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THE POWER OF CERTAINTY:
EXPERIMENTAL EVIDENCE ON THE EFFECTIVE DESIGN OF FREE TUITION PROGRAMS

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ABSTRACT

Proposed "free college" policies vary widely in design. The simplest approach sets tuition to zero for everyone. More targeted approaches limit free tuition to those who successfully demonstrate need through an application process. We experimentally test the effects of these two models on the schooling decisions of low-income students. An unconditional free tuition offer from a large public university substantially increases application and enrollment rates. A free tuition offer contingent on proof of need has a much smaller effect on application and none on enrollment. The results suggest students place a high value on financial certainty when making schooling decisions.

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A long line of research examines policies to increase college enrollment, especially among low-income students.¹ Recently, the policy debate has focused on a variety of “free college” proposals. These policies differ in their eligibility and implementation details, with the simplest setting tuition to zero for all students. More targeted approaches limit free tuition to those who successfully demonstrate need through an application process.

A compelling literature shows that seemingly minor differences in program design and implementation can have outsized effects on take-up rates.² We suspect this also holds true for free college programs. We implement a large-scale field experiment to test our hypothesis.

We randomly assign low-income high school students to receive a pre-admission, unconditional offer of four years of free tuition at the University of Michigan. In another treatment arm, the free tuition offer is contingent on students demonstrating need through a traditional aid application each year, for up to four years. A control arm experiences business as usual.

All students in this experiment have family incomes near the poverty line: they are identified using a confidential merger with data on individual eligibility for free- and reduced price meals in Michigan’s public schools. All students who are eligible for subsidized school meals, in expectation, will receive generous financial aid packages covering most if not all of their tuition and fees at the University of Michigan. Though both experimental arms advertise free tuition, they differ in the level of certainty and timing of when aid uncertainty is resolved.

Our analysis suggests that students’ application behavior is swayed by personalized encouragement and the framing of aid as “free tuition.” Students in both treatment arms apply to the University of Michigan at much higher rates. However, the financial certainty of the unconditional, four-year commitment appears particularly valuable. Among low-income students offered the unconditional, four-year commitment, the rate of application to the University of Michigan was 63 percent, compared to 44 percent in the arm with the conditional, one-year offer, and 35 percent in the control group.

Differences in enrollment behavior underscore the importance of fine print and additional verification in aid offers. While the up-front aid commitment increased University of Michigan enrollment by nearly 9 percentage points, the effect of the conditional commitment on enrollment was less than a percentage point and not statistically significant. This difference in part reflects the gap in application effects, but we also see differences in conditional yield rates. We provide suggestive evidence that the income and asset verification process may have resulted in students receiving slightly less than they expected, which likely dulled the impact of the conditional offer. We conclude that students place a high value on financial certainty when making schooling decisions.

¹See Dynarski and Scott-Clayton (2013) and Page and Scott-Clayton (2016) for reviews.

²See, for example, Johnson and Goldstein (2009); Beshears et al. (2013); Bulman (2015); Pallais (2015); and Goodman (2016).

I BACKGROUND AND RESEARCH DESIGN

Our setting is an ongoing initiative that has dramatically increased application and enrollment rates among low-income students at a selective public university. Since 2016, the University of Michigan at Ann Arbor has offered thousands of low-income students an up-front guarantee of four years of free tuition and fees (the “HAIL Scholarship”). Students randomized to receive this offer are more than twice as likely as those in a “business as usual” control group to apply to, be admitted by, and enroll at the University of Michigan (Dynarski et al., 2021).³

Our initial analysis of the introduction of this program did not allow us to tease out its mechanisms. The treatment was a mixed one: a personalized letter of encouragement from the university president, plus an unconditional offer of four years of free tuition and fees, plus mailings to parents. In the present paper, we narrow in on which of these mechanisms generates the very large effects on student decisions.

Our experimental test is straightforward. In fall 2019, we sent mailings to high-achieving, low-income, high school seniors in Michigan about the University of Michigan. We varied the content of these mailings across three randomly-assigned experimental arms. Photographs of the mailings are in Appendix A.

I. Control

Students are mailed:

- (a) recruitment materials typically sent to prospective applicants
- (b) general information about financial aid

II. HAIL Scholarship

Students and their parents are mailed:

- (a) a *personalized encouragement* to apply from the university president
- (b) an *unconditional offer of four years* of free tuition and fees

III. Go Blue Encouragement

Students and their parents are mailed:

- (a) a *personalized encouragement* to apply from the university president
- (b) a *conditional offer of up to four years* of free tuition and fees subject to verification of eligibility through financial aid applications each year

The first two arms replicate the design of Dynarski et al. (2021), in which high school seniors in fall 2015 and 2016 were randomized between control and the HAIL Scholarship. This captured the causal effect of the mixed treatment: a personalized letter of encouragement from the university president, plus an unconditional offer of four years of free tuition and fees, plus mailings to parents. As detailed in Dynarski et al. (2021), this mixed treatment generated very large increases in rates of application (42 percentage points) and enrollment (15 percentage points).

³Further analysis showed that students induced to attend University of Michigan would either have forgone college, attended a community college, or enrolled in a less-selective four-year college. There is no evidence that the HAIL intervention diverted students from other highly selective colleges.

