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Teaching and Educational Method

Fostering Undergraduate Research with Rising Student Demand and Shrinking Faculty Resources: The Saturday Morning Breakfast Club

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Abstract

The Iowa State Economics Department's Saturday Morning Breakfast Club mentors undergraduate research in a group setting rather than one-on-one. The group setting allows students to learn from each other and takes advantage of returns to scale in mentoring compared to the traditional one-on-one research advising. The switch to this model allowed us to greatly expand opportunities for undergraduate research despite shrinking numbers of faculty and rising numbers of students seeking research experiences. The quality of the research experience is evident in the number of placements in national competitions, refereed publications, and student reactions to the experience.

1 Introduction

Increasingly, high school graduates are coming to college having already completed a number of college credits. These were earned in some combination of dual credit courses, defined as a class that fulfills both high school and college credits, Advanced Placement (AP), or International Baccalaureate programs. Figure 1 shows that the number of high school students earning AP college credit quadrupled between 2000 and 2019 to reach 2.8 million by 2019. Barshay (2023) reports that the number of high school graduates with dual-enrolled credits in community colleges also quadrupled over the same period to 1.05 million by 2019. With 3.8 million high school graduates per year, over half are now entering college with college credits earned while in high school.[1] Many begin college with a semester or more of coursework completed and will enter their senior year having completed the mathematics, statistics and economics courses required by their major. These students may be well-prepared for conducting a research project, and many may stay for a fourth year for that opportunity.

The standard model of undergraduate research has mirrored that of graduate students. Undergraduates work one-on-one with an adviser on the student's project, or the student provides research assistance on a professor's project. This is still the model for the senior essay required at many private schools where there were 8.5 students per faculty member in 2020. Average student-to-faculty ratios have fallen over time at public universities (Figure 2) to 14.8 by 2020. However, student-to-tenured-faculty ratios have been rising over time and reached 33.6 by 2020. The trends of rising numbers of public university students ready and willing to conduct research with fewer research faculty available to advise them spell shrinking undergraduate research opportunities in public schools. The problem is exacerbated by the lack of institutional incentives to work with undergraduate students, and so relatively few faculty are willing to engage in undergraduate advising.

[1] In 2009, 42 percent of high school graduates had earned college credit in high school, the most recent data reported in the U.S. Department of Education, National Center for Education Statistics, High School Transcript Study. Since then, the number of students taking AP and dual credit classes increased by nearly 75 percent.

