Diagnosing the Learning Environment for Diverse Students in Introductory
Economics: An Analysis of Relevance, Belonging, and Growth Mindsets

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It is now well known both within and outside the economics profession that women and members of racial and ethnic minority groups are significantly underrepresented at all levels of the discipline (New York Times 2018). This underrepresentation is stark at the undergraduate level, where women and underrepresented minority students together earn one-third of bachelor's degrees in economics, despite earning nearly two-thirds of bachelor's degrees overall (Bayer and Wilcox 2019).

As part of our profession's continuing efforts to understand and address the underrepresentation of women and minority students in undergraduate economics majors, this paper analyzes administrative and survey data to diagnose the learning environment in an introductory economics course. We follow two successive cohorts of students who took the course in academic years 2017-18 and 2018-19 at our institution, where 53 percent of students take introductory economics, and the composition of graduating economics majors by gender and race is close to national averages.

Building on findings from educational psychology research, we focus on three aspects of a student's introductory economics experience:

- *Relevance*: The student perceives the material to be directly relevant or useful to their own life.

- *Belonging*: The student is socially integrated in their classes and feels they belong in the department.

- *Growth Mindset*: The student believes that their ability in economics is not fixed, but a malleable quality that can improve and grow.

The extant literature provides evidence that these factors are related to college success and are impacted by practices of faculty and departments (e.g., National Academies of Science, Engineering, and Medicine 2017). For the field of economics, there may be considerable scope for departments to broaden participation in the discipline through targeted efforts to increase relevance, belonging, and/or growth mindsets. While experimental interventions to draw members of underrepresented groups to economics have been encouraging (Bayer, Bhanot, and Lozano 2019; Porter and Serra 2019), much remains to be learned about the channels and durability of impacts.[1] In this paper, we aim to establish a framework and vocabulary for understanding the success of existing interventions and for targeting treatments in future research.

The first key contribution of our study is to document significantly lower survey measures of relevance, belonging, and growth mindsets (RBG) among women and underrepresented racial/ethnic minority (URM) students in introductory economics, relative to non-URM men.[2] Linking these measures to administrative data, we find that students with lower measures of RBG also tend to earn lower grades in the course and are less likely to declare economics as a major.

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[1] Bayer et al. (2019) demonstrate that an email intervention that welcomes incoming first-year women and minority students, encourages them to take an economics course, and provides information on the diverse people and research in economics increases their completion of economics courses in the fall semester. Porter and Serra (2019) find that visits to introductory courses by alumnae speaking on the importance of economics to their careers significantly increase the likelihood that female students enrolled in intermediate economics courses and declared a major in economics.

[2] URM students are those who report themselves to be black or African American, Hispanic or Latinx, or Native American. Non-URM men include white and Asian students.

We then provide evidence on the impact of a new, low-cost initiative (the "Visible Hands in Economics" or VHE program), which our department introduced to encourage persistence in economics among women and underrepresented minority students. Coordinated each year by a member of our department, the VHE program expands the role of undergraduate teaching assistants, emphasizing the goal of promoting an inclusive environment for all introductory students. A small and diverse group of student VHEs receive training in inclusive peer advising, run a weekly study hall open to all students taking introductory economics, and meet four times a semester to discuss progress and challenges with department faculty or educational staff. Importantly, the VHEs, who reflect the diversity of the campus population and may themselves have experienced lower RBG in previous economics classes, read and discuss research on issues of diversity and inclusion in economics. The program was offered for the first time in the 2018-2019 academic year, allowing us to compare the two waves of survey and administrative data to evaluate its effects on RBG among students in introductory economics. We made this intervention available to all introductory students, recognizing that non-targeted efforts to increase RBG may be particularly beneficial to underrepresented students, given that they have lower levels of RBG to begin with.

1 Data and Results

We collected survey data for two cohorts of students in an introductory economics course, which was taught in small sections of approximately 20-25 students (11 professors taught at least one section each, with only the textbook in common). The survey asked students a number of questions related to their experiences in their introductory economics courses, their interest in economics more generally, and their demographic characteristics. We then matched the survey responses to administrative

data, which included each student's grade, semester, and instructor for the course, class year, whether the student declared an economics major, and indicators for first-generation college students, international students, and varsity athletes.