While the treatment effects were conclusively large, it remained unclear *which* dimensions of the treatment were most effective. This ambiguity is consequential for policy. Consumers of the findings to whom we spoke, particularly policy actors, had widely varying takes on the program’s “secret sauce.” Some believed the personalized letter from the university president was what mattered, or the mailings to parents. Their interpretation implied that enhanced outreach would generate large changes in student behavior, without requiring any substantive change in financial aid policies.

Others interpreted the framing of aid as “free tuition” as what mattered most. This interpretation, too, implied that small tweaks to recruitment materials would reproduce the results. New mailings could, for example, highlight “free tuition,” with an asterisk and footnote indicating it was free contingent on passing a needs analysis. Again, this would require no up-front commitment of free tuition to students.

Our own interpretation was that it was the up-front guarantee of four years of free tuition that most affected student decisions. This conclusion rested, in part, on the null effects of previous experiments that provided only information about aid (e.g., [Bergman, Denning and Manoli 2019](#) and [Bettinger et al. 2012](#)). Informational interventions in other policy domains have also produced small to zero effects (e.g., [Bhargava and Manoli 2015](#)).

In order to nail down the mechanisms through which the original intervention affected student decisions, we worked with the university to design a third arm of the experiment.⁴ The new treatment arm highlights a University of Michigan program, announced in 2017, that targets low- to middle-income students: the Go Blue Guarantee. This program provides free tuition and fees to Michigan students with family income below \$65,000 and family assets below \$50,000.⁵

Communications for the two treatment arms (II and III) were made as similar as possible, but for the offer of aid. In particular, Arms II and III both highlight the concept of “free tuition,” while Arm I does not. The conditions of the “free tuition” offer differ between the two treatment arms.

In order to make the two treatment arms as similar as possible, the packets for HAIL and the Go Blue Encouragement were the same size and were similarly designed with the University of Michigan branding and bright coloring (Appendix A). Each packet included a letter signed by the president of the university, praising the student for their achievements and encouraging them to apply. Information was also mailed to parents and emailed to principals of eligible students. Letters to parents, mailed two weeks after the student packets, described the program (HAIL or Go Blue) and encouraged them to help their children apply. Communications with principals, sent around the same time as the student packets, explained the program, listed eligible students, and asked the principal to transmit the information to school staff who supported students in their college applications.

⁴It would have been very satisfying to add enough arms to separately identify the effect of every component of the original, mixed treatment. In practice, we were constrained by the capacity of the university to manage many treatment arms, as well as by the loss of statistical power from further splitting the sample.

⁵These two eligibility criteria for the Go Blue Guarantee are far simpler than the multivariable formula that is used to determine traditional aid such as the Pell Grant. From the students’ perspective, however, the process of qualifying for the Go Blue Guarantee is the same as it is for traditional student aid. Families complete financial aid forms, which the university uses to calculate the income and assets that define eligibility for the Go Blue Guarantee. Individual students only learn about their eligibility after admission. For continuing students this process is repeated, with aid potentially changing over time with a student’s financial situation.

The communications in the two treatment arms were identical but for their characterization of financial aid. The letters to students from the university president were identical but for a single paragraph. In the HAIL arm this paragraph read:

We believe you to be an academically excellent student who has worked hard for your achievements. If you apply to U-M and are admitted for the fall 2020 term, we will reward your hard work with the HAIL Scholarship, which covers the full cost of your in-state tuition for four years of study at our Ann Arbor campus. That's an approximate \$66,000 value to you and your family. Additionally, after a review of your financial aid applications, you will likely be eligible for additional aid to cover costs of housing, meals, textbooks, and other expenses.

For students in the Go Blue Encouragement arm, this paragraph instead read:

We believe you to be an academically excellent student who has worked hard for your achievements. That's why we hope you are planning to apply to the University of Michigan. Furthermore, our Go Blue Guarantee can help you with your college costs, as it covers the full cost of in-state tuition for in-state students who are admitted to the Ann Arbor campus and whose families earn incomes of \$65,000 or less, with \$50,000 or less in assets. If your family earns more, you can still Go Blue; we provide tuition support for families with incomes up to \$180,000.

As noted earlier, all the students in the experiment have low incomes and would typically qualify for free tuition through standard need-based aid programs administered by the university. It is the timing and certainty of the aid offers that varies across the experimental arms. The HAIL arm receives a four-year commitment of free tuition in the September of their senior year of high school. The control and Go Blue Encouragement arms receive a single-year commitment only if admitted, after completing the aid process, and have to reapply for aid in subsequent years. This is typically in March or April of the senior year of high school; however, aid commitments can arrive as early as December (for those admitted through an early decision program) or as late as the summer after high school (for those whose aid applications are hung up by bureaucratic delays).

II DATA, SAMPLE, AND RANDOMIZATION

We identify students for the intervention using longitudinal, student-level administrative data from the Michigan Department of Education (MDE) that contain the universe of students attending public high schools in Michigan ([Michigan Department of Education, 2022](#)).

We identify high-achieving students using high school GPA and SAT score, which come from mandatory, in-school 11th grade testing. GPA is self-reported on the SAT student questionnaire.⁶ For this intervention, qualifying SAT scores start at 1100 and qualifying GPAs at a B. Students with higher test scores faced a lower GPA threshold (and vice versa). The Office of Enrollment Management at the University of Michigan set the GPA and score cutoffs; they are similar to the criteria the school uses when gleaning prospective recruits from national data on SAT takers.⁷ Students in the sample had an average GPA of an A and SAT of 1270.

