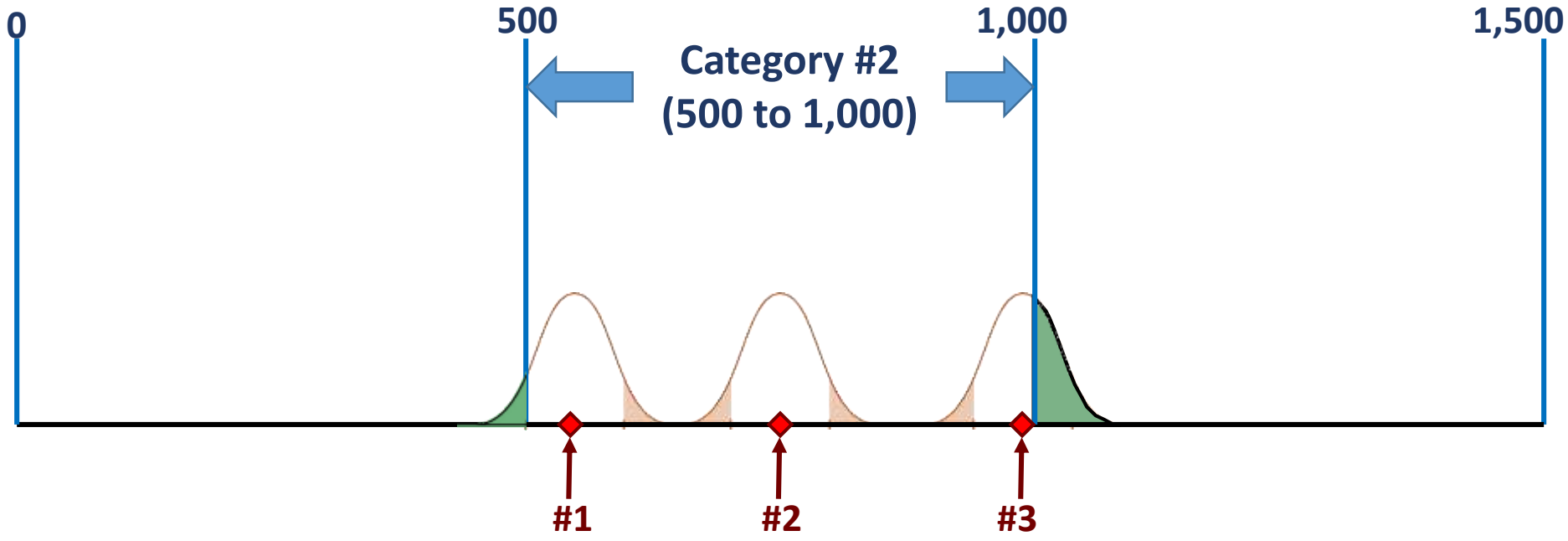
Calculating Map Uncertainty
Example – Mapping Unemployment



15% chance of error

n=3

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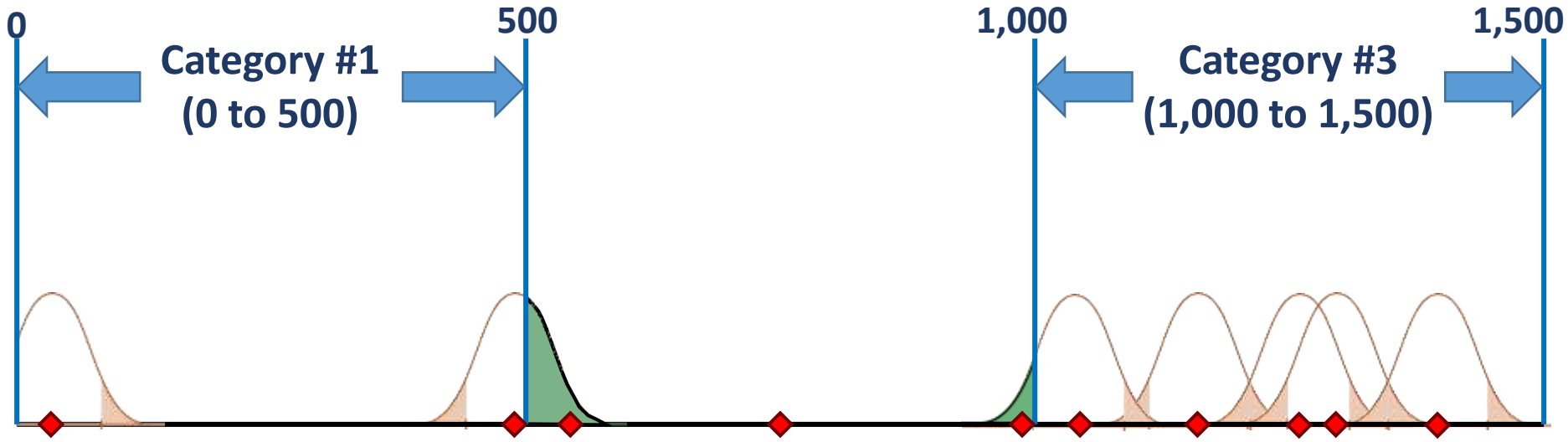
Calculating Map Uncertainty
Example – Mapping Unemployment



