The numbers are dismal. Black, Latinx, and Native American people earned just 9.5 percent of economics PhD degrees awarded to US residents in 2017 (National Center for Science and Engineering Statistics 2018). These groups comprise over 30 percent of the population. While the number of Latinx PhD degree earners in economics has increased over recent years, when normalized by their increasing share in the population, the trend is flat. More disheartening, the share of Black economics doctorates has actually fallen since the start of the millennium, while at the same time, the share of Black PhD earners in the fields of science, technology, engineering, and mathematics has risen. There are too few Native Americans earning doctorates to calculate meaningful trends (National Center for Science and Engineering Statistics 2018).

The experiences of minorities in economics are perhaps even more troubling. Of the Black, Latinx, and Native American respondents to the American Economic Association Climate Survey in winter 2018–19, 28 percent report having personally been discriminated against or treated unfairly on the basis of race/ethnicity by someone in the field of economics. Three-fifths of Black and Latinx women, both students and professionals, report experiencing either racial discrimination or gender discrimination or both. These groups are also the most likely to take costly
The poor numbers and experiences both imply harm to our profession. First, the field of economics is losing out on diverse perspectives and viewpoints. In a variety of settings, racially diverse groups have been shown to outperform homogeneous teams (for a review of the literature, see Bayer and Rouse 2016). Second, the underrepresented minority talent we do have is deployed inefficiently, as minorities alter their research, conference participation, and even their workplaces in order to avoid harassment.

You can improve this situation, and this article tells you how. Faced with very little literature to inform the discussion, we collected new survey data. We targeted Black, Latinx, and Native American individuals at various positions in the economics career trajectory as well as those who had been on the trajectory but were no longer. The latter group’s views have been much less present in discussions of race and economics. (For example, this group was not reached by the AEA Climate Survey.) We conducted 75 surveys, followed by open-ended interviews with more than half of the participants on the question of what helps and hurts minority group members to succeed in economics. While respondents’ date of college graduation and relationship to economics were quite varied, we heard a few consistent themes; namely, that bias, a hostile climate, and a lack of good information and good mentoring discouraged underrepresented minorities from careers in economics.

In response to pressure applied by what was then the Caucus of Black Economists and is now the National Economic Association (NEA), the American Economic Association (AEA) established its Committee on the Status of Minority Groups in the Economics Profession (CSMGEP) over 50 years ago (Simms and Wilson 2020). Soon after, the AEA began its summer training program to prepare undergraduate students from underrepresented backgrounds for PhD programs in economics. In the 1990s, the AEA began its mentoring program, matching underrepresented minority graduate students with mentors. The share of economics PhDs going to Black Americans increased from the mid-1970s until the turn of the millennium, but since that time, as previously noted, it has been on the decline (National Center for Science and Engineering Statistics 2018).

While insufficient dedicated resources inhibit progress, so does insufficient understanding. Very recent developments, including the establishment of the AEA’s Code of Professional Conduct, Policy on Harassment and Discrimination, Committee on Equity, Diversity, and Professional Conduct, and Task Force on Best Practices—all since 2018—represent a new awareness of problems on the demand side: the choices of economists at all stages of their (potential) colleagues’ careers are reducing the numbers and worsening the experience of Black, Latinx, and Native American individuals in economics.

The reflections and experiences of the respondents—your students, colleagues, and former colleagues—surveyed and interviewed for this paper, point to a variety of actions that you can take to inform, mentor, and welcome. Some actions, like telling students about programs that help minorities transition from a BA to an economics
PhD, take less effort; others, like starting new programs that help minorities make that transition, require much more. Our goal is not that any one person will pursue all of the recommended action steps, but that each economist will take at least one action to improve the representation and experience of Black, Latinx, and Native American individuals in the economics profession.

Survey and Interview Data

We sought to hear from Black, Latinx, and Native American respondents with a great range of experiences in the field of economics. We were aiming for a broad sample, more than a representative sample. In an online Appendix available with this paper at the *Journal of Economic Perspectives* website, we include the survey itself, along with our interview and data coding protocols and procedures. Here, we provide an overview of the process.

We targeted our request for survey participants to the listservs of the American Society of Hispanic Economists (ASHE), the National Economic Association (NEA), and the CSMGEP. Because we also wanted to reach those who had considered an economics career but rejected the option, we also targeted former AEA summer program participants. We asked recipients of our request to take the online survey and/or forward the announcement.

The survey first asked respondents to choose the response that best describes their location on and satisfaction with their economics trajectory. Table 1 shows the possible responses. The key question for analysis in the survey—the most important question—asked for open-ended responses to “What is the most important thing we should know about what helps and hurts minorities’ progress in an economics career?” Seventy-five eligible people began the survey; 67 answered the most important question. We also collected demographic data to determine eligibility for the study, which was based on identification as Black, Latinx, and/or Native American and at least a previous interest in or consideration of economics as a career.

Because we are particularly interested in the factors that lead to a more versus less positive experience in an economics career, we divide the sample into two groups. The first group we term the *nondisrupted* respondents. These respondents’ careers are progressing. If they have completed an economics PhD, they are satisfied with their employment. For the purposes of the categorization, we mark the beginning of an economics career as entering a PhD program. Therefore, we also include in the *nondisrupted* group those who never began an economics doctoral