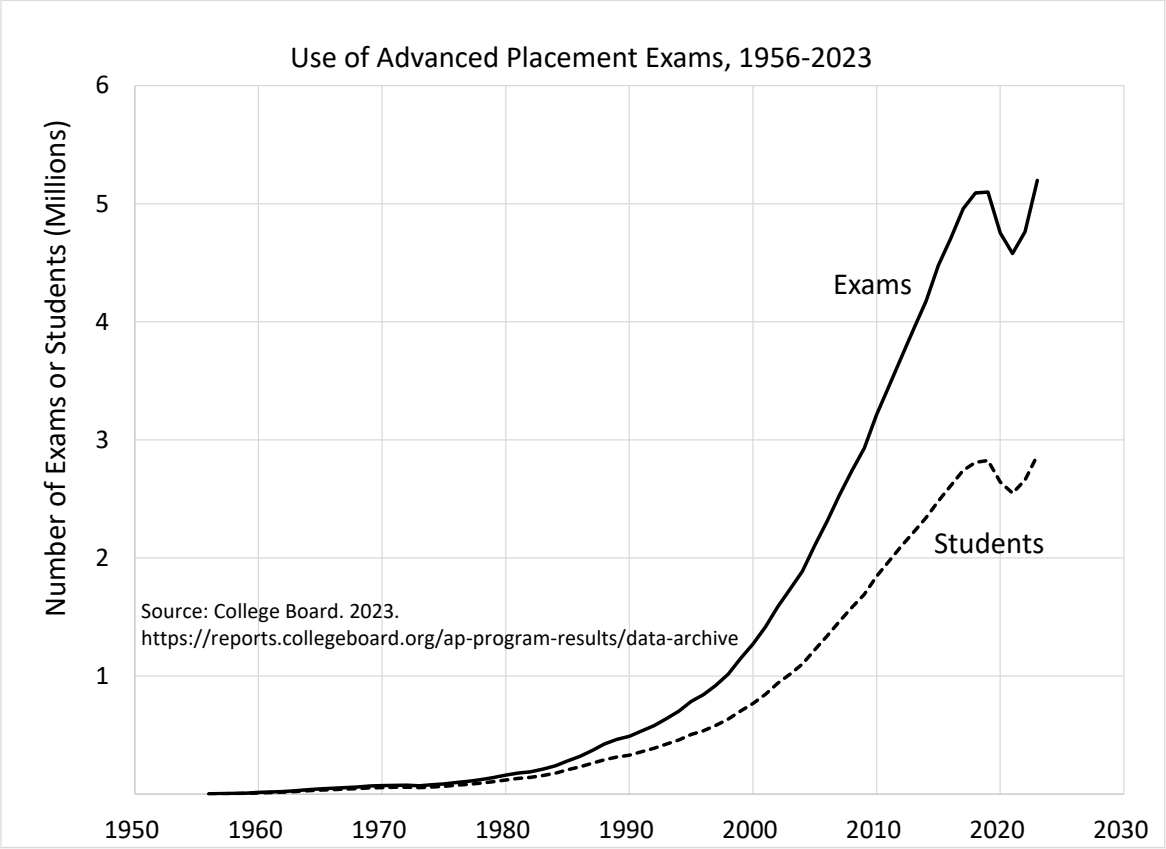

Figure 1: The Total Number of Advanced Placement Students and the Total Number of Exams Completed by Year, 1956–2023.

Some universities have met the challenge by offering capstone courses in research methods. While such courses indeed broaden the number of students served, they often achieve their economies of scale by limiting the range of topics and methods a student may use. At Iowa State University (ISU), we tried an alternative means of scaling up research opportunities without standardizing the topics or methods. Our Saturday Morning Breakfast Club strategy is more akin to a research-group model than a one-on-one model. Through a group dynamic and the addition of graduate teaching assistance to the process, we aim to exploit returns to scale in research advising to increase the productivity of scarce faculty time.

It is useful to discuss why a public university should encourage undergraduates to engage in research when it lacks the comparative advantage to provide such services compared to liberal arts colleges. The first is that land-grant universities must develop the next generation of scholars in agricultural economics, and passively waiting for undergraduates to self-identify will not motivate the best and the brightest. Furthermore, students may only realize their talents for research after they obtain research experience, making early exposure a useful screening mechanism. We argue that the Breakfast Club serves to develop future graduate students and provide undergraduates with the chance to build a research portfolio that will follow them into their professional careers.

A second reason to offer a research outlet to undergraduates is that it motivates high-achieving students, who may be able to graduate early, to stay for a fourth year. With state support for public universities waning, tuition is the only growing source of revenue. Colleges and universities already face