20% chance of error

n=2

3% chance of error

n=5

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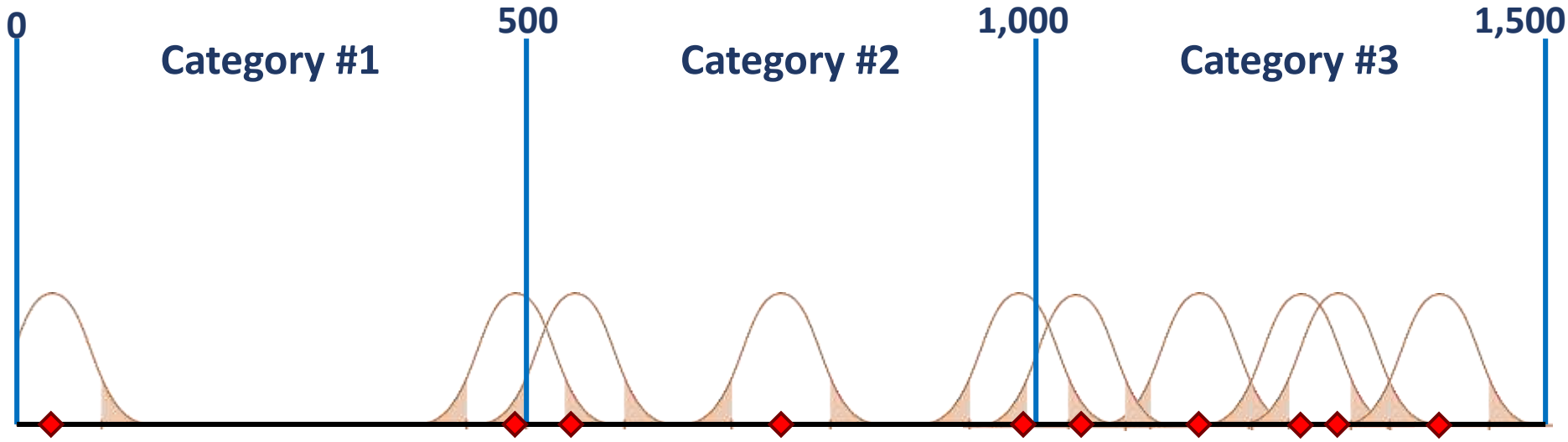
Calculating Map Uncertainty
Example – Mapping Unemployment

10% overall chance of error n=10



20% chance of error	15% chance of error	3% chance of error
n=2	n=3	n=5

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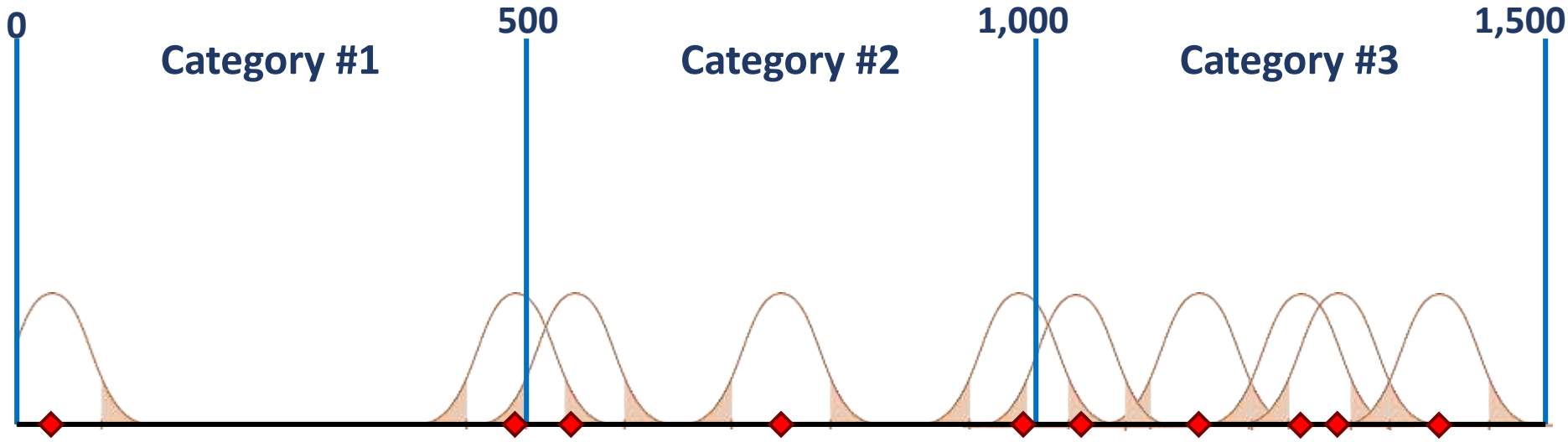
Calculating Map Uncertainty
Example – Mapping Unemployment