We identify low-income students using data on qualification for the federal subsidized school-meals

⁶The state of Michigan stopped the statewide collection of high school transcripts several years ago; hence our use of self-reported GPA. For students with grades and scores in the target range in earlier cohorts, self-reported GPA on the SAT questionnaire was closely aligned to official GPA on transcripts.

⁷Grades and scores alone do not determine admission; like most highly selective colleges, the University of Michigan uses a holistic admissions process that also considers factors such as family background and extracurricular activities.

program. Nationwide, students with family income below 130 percent of the federal poverty line qualify for free lunches, while those with incomes up to 185 percent of the poverty line can get subsidized lunches. In 2020, for a family of four, these thresholds were \$34,060 for free lunch and \$48,470 for subsidized lunch.

Of the approximately 100,000 juniors in Michigan’s public high schools in the 2018-19 school year, 1,796 students from 477 schools meet both the income and academic criteria for the experimental sample. Four-fifths of our sample qualifies for a free lunch and the remainder for a reduced-price lunch.

A Randomization

All students in a school who meet the income and academic criteria are assigned the same treatment status. That is, we randomly assign entire high schools to the treatment arms. We do this because we hypothesize treatment spillovers within schools, which would attenuate estimated effects toward zero.

We stratify the sample by region (Southeast vs. rest of Michigan) and urbanicity (city vs. suburb, town, or rural)⁸ and randomize within each of the resulting four strata. We chose these strata based on the finding in our earlier experiment that students in rural and more remote areas are most affected by HAIL (Dynarski et al., 2021). The probability of assignment to each arm is one third. We rerandomized to achieve balance within region on school characteristics (see Appendix Table 1).

The randomization resulted in 610 control students in 159 control schools, 595 HAIL students in 159 HAIL schools, and 591 Go Blue Encouragement students in 159 Go Blue Encouragement schools. Sample characteristics are shown in Table 1, by experimental arm. A third of the schools are in the Southeast region of the state, near Ann Arbor, Lansing, and Detroit. Another 15 percent of schools are in the largely rural Upper Peninsula. The remaining schools are scattered across the Lower Peninsula, with many in the Grand Rapids area. Over half the schools are rural, about a third are suburban, and the remainder urban.

Using non-mutually-exclusive race categories, our sample is eighty percent White, seven percent Black, seven percent Hispanic, eleven percent Asian, three percent American Indian, and less than one percent Native Hawaiian or Pacific Islander. Eight percent of the sample belongs to more than one of the race categories.

Balance checks are shown in Appendix Table 1. None of the pairwise comparisons between the treatment and control groups are statistically significant at conventional levels; we also found no statistically significant differences between the combined treatment groups and the control group. This is substantiated by a joint F-test for each pair of treatment arms, which reveal that, together, these characteristics do not predict treatment status.

⁸Due to a coding error, we implemented the randomization using out-of-date versions of the urbanicity variables in our dataset. Using up-to-date values of these variables, our treatment arms are not balanced on the proportion of city schools. All of our main results are robust to controlling for the up-to-date urbanicity values.

III EMPIRICAL STRATEGY

We evaluate the effect of the HAIL and Go Blue Encouragement offers on application, admission, and enrollment at the University of Michigan, as described in our pre-analysis plan.⁹ We use internal data on these outcomes from the university ([University of Michigan Office of Financial Aid 2022](#); [University of Michigan Office of Enrollment Management 2022](#)), as well as enrollment data from the state of Michigan ([Michigan Department of Education, 2022](#)). We estimate the following by ordinary least squares (OLS):

$$(1) \quad Y_j = \beta_0 + \beta_1 HAIL_j + \beta_2 GBEncouragement_j + S_j + u_j$$

where Y_j is an outcome of interest at school j . We collapse the individual student data to the school level (the level of randomization) and conduct analysis on these means. $HAIL_j$ and $GBEncouragement_j$ indicate assignment to the HAIL or Go Blue Encouragement treatment group, respectively. S_j is a vector of strata dummies.

β_1 and β_2 are the parameters of interest and measure the causal effect of being randomized into the HAIL or Go Blue Encouragement treatment arm, respectively, relative to the control arm, i.e., the estimated effect of the intent to treat (ITT). These parameters represent the treatment effect on the outcomes of interest, with schools weighted equally. We additionally test whether the HAIL and Go Blue Encouragement treatment effects are significantly different from each other.

In Section V, we present instrumental-variable (IV) estimates where we use assignment to each treatment as an instrument for application to the University of Michigan. We estimate the causal effect of application on admission and enrollment for students induced by either intervention to apply.¹⁰ In these analyses, we estimate the following systems of equations using two-stage least squares (2SLS):

$$(2a) \quad Application_j = \alpha_0 + \alpha_{HAIL} HAIL_j + S_j + e_{HAIL}$$

$$(2b) \quad Y_j = \beta_0 + \beta_{HAIL} \widehat{Application}_j + S_j + u_{HAIL}$$

$$(3a) \quad Application_j = \alpha_0 + \alpha_{GB} GBEncouragement_j + S_j + e_{GB}$$

$$(3b) \quad Y_j = \beta_0 + \beta_{GB} \widehat{Application}_j + S_j + u_{GB}$$

where $\widehat{Application}_j$ is the school-level application rate predicted by equation 2a or 3a. In this set-up, β_{HAIL} and β_{GB} represent the local average treatment effects (LATE): the causal effects of application on enrollment (or admissions), for students induced by the HAIL or Go Blue Encouragement treatment, relative to the control treatment, to apply.