During the two years of interest, just over one-third of all introductory economics students at our institution were female, and 16 percent were underrepresented minority students, by comparison with college-wide shares of 51 and 21 percent, respectively (see Appendix Table 1). Approximately one-fifth were first-generation college students, which is consistent with our institutional average. The response rate to our survey was high, with approximately 58 percent of introductory students completing the survey. The 2017-18 sample contains 138 observations, and the 2018-19 sample contains 135 observations. While female students were somewhat more likely to respond to the survey than their peers, there were no statistically significant differences in response rates by minority status, or by grade earned in the course.

1.1 *Differences in RBG for Women/URM Students and Non-URM Men*

Table 1 demonstrates marked differences in measures of relevance, belonging, and growth mindsets between women or URM students and non-URM men. We present the fractions of students responding "Strongly Agree" to each statement (except where noted), along with a summary index measure for each category, which is the average of the standardized values of the indicator variables reflecting whether a student strongly agreed with the statements in that category (Kling et al. 2007).[3]

The differences are striking. For nearly every measure of relevance, belonging,

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[3] For example, we create an individual's summary index for *Belonging* by taking each 1-0 variable related to belonging (e.g., Did the student strongly agree with *"My Econ 001 class was collegial"*?), subtracting its mean and dividing by its standard deviation, and then averaging across the 8 standardized belonging variables. All variables are defined to reflect desirable outcomes. We use the mean and standard deviation from the 2017-18 cohort, which was not exposed to the VHE program.

Table 1: Measures of R, B, and G Among Introductory Economics Students

	(1) Non-URM Men	(2) Women and URM Students	(3) p-value
A. Fraction responding "strongly agree" (except where noted)			
Relevance			
The textbook used examples that were relatable to my life	0.130	0.104	0.547
The professor used examples that were relatable to my life	0.402	0.294	0.082*
We discussed important, real world issues in class	0.314	0.314	0.998
The class gave me a useful framework for thinking about important issues	0.275	0.277	0.961
Disagree: We overlooked important aspects of the issues we studied	0.353	0.234	0.043**
Belonging			
My Econ 001 class was collegial	0.284	0.200	0.130
I felt that the students supported each other	0.337	0.250	0.145
I felt the prof cared about whether I was learning the material	0.431	0.281	0.016**
I felt comfortable asking questions in class	0.382	0.265	0.053*
I felt comfortable asking questions at TA clinics	0.289	0.236	0.416
The economics department values Swarthmore students	0.306	0.237	0.276
People like me can become economists	0.410	0.207	0.002***
Answered NO: Do you feel different from the typical economics student?	0.851	0.595	0.000***
Growth Mindset			
Strongly agree: I felt the prof believed I could learn the material	0.446	0.368	0.226
Strongly agree: While taking the course, I believed I could learn the material	0.441	0.301	0.026**
B. Summary index measures			
Average of standardized variables measuring Relevance	0.078	-0.039	0.190
Average of standardized variables measuring Belonging	0.234	-0.040	0.001***
Average of standardized variables measuring Growth Mindset	0.058	-0.169	0.038**
Observations	102	138	240

Notes: The third column reports p-values from t-tests for equality of the proportions in columns 1 and 2. Only respondents with non-missing self-reports of gender and minority status are included. See text for further detail regarding construction of summary index measures.

and growth mindset, the absolute difference between the two groups is positive, and seven of the differences in individual measures are statistically significant (another two are marginally significant, with $p=0.130$ and $p=0.145$).[4] Similarly, each of the three summary indices is negative for women and URM students but is positive for non-URM men.[5] While the difference in the relevance index is not statistically significant given the current range of practices within the course, women and URM students were less likely to report that their professors used examples that were relatable to their lives and more likely to feel the course overlooked important aspects of the issues it covered.

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[4] Most statistically significant differences remain so after correction for multiple comparisons.
[5] Index values can be negative because the index is an average of standardized measures.

Differences in feelings of belonging are more dramatic, with the summary index differing between the two groups at $p=0.001$. Women and URM students were more likely to feel different than the typical economics student and were less likely to feel comfortable asking questions in class, to feel that the professor cared whether they learned the material, and to believe that people like them could become economists. Women and URM students also report lower measures of growth mindset: Only 30 percent report that they believed they could learn the material while taking the course, compared to 44 percent of non-URM men.