Max acceptable map error → **10% overall chance of error**



20% chance of error

Max acceptable error for any one class

15% chance of error

3% chance of error

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Evaluation of Cross-section of ACS Estimates

Assessment of Map Reliability for Selected ACS Estimates
2011-2015 ACS Summary Files

Demographic	Population 85 years and over
	Median Age
	Females 65 and over
	Asian nonhispanic
	Chinese, excluding Taiwanese
	Asian Indian
	Bangladeshi
	Southeast Asian
Social	Single female head, own children under 18
	65 and over living alone
	Less than high school diploma
	Population with ambulatory difficulty
	Born in New York State
	Born in Haiti
	Foreign-born non-citizen
	Speaks Spanish, limited English Proficiency
Economic	Unemployed
	Mean travel time to work
	Workers in professional occupations
	Workers self employed
	Household income $200,000 or more
	Median household income
	Population 65 and over below poverty
	No health insurance coverage
Housing	Vacant housing units
	Rental vacancy rate
	Median number of rooms
	No vehicles available
	1.51 or more occupants per room
	Owner costs 35% or more of income
	Rent 35% or more of income
	Rent 50% or more of income

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Dimensions of Analysis

1) 59 ACS counts, percents, means, medians, and rates

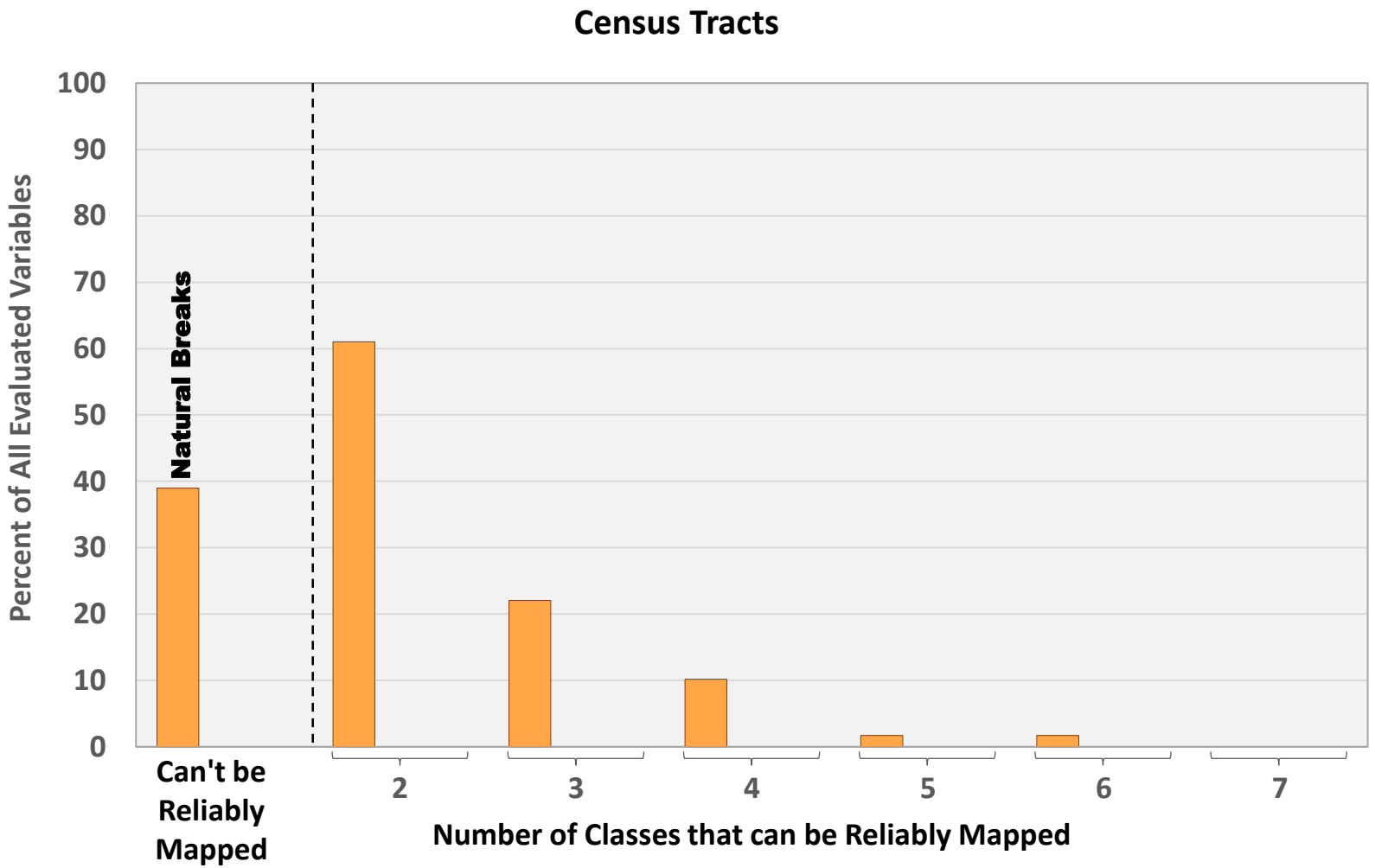
2) 3 map classification schemes (up to 7 classes)