---

1 We refer to those identifying as Native American, Indigenous, American Indian, Alaskan Native, and Pacific Islander as Native American, recognizing that there is no consensus on what the most respectful term is. Respondents used the first three, with some respondents using more than one term in the course of the interview. Similarly, the terms Black and Latinx include individuals who identify as African American and, respectively, Hispanic or Latino/Latina. Our focus on these three groups is not a comment on whether those who identify as Asian experience discrimination. The AEA Climate Survey results demonstrate that they do (Allgood et al. 2019).
Table 1
Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Most important-question sample</th>
<th></th>
<th>Interview sample</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>Disrupted</td>
<td>Non disrupted</td>
<td>All</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>47.8</td>
<td>68.8</td>
<td>41.2</td>
<td>50.0</td>
</tr>
<tr>
<td>Latinx</td>
<td>52.2</td>
<td>31.3</td>
<td>58.8</td>
<td>50.0</td>
</tr>
<tr>
<td>Native American</td>
<td>7.5</td>
<td>6.3</td>
<td>7.8</td>
<td>9.5</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>53.7</td>
<td>68.8</td>
<td>49.0</td>
<td>57.1</td>
</tr>
<tr>
<td>Undergraduate graduation cohort</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970s and 1980s</td>
<td>11.9</td>
<td>18.8</td>
<td>9.8</td>
<td>11.9</td>
</tr>
<tr>
<td>1990s</td>
<td>22.4</td>
<td>37.5</td>
<td>17.6</td>
<td>26.2</td>
</tr>
<tr>
<td>2000s</td>
<td>31.3</td>
<td>43.8</td>
<td>27.5</td>
<td>31.0</td>
</tr>
<tr>
<td>2010s</td>
<td>32.8</td>
<td>0.0</td>
<td>43.1</td>
<td>31.0</td>
</tr>
<tr>
<td>Best describes you</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Considering Economics PhD</td>
<td>14.9</td>
<td>0.0</td>
<td>19.6</td>
<td>11.9</td>
</tr>
<tr>
<td>Considered Economics PhD but did not attend</td>
<td>16.4</td>
<td>0.0</td>
<td>21.6</td>
<td>14.3</td>
</tr>
<tr>
<td>In Economics PhD Program</td>
<td>17.9</td>
<td>0.0</td>
<td>23.5</td>
<td>21.4</td>
</tr>
<tr>
<td>Started Economics PhD but did not complete</td>
<td>7.5</td>
<td>31.3</td>
<td>0.0</td>
<td>9.5</td>
</tr>
<tr>
<td>Completed Economics PhD, but currently not employed in economics</td>
<td>3.0</td>
<td>12.5</td>
<td>0.0</td>
<td>4.8</td>
</tr>
<tr>
<td>Completed Economics PhD, started and currently in an academic job, and satisfied</td>
<td>16.4</td>
<td>0.0</td>
<td>21.6</td>
<td>14.3</td>
</tr>
<tr>
<td>Completed Economics PhD, started and currently in an academic job, and unsatisfied</td>
<td>6.0</td>
<td>25.0</td>
<td>0.0</td>
<td>7.1</td>
</tr>
<tr>
<td>Completed Economics PhD, started in and left an academic job, currently in a job that uses economic skills, and satisfied</td>
<td>6.0</td>
<td>25.0</td>
<td>0.0</td>
<td>7.1</td>
</tr>
<tr>
<td>Completed Economics PhD, started in and left an academic job, currently in a job that uses economic skills, and unsatisfied</td>
<td>1.5</td>
<td>6.3</td>
<td>0.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Completed Economics PhD, started in and went to a non-academic job, currently in a job that uses economic skills, and satisfied</td>
<td>10.4</td>
<td>0.0</td>
<td>13.7</td>
<td>7.1</td>
</tr>
<tr>
<td>N</td>
<td>67</td>
<td>16</td>
<td>51</td>
<td>42</td>
</tr>
</tbody>
</table>

Note: Data based on responses to survey. We define disrupted based on the respondents’ response to the best-describes-me question on the survey. The respondent was labeled disrupted if they answered with one of the following options: started economics PhD but did not complete; completed economics PhD, but currently not employed in economics; completed economics PhD, started in and left an academic job, currently in a job that uses economic skills, and satisfied; completed Economics PhD, started in and left an academic job, currently in a job that uses economic skills, and unsatisfied; completed Economics PhD, started in and left an academic job that does not use economic skills; completed Economics PhD, started in a non-academic job, currently in a job that uses economic skills, and satisfied; and completed Economics PhD, started in a non-academic job, currently in a job that does not use economic skills. We omit three responses to the best-describes-me question because no respondents chose those options. They are the following: completed economics PhD, started in and left an academic job, currently in a job that does not use economic skills; completed Economics PhD, started in a non-academic job, currently in a job that uses economic skills, and unsatisfied; and completed Economics PhD, started in a non-academic job, currently in a job that does not use economic skills.
program, even if they had considered an economics career and rejected it. The disrupted respondents, on the other hand, started on the economics pathway but then left economics, or started on an academic career and then left academic economics, or are unsatisfied in their current position.²

Disruption of minority careers is an important feature of the problem to study. Black, Latinx, and Native American students earned nearly 17 percent of bachelor’s degrees in economics, but under 10 percent of economics doctorates earned by US citizens and residents in 2018. Subject to selection, survey evidence suggests that the groups make up under 6 percent of US full professors in economics (CSMGEP Annual Report 2019). The shrinkage at each stage suggests the possibility of near-term gains. Relative to their representation in the sample, Black and women respondents are overrepresented among disrupted participants, which echoes the AEA Climate Survey results showing that Black respondents of all genders, women of all races, and Black women especially are most likely to have experienced discrimination within economics and to have taken a costly action, such as leaving a job to avoid negative treatment (Bayer 2020).

We followed the survey with open-ended interviews of 42 of the survey respondents. While not common in economics, collecting data through open-ended interviews whose transcripts are then hand-coded by assigning labels to passages of text is a standard form of analysis in other social sciences and is growing in popularity (Miles, Huberman, and Saldaña 2020). We scheduled the interviews for an hour in length, but often with the consent or even encouragement of the interviewee, they lasted longer. Summary statistics for both the interview and most-important-question samples are in Table 1. Both samples include respondents who graduated from college from the 2010s back to the 1970s, with more robust coverage from the 1990s on. Approximately half of respondents in both samples identify as Black, approximately half as Latinx, and under 10 percent as Native American.³ (Race categories were not mutually exclusive.)

In targeting survey respondents for our open-ended interviews, we put greater emphasis on following up with disrupted respondents. Many are no longer in the economics profession; their opinions are not generally incorporated into discussions on race and economics. Given their original interest in economics, the disrupted respondents represent the kind of minority student who might be persuaded to pursue a career in economics, provided we make some changes to the field. In fact, a majority of disrupted survey respondents—including all four who began an economics PhD program but did not complete it—would pursue economics if

²We categorize those who started and left academia as disrupted even though they remain in economics as a profession, because of the alteration of the career trajectory. Given the desire of respondents to see more professors of color in academia, understanding why respondents left academia is of particular interest. We divide the sample into these two rather coarse groups, instead of more finely, to help maintain confidentiality.