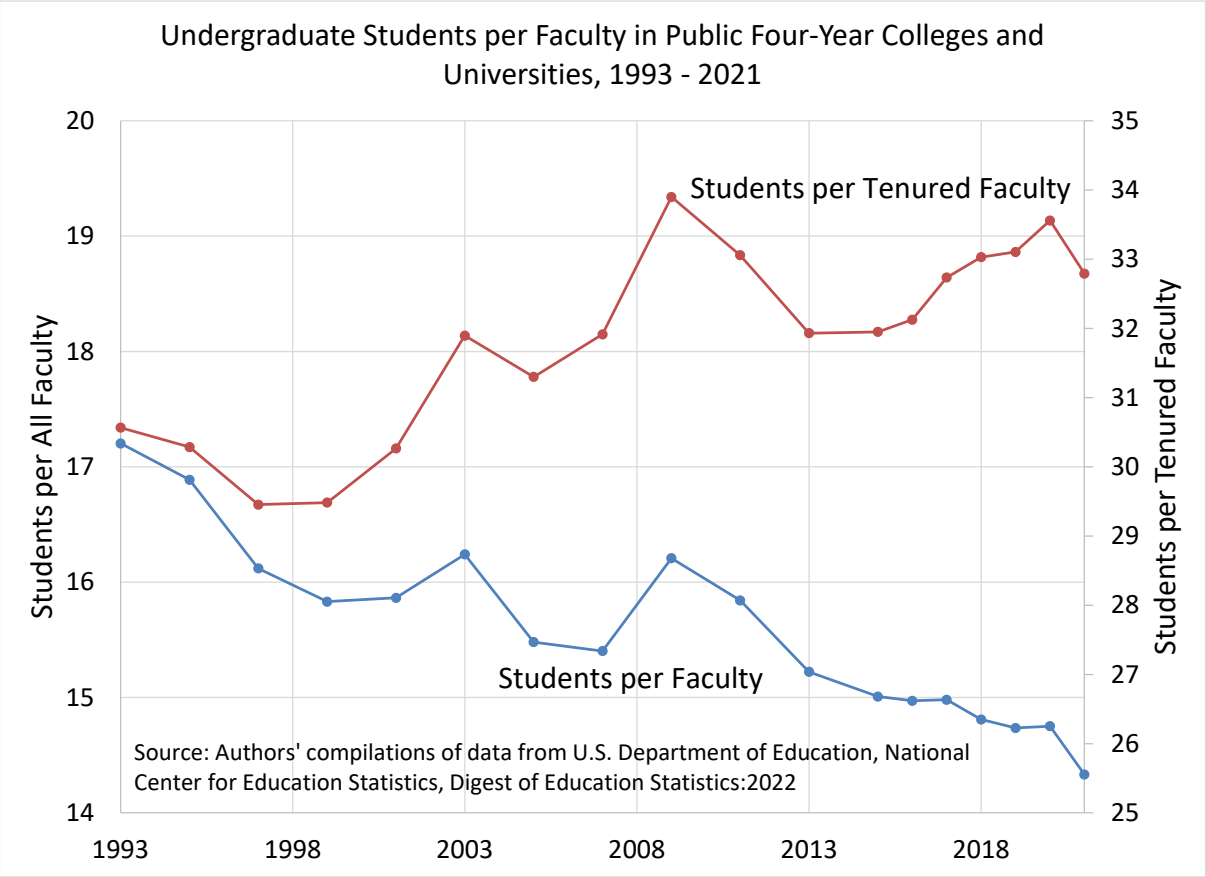

Figure 2: The Ratio of Students to All Faculty and to Tenured Faculty, 1993–2021

an upcoming enrollment cliff that will decrease the number of high school graduates enrolling.[2] The problem will be exacerbated if the students entering college have enough credits in hand that they only stay for three years.

The third reason is that the student's research experience serves as a way of differentiating themselves on the market. As one example, one student told us that the employers at the university career fair only wanted to talk about her project because the research skills she acquired made her more interesting to firms.

This paper will present a case analysis of the ISU Economics Department's Saturday Morning Breakfast Club,[3] an effort to expand undergraduate research opportunities despite shrinking faculty positions by exploiting returns to scale. By switching to a model of group research advising and increased research partnerships between graduate and undergraduate students, we were able to expand the range of undergraduate research opportunities, including solo or joint research projects, and team research for national competitions. In addition, Breakfast Club participants presented their work at national and regional professional meetings. The club fostered submissions to and publications in professional journals as well as designing and conducting Extension research and building resumes for admission to graduate and professional schools.

[2] Nayga, Liu, and Kassas (2024) report that declining fertility will result in a projected 10.4 percent decline in the number of U.S. high school graduates after 2025. This will have a particularly large adverse impact on college enrollments in the Midwest and Northeast.

[3] The name was inspired by the 1985 John Hughes film of the same name, but from the start, we provided fruit and pastries because students might attend past the noon hour.