⁹This study is registered at the randomized trial registry of the American Economic Association under RCT ID AEARCTR-0001831, with 10.1257/rect.1831-3.0 ([Dynarski et al., 2019](#)).

¹⁰Only the first stage and the reduced form analysis were included in the pre-analysis plan.

We run 2SLS separately for the control and HAIL arms (equation 2) and the control and Go Blue Encouragement arms (equation 3), with equation 2 estimating the LATE for control-HAIL compliers, and equation 3 estimating the LATE for control-Go Blue Encouragement compliers. Each equation is estimated for admission and enrollment outcomes. Consistent with our ITT analyses, we report school-level results.

IV RESULTS

Panel A of Table 2 shows the main effects of the HAIL and Go Blue Encouragement offers on application, admission, and enrollment at the University of Michigan; Appendix Figure 1 shows the effects visually. We find that the HAIL scholarship increased application by 28 percentage points, admission by 10 percentage points, and enrollment by 9 percentage points relative to the control group. The Go Blue Encouragement treatment increased application by 8 percentage points, admission by 3 percentage points, and enrollment by 1 percentage point, relative to the control group; for the Go Blue Encouragement treatment, only the effect on application is statistically significant at conventional levels.

The HAIL treatment effect is larger than the Go Blue Encouragement treatment effect on both the application and enrollment margins (p-values on differences are 0.000 and 0.022, respectively), and marginally significant on the admissions margin (p-value on difference is 0.053). Substantively, the treatment effect on application was 20 percentage points higher for HAIL than Go Blue Encouragement and the admission and enrollment effects were each 8 percentage points higher than Go Blue Encouragement.

Overall, both HAIL and Go Blue Encouragement significantly increased application rates among low-income, high-achieving students. However, effect sizes are about three times larger for HAIL and we find no significant effects of Go Blue Encouragement on enrollment. Since everyone in the control group was theoretically exposed to the statewide Go Blue policy, this implies that the personalized mailers did little to increase enrollment among low-income, high-achieving students beyond the statewide Go Blue policy.

The results so far are based on data from University of Michigan on application, admission, and enrollment. We use data from the National Student Clearinghouse to examine college enrollments nationwide. (We do not have data on nationwide application or admissions.) The second panel of Table 2 presents these results.

For HAIL, the point estimates are broadly similar to those for the two cohorts examined in [Dynarski et al. \(2021\)](#), though they are substantially less precise due to the smaller sample. The results indicate that HAIL did not “poach” students from other schools as selective as UM, nor did it increase enrollments at such schools. Students induced into UM by HAIL would not have attended college at all, or attended less selective colleges, in the absence of the intervention.¹¹

None of the point estimates for Go Blue Encouragement are substantively or statistically significant. Go Blue Encouragement had no impact on enrollment at UM, or anywhere else.

¹¹The control mean for UM attendance is higher than for the earlier cohorts, while for the HAIL arm average attendance is about the same. This mechanically produces a smaller treatment effect (9 vs 15 percentage points) than in the first two cohorts. This could be explained by many factors, including variation over time in program materials (the HAIL packet shrank), changes between cohorts in the definition of the experimental sample, secular time effects, the introduction of the Go Blue Guarantee, or growing knowledge of the HAIL Scholarship among low-income students in the state.

V MECHANISMS

Our ITT estimates suggest that the up-front guarantee of free tuition has a profound impact on student behavior. In this section, we dig further into the data to try to understand why HAIL had such a large effect compared to the Go Blue Encouragement.

A The Burden of Aid Forms

HAIL guarantees free tuition. It also waives aid forms. Perhaps students respond so strongly to HAIL, in part, because they really, really despise aid forms. If HAIL increased applications because it waived paperwork requirements that marginal enrollees found burdensome, we would expect that UM enrollees in the HAIL arm would be less likely to fill out the FAFSA than those in the Go Blue Encouragement and control arms.

We find that 98-99 percent of enrolled students complete the FAFSA, with no significant differences across the three arms. Nor is the timing of aid applications consistent with students in the HAIL arm avoiding the aid form. If anything, HAIL students are quicker to submit their FAFSA applications than control and Go Blue Encouragement students (see Appendix Figures 2 and 3).

The University of Michigan requires a second financial aid form, the CSS Profile, which is administered by the College Board and asks for additional information about family finances. The patterns for the Profile submission diverge from those of FAFSA (Appendix Figure 4). Students tend to submit the Profile later than they submit the FAFSA: very few students from any of the treatment groups submit the Profile before December 20, by which time many students had submitted their FAFSA. Conditional on enrollment, HAIL students are slightly less likely than control or Go Blue Encouragement students to file the Profile at all (92 percent of enrolled HAIL students complete the Profile compared to 96-97 percent of control and Go Blue Encouragement students) but this difference is small and is not statistically significant.¹²

B Yield Rates and Aid Offers

Both HAIL and Go Blue Encouragement increased applications to the University of Michigan, but only HAIL increased enrollment. In part, Go Blue Encouragement's lower effect on enrollment is mechanically a product of its lower effect on application.¹³ We next investigate whether it also reflects a lower admission or enrollment rate, conditional on application. We cannot use intent to treat to causally estimate these rates, which condition on (the post-treatment outcomes of) application and admission. We therefore turn to instrumental variables analysis to examine enrollment and admissions decisions among those induced to apply by the treatments.