   - Natural Breaks
   - Equal Interval
   - Quantile

3) 3 geographic summary levels

   - Census Tracts
   - Neighborhood Tabulation Areas (NTAs)
   - PUMAs

“Mapability” of Variables for New York City Census Tracts – Number of Classes that can be Reliably Mapped



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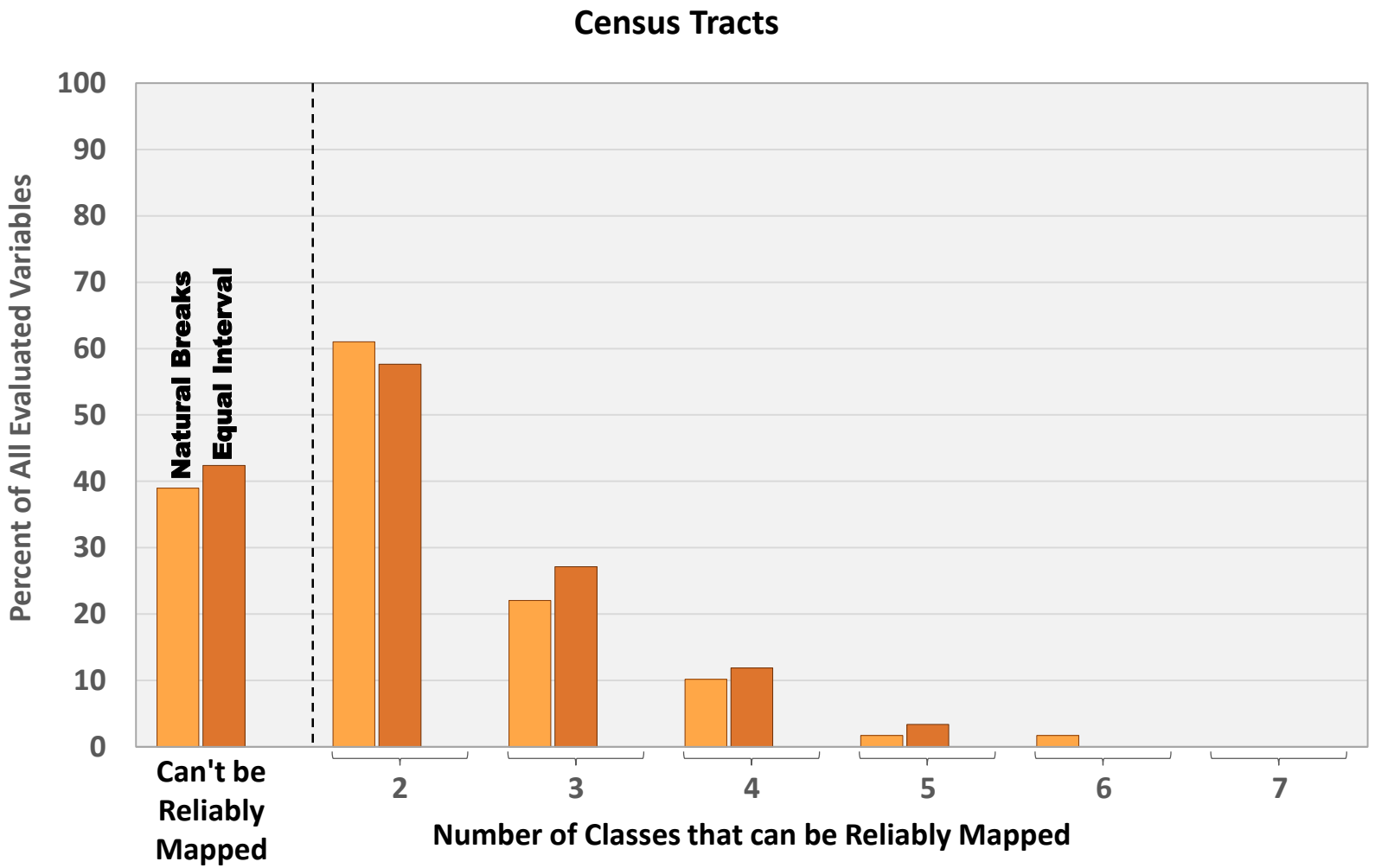