2 The Iowa State Breakfast Club Model

The ISU Economics Department's Saturday Morning Breakfast Club began on a bus ride to Omaha. Since 2014, the ISU Economics Club has taken an annual trip to the Berkshire Hathaway annual meeting. The so-called "Woodstock for Capitalists" provided students a glimpse of economics in practice as CEO Warren Buffett and his right hand, Charles Munger, answered questions in their folksy style about business strategy, politics, regulation, and life. During the trip, two students discovered that they were each working on a research project, but they were unaware of each other's efforts. Why, they asked, did we not have a way for undergraduates working on papers to interact? And so, the Breakfast Club was born.

The Breakfast Club model is a drop-in workshop in which a small number of experienced researchers provide advice and collaborative support to undergraduate researchers. The assigned experienced research advisers include one faculty member and at least one graduate student. Undergraduate advisers identify students who have an interest in conducting research and refer them to the Breakfast Club faculty member, who then discusses possible topics with the student and the student's time frame for completing a project. In our experience, some students start projects during their freshman year, and so relatively ambitious projects can be undertaken that are planned to take multiple years. Others may have to finish in a semester, and so they carry out more limited projects. In several cases, two students were interested in the same topic and worked on a project together.

The Breakfast Club need not be a formal class in the sense of a research seminar. At ISU, some students participate without credit in each semester, although most register for independent study credits at some point. These credits are offered on a satisfactory-fail basis. The lead faculty member may serve as the primary research adviser, or another faculty member may be recruited depending on expertise. However, the Breakfast Club faculty and graduate students agree to assist on the data collection, statistical analysis, paper design, and writing. This frees up the other faculty to focus on content advising. Sometimes, the student's project overlaps with another graduate student's interests, often because of the use of the same data set. In those cases, that graduate student may be invited to join the project as an adviser or coauthor. As a result, there are more personnel involved than just the original two, but the Breakfast Club personnel specialize in the day-to-day support and training.

From the beginning, the undergraduate research program followed these strategies:

1. Every student who wanted to participate, as long as they understood the expectations, was allowed to join. Some students who had been marginal performers in their coursework blossomed when they found out how to apply their skills to data.
2. Students work on their own projects. None served as research assistants on a faculty project. Once a student identified a topic or area, the faculty member and the student hashed out a project that could be feasibly completed in the time available. Each project was novel, and it was hoped that it might develop into a publishable paper depending on the student's commitment and whether the data exploration proved fruitful.
3. Projects could span one semester, several semesters, or several years depending on the number of remaining semesters in the student's program.
4. The pace of the work ebbs and flows, as students' course work had to take precedent.
5. Students were encouraged to discuss their projects with other students. Often, more senior students help new students with research methods.
6. Some group sessions were held for all participants on topics such as "How to design a research strategy," "How to do a literature search," "How to organize and write a paper," and "How to use Stata."

7. We met on Saturday mornings when students would have no conflicting academic obligations. While separate sessions could be arranged, if necessary, there were gains from complementarities when there are multiple students. The sessions could last for several hours, especially if we were cleaning data or conducting statistical analyses. In general, the student received assistance as long as they wanted help.
8. While students were encouraged to generate a paper, the value in the exercise is gaining research experience. Students who attended in order to satisfy independent study credits were given a satisfactory grade based on the effort, as students learn from the process whether or not it succeeds. Many students did not complete their projects, but many others completed papers, and a few managed to publish in refereed journals. Students are more comfortable trying the unknown when they are not afraid that the lack of success may result in a bad grade.