³We did not ask respondents for their place of birth or citizenship. Based on responses in interviews, we estimate 69 percent of the interview sample grew up in the United States and 21 percent grew up outside of the United States; we could not determine where 10 percent of the sample were raised.
they had it to do again. In addition to disrupted economists, we targeted those with intriguing or unique answers from the most important question.

The interview and the most-important-question data are complementary. In the interviews, respondents were invited to discuss an unlimited number of factors they felt affect minorities’ progression in economics. The interviewers prompted recall of these factors by asking the respondent to walk through their career trajectory. Based on our coding, the top three hindrances mentioned by respondents in interviews were lack of mentoring, lack of good information, and implicit bias. The disrupted respondents frequently mentioned those three plus lack of funding, departmental policies/actions, and the hostile climate in economics. Nondisrupted respondents cited mentoring and teaching as top hindrances.

The most important question, on the other hand, asked respondents to zero in on the most important factor or factors affecting minorities’ careers. There is overlap between the hindrances frequently mentioned in the interview and those often mentioned in the responses to the most important question, namely around mentoring and implicit bias. However, disrupted respondents’ views on the most important question stood out for their focus on issues about the general climate or their interactions with other individuals in the field, such as implicit bias, elitism, institutional inaction about diversity, lack of understanding/listening on the part of colleagues, bosses, or professors, the field’s lack of openness to new questions and methods, and career prospects.

Many respondents expressed feeling unheard in economics: their voices unheard in conversations or seminars and their scholarship unheard in the widest-circulating journals. Because these ideas are their most important contributions to a very significant ongoing conversation on race in economics, we list all responses to the most important question in Table 2.

In the remainder of the paper, we synthesize respondents’ experiences and reflections, organized not by the hindrances listed in this section, but rather into broad areas of actions that you can take to improve both the numbers of and climate for minorities in economics. The action areas are inform, mentor, and welcome.

**Inform**

The trajectory to becoming a PhD economist is far from obvious. To take just one example raised by the interviewees, it is not intuitive to undergraduates that an economics major is not sufficient preparation for a doctoral economics program (as highlighted by Sharpe 2017). Because of the dearth of Black, Latinx, and Native American economists and the fact that information spreads more readily within race/ethnicity, students from these minority groups are less likely to receive good information about an economics career. As one graduate student explains:

4 Throughout the discussion, we describe respondents with minimal demographic information to maintain confidentiality.
Because there are so many things about advancing in the career that have to do with interactions and with getting the right advice at the right time and when you don’t have this knowledge, and when your family doesn’t have this knowledge, then it’s harder for you to know who to ask first. And even if you know who to ask, it’s harder to even approach that person or to go about getting this knowledge.

What Kind of Information?

Respondents argued that more minorities would succeed in economics if they had access to pertinent information at the right time. For example, a first crucial bit of information is how to succeed in college. A recent graduate looks back on her college experience,

I wish I had been part of a program that would’ve taught me how college was different from high school. I think that would’ve made my transition, my first semester 1,000 . . . times easier . . . Somebody to tell me, “This is what office
Table 2 (continued)

What Is the Most Important Thing We Should Know about What Helps and Hurts Minorities’ Progress in an Economics Career?

Qualifying exams were my road block. I started two well-ranked economics doctoral programs. In the first program, I failed qualifying exams (along with half my cohort). In the second program, I passed two of three qualifying exams and could not continue the program.

The implicit bias within the economics profession concerning minorities contributing to new approaches in economics: New questions, new applied methods, new data collection and survey design to better capture disenfranchised and neglected communities. I was told by senior white males: ‘You couldn’t have possibly written this article on your own… I was asked by a hiring committee member if I was planning to do ‘Latino economics’… Deconstructing stereotypes of female and minority research capabilities held by members of the profession requires constant energy and a stainless-steel spine. But if there is no diversity of race/ethnicity, and especially class (working-class members in the profession), nothing will change. The most disappointing time in the academy was training the next generation of minority economics and policy students who would confide: ‘Why should I do a PhD in Economics… only to face what I see you facing?’...

There is an intolerance [to] differences in appearance and research agendas. Economics is a wide-ranging field but when it comes down to it, job opportunities in academia are very limited to specific fields and ideas. Hence, we find ourselves in a self-serving and self-re-enforcing loop.

The most important thing that helps minorities is being mentored by other minority economists. The most important thing that hurts minorities is racism. Although many schools are aiming to recruit faculty of color, it is very clear that some places are not open to understanding faculty of color, listening to and supporting their interests, as well as understanding research that is racially motivated.

The economics field is very cutthroat and hostile in general to anyone who does not look like the ‘typical’ economist. The field has also become too much about prestige and who has the best math skills. Many minorities get into economics because they want to make a difference in their communities, but the way the profession and economic careers are structured, this becomes exceedingly difficult to do.

White [males] have a virtual monopoly over the position of journal editor [not associate editor]. There is an elite monopoly over control of NSF (and similar) funding. Departmental governance and search committees tend to exclude African Americans, assuming there’s an African American in the department.

(continued)
What you can do with an economics degree (BA and PhD) is a third example of information that respondents needed. “The clearest path post economics BA from my university seems to be banking and getting information about other paths seems to be like pulling teeth,” reads one response to the most important question. Many interview participants expressed a similar frustration. They lacked specifics in terms of where economists work. They wanted to learn more about the relationship between an economics degree and public policy work, both in and out of government. One respondent who considered an economics PhD but decided against it looked back more than two decades to her college years. “I lacked concrete information on what my career prospects would be beyond academia. I didn’t even know until recently that I could have worked for the Federal Reserve!”
Respondents also wished they had known more about economic research and what academic economists do outside of the classroom. They wanted salary information too. One interview respondent learned these things when she participated in the AEA Summer Program. “Once I saw that, that . . . doing research, being an academic could be a career and that I could support myself doing that,” then a PhD in economics became a real possibility for this participant.

A final example of needed information is, what it takes to be successful as a new PhD. A graduate student expresses this concern,

People talk about the hidden curriculum or that sort of thing. And it goes really deep because it’s not just about how does tenure work? But also, what do specific tenure requirements look like at specific schools? . . . People who have been around in the discipline for long enough know the subtle differences . . .
Table 2 (continued)

What Is the Most Important Thing We Should Know about What Helps and Hurts Minorities’ Progress in an Economics Career?