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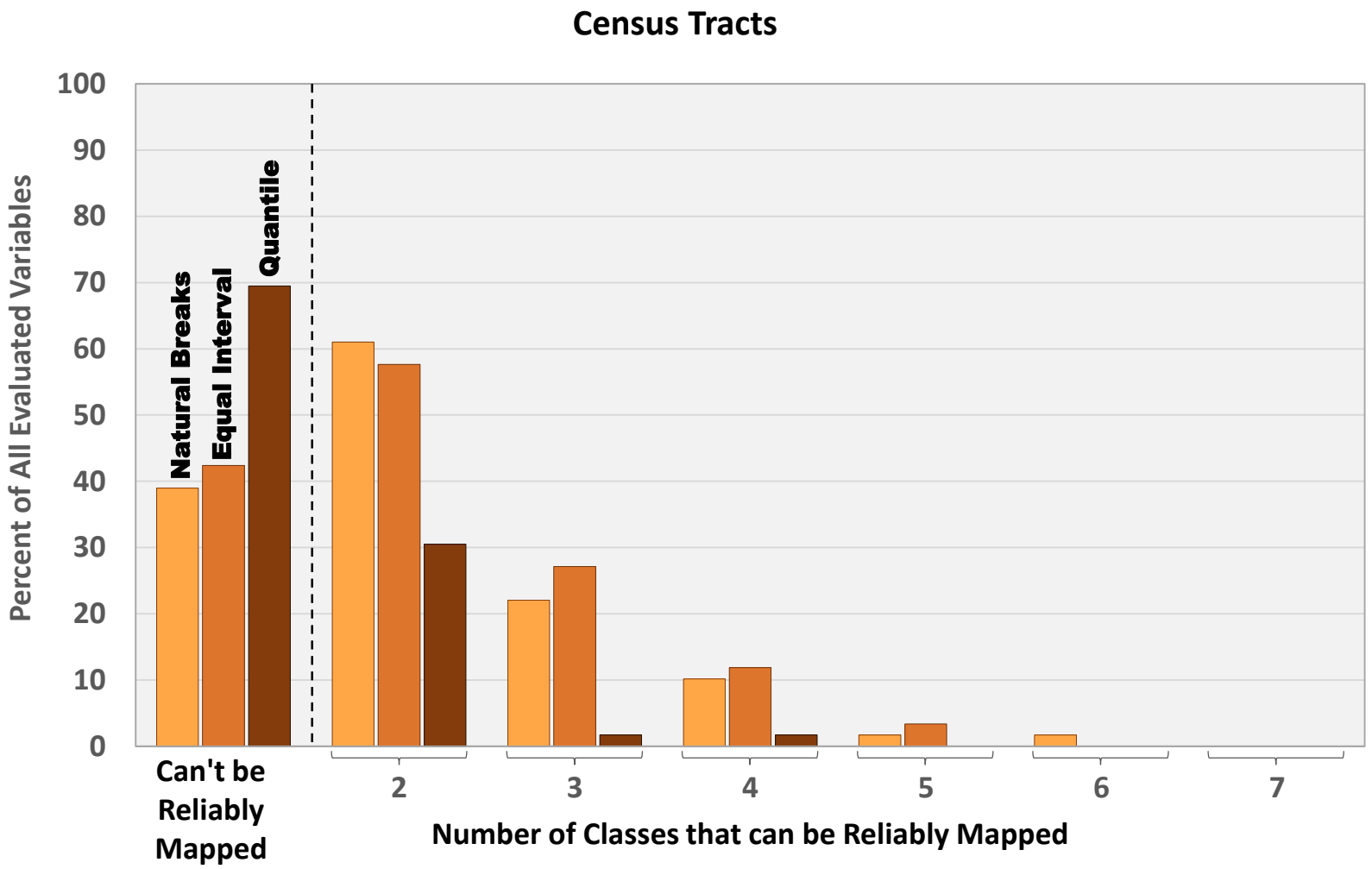