In addition to traditional paper-oriented research projects, the Breakfast Club model also supports team development for student competitions sponsored by professional development organizations. Group competitions are opportunities to provide research advice on the same topic for many students in a single instance, and so they are a source of returns to scale. Team competitions create complementarities between student researchers and allow the adviser's time to benefit all team members at once. A few of the more prominent competitions considered by ISU Breakfast Club members include:

- The iOMe Challenge (https://iomechallenge.org/iome-challenge/) sponsored by St. Norbert College where a team analyzes a policy question;
- The Federal Reserve's National College Fed Challenge (https://www.federalreserve.gov/conferences/fedchallenge.htm) where teams evaluate economic conditions and propose monetary policy; and
- The Federal Deposit Insurance Corporation (FDIC) Academic Challenge (https://www.fdic.gov/analysis/academic-challenge/) where the team evaluates an issue facing the banking industry.

It is useful to start with one competition because there is a steep learning curve in participating. It is also important to select a well-managed competition as poorly functioning websites, unclear rules or scoring rubrics, or poor feedback will only frustrate students and limit the learning experience.

A third way for students to share their research is to present their work in a professional setting. Lists of undergraduate conference opportunities and journals that cater to undergraduates are maintained by the American Economic Association (https://www.aeaweb.org/resources/students/undergrad-research). Some of these conferences hold competitions. Although students can be very nervous before presenting, our experience has been that students uniformly felt positive about the experience. As we never forced the issue, it is also plausible that only those prone to appreciate the experience went through with it.

In Figure 3, we show what happened to the number of undergraduate students who signed up for research credits in an academic year. The data understate the total number of students participating in the Breakfast Club. There are two reasons for this. First, the five students who made up our case study team starting in 2017 are excluded because they did not receive research credits for their participation. Second, students typically sign up for their research credits in one semester, even if they work on their project for as many as four semesters. Nevertheless, even the understated measure shows that the