In Table 3 we show IV estimates of the causal effect of application on admission and enrollment

¹²Students who complete the FAFSA but not the Profile tend to have higher family income and assets and are likely not eligible for additional aid. The small differences between FAFSA and Profile application behavior likely reflects the fact that the University of Michigan is the only public university in the state (and one of a handful nationwide) that requires the CSS Profile. Thus, the CSS Profile constitutes an additional marginal cost of applying to UM.

¹³If Go Blue Encouragement students enrolled at the same rate as HAIL students, conditional on application, Go Blue Encouragement would have increased enrollment by 2.5 percentage points instead of 1 percentage point, both below the minimum effect size that we could have detected.

(estimates are weighted by school; we show student-level results in Appendix Table 2). In this analysis, random assignment to each treatment arm is used as an instrument for application to the University of Michigan. We estimate effects separately for HAIL relative to control, and Go Blue Encouragement relative to control. The first stages for these IV equations are the same estimated effects on application as the ITT from the previous sections. HAIL increased the application rate by 28 percentage points while Go Blue Encouragement increased it by 8 percentage points. It is important to note that while the F-statistic for the first stage for HAIL is above conventional thresholds at 54, for Go Blue Encouragement it is less than five. The Go Blue Encouragement arm therefore does not pass the relevance test. We consider IV results for Go Blue Encouragement and comparisons across the arms to be suggestive rather than definitive.

For those offered the HAIL treatment (column 1), the IV estimates show that 34% of those induced to apply were admitted and 31% enrolled. For Go Blue Encouragement (column 2), 30% of those induced to apply were admitted and just 10% enrolled. The ratio of enrollment and admission IV estimates is the yield rate for induced admits: 90% ($=0.308/0.342$) for HAIL and 33% ($=0.100/0.299$) for Go Blue Encouragement.

The admission rates for induced applicants from the two arms are quite similar. Applications induced by the two treatments were presumably viewed as similarly qualified by university admissions officers (we do not have admissions scores or notes). But enrollment rates and yield rates for the two treatments, while imprecisely estimated for Go Blue Encouragement, are very different, with the yield rate for HAIL almost triple that for Go Blue Encouragement. Something caused the behavior of students from these two arms to diverge after admission.

Differences in aid offers are a plausible explanation. HAIL students could, by construction, only get pleasant surprises in their aid offers, which could not be less than the promised tuition and fees.¹⁴ On the other hand, financial aid offers for Go Blue Encouragement students may have fallen short of expectations created by the headline of “free tuition.” We do not have financial aid application information, or offer letters, for all students who were admitted to the University of Michigan. We can only examine differences in the financial aid packages awarded to enrolled students (Figure 1; see Appendix Table 3 for more detail).

While aid packages for control, HAIL, and Go Blue Encouragement students are broadly similar, enrolled HAIL students receive around \$2,700 more in grants, on average, than Go Blue Encouragement students. Students in the Go Blue Encouragement arm are less likely than those in the HAIL arm to receive full-tuition scholarships: 80 percent of students from the Go Blue arm have grants that covered tuition and fees, compared to 97 percent of the HAIL arm.¹⁵ It is plausible that the gap is even larger among those who chose not to enroll.

Our data indicate that many students induced to apply to UM by the free tuition offer did not wind up qualifying for the Go Blue Guarantee free tuition policy. In particular, many who would have qualified based on their *incomes* did not qualify based on their *assets* (which, as measured by the Profile, include housing

¹⁴HAIL students typically received far more grant dollars than originally promised, to pay not only for tuition but for room, board and other schooling costs.

¹⁵The four HAIL students who did not get full tuition scholarships have grants that only covered one semester, as they did not enroll in spring 2021. The same is true for five Go Blue and control students.

equity in the primary home).¹⁶ By our calculations from the Survey of Income and Program Participation, more than a third of families in Michigan with incomes below \$65,000 have housing equity of at least \$50,000. The University of Michigan meets students' full financial need, so many students who do not meet the official criteria for the Go Blue Guarantee still receive substantial financial aid packages. Nevertheless, the disappointment of not qualifying for the free tuition guarantee after learning of its existence may have contributed to their decision not to enroll.¹⁷

C Effects of the Statewide Go Blue Guarantee Program

The Go Blue Guarantee was implemented for all Michigan students at once, for winter 2018 enrollment at the University of Michigan. Our experiment, which took place in 2019, does not let us examine the effect of the program directly. That is why our experimental arm examining its effect is an encouragement exercise; potentially, *everyone* in the control arm could cross over into the Go Blue treatment. In the ITT estimates, any statewide effect of the Go Blue Guarantee is reflected in the behavior of the control group.

Time patterns in application, admission, and enrollment at the University of Michigan for high-achieving students from the state of Michigan shed some light on whether the statewide rollout of the Go Blue Guarantee had any effect on student decisions. In Figure 2 we plot these rates separately for low-income and non-low-income students who have SAT scores of at least 1100.

For low-income students, we clearly see the effects of the initial rollout of the HAIL Scholarship for the 2016 cohort. We see sharp increases when the experiment started, of 8 percentage points in application, 2.8 percentage points in admission, and 2.7 percentage points in enrollment. HAIL students comprise approximately a quarter of the low-income population depicted in Figure 2.¹⁸ The experimental results for these cohorts are roughly four times the magnitude of the time series jumps, which is consistent with the HAIL treatment-group students producing all of the increase.