Lack of mentorship during the economics degree. Lack of mentorship upon entering a position. Hold me to the same standards as white males.

Communication.

Other than structural discrimination [as a hindrance], I think having a mentorship team and peer study groups are critical for successfully graduating with a PhD and making it through the promotion and tenure process.

Funding is an issue if you come from a minority background. Several classmates get extra support from their families in many ways (most classmates come from upper middle-income households in the USA, or high-income households if they are international students), but usually people with minority backgrounds have no external financial support because most of these students come from a working-class background. This is important because extra expenses do occur, minorities without extra financial support have to be RA/TAs . . . during the summer (time to do research is reduced) and if unexpected emergencies occur, they have a larger negative impact among minorities.

Too much [lip] service; We are not monolithic; Lack of cultural knowledge from the majority group; Racism/sextism; Tell us to shut up and be grateful.

Lack of representation in grad school programs from peers and faculty to do research with. Lack of preparation and good mentorship.

Not having minority faculty similar to you in [your] program.

The lack of people with our shared experiences, both in terms of faculty and student-colleagues, hurts minorities progress in economics careers.

I was an average student; I had never taken an economics class before college, so it was all new to me. I persisted in the degree because I was being challenged intellectually, and I enjoyed it. Unfortunately, all the research opportunities were allocated to the top performers in the department . . . However, an undergraduate email list advertised a position in the economics department; the position did not rely on any grade point average cut[off] score. I met with the professor, also a minority, and he brought me onto the research team . . . the professor took me under his wing. . . . The support and guidance that a faculty mentor can provide is critical to what helps minorities progress in an econ career. Arbitrary cut[off] scores, on the other hand, can critically hurt minorities’ progress. . . . The primary factor that made me want to pursue an Econ PhD was having a meaningful research experience . . .

Economics is a tool used most effectively to rob African Americans and to enrich the real minority, the 1 percent. When an African American is in the class, the professors recognize that economic theory gets personal. Because of life experience, Black students can see through the facade and this isn’t appreciated by many classically trained economists, who do not appreciate having their theories questioned.

I think it is important for minorities who are considering economics to work with minorities who are already working in economics. I went to a summer program [that] encourages minorities to pursue economics but I don’t remember being taught by or meeting minorities who had economics PhDs.

Disseminate Information

You can illuminate the “hidden” parts of the field of economics. If you are on a college campus, the work can begin even before students arrive. In a field experiment involving 2,710 students across nine US colleges, Bayer, Bhanot, and Lozano (2019) show that emailing information about a diverse array of topics and researchers within economics to incoming women and minority college students increases their likelihood of completing an economics course in the first semester by 3.0 percentage points, nearly 20 percent of the base rate. Such outreach by individual faculty and departments to students from groups not traditionally associated with economics may help offset the information disadvantage and the biased
Once students are in class, be explicit about your expectations, including appropriate use of office hours, classroom conduct, and class preparation time and what they can expect from you including e-mail use, hours of availability, and the type of help you are willing to give. Let them know what economists actually do and how they can get there through announcements and links on the course website and more seamlessly through course content (which would also speak to respondents’ calls for more applied introductory courses discussed later in this paper).

The advice and resources offered on the AEA website (Bayer et al. 2019), including the videos that expose students to the research that economists do (Div.E.Q. 2019) can be helpful in this regard.
Outside of the classroom, share information actively. Be explicit about expectations with those you supervise as RAs, interns, or PhD advisees. What do you expect their work product to look like? When do you expect it? How and when should they contact you with questions? Provide clear feedback to let supervisees know how they are performing. Make sure that the young people with whom you work have a sense of the breadth of economics in terms of topics studied, career trajectories, and places of employment. Share resources available for succeeding in such a career with those you supervise, whether they ask for the information or not. Students may not know what they do not know. The fact that you speak to the student about graduate school may move that option more squarely into the realm of possibility.
Invite students and junior colleagues to help with your research, to attend conferences, and to join your field. Invite undergraduates to attend seminars. Departments can host brown bag lunches with professors, “so that we can learn about what cool stuff our professors are doing,” a recent college graduate suggested. Even better, allow an undergraduate economics club to drive the agenda for a speaker series. Respondents noted that affinity groups, such as groups for minorities in social science, or women in economics, are good tools of information dissemination as well. Departments can encourage and support such groups.

Introduce
You can facilitate connections among researchers and bring minority researchers into your own network. Related to the problem of lack of information is a lack of connection to key networks. If you know of an early-career researcher who would benefit from interacting with another researcher you know, put the two in touch. Connect people online and at conferences. Share opportunities to submit to, present in, and attend conferences. We know these connections are vital to success. A named professor in the sample attributes his strong publication record to being in a network that includes many journal editors. Another PhD says she is no longer in academia because she never made the connections she needed to get her work out there. “In the end, she says “it’s who do you want to hang out with, who do you want to be friends with, who do you feel like you can talk with?”

Inform Yourself
Here we provide some basic information about a few of the bridge and mentoring programs available for minority economists and economists in training.

The AEA has three programs. In the AEA Summer Program, undergraduates and recent college graduates from underrepresented backgrounds take coursework to prepare them for a PhD in economics. In the AEA Mentoring Program, underrepresented minority graduate students are matched with PhD economists for one-on-one mentoring. In the AEA Summer Economics Fellows Program, graduate students and junior professors are placed within the research communities of government organizations, while allowing the fellows to work on research projects of their own. You can find additional information on all of these programs on the CSMGEP webpage (https://www.aeaweb.org/about-aea/committees/csmgep/programs).

Another major program in this space is the Diversity Initiative for Tenure in Economics (DITE) which supports underrepresented minority scholars moving from untenured to tenured status. There are also several post-baccalaureate programs that allow students to work as research assistants and complete coursework in preparation for a PhD in economics. The PhD Excellence Initiative at New York University (NYU) is one example that targets underrepresented minorities. For a more complete listing, see the AEA’s website on Professional Development Initiatives (https://www.aeaweb.org/about-aea/committees/cswep/programs/resources).
To learn about—or post—additional opportunities for minority economists and economists in training, you can subscribe to the CSMGEP listserv and join the ASHE (https://asheweb.org/), which is “concerned with the under-representation of Hispanic Americans in the economics profession” and the NEA (https://www.neaecon.org/), which “promote[s] the professional lives of minorities within the profession,” to be part of their listservs and receive up-to-date information on opportunities for minorities in economics. The Association for Economic Research of Indigenous Peoples (https://www.aeripecon.org/), a new professional association founded in February 2019, hosts events and resources “to facilitate intellectual exchange, foster networking and information sharing, encourage and promote teaching and research on topics related to the social and economic development of Indigenous peoples.”