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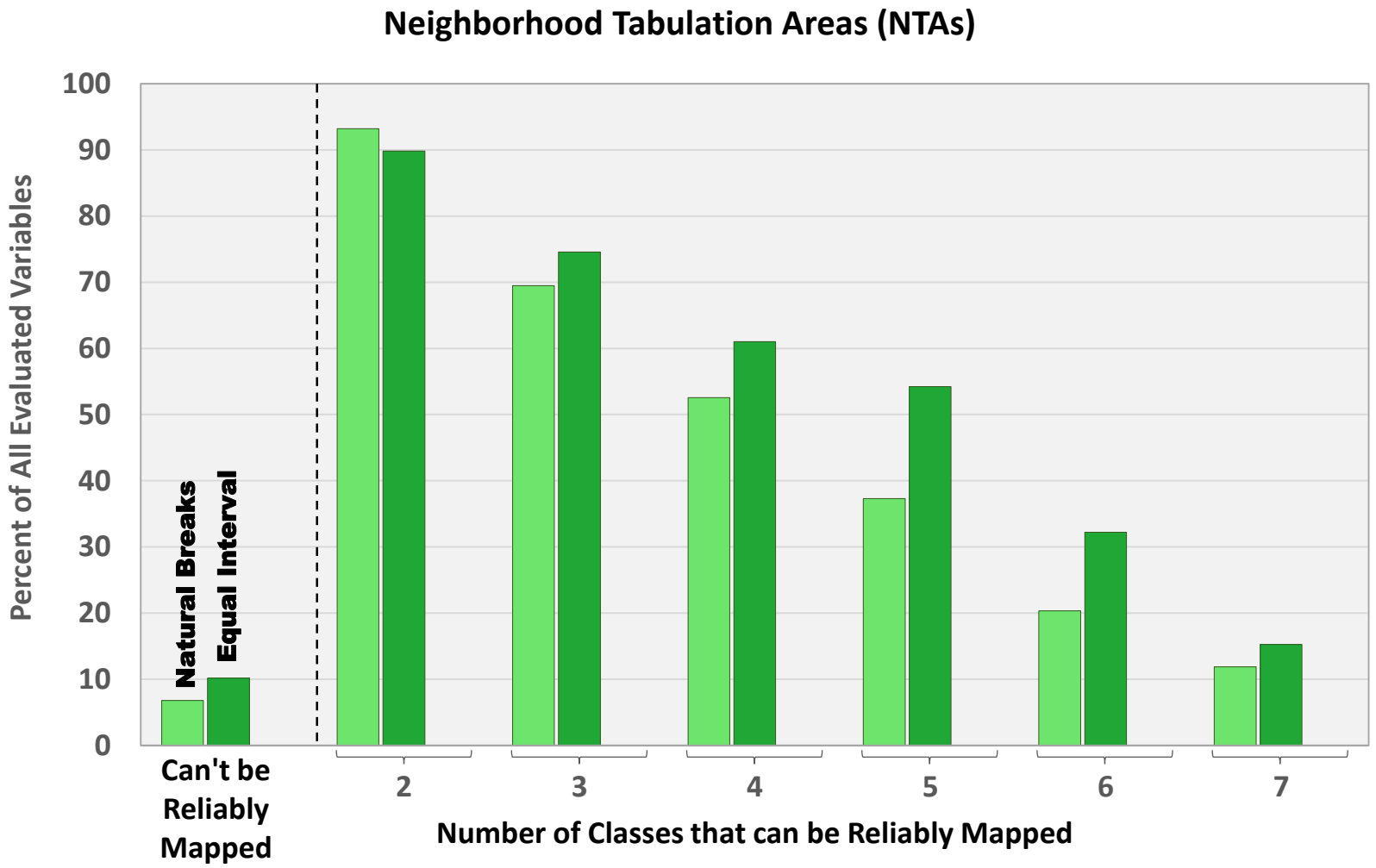
"Mapability" of Variables for New York City NTAs – Number of Classes that can be Reliably Mapped



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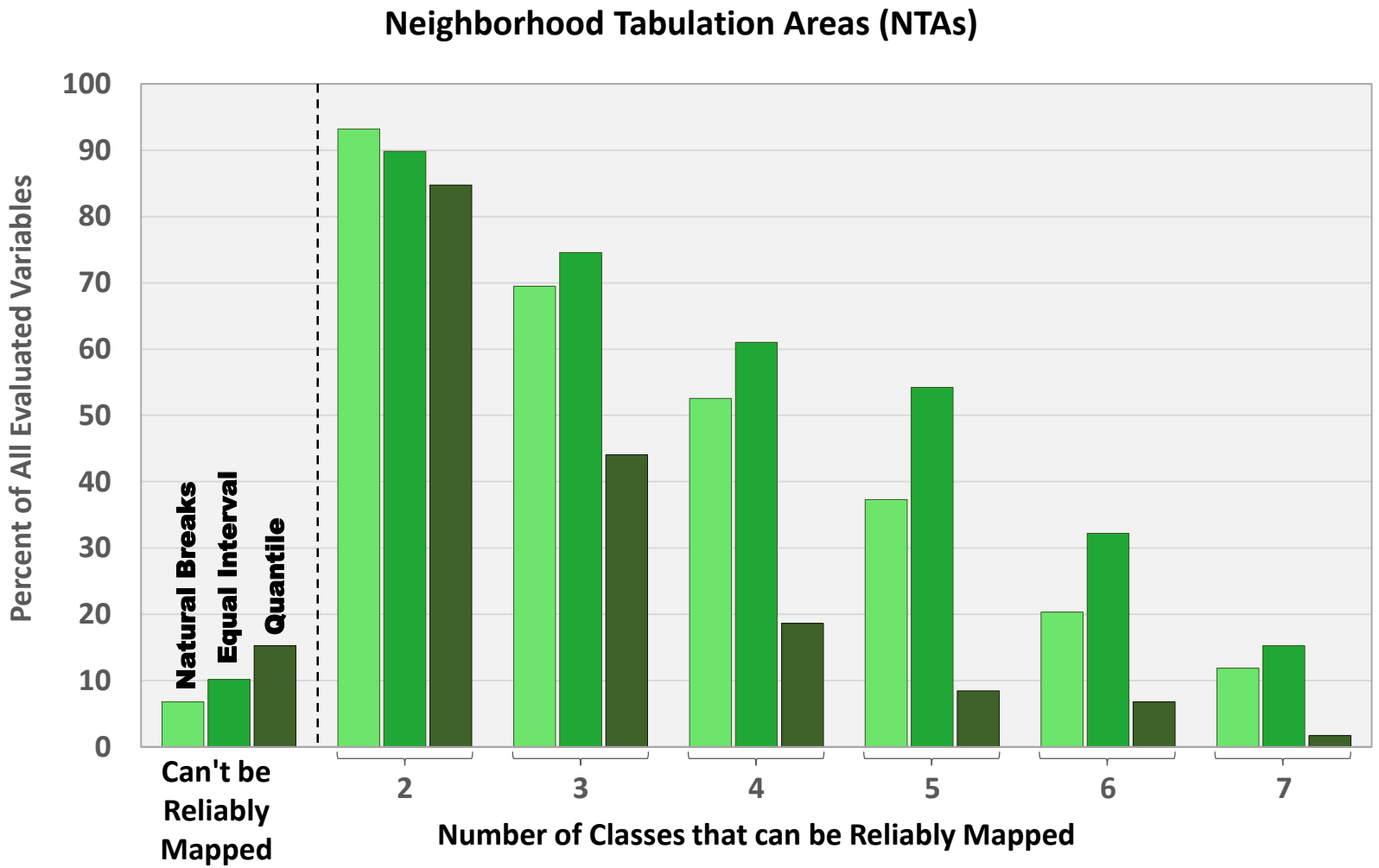
"Mapability" of Variables for New York City NTAs – Number of Classes that can be Reliably Mapped



