

CFPB initial methodology

Siskin/weighted/imputation methodology

Omitted variables

Correlated only with true class assignment	Estimated class coefficients are close to what is obtained using true/reported class membership.	Estimated class coefficients will be closer to zero than what is obtained using true/reported class membership, since omitted characteristics will be attributed to all individuals with a given probability of assignment, regardless of actual class membership.
Correlated with group composition (beyond that associated with race)	Estimated class coefficients will (likely) overestimate coefficients relative to reported membership, since methodology will associate variation coming from additional sources with class membership and not group composition.	Estimated class coefficients reflect differences due to unmeasured characteristics that are correlated with class and the outcome of interest. This will result in an estimate that is: -larger than the one reported without correlation -smaller than that reported using CFPB methodology -undetermined relative to what is obtained using true/reported class membership
Possible resolution to correlation with group composition (beyond that associated with race)	Estimation procedure would require use of individual level and group-level characteristics to separate impact of both, then remove impacts of group level characteristics and re-run regression. Only required if not planning on including individual-level omitted variables in model of interest.	No resolution. Assumption of model is that omitted characteristics are driving the disparity, and should be included. If anything, run similar procedure to adjacent cell.

Implications given true state of the world

Only disparate treatment	Estimated class coefficients are close to what is obtained using true/reported class membership. No additional covariates should be necessary.	Estimated class coefficients will be closer to zero than what is obtained using true/reported class membership.
Only disparate impact	With no additional covariates and correlation with group composition, estimated class coefficients will likely overestimate disparities relative to those obtained using true/reported class membership, since all variation is believed to derive from different outcomes across classes, not probabilities of assignment.	Estimated class coefficients reflect differences due to unmeasured characteristics that are correlated with class and outcome of interest. Since this is the definition of disparate impact, estimated class coefficients will generally be closer to those obtained using true/reported class membership than CFPB methodology. However, differences will be attributed to correlation with group composition beyond that associated directly with race.

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Theory of discrimination

Type	Disparate treatment	Disparate impact
Description	Members of protected classes experience different outcomes because they are treated differently on the basis of class membership.	Members of protected classes experience different outcomes because class membership is correlated with unmeasured characteristics that also influence outcomes.
Example	African American borrowers are charged a higher markups (relative to white borrowers) on the basis of race.	African American borrowers pay higher markups on average (relative to white borrowers) because higher markups are associated with applicants who live in low income areas, and African American applicants are more likely to live in areas with lower average incomes.

Measurement approach

Source of variation	Across groups of individuals by probability of assignment to protected class.	Across groups of individuals by probability of assignment to protected class.
Description	Measurement approach assumes that members of protected class actually experience the full treatment based on class membership. Estimated disparities reflect differences between classes due to the treatment of individuals. The probability of class assignment is a direct measure of the proportion of individuals who actually experience the treatment. The variation across groups of individuals sharing the same probabilities of assignment is assumed to come from differences within groups of applicants sharing the same probability of assignment and across groups of applicants with different probabilities of assignment.	Measurement approach assumes uncertainty with respect to class membership and no disparate treatment. It is assumed that all applicants within a group of applicants sharing the same probability of assignment experience the same treatment. Estimated disparities reflect differences in the outcomes across groups of applicants and are associated with classes to the extent that group outcomes are correlated with the probability of class membership. The variation across groups is assumed to arise from differences in non-class based characteristics across probabilities of assignment, while all classes are treated equally within a groups of applicants sharing the same probability of assignment.
Example	For example, suppose the probability of being classified as African American for a group of applicants living in the same census tract is 40% (based on the racial composition of the census tract). The assumption is that 4 out of every 10 applicants within the group of applicants are African American and actually experienced disparate treatment.	For example, suppose the probability of being classified as African American for a group of applicants living in the same census tract is 40% (based on the racial composition of the census tract). The assumption is that all applicants in the group experienced the same impact, and the extent to which this impact will be attributed to being African American is determined by the correlation between group outcomes and the composition of groups (e.g., 40%, 50%, etc., African American) across groups of applicants.

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Both	Estimated class coefficients will attribute both types of disparities to disparate treatment alone, typically resulting in overly large estimates of disparate treatment. Inclusion of omitted variables (ideally individual-level) driving disparate impact should move class coefficients toward the true disparate treatment value.	Estimated class coefficients will attribute both types of disparities to disparate impact alone, resulting in overly large estimates of disparate impact and an inability to estimate disparate treatment.
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