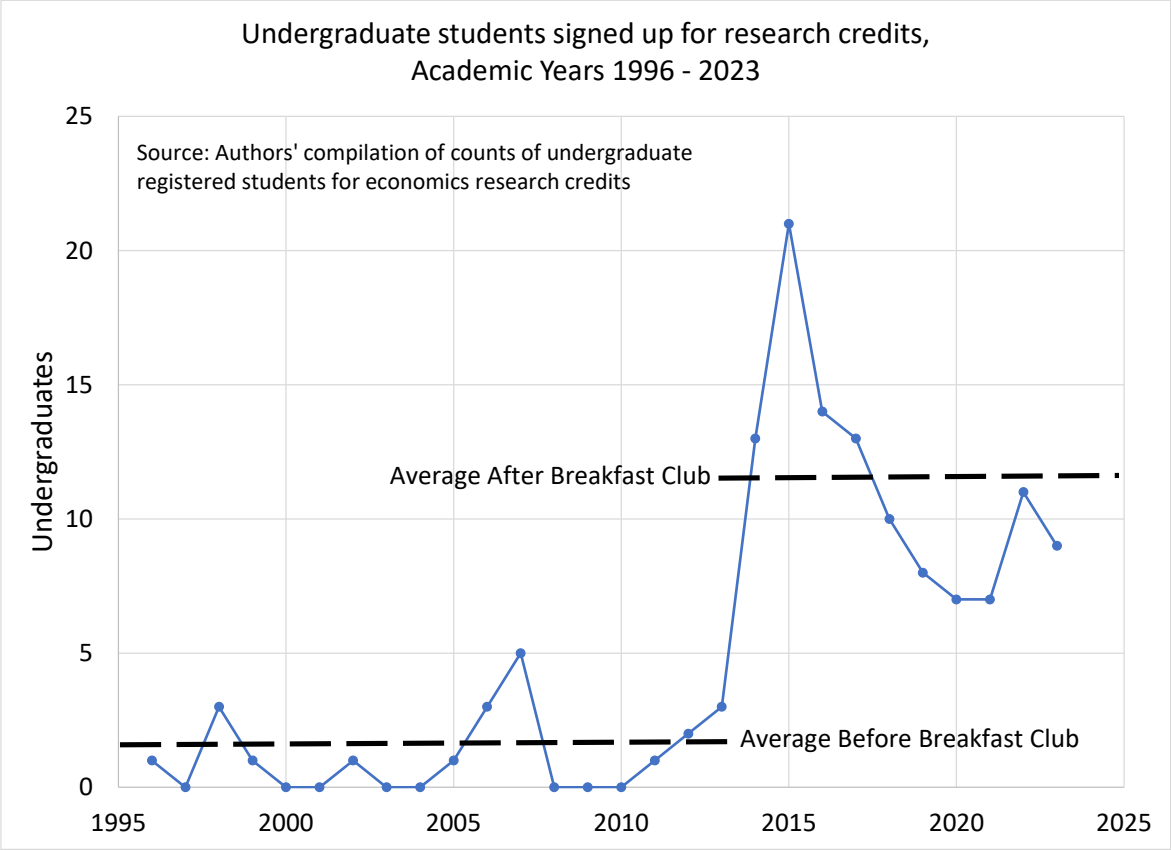

Figure 3: Iowa State University Undergraduates Enrolled for Economics Research Credits, by Academic Year, 1996–2023.

number of undergraduates conducting research increased dramatically when we switched to the group advising strategy.[4]

3 Benefits of the Breakfast Club Model

Undergraduate research develops communication, analytical, technological, and problem-solving skills (Russell, Hancock, and McCullough 2007; Wayment and Dickson 2008; Nolan et al. 2020). The collaborative relationships between undergraduates, graduate students, and faculty fostered by the Breakfast Club offer some additional benefits.

3.1 Benefits to Undergraduate Students

One major hurdle the Breakfast Club overcomes is the student's view of unapproachable faculty. Oftentimes the lack of student interest in research may be an incorrect view that faculty are intimidating or unapproachable. In a one-on-one model, the student must seek out a potential faculty adviser. Most undergraduates will not have the background to formulate a promising research question. But even with a topic in mind, students may not know which faculty member could advise. Under the Breakfast Club model, students already know the research experience is available and exactly which faculty member to

[4] The university shut down in Spring 2020, but resumed masked face-to-face advising in Fall 2020. The pandemic did affect the number of participating students in 2020–2021, but the numbers rebounded thereafter. At least part of the reason is that our advisers suggest the Breakfast Club to promising students during their course scheduling meetings, and the advising sessions were also disrupted by the pandemic.

contact. The topic will follow. Additionally, working with other undergraduate students and graduate students might be less intimidating than working directly with one faculty member.

As with a typical one-on-one model, the Breakfast Club provides undergraduate students with research experience that increases their exposure to advanced econometric methods and statistical software. Perhaps equally valuable is that the Breakfast Club encourages collaboration with other undergraduate students. With a common meeting time, the undergraduate students have the opportunity to discuss their research projects with each other, share ideas, and jointly problem-solve. One of the most popular activities is when one student proposes his/her research idea, and all the students throw out suggestions, concerns, testable hypotheses, or possible alternative questions. The peer learning is not just that students may be facing a similar obstacle, but that they can learn about a completely different challenge being faced by their fellow students.

3.2 Benefits to Graduate Students

At ISU, one faculty member oversaw the Breakfast Club along with one graduate student Teaching Assistant (TA). More recently, previous TAs drop in to help if they have a paper with an undergraduate that is continuing from a previous semester. During mentoring/advising meetings, the faculty member and graduate student divide their time assisting students working on identifying relevant literature, cleaning data, developing models, and conducting data analysis. The work is similar to triage—most undergraduates can work independently if they have access to assistance when they get stuck. Graduate students provide guidance and mentorship to the undergraduates and refer the most challenging issues to the faculty member. This is a great opportunity for graduate students to develop their mentoring skills. Being a good mentor takes time, experience, and patience, so encouraging early-career development of these skills gives graduate students a head start on becoming better future mentors.

The Breakfast Club also provides graduate students with teaching opportunities. Important research-related skills such as in-depth literature reviews, econometric techniques, and statistical software use are not always included in the undergraduate curriculum. While many of the undergraduate students who engage in research, are motivated self-learners, they often need guidance on important concepts. The graduate students create a one-class lecture based on the specific needs to the undergraduate students in that semester, such as an introduction to Stata or R. With limited teaching opportunities, these one-class lectures provide the graduate student with valuable teaching experience as a preparation for a career in academia.