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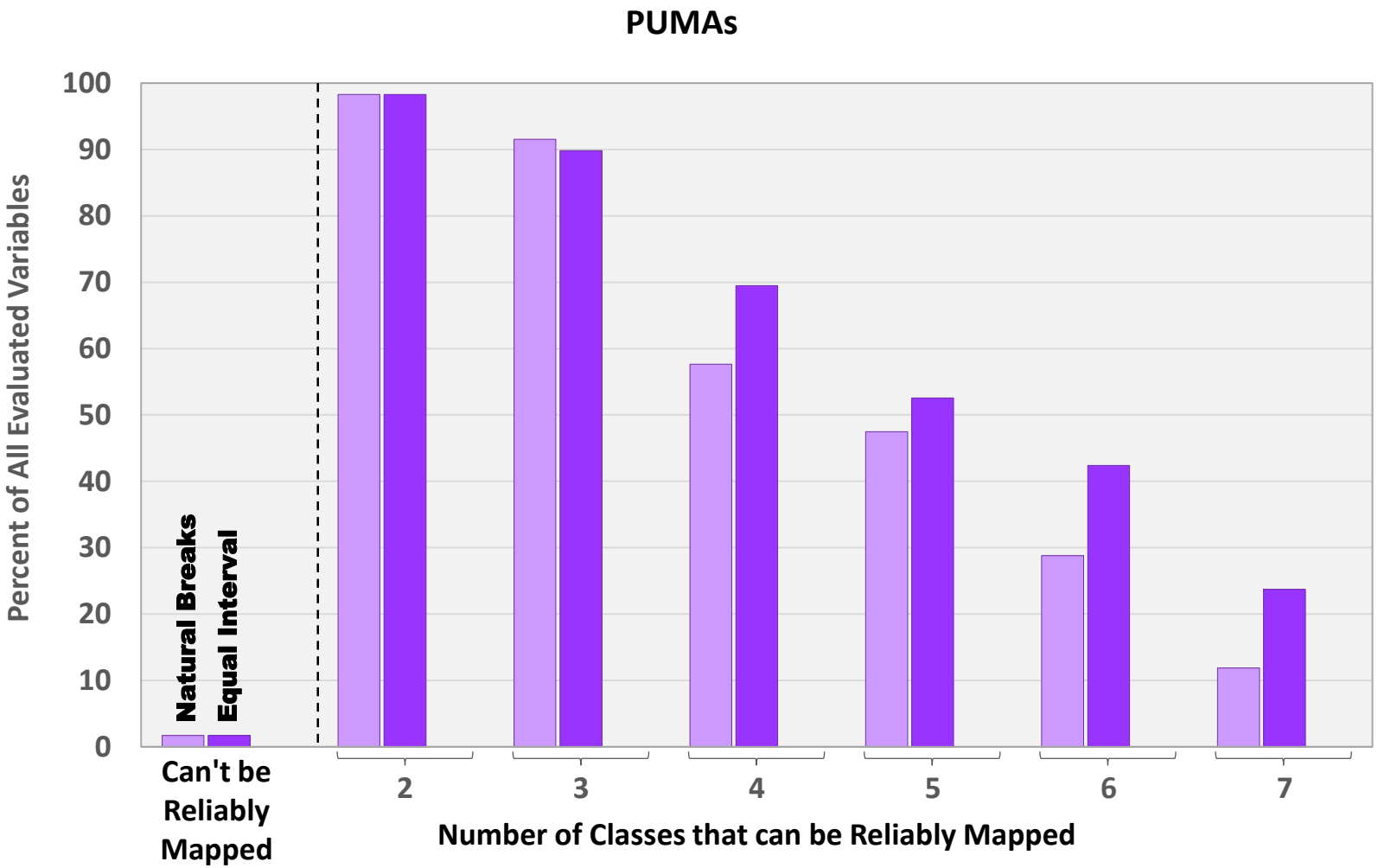
"Mapability" of Variables for New York City PUMAs – Number of Classes that can be Reliably Mapped



