

Best vs All: Equity and Accuracy of Standardized Test Score Reporting

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June 22, 2022

- ▶ Standardized tests are essential to college admission
- ▶ College score-reporting policies:
 - ① **“Report Max”** (superscoring): applicants can choose which scores to submit
 - ② **“Report All”**: applicants must submit all test scores
- ▶ A source of unfairness: only *some* applicants can take the test multiple times
 - The retest rates in the ACT vary across groups
 - Hispanic students 34% vs White and Asian students 49%
 - Parents without a bachelor's degree 36% vs Parents with a bachelor's degree 62%
 - Both policies give highly resourced applicants more discretion over reported scores

- ① What happens under different score-reporting policies?
 - Students: test-taking decisions *given* their groups, ability types and score records
 - College: admission decisions *given* the reported scores
- ② How do these two reporting policies compare in terms of equity and accuracy?
 - Equity: group gap in false positive rates & group gap in false negative rates
 - Accuracy: college's expected payoff for screening purpose

Main Results

“Report All” is superior to “Report Max” both in equity and in screening accuracy

- ▶ Under “Report All”, there exist equilibria where a student’s admission probability is independent of the group membership, conditional on the ability type
 - *First-score equilibrium*: the admission outcome is determined by the first score
 - False positive rates and false negative rates are identical across groups
 - Outcome equivalent to enforcing a “one-test” policy
 - The unique nontrivial equilibrium outcome when students take the test at most twice
- ▶ Disparities between the two policies grow with the test score inaccuracy and the inequity in access to the test

The Model

- ▶ Players: a college & students
- ▶ Actions
 - Student: whether or not to take the test again
 - College: whether or not to admit the student

The Model: Information Structure

► Student

- Two ability types: $t \in \{H, L\}$ – the prior that a student is of type H is p
- Two group categories: $c \in \{1, 2\}$
 - Category 1 can only take the test once
 - Category 2 can take the test up to k times ($k \geq 2$)
 - The proportion of category 1 students is ϕ
- A sequence of test scores received thus far $s^n \in \{A, B\}^n$
 - The test generates a binary score $s \in \{A, B\}$
 - Test accuracy $Pr(s = A|t = H) = Pr(s = B|t = L) = \alpha \in (0.5, 1)$

► College: reported test scores

The Model

- ▶ No group discrimination on the surface
 - Ability type p and test accuracy α are category-independent
 - The college is blind to group categories
- ▶ Yet, among all students, only Category 2 students can make testing decisions *adaptively* after observing their previous test scores

The Model

► Strategies

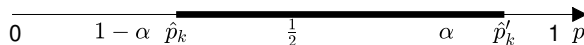
- Category 2 students: whether or not to retake the test *given* (t, s^n)
- College: whether or not to accept the student *given* the reported scores

► Payoffs

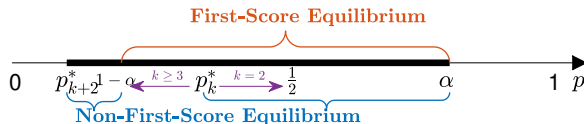
- Student: 1 for being admitted, 0 for being rejected
- College: 1 for admitting a type H student, -1 for admitting a type L

Non-Trivial Equilibrium Outcomes

- Trivial equilibrium outcomes: all students get admission/rejection



(a) Report Max



(b) Report All

- First-score equilibrium: $A \Rightarrow$ admission, a score record beginning in $B \Rightarrow$ rejection
 - The **unique** nontrivial equilibrium outcome if $p \in (1 - \alpha, 0.5)$ and $k = 2$

Equity: Category Gap in False Positive and False Negative Rates

Gap between categories (conditional on type) is lower under “Report All”

Compared to the nontrivial equilibrium under “Report Max”

- First-score equilibrium under “Report All”

	FN	(1, H)	(2, H)		FP	(1, L)	(2, L)
Max		$1 - \alpha$	$(1 - \alpha)^2$	Max		$1 - \alpha$	$1 - \alpha^2$
All		$1 - \alpha$	$1 - \alpha$	All		$1 - \alpha$	$1 - \alpha$

- “Report All” achieves parity across categories, whereas “Report Max” always favors the advantaged (Category 2) students
- Non-First-Score Equilibrium under “Report All”
 - Inequity across categories remains but it is reduced compared to “Report Max”

The college's expected payoff is higher under “Report All”

$$U_C^{nfs} \geq U_C^{fs} > U_C^{max}$$

- ▶ We study two score-reporting policies, “Report Max” and “Report All”, in an environment where students have unequal access to retaking a standardized test
- ▶ The paper characterizes the set of equilibrium outcomes under both policies
 - Under “Report All”, there exists first-score equilibrium outcome in which a student’s admission probability is category independent, conditional on the ability type
- ▶ Comparing the sets of non-trivial equilibrium outcomes under these two policies, we find that “Report All” yields lower inequity across categories and higher screening payoff for the college