The Breakfast Club provides graduate students with the opportunity to work on research outside of their dissertation chapters. Almost all TAs have had at least one joint project with an undergraduate, helping to diversify the graduate student's portfolio leading into the job market.

3.3 Benefits to Faculty

One of the major challenges of undergraduate research projects for faculty is the amount of time devoted to just one student conducting one research project. This challenge is amplified if mentoring holds little value during the tenure process. Because the Breakfast Club faculty member and TA specialize in providing assistance on the more basic aspects of assisting undergraduates, other faculty can focus on helping define the research topic and plotting the conceptual design. Specialization according to comparative advantage is the key to the creation of returns to scale in undergraduate research mentoring.

It is a bit more complicated to generate a publishable paper. With rare exceptions, producing a paper of sufficient quality to generate a revision request and ushering it through the revision process will require the participation of the graduate student and faculty member as coauthors. In our experience, only a few faculty with particular interest in the topic were willing to carry the project all the way through the publication process. It is more common that faculty aim for a good senior essay or

honors project.

4 Student Success

Most of our students have participated in individual research projects. We encourage students to present their work if they complete a paper. Each semester, the University Honors program hosts a poster session and paper presentation day. This is open to non-honors students as well. Students can also present a poster at the Iowa State Capitol to audiences of state legislators.

For the bravest, there are numerous opportunities to present papers at regional or national conferences. Our students have presented at the undergraduate sessions of the Midwest Economics Association (MEA), the National Conference on Undergraduate Research, The Dallas Federal Reserve's Economics Scholars Program, the Southern Regional Science Association, and the Agricultural and Applied Economics Association (AAEA). Since 2015, Breakfast Club participants have finished first twice and second once in the AAEA paper competition and placed three times in the AAEA spreadsheet competition. We have had two students place in the MEA competition. Some of the conference presentations have unexpected benefits, as when two of our undergraduates were hired by the Dallas Fed after giving their talks.

Our research team outlet has been the Conference of State Bank Supervisors Community Bank Case Study Competition (https://www.csbs.org/policy/tags/case-study-competition), which involves a team partnering with a bank to analyze the bank's business plan and past and potential future performance in the context of a chosen research question. The team writes a twenty-five-page paper and develops a five-minute video summary of the case. We were encouraged by an alumnus who was also the Iowa State Superintendent of Banking to give the competition a try. The combination of applied microeconomics and business suits our students' comparative advantage. In the seven years that we have participated in this national competition, we have finished in the top five, three times.

Another test of the strategy is whether students can produce a publishable paper. Fifty-six students initiated a research project, and another twenty-seven took part on a bank case study team. Twenty-one students have had a part of ten refereed publications, although ten of the students with a publication were members of a bank case study team whose case studies were published because they placed in the top three in the competition. Other students have had versions of their research published in outlets such as the *Review of Development Economics*, *American Journal of Agricultural Economics*, *Education Economics*, and *Agricultural Economics*. Our experience is that many students have an interest in trying to attain that level if we are willing to continue working with them, and this is where the use of TAs helps immensely. Six different graduate students have served as coauthors on the publications.

Students self-select into the program, so we cannot claim that participation has a causal effect on later academic work. However, 55 percent of the students who participated in the Breakfast Club have gone on to graduate or professional school. Of these, 42 percent have completed a Master's, 7 percent have gone to law school, and 7 percent have gone to doctoral programs.

5 Student Reactions

The Iowa State Alumni Association was able to locate email addresses for about half of the past Breakfast Club members. Many of the students were near the top of their class, but others were C students. We never turned down a student who said they were willing to put in the work. We asked them to respond to the question, "What were the benefits of participating in the Breakfast Club?" We provide some of the replies.

> *"The Saturday Breakfast Club provided a structured time to access professors outside of office hours. It provided access to resources and connectivity to peers. It also fostered accountability. I felt supported and encouraged by my professors."*

"The research program pushed me to look beyond what was in the textbooks and to find ways to apply my in-class knowledge outside of the classroom."