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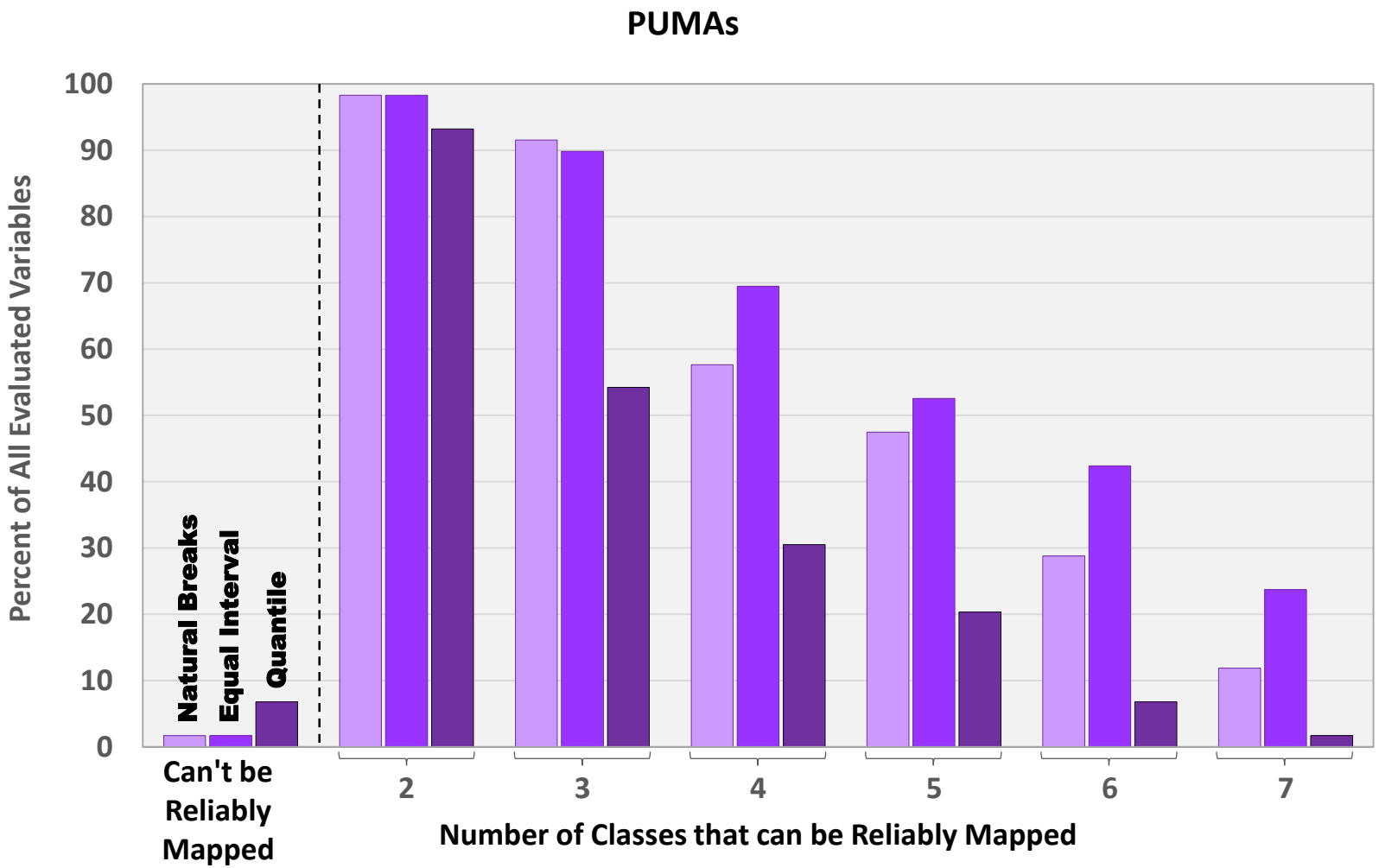
"Mapability" of Variables for New York City PUMAs – Number of Classes that can be Reliably Mapped



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Conclusions and Guidance

1) Exercise extreme caution when mapping ACS data at census tract level

2) Avoid using quantile mapping scheme

3) 90% of variables can be reliably mapped at PUMA level using three classes in both Natural Breaks and Equal Interval schemes

4) NYC specific NTAs almost as reliable as PUMAs

5) Reliability of maps not just about magnitude of error in ACS data