Our survey respondents praised bridge and mentoring programs as helpful not only in skill development, but also in terms of information acquisition and network formation. One recent graduate of the AEA Summer Program said: “A lot of people I still keep in contact with. We all, if someone’s applying for a job, we’ll check resumes. [If I apply to graduate school] I have people I know who can help me, read my application. And just have a support network in general. I think that was a super valuable experience.”

While respondents lauded the programs that were available, they saw a great need for more, particularly for those that aid with the transition from a BA to a PhD in economics. Such programs can take many forms, but all should center on the professional development of the participants. One respondent was admitted to a PhD program that allowed her to take undergraduate math classes at no charge for her first year on campus before moving on to the first-year PhD curriculum in her second year. The AEA Summer Program consists of classroom instruction and exposure to current economic research in preparation for a PhD application. Post-baccalaureate programs that allow participants to combine classroom instruction and research-assistant work are popping up on many campuses. These programs can take as few as one student per year and can often garner grant support. If you are interested in starting such a program at your institution, one place to start might be by viewing the joint CSWEP/CSMGEP Panel “Launching a Professional Development Initiative: A Conversation among Mentoring Veterans, Eager Mentors, and Founders of New Mentoring Initiatives” from the 2020 AEA meetings (available at https://www.aeaweb.org/about-aea/committees/cswep/videos/2020/develop).

Mentor

As much as respondents praised bridge programs, there was one suggestion for improvement from a summer program graduate: “I think programs like [the AEA Summer Program] would do even better if they added an ongoing mentoring component after the program to support students in the graduate school application process and journey.” In fact, mentoring was the most frequently named solution to
the lack of racial and ethnic diversity in economics, in both the in-depth interview and most-important-question samples. As we previously noted, lack of mentoring was a frequently cited problem.

Given the small numbers of minority PhDs in economics, for mentoring to be a meaningful part of the solution, a large share of those mentors will have to be non-minority economists. In our roles on the CSMGEP, we have heard non-minority economists question whether they can effectively mentor minority economists and would-be economists. The answer is yes. More than two-thirds of interview participants reported that a non-minority economist had acted as an effective mentor at some point in their career.

Mentees do not expect all of their mentoring needs to be met by a single mentor. As one graduate student explained,

I’m sure it’s a common thing for people of color . . . and maybe for women, but you have to cobble together your team of mentors or advisors and have them each serve their own purpose. . . . [M]y advisor is not going to be the person that I listen to about race and ethnicity in research. . . . I think as much as she’s read about that, that’s not her expertise, and that’s not where her political investments really line up with mine. She’s good at helping me navigate the program and navigate the job market. And my mentor through the AEA mentoring program [Latinx like the speaker] . . . in terms of political investments and in terms of inspired research, I talk to him and I get a million ideas. . . . And I feel so jazzed about changing the discipline talking to him.

A respondent who started but did not finish a PhD program summed up the situation succinctly. “I think there has to be an effort by non-minority scholars to both understand that there is a pipeline problem . . . and be willing to mentor.”

The key phrase is “an effort by non-minority scholars.” You will need to do more than wait for a minority student from an underrepresented group to knock on your office door and ask for mentoring. As one student explains,

First, undergraduate students need to see that there are people like them in the field. But you can’t have that unless you have people in the field. So, it’s a bit of a vicious cycle. But I think undergraduates also need people to tell them that if you are a minority, you can also come in. So even though you don’t look like me, you’re also smart or you’re also talented or you’re also driven enough to do this. So, I think [even] when there’s no diversity in the cohort or [among the] professors, they can still actively look for diverse students. And I say actively . . . because I think one of the mistakes a lot of people make is assuming that, oh, the smart and the driven students are the ones that come to meet me [and] are the ones who asked me about graduate school. There are many smart and driven students that just don’t dare or don’t have maybe the language skills or don’t have the information . . .
Sometimes you just don’t know. And I think the role that a professor can play, or a mentor can play is really big.

The mentoring relationship may last months or years, may be declared formally or arise more organically. (Please do not let the possibility of an organic mentorship arising prevent you from reaching out to students, from participating in formal mentoring programs, or from even starting a mentoring program.) Specifically, what are students and assistant professors of color looking for a mentor to do? First, provide information and connect the mentee to resources and networks as described earlier. Respondents would like to meet regularly with their mentors. Respondents would also like mentors to listen and help the mentee to become the economist that the mentee wants to be, not a reflection of the mentor. Respondents are also looking for mentors who are proactive. An academic explained:

You asked me in terms of diversifying the profession and also mentoring and the things I talked about, sponsorship and mentoring, making sure that before the student [starts] failing classes, intervene and make sure, check in with them. How are you doing? What do you need to get through to the classes? . . . What do you need to get through this dissertation? Would you like to coauthor this paper? When they’re faculty members, would you like to coauthor these papers? Would you like to go in on this NSF grant? Those are the kinds of things that are needed to retain [underrepresented minorities in economics].

Finally, mentors should be encouraging. Be your mentee’s champion. Too many respondents were discouraged from pursuing economics. One was told she would never attain the mathematical proficiency needed. Another was advised that because he was unable to get into a top ten program that it wasn’t worth attending economics graduate school, which is a manifestation of the elitism that many interviewees perceived as a major hindrance to their trajectory in economics. A respondent who went as far as an MA in economics was asked about what factors might have led to his earning a PhD, and responded, “I don’t know. I guess maybe just being told that you can actually be an economist.”

Good mentoring was pivotal to many respondents’ decisions of whether to major, work, or get a PhD in economics. One AEA Summer Program graduate believes that had she had a mentor to help her, she would have applied for economics PhD programs when she returned to her home campus that fall. She never did apply, but says if she had to do it again, she would because she got a “thrill” from doing math and economics. More than one respondent credits good mentoring with their being in an economics PhD program today. A student explained the value of mentoring as follows,

I wouldn’t have known from anyone that a PhD is what I needed if I hadn’t had someone saying, ‘Hey, this is what’s going on. This is what [you] probably
need. I think you can do it.’ If we don’t have people going out and speaking and encouraging and mentoring and being in relation with us, then what, you know?