The raw time-series is also consistent with the pattern of results in the present paper. When the Go Blue Guarantee is implemented for the class of 2018, there is a small increase in application rates but none in admission or enrollment. These descriptive statistics line up with our experimental results: Go Blue had a moderate effect on application but none on enrollment, while HAIL had large effects on both application and enrollment.

¹⁶We have measures of total income and total assets, as differentially captured by the FAFSA and the Profile, for students in our experimental sample who enroll at UM. Students can qualify for Go Blue only if assets and income as measured by both the FAFSA and Profile fall below the stated cutoffs. Almost all students passed the Go Blue income test of \$65,000, as expected in a population eligible for subsidized school meals. Almost all would also have passed the asset test of \$50,000 had only the FAFSA been used to calculate assets. We do not have microdata on detailed asset categories. We do know, however, that through the CSS Profile, UM collects data on housing equity and retirement savings of aid applicants.

¹⁷Even among students who meet the criteria for the Go Blue Guarantee, only some will see a "Go Blue Grant" printed in their financial aid package. This contrasts with students in the HAIL arm, who all see a "HAIL Scholarship" printed in their financial aid package covering their tuition and fees. This is because the HAIL Scholarship is applied first, before other financial aid, whereas the "Go Blue Grant" is packaged last. For both control and Go Blue Encouragement students, the financial aid office packages other scholarships, federal grants, and state aid first before adding a "Go Blue Grant" for eligible students (only if they have remaining need). Again, HAIL students got what they were expecting, and likely more, while Go Blue Encouragement students may have been surprised in what they were offered—both in amount and in presentation.

¹⁸Our experimental sample is a subset of the low-income sample because Figure 2 is limited to students with a minimum ACT or SAT score, while eligibility for HAIL also depends on GPA.

VI DISCUSSION

Our findings are relevant to the design of tuition and aid policy. The University of Michigan’s Go Blue Guarantee represents a growing trend among post-secondary institutions (including Harvard, Princeton, Stanford, and the Universities of Illinois, Virginia, and Wisconsin) in offering free tuition or free cost of attendance to students from low- and moderate-income families. Additionally, some states have implemented state-wide free tuition or tuition scholarship programs, including the Susan Thompson Buffett Foundation scholarship award in Nebraska (Angrist, Autor and Pallais, 2020) and the New York Excelsior Scholarship. These programs all provide either free tuition or free cost of attendance to students with family income below a certain threshold. Most recently, in 2020, Democrats campaigned on a promise of free tuition.

At first glance, all of these policies appear straightforward. But design details matter, and existing and proposed free tuition policies vary considerably. Our findings suggest that the implementation details of these proposals will matter for their effect on student decisions.

Some free-tuition proposals simply set the “sticker price” of tuition to zero. Like the HAIL Scholarship, these policies allow students to know that their tuition is free *before* they make application decisions. By contrast, other proposals leave *sticker* prices untouched, but set the *net* price of tuition to zero for the subset of students who qualify for sufficiently large need-based grants.¹⁹ Like the Go Blue Guarantee, this delays the revelation of tuition prices until *after* students have applied to college and completed aid forms.

Our findings suggest that a straightforward, zero-tuition program like HAIL would substantially expand enrollments among low-income students. However, we expect little effect of policies that, like the Go Blue Guarantee, rely on traditional, need-based aid programs and do not resolve uncertainty about aid until after application.

A downside of a broad-based commitment of free tuition is that it is expensive, since the subsidy goes to all students regardless of income. But there are several ways to target free tuition to low-income students without relying on the traditional system of needs analysis. For example, at community colleges (which largely enroll students of modest means) a zero-tuition approach would convert what is essentially a policy of free *net* tuition into a policy of free *sticker-price* tuition, providing potential students greater certainty while requiring little change in per-student spending (of course, total spending would rise if the policy attracted more students to college).

A free-tuition policy at four-year colleges would, by contrast, require substantial government funding, since these schools typically rely on the tuition revenue of full-paying, upper-income students. These colleges could create *targeted* zero-tuition guarantees like the HAIL Scholarship. Data-sharing partnerships with state educational agencies would allow individual schools, consortia of schools, or entire state systems to proactively identify low-income students to offer an early free tuition guarantee. Our findings suggest these policies would substantially expand the attendance of low-income students at four-year colleges, where they are currently under-represented.

¹⁹The institution- and state-level policies above are all examples of free net-price policies. For a recent legislative proposal, see, for example <https://www.nytimes.com/2021/10/08/us/politics/manchin-democrats-means-testing.html>

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Table 1
School-Level Summary Statistics by Treatment Arm

Characteristic	Control mean	HAIL mean	GB Encouragement mean
Southeast school	0.352 (0.479)	0.346 (0.477)	0.352 (0.479)
School in UP	0.151 (0.359)	0.176 (0.382)	0.151 (0.359)
City school	0.126 (0.333)	0.126 (0.333)	0.126 (0.333)
Town/rural school	0.528 (0.501)	0.528 (0.501)	0.516 (0.501)
Suburban school	0.346 (0.477)	0.346 (0.477)	0.358 (0.481)
Distance of school from UM (miles)	98.9 (86.737)	104.1 (86.649)	97.5 (75.648)
UM application rate of school, class of 2015	0.065 (0.077)	0.066 (0.096)	0.060 (0.090)
Average ACT score of school, class of 2015	19.959 (1.851)	19.915 (2.063)	19.886 (2.071)
Proportion of HAIL students with A or A+ GPA	0.858 (0.240)	0.866 (0.223)	0.839 (0.263)
Proportion of HAIL students with A-, B+, or B GPA	0.142 (0.240)	0.131 (0.223)	0.160 (0.262)
Average SAT of HAIL students	1260.270 (71.144)	1264.402 (72.771)	1261.517 (61.826)
Proportion female	0.564 (0.346)	0.549 (0.357)	0.570 (0.336)
Proportion under-represented minority	0.170 (0.283)	0.154 (0.269)	0.185 (0.294)
Average number of HAIL students	3.8 (3.500)	3.7 (3.189)	3.7 (3.506)
Number of schools	159	159	159
Number of students	610	595	591

Source: [Michigan Department of Education \(2022\)](#), [University of Michigan Office of Enrollment Management \(2022\)](#).