1.2 *RBG correlates with increased performance and persistence in economics*

In Table 2 we offer evidence that stronger feelings of relevance, belonging, and growth mindset are associated with better performance in introductory economics (as measured by course grade), and with a higher likelihood of declaring economics as a major. The key right-hand side variables are the indicator for *Female and/or URM students*, and *High RBG*, an indicator for the student having relevance, belonging, and growth summary indices that are all above their medians. While we cannot ascribe a causal interpretation to these regression results, the models control for several potential confounders, including indicators for first-generation college student, international student, varsity athlete, and whether the course was taken for credit/no-credit (i.e., no letter grade)[6], as well as instructor, cohort, and semester-of-college fixed effects. When the outcome is declaring an economics major, we control for the student's grade in introductory economics.

The results indicate a statistically significant and positive relationship between *High RBG* and the likelihood the student earned an A- or better in introductory economics,

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[6] When students take the course for credit/no-credit, they are given a "shadow grade" by their professor. We use that shadow grade in columns 1 and 2 but include the control because shadow grades tend to be lower than if the student had taken the course for a letter grade.

Table 2: RBG and Performance and Persistence in Economics

	(1) Grade A- or Better	(2) Grade A- or Better	(3) Grade A- or Better	(4) Declared Major	(5) Declared Major	(6) Declared Major
Female or URM	-0.087	-0.057	-0.076	-0.227**	-0.206**	-0.114
	(0.065)	(0.064)	(0.065)	(0.091)	(0.091)	(0.090)
High RBG		0.259***	0.274***		0.189*	0.157
		(0.077)	(0.078)		(0.114)	(0.109)
Likely to major before Econ			-0.144*			0.394***
before taking intro course			(0.080)			(0.109)
Control for grade in intro econ?	–	–	–	Yes	Yes	Yes
N. of obs.	240	240	240	129	129	129
R^2	0.207	0.246	0.257	0.264	0.282	0.361

Notes: Results from linear probability models; * p<0.10, ** p<0.05, *** p<0.001. See text for discussion of controls and differences across columns. Sample in columns 4-6 is students who took the course in the first 4 semesters of college, as major is declared near the end of the second year.

as well as the likelihood that the student declared economics as a major. These are large coefficients: Students with high RBG have a 53 percent higher probability of earning a grade of A- or better and a 49 percent greater likelihood of majoring in economics, relative to the means for the full sample.

Despite the inclusion of several control variables, reverse causality may be at play, particularly when examining course grades. That is, students who performed well in the class might report high measures of RBG when reflecting back on the experience. Such reverse causality is somewhat less likely in the case of students who declared a major in economics, the majority of whom did so well after taking the course and survey. Of course, it is also possible that students who arrived at college intending to be economics majors (and later declared the major) had greater feelings of relevance, belonging, and growth mindset within introductory economics due to this strong intention. In columns 3 and 6, we control for the student having responded that they were likely or very likely to become an economics major *before* taking the introductory course. Notably, adding this control does not significantly affect the estimated relationships between *High RBG* and these measures of performance and persistence.[7]

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[7] Similarly, Appendix Table 2 finds no strong correlation between ex-ante interest and RBG.

1.3 *An Intervention to Enhance Inclusion in Introductory Economics*

The Visible Hands in Economics (VHE) program was offered for the first time in the 2018-19 academic year, with the primary goal of providing a more inclusive and supportive environment in introductory economics, particularly for women and underrepresented minority students. All students taking our introductory course were made aware of the undergraduate VHEs and the weekly VHE study hall as resources available to them, but they were not told anything about the program's goals for inclusivity, and most students probably did not realize that the program was new.

Rates of exposure to the program were generally high (Appendix Table 3), with the vast majority of students reporting awareness of the program and the weekly VHE study hall sessions. Attendance was slightly higher among women and URM students. Fifty-seven percent attended the study hall at least once (compared with 37 percent of non-URM men, p=0.04), and 45 percent attended at least a few times during the semester (not statistically different from the 33 percent of non-URM men who did so).

We analyzed the data for suggestive evidence on the results of this program, comparing students who were exposed to the pilot to similar students in the prior year. This analysis should not be interpreted as definitively estimating causal impacts because there is likely to be non-random selection into exposure to the VHE program (e.g., students with higher levels of RBG may be more likely to attend the VHE study halls), and there were also other changes between 2017-18 and 2018-19, including which professors were teaching the introductory course (Appendix Table 4). We attempt to reduce the influence of selection and time trends by matching students on observables and limiting the sample to those taught by a professor who taught the course both years (results in Appendix Table 5), but unobservable differences surely remain between students who were and were not exposed to the program. In short, while we

hesitate to draw any strong conclusions from this analysis, our results suggest that the program likely had some positive effects, particularly on feelings of belonging among introductory economics students.

2   Discussion and Conclusions

A primary contribution of this paper is to document significantly lower measures of relevance, belonging, and growth mindset (RBG) among women and URM students, relative to non-URM men, in introductory economics. In addition, we provide evidence that higher levels of RBG are associated with better performance in the course and an increased likelihood of majoring in economics. While our approach precludes a causal interpretation, the correlations are suggestive that interventions to increase RBG (even among all introductory students) may help to increase the rates at which women and URM students pursue economics beyond the introductory level.

To this end, our institution piloted the Visible Hands in Economics (VHE) program in 2018-19, as a low-cost intervention to enhance inclusivity in our introductory course. The VHE program may have enhanced feelings of RBG among introductory students by creating a common space for discussing economics and by introducing students to a diverse set of mentors who had been successful within the department. Importantly, a special feature of the VHE program was that the intervention aimed to increase RBG and performance and persistence in economics not only among introductory students, but also among the students who served as VHEs. With respect to the latter goal, the intervention was of a more targeted nature: We chose VHEs who were disproportionately diverse relative to the composition of past economics majors, and whose persistence in economics we wanted to encourage. In their own survey responses, over 85 percent of the VHEs reported that participation in the program strengthened their

interest in pursuing economics further and increased their confidence that they could be successful in upper-level economics courses.

Moving forward, we plan to continue to offer and improve the VHE program and to announce its objectives as well as its availability. More broadly, we expect that economics faculty across academia could increase diverse students' interest and performance in economics by explicitly stating and pursuing the goal of creating a learning environment that offers relevance, belonging, and growth mindsets for all students.

References

[1] Bayer, A., Bhanot, S.P. and Lozano, F., 2019. "Does simple information provision lead to more diverse classrooms? Evidence from a field experiment on undergraduate economics." AEA Papers and Proceedings, Vol. 109, 110-14.

[2] Bayer, A. and Wilcox, D.W., 2019. "The unequal distribution of economic education: A report on the race, ethnicity, and gender of economics majors at US colleges and universities." The Journal of Economic Education, 1-22.

[3] Kling, J.R., Leibman, J.B., and Katz, L.F., 2007. "Experimental Analysis of Neighborhood Effects," Econometrica, Vol. 75, No. 1, 83-119.

[4] National Academies of Sciences, Engineering, and Medicine 2017. Supporting Students' College Success: The Role of Assessment of Intrapersonal and Interpersonal Competencies. Washington, DC: The National Academies Press.

[5] Porter, C. and Serra, D., 2019. "Gender differences in the choice of major: The importance of female role models." American Economic Journal: Applied Economics.

[6] "Wielding Data, Women Force a Reckoning Over Bias in the Economics Field," The New York Times, January 10, 2018.

Appendix Table 1: Means for Student Body, Intro Econ Students, Survey Respondents, and Non-Respondents

	(1) All Students	(2) Had Not Yet Taken Intro	(3) Took Intro 17-18 or 18-19	(4) Survey Non-Respondents	(5) Survey Respondents	(6) p-value (4) vs (5)
Woman	0.506	0.547	0.379	0.277	0.452	0.000
URM student	0.199	0.212	0.158	0.175	0.145	0.403
First-gen. college student	0.189	0.202	0.186	0.164	0.202	0.324
N. of obs.	2128	1578	425	177	248	425

Appendix Table 2: Predictors of High RBG

	(1) High RBG	(2) High RBG	(3) High RBG
Female or URM (self-report)	-0.099*	-0.102*	-0.109*
	(0.056)	(0.056)	(0.058)
First-gen college student	0.068	0.071	0.095
	(0.067)	(0.068)	(0.070)
Varsity athlete	-0.022	-0.022	-0.024
	(0.057)	(0.058)	(0.060)
International student	-0.084	-0.087	-0.078
	(0.076)	(0.077)	(0.078)
Took Ec1 CR/NC	-0.166	-0.190*	-0.164
	(0.103)	(0.111)	(0.112)
Business career motivation	0.034	0.034	0.003
	(0.062)	(0.064)	(0.067)
Policy career motivation	0.091	0.090	0.092
	(0.063)	(0.064)	(0.067)
Likely to choose Econ as major	0.093	0.094	0.105
before taking Intro	(0.070)	(0.071)	(0.073)
Cohort FE	Yes	Yes	Yes
Semester-of-college FE	No	Yes	Yes
Instructor FE	No	No	Yes
N. of obs.	238	238	238
R^2	0.072	0.076	0.110

Appendix Table 3: Exposure to the VHE Program (2018-19 Cohort)

	Non-URM Men	Women and URM Students
Was aware of VHE study hall	0.86	0.94
Ever attended VHE study hall	0.37	0.57
Attended a few times or more	0.33	0.45
Attended weekly or almost weekly	0.14	0.12
N. of obs.	51	67

Appendix Table 4: Comparison of 2017-18 and 2018-19 Cohorts

	(1) 2017-18	(2) 2018-19	(3) p-value
Female or URM (self-reported)	0.579	0.573	0.927
First-generation college student	0.223	0.171	0.312
Varsity athlete	0.331	0.350	0.747
International student	0.140	0.162	0.637
Took course for Credit/No-Credit	0.471	0.470	0.988
Took course as first-semester first-year	0.388	0.410	0.731
Instructor 1	0.108	0.207	
Instructor 2	0.099	0.265	
Instructor 3	0.066	0.060	
Instructor 4	0.107	0.197	
Instructor 5	0.198	–	
Instructor 6	0.140	–	
Instructor 7	0.107	–	
Instructor 8	0.165	–	
Instructor 9	–	0.068	
Instructor 10	–	0.120	
Instructor 11	–	0.077	
N. of obs.	121	117	238

Appendix Table 5: Estimated Impacts of the VHE Program
(Treatment Effects Estimated by Matching on Observables)

	(1) Intent-to-Treat Cohort 2 vs. Cohort 1	(2) Intent-to-Treat Cohort 2 vs. Cohort 1 (Same Profs)	(3) Compliers vs. Defiers	(4) Compliers vs. Cohort 1	(5) Compliers vs. Cohort 1 (Same Profs)
High RBG	-0.000	0.000	0.174*	0.096	0.043
	(0.051)	(0.088)	(0.097)	(0.089)	(0.102)
Relevance index above median	-0.103	-0.096	0.324**	0.089	0.095
	(0.092)	(0.184)	(0.152)	(0.141)	(0.209)
Belonging index above median	0.079	0.103	0.259**	0.282**	0.265
	(0.085)	(0.151)	(0.120)	(0.118)	(0.163)
Growth Mindset index above median	-0.109*	0.013	0.179*	-0.002	0.070
	(0.063)	(0.098)	(0.105)	(0.096)	(0.120)
People like me can become economists.	0.049	-0.029	0.398***	0.168*	0.130
	(0.056)	(0.087)	(0.091)	(0.097)	(0.104)
I felt comfortable asking questions in class.	0.063	0.118	0.167**	0.168**	0.215**
	(0.064)	(0.095)	(0.081)	(0.078)	(0.108)
N. of obs.	240	134	118	179	93

Notes: Results from propensity score matching; * $p<0.10$, ** $p<0.05$, *** $p<0.001$. Students matched on indicators for female or URM status, first-generation college student, varsity athlete, international student, taking the course in first semester of college, and taking the course as Credit/No-credit (i.e., no letter grade). See text for further detail regarding differences in sample across columns. Column 1 uses the entire sample of students from both cohorts (academic years 2017-18 and 2018-19). Column 2 uses only the sample of students who took the course from an instructor who taught it in 2017-18 and 2018-19. Column 3 compares students who attended the VHE Study Hall at least once in 2018-19 ("Compliers") to those in 2018-19 who did not attend ("Defiers"). Column 4 compares compliers to similar students in Cohort 1. Column 5 compares compliers to similar students in the first cohort, but restricts the sample to those with an instructor who taught the course in both years.