For more on the good, the bad, and the ugly of mentoring, see Bogan (2019) as well as Cook (2019) and the CSWEP News issue on mentoring underrepresented minority women edited by Mora (2019).

Welcome

Broaden the Introductory Course

From the first contact that students have with economics, the field is off-putting, respondents tell us. Some believe that the introductory courses are designed to “weed out” students from the major. Whether professors are doing this deliberately to decrease numbers or not, respondents point to theories and formulas devoid of applications as uninviting. The impact of these uninviting courses is not equal across student demographics. Bayer et al. (2020) find that minority (and women) students in introductory economics classes report significantly lower measures of relevance, belonging, and growth mindset; for example, they are less likely to agree that their professor uses relatable examples, to report feeling comfortable asking questions in class, to believe that people like them can become economists, and to believe that they could learn the material.

Respondents recommend that introductory courses be more applied and that they include examples that are relevant to students from all backgrounds. In fact, nearly 75 percent of interview respondents cited an interest in public policy in explaining what first attracted them to economics. Says a recent undergraduate,

Being able to connect what’s happened in the classroom with what a given student’s lived experience or question is, is extremely useful. . . . I personally know a lot of . . . people of color, who, I think personally, if economics was much more accessible, they would probably be economists because they’re interested in questions of, how do we fix the gender gap? How do we fix the racial disparities in education and wages? These are economics questions.

A student who is now in an economics PhD program was hooked by being invited to critique the textbook models,

Every time in class [the teacher] would say, “I’m going to show you this model[and] I want you to know that these are all of these assumptions baked into this model. . . . Every day you should ask yourself whether those assumptions are really true. . . .” And so, that got me thinking. . . . And I started realizing that I actually wasn’t that bad at math. I got to this point where I was like, oh wait, no, I’m proficient, I can probably do this.
Another discouraging factor in one’s early years in economics is that, according to several respondents, professors give the impression that they are only interested in the top students. The same recent undergraduate advocating for more applied work above explained, “It’s like an ID card. Show your ID, show your A, ‘Okay, you get a letter. You get my attention.’” A respondent who graduated from college some time ago talked about how disheartening it was that he could not get a research assistant position on campus because all the positions had requirements for a minimum grade point average. Given that students come into college (and graduate school) with different prior academic experiences, have different rates and manners of assimilating information, and that there are types of intelligence invaluable to research that may not show up on an introductory microeconomics final, we do ourselves (and of course the students) a great disservice by eliminating them from consideration based solely on grades.

Some students will come into an economics course (at the undergraduate or graduate level) with a strong network. Others will know no one and will therefore be at a disadvantage in completing coursework and studying for exams. Level the playing field by formalizing processes and taking across-the-board steps: share resources like copies of past exams universally, set up study groups for all students and encourage students to work collectively, and assign and guide graduate student advising.

Students are receiving implicit and explicit messages about the identity of who belongs in the field. Counter those messages. Be upfront with students about the economics profession’s need to be more diverse and the messages of exclusion communicated by materials that omit or diminish the experience of minorities. Div.E.Q. at DiversifyingEcon.org (Bayer 2011) provides strategies for managing diverse classrooms.

**Call Out Bad Behavior**

The economics profession does not become more welcoming in graduate school and beyond. In fact, interview and survey respondents deemed it as “hostile,” “cutthroat,” and as previously stated, “elitist.” One associate professor describes her department’s treatment of graduate students as essentially their saying,

“We’re going to pit you all against each other. We’re only going to support the top students. This is a fight to the death.” . . . The type of environment that’s in economics. I’m just going to be honest with you, I don’t think that a student

---

A number of steps can serve to increase the sense of belonging for minority students, including offering diverse instructors (Fairlie, Hoffmann, and Oreopoulos 2014), teaching assistants (Lusher, Campbell, and Carrell 2018), authors (Bayer, Bhanot, and Lozano 2019; https://jlsumner.shinyapps.io/syllabustool/), and speakers (https://econspeakerdiversity.shinyapps.io/EconSpeakerDiversity/). In addition, successful interventions help students see that adversity is normal rather than an indictment of their belonging, reinforce beliefs that success is attainable and worthwhile, and build community. For example, an intervention designed to buttress Black students’ sense of belonging improved academic achievement, as well as self-reported health and well-being, and reduced the reported number of doctor visits for three years after the intervention (Walton and Cohen 2011).
who is an underrepresented student does well in that environment. I think that we tend to do well in a more supportive environment where we don’t feel so isolated.

And about the profession in general, she continued, “The economics profession is brutal. Colleagues and students can be disrespectful, have implicit biases, and not understand the stress that being a minority economist entails.”

There is a long history of economists from minority groups being pushed out, neglected, and undervalued. Examples include the experiences of Sadie Tanner Mossell Alexander as the first African-American woman to receive a PhD in economics in 1921 (Malveaux 1991; Banks 2005) as well as the history of the National Economic Association (Simms and Wilson 2020) and the results of the recent AEA climate survey (Allgood et al. 2019).

To create a more welcoming climate in economics for minority scholars, you can call out unacceptable behavior—racism, sexism, harassment of all types—when you see it and when it is reported to you. Your workplace (and our profession) needs clear policies and consequences for this behavior. The AEA Best Practice website (https://www.aeaweb.org/resources/best-practices) provides guidelines for developing such policies.

More often than explicitly racist behavior, respondents had interactions that suggested more subtly expressed racial bias. The associate professor continues,

[My white] colleagues or even other administrators, they don’t know that you have to deal with different layers. . . . I can say something, exactly the same as my white male colleague, but when I say it, I’m being a witch, or I’m mean, but they don’t deal with that. . . . So, I’m usually the first Black economist [my students have] ever seen. And that in and of itself has its own issues, like are you qualified? Are you competent? That’s what I mean is [my colleagues] don’t have to deal with [that] . . . and then when you do get eval[uation]s, . . . what [my chair] noticed was that when it comes to minorities, [the students] veer off [into] personality. He’s like, “I’ve never seen that with eval[uation]s of the white colleagues.” . . . They might like my class [but] they’d be like, “But I don’t like.” And it’s usually something really personal or how I dress. And he’s like, “I never see that with other colleagues unless they are . . . underrepresented minorities.”