Notes: All analyses conducted at the school level. Standard deviations in parentheses. Due to a coding error, we implemented randomization based on out-of-date values of the city, town/rural, and suburban variables, which we use for this table as well.

Table 2
 Estimated Effect of HAIL Scholarship and Go Blue Encouragement Treatments
 on College Choice Outcomes

Outcome	Treatment effect		HAIL vs. GBE Effects
	HAIL	Go Blue Encouragement	
<i>Panel A. University of Michigan Application, Admission, and Enrollment (UM administrative data)</i>			
Applied to University of Michigan	0.280 (0.038)	0.082 (0.039)	0.198 (0.038)
		[0.354]	
Admitted to University of Michigan	0.096 (0.036)	0.025 (0.035)	0.071 (0.037)
		[0.230]	
Enrolled at University of Michigan (UM data)	0.086 (0.033)	0.008 (0.032)	0.077 (0.034)
		[0.174]	
<i>Panel B. Enrollment Outcomes (National Student Clearinghouse data)</i>			
University of Michigan (NSC data)	0.089 (0.033)	0.010 (0.032)	0.080 (0.034)
		[0.169]	
Highly competitive or above (other than UM)	0.010 (0.016)	-0.002 (0.015)	0.012 (0.017)
		[0.039]	
Four-year	0.039 (0.035)	-0.009 (0.036)	0.048 (0.036)
		[0.724]	
Two-year	0.002 (0.021)	0.012 (0.021)	-0.010 (0.022)
		[0.071]	
Any	0.041 (0.031)	0.002 (0.033)	0.038 (0.032)
		[0.796]	
Number of school-years		477	
Number of students		1,796	

Source: [Michigan Department of Education \(2022\)](#), [University of Michigan Office of Enrollment Management \(2022\)](#).

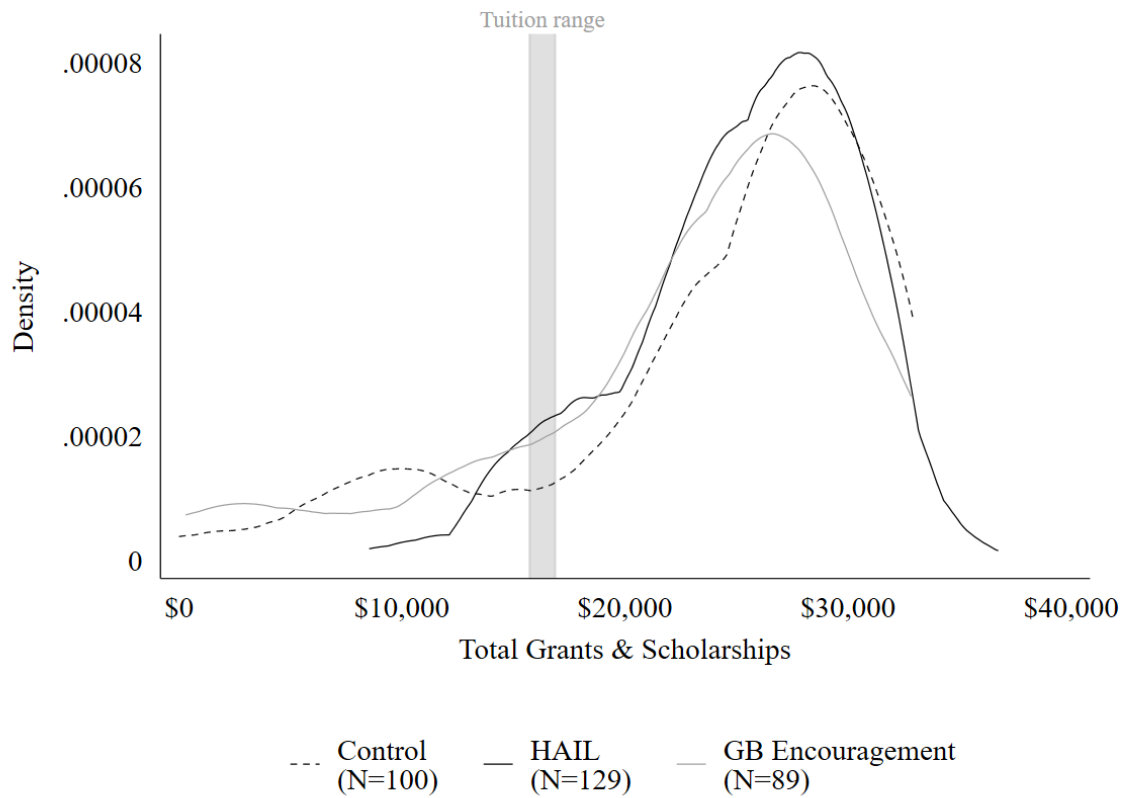
Notes: All analyses done at the school level. Robust standard errors reported in parentheses. Results from a regression of the outcome on indicators for each treatment status (HAIL, Go Blue Encouragement), and strata indicators. Control means are in square brackets. The difference, and standard error of the difference, between the HAIL and Go Blue Encouragement effect coefficients reported in the right-most column. UM application, admission and enrollment measured in the summer and fall following expected high school graduation. Admission and enrollment are unconditional on application.