"It provides the opportunity to challenge yourself and pursue a topic or question deeply. When you spend a lot of time on a question or exploring a data set, it opens a lot of different avenues to explore and things to learn. There is also a lot of joy in devoting a lot of time and effort toward a more complicated and extensive task then your typical class assignment. Also, specific to Breakfast Club, you are around other people doing interesting things and challenging themselves."

"The assistance with networking with the other members of the program (great for an introvert like myself!)."

"Having a group-advised setting allowed me to bounce ideas off my peers and provided more oversight to my projects."

"The main benefit was mental. It allowed me to see myself as a capable researcher, and someone who was fit to ask difficult questions and attempt to really find a good solution to the problem or question at hand."

As a sometimes underperforming student, the Breakfast Club gave me an opportunity to engage in the subject I love by using another thing I'm passionate about to keep me focused."

6 Conclusion

The Breakfast Club model provides a low-cost way to increase undergraduate research participation. Minimal new funding is needed, and the benefits of collaboration accrue to faculty, graduate students, and undergraduates alike. Nevertheless, the program would merit expansion by federal agencies interested in encouraging the development of future scholars. The philosophy is similar to that of the National Science Foundation's *Integrative Graduate Education and Research Traineeship* (IGERT) program, which evolved into the *NSF Research Traineeship* (NRT) program. However, those programs are aimed at graduate students and do not build in the interaction between graduate students and undergraduates. It is also comparable in part to the NSF Research Experiences for Undergraduates (REU) program, which partners undergraduates with faculty. A major distinction of the REU, however, is that it only accepts students who apply on a competitive basis and who are U.S. citizens or residents. Crucially, REU participants do not necessarily come from the same institutions.[5] The Breakfast Club model connects undergraduate researchers at a far lower transaction cost.

Our model can effectively target students at the undergraduate level who might otherwise have little exposure to graduate education or to research in general. First-generation college students and students from underrepresented populations are especially well-served by this type of model, which combines research and mentorship attributes. As a policy measure, any funding to support the implementation of the Breakfast Club model should be broad in its research focus to allow promising undergraduates to explore their own curiosity and to learn how to design a project aimed at answering their own questions. Waiting for students to enter graduate programs before engaging in research

[5] The REU accepts proposals from all disciplines, but the expressed goal on the web site is to, "attract a diverse pool of talented students into careers in science and engineering." The weight of the program is heavily in STEM, with sixty-eight in physics, eighty-five in chemistry, but only thirty-three in social, behavioral, and economic sciences, none in economics. There is one in Small Business Innovation Research (https://www.nsf.gov/crssprgm/reu/reu_search.jsp).

ignores the fact that the best prospects for research careers are entering college with many credits in hand and have the skills necessary to experience a challenging research topic as undergraduates.

These are the key lessons that we have derived from ten years of experience running the Breakfast Club.

1. It is critical to have buy-in from advisers who can direct students to the research opportunity. Many promising undergraduates are not thinking that research opportunities are available.
2. It is critical to have buy-in from the faculty as a whole, who may be asked to provide content advising.
3. Most research projects take more than one semester. Students should be targeted early enough in their programs that they can complete a project in three to four semesters, but the program should also be sufficiently flexible to have some one-semester projects.
4. Do not obsess on completion. Students learn from the process. Nevertheless, have an agreement at the beginning on whether the objective is a publishable paper, a completed senior essay or poster presentation, or just progress on a completed research proposal. We adjusted the credits allocated based on the objective.
5. Our program is evolving into a concurrent BS/MS program that provides students more recognition for their research. It may be that the Breakfast Club was a midpoint toward the development of an alternative degree option.
6. The strategy relies on returns to scale. Joint undergraduate projects, team competitions, or other means of exploiting returns to scale are critical to maximizing the benefits from the fixed faculty and graduate student inputs.

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Appendix A: Breakfast Club Student Publications

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