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Graduate Student Unions, Wages and Scientific Productivity

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An increasing number of university graduate students and postdocs are members of unions. Between 2021 and July 2023, the number of graduate student unions in the United States increased by 56%, rising from 54 to 84 (Quinn, 2023). Historically, unionization was limited to public universities, as the National Labor Relations Board (NLRB) had largely excluded graduate students at private universities from union eligibility. A landmark 2016 NLRB decision for Columbia University, however, recognized graduate teaching and research assistants as both students and employees, overturning earlier rulings and fueling a surge in unionization efforts and collective bargaining agreements across American campuses.

Graduate student unions generally negotiate agreements with university administrators in an effort to increase student stipends, improve benefits, and establish rules for working conditions. While these efforts have led to increased stipend levels of current students (see Figure 1), how have they impacted the number of doctoral students being trained and scientific productivity? While increasing the cost of workers can decrease labor demand, the effect of increased stipends and benefits is ambiguous on student employees and the pipeline of the scientific workforce. One the one hand, the increasing cost of student employees may mean that principal investigators (PIs) reduce the number of students working in their labs and research groups. On the other hand, PIs may include more student employees as co-authors on papers and increase time spent on student mentoring. While the decrease in labor demand may decrease the number of student employees who go on to careers in academic science, the increased inclusion and mentorship of student employees may increase the rate that students graduate and transition to successful scientific careers.

Despite the rising importance of unions at universities, relatively little empirical research has attempted to systematically measure the impact of changes in graduate union collective bargaining agreements on scientific production in university labs both because of data limitations and because of econometric challenges. On the data limitations, few datasets contain large-scale student employment data at the level needed for this analysis. Traditional government surveys, such as the Current Population Survey, do not comprehensively capture student employment in

university research labs, while Census and IRS based data, such as the Longitudinal Employer-Household Dynamics, is unable to track employment within universities at the lab level. Detailed data on collective bargaining agreements is also lacking, as no single source of collective bargaining negotiations has previously been collected or parsed into structure data. In addition to the data limitations, naive comparisons of grad student and postdoc outcomes at schools with and without unions may be misleading because of selection. For example, schools with particularly poor student employee pay and treatment may be both more apt to found unions and have worse student outcomes creating a false impression of the causal relationship. In order to isolate the effect of unions on employment in scientific research and student outcomes, comprehensive longitudinal data on student employment at the lab level along with scientific publications, student outcomes, and union contract negotiation data are required.

In this paper, we analyze the effect of changes in minimum salary (stipend) levels in graduate student collective bargaining agreements for a sample of universities in the United States between 2000 and 2021. We manually collected and parsed information about the terms and resulting changes in stipends from union contracts across 11 unionized universities and 23 contract renegotiations. We also collect information on minimum stipend levels from additional non-unionized universities to use as controls. We combine this information with lab-level student employment data from over 11,000 labs at 32 research universities in the United States as well as publication data produced by these labs and student career outcome information. By aggregating this data into a lab-quarter panel, we examine the dynamics of employment in labs, productivity in the lab, and student outcomes during the two years before and after the contract changes. In order to isolate the effect of the negotiated changes, our analysis utilizes a staggered difference-in-differences approach, comparing the employment dynamics among labs at universities in the time period around union contract changes with labs at universities that either did not have a union or did not have a contract change with their union at the same time. We focus on the change in the hiring of student employees in labs, the change in students listed as co-authors on publications, and the change in students pursuing either academic or life science careers.

Our primary sources for data are UMETRICS and Steppingblocks. The UMETRICS database is a collection of administrative records from over 30 R1 universities in the United States. The records in this database are charges to sponsored research grants, including the

employment of student and non-student workers. We use this data to track the employment levels of labs over time. In addition, UMETRICS has been connected with Steppingblocks, a database of career outcomes for graduates of many higher education institutions. Much like the self-reported information on LinkedIn profiles, this data allows us to observe if the student pursues additional degrees as well as which industry a student employee goes on to work in. We use this data to track student outcomes before and after union negotiations.

Illuminating the dynamic effects of graduate student union negotiations are particularly important for a variety of reasons. First, the student employees play a vital role in the work of scientific research. Students prepare and run experiments, write code, and draft reports. Second, student employees are both an input to the production of scientific work as well as an output. Trained student employees fill the pipeline to become future scientists, PIs, and private sector researchers. Lastly, union negotiations may have unintended consequences for equity among student employees. For example, with less funding available, PIs may favor students with external funding or hire students from less diverse backgrounds.

After describing the empirical context, our analysis is presented in three pastures. First, we present both event study plots and difference-in-differences estimates for employment dynamics at the lab level. Using our lab-by-quarter panel, we estimate if labs change their size by hiring fewer student employees in the years subsequent to the contract negotiations. Second, we examine the changes in the number of named non-faculty members on the publications produced by labs following the union negotiations. Third, we flag the rate that student employees go on to pursue academic careers as well as careers in life sciences following their degree completion. Tying these results together provides a clearer picture of the impact of unions.

Prior research on unions at universities has focused on faculty, and have been limited to wage effects. In recent work, Baker et al. (2024) examine unionization of faculty at Canadian universities from 1970-2022. Using an event-study design, they find that unionization leads to average salary gains and a compression of the distribution of faculty salaries. Klaff and Ehrenberg (2002) meanwhile examine staff unions, and find that collective bargaining coverage raises staff salaries by around 9-11%.

In the coming months, we will complete a draft of the initial paper to be ready for the April 2025 meeting. Specifically, we plan the following timeline to complete a draft:

- **January 2025**: Complete collection of information on stipend levels for the universities in UMETRICS university sample (see Figure 1 for current universities we have collected contract information for).
- **February-March 2025:** Link these data to UMETRICS data. Estimate difference-in-difference models and prepare tables and figures.
- **March-April 2025:** Complete draft of paper.

References

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Klaff, D.B. and Ehrenberg, R.G., 2003. Collective bargaining and staff salaries in American colleges and universities. ILR Review, 57(1), pp.92-104.

Quinn, R. (2023, September 6). Grad worker unionization is booming, even down south. Inside Higher Ed | Higher Education News, Events and Jobs. https://www.insidehighered.com/news/faculty-issues/labor-unionization/2023/09/06/grad-worker-unionization-booming-even-down-south

Figures

Figure 1. Changes in Minimum Stipend Levels (Monthly) at Selected Universities