Table 3
 School-level Instrumental Variables Estimates of the Effect of UM Application
 on UM Admission and Enrollment

Outcome	Comparison	
	HAIL - Control	GB Encouragement - Control
Admitted	0.342 (0.103)	0.299 (0.330)
Enrolled	0.308 (0.100)	0.100 (0.356)
Applied (First Stage)	0.280 (0.038)	0.082 (0.039)
First-stage F statistic	53.923	4.508
Strata dummies	X	X
Number of schools	318	318

Source: [Michigan Department of Education \(2022\)](#), [University of Michigan Office of Enrollment Management \(2022\)](#).
 Notes: All analyses done at the school level. Robust standard errors reported in parentheses. Results from two-stage least squares regression, where the first stage is a regression of application on treatment and strata dummies. The left column regression sample includes control and HAIL schools, and the right column regression sample includes control and GB Encouragement schools.

Figure 1
 Distribution of Total Grants and Scholarships Awarded to Students, by Treatment Arm

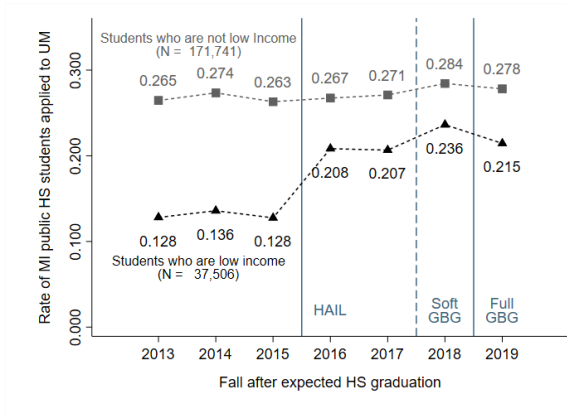


Source: [Michigan Department of Education \(2022\)](#), [University of Michigan Office of Enrollment Management \(2022\)](#), [University of Michigan Office of Financial Aid \(2022\)](#).

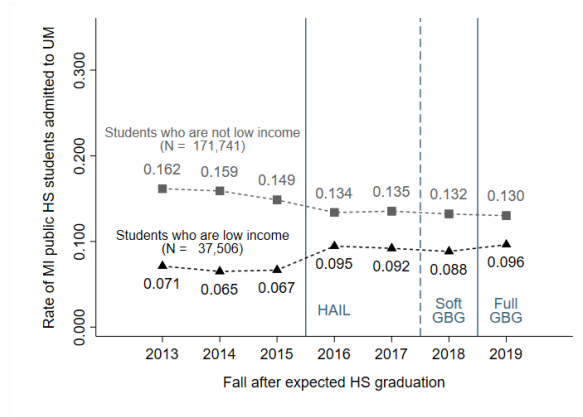
Notes: Figure plots the distribution of total grant aid by treatment group, among students with aid data reported. Grant aid includes all institutional and departmental scholarships and grants, federal grants, state grants and scholarships, and private scholarships. The gray bar represents the range of tuition and fees charged to each student. Tuition and fees range from \$15,734.19 to \$16,836.19 depending on the school or college each student is enrolled in at UM. Only the difference between the GBE and HAIL distributions is marginally significant, with an exact p-value from a two-sample Kolmogorov-Smirnov test of 0.051. The four HAIL students who did not get full tuition scholarships have grants that only covered one semester, as they did not enroll in spring 2021. The same is true for five Go Blue and control students.

Figure 2
University of Michigan Application, Admission, and Enrollment Rates
for High-achieving Michigan Public High School Students

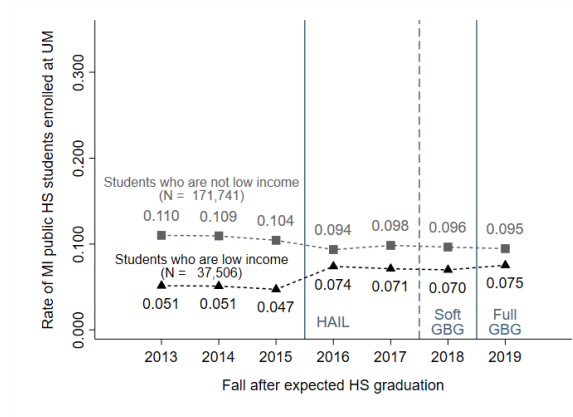
(a) Application to University of Michigan (UM)



(b) Admission to UM



(c) Enrollment at UM



Source: [Michigan Department of Education \(2022\)](#), [University of Michigan Office of Enrollment Management \(2022\)](#).

Notes: Figure plots the number of students who applied (or were admitted/enrolled) to UM over the number of students in each 11th grade cohort in Michigan public schools. High-achieving students are students who scored at least a 23 on the ACT before 2016, or a 1100 or the SAT in 2016 or later, to correspond with the HAIL academic criteria. The University of Michigan considers the full rollout of the Go Blue Guarantee to be 2018. There was a partial rollout in 2017, which we label here as the “soft Go Blue” rollout.