Other examples of this sort of subtle bias include differential treatment by colleagues, disrespectful interactions with supervisees or students, receiving more challenges and more interruptions from seminar audiences, and having one’s right to be in a certain job or location challenged. To make the economics environment more welcoming, you can raise awareness of the more subtle, but pervasive, biases too. Question whether evaluations, made by students or by colleagues, might be biased. Indeed, survey responses like ours along with the findings of large-scale studies led the AEA to recommend “Do not rely exclusively, or even primarily, on
student evaluations of teaching to inform tenure and promotion decisions” (Bayer et al. 2019). Reduce the influence of remaining biases by standardizing processes such as job searches. Again, the AEA Best Practices website offers details (Bayer et al. 2019).

Listen

When asked what would improve diversity in the economics profession, an economist at a policy organization answered,

I think people understanding that we are unique, and we all have different experiences. People being open to people talking about their experience and . . . actually hearing them. [I am] not saying that you have to agree with them. You don’t have to, that’s fine. But really listening to what people are saying that are from different backgrounds and saying like “Wow, I’ve never experienced that in my entire life but maybe that could be the case. And how can we talk about this?” And being more open about issues that minorities have.

Diversifying the profession means not just diversifying the hue of the skin of the people who do economics, but also diversifying the approaches, questions, experiences, and goals of economists. Respondents asked to be heard on these differences, which shape both the substance of their work and their workplace experiences with implicit and explicit bias. Respondents also wanted to be heard by advisors whose help they would like in reaching research and career goals that are distinct from those of their advisors. For example, one PhD economist who is satisfied with her career in industry said, “If you’re in graduate school and you know you don’t want to be in academics, then there should be . . . someone telling you that’s okay; you don’t have to be an academic. You can go to industry.”

Respondents want colleagues and department chairs to hear that service can be different for minority scholars, not only in terms of quantity of committees, but also in terms of intensity of the work. For example, minority faculty members frequently report more than their fair share of advisees, at least de facto, as minority students are eager to work with a minority advisor. Finally, respondents want to be heard in seminars and in other discussions of research including when they raise critiques through a racial lens, “Instead of being met with . . . not her again,” said a PhD student. The point is to listen actively to each individual’s particular concern, which may be quite distinct from yours, and then help to address it.7

Broaden the “Legitimate” Topics

More difficult than simply trying to raise certain ideas, respondents say, is trying to pursue them as research topics.

I think there’s a problem with this whole notion of . . . bringing new questions and new ways of approaching very established and old issues in economics. People like to support, especially scholars of color, if they’re . . . echoing the mainstream and it’s harder and tougher when you’re not doing that.

Respondents struggled to get the economics community to engage with work that was viewed as interdisciplinary in nature, was outside of the neoclassical paradigm, or that challenged economic dogma, among other topics. This played out for a current graduate student as follows,

A lot of the research questions I had . . . as a first-year graduate student were kind of particular to my upbringing and the things that I experienced growing up and as a young adult. Early on, however, some faculty would always ask me to think about . . . my research questions’ value to other social scientists. This nudge led me to discard many of my initial motivations for pursuing a PhD, but at the time, I did not see this nudge as particularly evil. As I have reflected on this over the years, I realize that this nudge disproportionately affects minorities. The social science community consists mostly of white males. . . . I’ll reiterate that these statements probably came from a good place. But in retrospect, faculty should avoid hindering potential research agendas because they are not interesting to white males.

Different backgrounds and lived experiences of course can lead to different research interests and insights (for example, Bayer and Rouse 2016; May, McGarvey, and Whaples 2014; Malmendier, Nagel, and Yan 2017). Respondents report that advisors and mentors particularly discourage graduate students and early stage minority researchers away from topics related to race or other aspects of their identity, which are the topics that in many cases drew the young researchers to economics in the first place. There is a perception that Black scholars studying Black people or Latinx scholars studying Latinx people or Native American scholars studying Native American people may be biased or taken less seriously as scholars. (Of course, this critique is never made of white men scholars studying white men.) Sadly, this double standard has not changed across the years. A full professor who earned her PhD several decades ago says that because of a nudge away from identity, her early work was “totally sexless and ethnicness-less” and it was 20 years before she began studying a topic that she enjoys and has been productive in, a topic related to her background. Many underrepresented minorities are drawn to economics research because they find the existing research to be problematic or lacking in some fashion.

---

8For example, a frequent critique of the literature on the economics of race is that it relies on a “deficit” model of the behavior in communities of color, rather than racism or structural racism, as explanations for differences in outcomes across race. For discussion, see the Darity et al. (2015) introduction to a special issue of the Review of Black Political Economy devoted to stratification economics and the open letter to economists from Bill Spriggs (https://www.minneapolisfed.org/~/media/assets/people/william-spriggs/spriggs-letter_0609_b.pdf).
We imagine that advisors and mentors suggest against certain topics because they believe that conference organizers, journal editors, and hiring and tenure committees will not be appreciative of them. Thus, the gatekeepers in the economics profession need to take a broader view of legitimate economics research.

Engage, Admit, Hire, Promote

Respondents in our survey were unequivocal that having more peers, mentors, and role models of color would improve the economics experience for minorities. One graduate student said it would be “revolutionary.” Many underrepresented-minority students struggle with being the only “one” of their race, class, and/or academic background. Some students find it hard to connect across race. More frequently, respondents yearn to be in dialogue with other minority economists. One respondent attended the AEA Summer Program and yet does not remember having a single instructor of color. Another expressed surprise: “Even though I went to college in [name of city], which has a very large minority population, I didn’t know any economists who were minorities on a basis where I could shoot ideas off of them or ask them what their story was, or how they got to where they needed to be.” Four Black women in the interview sample attribute their failure to go on to get their PhDs at least in part to the lack of mentors who look like them.

Role models can be on syllabi, not just in the classroom. You can increase exposure to the work of underrepresented-minority economists; as one example, social media can be a platform to lift up research by minorities. Diversify the literature you cite on syllabi and in research. Consider racial diversity in the seminars and conferences you organize (and as a tenured respondent to our survey added, not just on the race-related panels). A great new resource is the Diversifying Economics Seminars – Speakers List (https://econspeakerdiversity.shinyapps.io/EconSpeakerDiversity/), which includes economists who identify as underrepresented minorities and/or women and/or LGBTQ+, along with their area of research and contact information.

If you are a journal editor, diversify who you publish. If you are not receiving enough submissions by underrepresented minority economists, reach out and solicit them. Invite minorities onto the editorial team. Respondents pointed to the lack of diversity in terms of both race and institutional affiliation of editors as contributing to the lack of diversity of authors and topics in economics’ leading journals. A tenured professor, unsatisfied in her position, put it bluntly: “We need to quit being elitist. If you look at who are the editors of a lot of these journals, it’s the same schools. So . . . if econ really wants to increase diversity, we have got to get editors who didn’t all go to Harvard, Stanford, Yale, Princeton . . . . ” Of course, the more you mention, cite, invite, and publish the work of minority economists, the more likely it becomes that those minority economists will be able to stay in the profession. One way to increase your exposure to the intellectual contributions of minority economists is by
attending sessions sponsored by CSMGEP, NEA, and ASHE at annual and regional meetings.9

In the area of admissions and hiring, one cannot rationally expect to obtain a different outcome with the same behavior. If you want to increase diversity, then existing admissions and recruiting practices need to change. We do not know what the final process should look like, nor do we assume it will be the same for every department. But items that should be on the examination table include: First, recruiting from a wide variety of schools including historically black colleges and universities and other minority-serving institutions, and dropping the elitist view of favoring applications from only certain schools. Second, communicating by words and actions that students of all kinds are welcome in the economics profession. Third, discontinuing reliance on the Graduate Record Exam (GRE), an exam on which women and underrepresented minorities score lower on average. The Educational Testing Service (2018), which administers the GRE, warns against using a test cutoff as the sole factor in admission denials. The exam has been dropped completely by top PhD programs in several of the sciences in favor of more holistic evaluations of applicant potential (Langin 2019). Fourth, developing a more holistic (beyond the scores and grades) picture of an applicant’s potential research ability. Physicists and others have identified graduate admissions criteria that keep longstanding inequalities in place and have developed methods for recognizing and selecting for unrealized potential in students during the admissions process (Posselt 2016; Stassun et al. 2011).

Hiring and promotion practices need to change, too. Explains the same tenured professor who spoke about economics journal editors,

And again, it comes from having people who are more open when it comes to reading applications, who [don’t] only want an applicant who looks like A. Who are more open to “Hey, this person might not [look] like A, but they’re doing some really interesting research. Maybe we should give them a position here. Even though they might not be in our network of friends.”

Here are some suggestions to begin a discussion in each department. First, cast your net widely. For junior positions, that means advertising broadly and giving full consideration to applicants from all schools. For senior positions, this means creating a census of potential applicants and not simply considering those economists who come to mind. Second, when we picture the ideal hire, we are overly influenced by what we have seen in the past—the phenotype, the academic record, and the research (Tverksy and Kahneman 1973). Strive to counter this tendency—that is, to work with a broad definition of the questions, approaches, and experience profiles that your department needs. Third, prioritize diversity (of experience and of thought) in searches, or else this concern is likely to fall to last

9See the most recent issue of their joint newsletter, The Minority Report, for a list of recent sessions and other information at https://www.aeaweb.org/about-aea/committees/csmgep/minority-report.
place. Fourth, structure recruiting and evaluation processes and standardize interviews so that unconscious biases do not create unequal opportunities for candidates to perform and impress. Fifth, at promotion time (or preferably before), note that diverse people will have diverse experiences and recognize and account for these diverse contributions (like an advising overload) to your department. Sixth, hire for the work and not for the phenotype. Respondents loath tokenism. To help get you started on this work, see the Commission on Ethnic Minority Recruitment, Retention, and Training in Psychology (2019) and the AEA Best Practices resource (Bayer et al. 2019).

We will add a word about quality, a concept that is often used to end conversations about diversifying schools and workplaces. A respondent reported on a faculty meeting, “We were talking about what can we do to recruit, especially more Black professors. And then one of my colleagues was like, ‘Well, we don’t want to lower our standards.’” Darity (2010) discusses the role of “the fetishization of ‘merit’ as a rationalization for discriminatory outcomes.” It is a given that departments do not want to lower standards. That this issue is raised (repeatedly) after someone mentions diversity and hiring is the sort of micro-aggression that can make minorities feel outraged and unwelcome. It is also wrong. For departments of economics, the existing biases in current admissions and recruiting practices are the equivalent of leaving money on the table. As evidence, note that prominent companies around the world are working to increase diversity (for ten examples, see https://www.socialtalent.com/blog/recruitment/10-companies-around-the-world-that-are-embracing-diversity).

Conclusion

Economics has a diversity problem. The numbers of Black, Latinx, and Native American economists are low, as is their relative level of satisfaction in the economics profession. Based on surveys and interviews of underrepresented minority economists, both those who are on and those who have exited an economics career trajectory, we have offered ways in which you can help to counter this problem, grouped under the action areas of inform, mentor, and welcome.

As economists, we recognize that individuals respond to incentives. Research, teaching, and service are all incentivized, although admittedly to varying degrees. Economists put effort into these activities. The work gets done. But the meager incentives that exist for increasing racial and ethnic diversity across economics have proven insufficient to move the needle. Issuing diversity statements is far from enough. As one PhD economist who is no longer searching for an academic job told us, “I think that there needs to be intensified pressure on economics departments, in particular, to hire people of color. Because until there is pressure, I don’t think people are going to change who they’re seeking.” Forceful incentives have yet to be applied around diversity issues. It is logical to conclude that diversity must not truly be a priority in the economics profession.
We thank interviewers Erika Jackson, Britney Moreira, and Trenel Francis; coders Avery McKenna and Kayla Preito-Hodge; those who assisted us with qualitative methods LaRue Allen, Elizabeth Ananat, Desmond Ang, Jiwon Choi, Sarah Jacobson, Joanna Lahey, Jenny Shen, Lisa Suzuki, and Cirecie A. West-Olatunji; and Trevor Logan and editors Gordon Hanson, Enrico Moretti, Timothy Taylor, and Heidi Williams for helpful comments. A special thank you goes to Arkey Barnett who provided stupendous research assistance.

References


This article has been cited by: