The Effects of Graduate-student Unionization on Stipends

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WORKING PAPER[1]

Abstract

Graduate assistants have organized labor unions since the 1970s. Presently, 38 universities have a graduate–student union. However, the effect graduate–student unions have on wages, wage variance, health benefits, and organizational structure is unknown. This study uses data from the *Chronicle of Higher Education* and government data to estimate the economic effects of unionization. By using a multilevel model is used to control for intra–university correlation of wages, this study concludes graduate unions are effective at raising stipends, but ineffective at lowering fees, providing health–care coverage, and lowering intra–university wage variance.

Even though faculty and staff unions have made unionism more familiar to campuses, graduate students still do not fit the demographic profile of traditional unionized labor. Graduate assistants are, for all intent and purposes, temporary employees—leaving their duties after graduation; young—typically under thirty; and have completed over 16 years of schooling.[2] It is unclear whether graduate–student unions achieve their goals of increasing stipends, lowering hours worked, expanding health benefits, and improving working conditions. The high turn–over rate of graduate assistants, including the union leadership, may hinder their ability to secure important union provisions.

A number of scholars have argued the potential beneficial and deleterious effects of unionization. Scholars have taken a traditional pro– and anti–union stances. Pro–union scholars argue unions help secure higher remunerations, better benefits, improve job security, create better working conditions, and prevent the mis-use of graduate assistants. Anti–union authors have noted the higher wages extracted from universities will only limit the available space in graduate programs or force some programs to close entirely. Further, these authors also claim graduate unions will interfer with the mentoring between faculty and graduate students. These arguments have been well documented, but the empirical questions regarding the above claims are still unknown.

This paper will use data set assembled from two surveys conducted by the *The Chronicle of Higher Education*, the U.S. Department of Education, National Research Council, and the National Science Foundation to examine the economic effects of graduate–student unions. In particular, this paper will explore unions impact on wage levels, wage distribution, and fringe benefits.

Finally, graduate assistants are known under a number of labels: teaching assistants (TAs); research assistants (RAs); and graduate assistants (GAs), which usually includes TAs and RAs. Thus, unions composed of graduate assistants also have a number of synonyms: graduate–*student* unions; graduate–*employee* unions; and graduate–*assistant* unions. No scholar doubts that graduate assistants are also students, but there is contention on whether these graduate students shall also be considered employees. The term "employee" is contentious and at the crux of the cases presented to the National Labor Relations Board. Union activists, for obvious reasons, usually denote themselves as graduate–employee unions. This paper will refer to these unions as graduate–student unions, which does not preclude these students from also being considered employees. Beyond that, this paper does not address the status of graduate assistants as employees or students.

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[2]Hirsch and Macpherson (See 2003, Table 5.4) for a description of current unionized workers.

Brief History of Graduate–student Unions

Unionization at public universities is governed by state law. States with dense union membership in the private sector were often the first to grant union status to graduate students. The first three graduate unions were in states with union density higher than the national average (see Hirsch et al., 2001). Moreover, most of the graduate–student unions are in the Pacific, West North Central, East North Central, and Middle Atlantic regions—the regions with the most dense union membership (Hirsch and Macpherson, 2003). The University of Wisconsin–Madison's Teaching Assistants' Association (TAA) is generally regarded as the first graduate–student labor union. Originally an informal union, the union won recognition in 1969 after a short strike. Although TAA was the first union to win recognition as a stand–alone graduate union, it was not the first to receive a contract. In 1968, the City University of New York (CUNY) faculty union included rights for graduate assistants in their contract.

Following Wisconsin and CUNY, unions at Rutgers University, University of Michigan, and University of Oregon won their first contract in the 1970s. The 1980s were relatively quite; only three universities in Florida—University of Florida, South Florida University, and Florida Agriculture & Mechanical University—unionized in the 1980s. Yet, unionization efforts at large university systems, such as the University of California–Berkley and State University of New York (SUNY), begun. By the 1990s, seven University of California campuses, SUNY, and six other universities unionized. Unionism also grew rapidly throughout the 2000s. Sixteen universities won recognition, including the California State University System, and two unionized as recently as 2010.

The New Jersey Institute of Technology won recognition in 2010, and at the time of publication, is currently negotiating their first contract with the university (Heyboer, 2010). In early 2012, Montana State University teaching and research assistants voted to unionize after receiving preliminary approval by the state's labor relations board (Schontzler, 2012b). However, the elibility for students to organize is, at the time of writing, being reconsidered by a judge (Schontzler, 2012a). Ultimately, 38 universities are unionized in the United States. The trends in graduate–student unions is showed in Figure 1.[3]

[FIGURE 1 ABOUT HERE]

Unionization at private universities is subject to the National Labor Relations Act and the rulings of the National Labor Relations Board (NLRB). The NLRB has debated whether graduate assistants can be

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[3]At least nineteen unions have formed but not been formally recognized: Boston University; Brandeis; Brown; Columbia; Cornell; Indiana; Ohio State; Pennsylvania State; Polytechnic Institute of New York University; Purdue; Rensselaer; Tufts; Maryland; University of Chicago; University of North Carolina at Chapel Hill; University of Pennsylvania; University of Southern California; University of Virginia; and Yale University.

considered employees. In a myriad of cases, the NLRB originally rejected graduate–student unions based on the "primary intent" test (*Adelphi* 1972; *Cedars Sinai* 1972). Later in 2000, the NLRB, a majority who were Democrats, used a broader definition of employment—echoing the dissent in *Adelphi*—accepted an appeal by New York University (*New York University* 2000). NYU's graduate–student union was the first to be recognized by a private university. However, in 2004 with a different composition of primarily Republican members, the NLRB reversed itself again and excluded graduate assistants as employees at private universities (*Brown* 2004). Since then, NYU's administration has refused to renew their union contract with graduate assistants and no other private university has voluntarily recognized a graduate–student union (Gravois, 2005).

The pace of unionization has tapered since the mid 2000s. There has been attempts to unionized research assistants where they had not been previously included in the bargaining unit. The earliest GA union at the University of Wisconsin–Madison included RAs when the legislature passed a law to permit RAs to unionize (AFT-Wisconsin, 2009). The NLRB recently ruled that post–doc researchers were also permitted to unionize at private, but affiliated with public universities, research centers (*SUNY-Buffalo* 2010). In 2012, RAs at the University of Michigan—the fourth oldest GA union—attempted to be reincorporated into the pre–existing bargaining unit (Basu, 2012). However, the Michigan legislature passed a law preventing those students from unionizing (Bell, 2012).

Table 1 shows all of the universities where graduate assistants have unionized and negogiated at least one contract. The formation date indicates the year a union first formed; the recognized date is when the university administration officially recognized the union; and first contract is when the first union contract was ratified by graduate students.[4]

[TABLE 1 ABOUT HERE]

Antecedents of Unionization

The rise of GA unions can be attributed to the sometimes bleak economic realities that face graduate students, both in school and in the job market. For one, graduate students have been taking longer to complete their degrees (Ehrenberg et al., 2004; Snyder et al., 2006) and spending more time as graduate assistants (Ehrenberg and Mavros, 1995). Meanwhile, outside monies for financial assistance from the federal government has decreased (Snyder et al., 2006; Ehrenberg et al., 1993). After graduation, the outlook is

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[4]A number of events can be counted as a formation of the union. Usually a successful "card signing" drive, an official vote of confidence for a union, or any legal action (e.g., petition) was recorded as a formation.

not any more sanguine. Graduate students, particularly in the humanities, are facing a tighter job market (Aronowitz, 1998; Barba, 1994), universities are cutting back on the number of tenured faculty positions being offered, and some real wages have fallen (Snyder et al., 2006). Union gains are also attributable to changing institutional structures. Legislation permitting unionization and the spread of faculty unions have helped graduate unions succeed in gaining recognition (Julius and Gumport, 2003).

The time–to–degree—the amount of time it takes to receive a graduate degree after starting the program— has been steadily increasing since the 1970s. Between 1978 and 2001, the median time–to–degree for all students rose from 6.3 to 7.5 years (Hoffer et al., 2002, Table 15). However, social sciences, education, and the humanities have had the largest percentage increases on top of their comparatively high time–to– degree rates from the 1970s. In 1978, a doctorate in social sciences and humanities took 6.2 and 7.5 years, respectively. By 2001, half of humanities doctorates took over 9 years and 7.8 years for social sciences. As a result, the student faces higher opportunity costs while in graduate school since they must forgo current job opportunities to finish their studies.

In addition to opportunity costs, there is also the worry of the accounting costs as a graduate student. The share of graduate students being supported by federal funds has declined (Ehrenberg et al., 1993); meanwhile, the share of graduate students relying on teaching or research assistantships has increased. The type of assistantships assigned often depends on the student's major. For example in 2003, 56.6% of engineering students were supported by research assistantships, 16.4% by fellowships, and only 8.1% by teaching assistantships. By contrast, over 32% of the students in the humanities are teaching assistants, 34% were using their own funds, and only 1.8% held research assistantships (Snyder et al., 2006, see Table 18).

Debt levels also tend to be higher for those in social sciences and humanities (Hoffer et al., 2002, Table 19). The mean debt levels for graduate students in engineering, for instance, was $7,860 in 2003, while the debt burden for social sciences and humanities averaged $18,083 and $15,152, respectively. Humanities and social science graduate students are also the least likely to have no debt (39.6% and 36.6%, respetively) and most likely to have incurred debts exceeding $35,001 (21.1% and 28.2%). Further, it appears this debt is primarily accumulated during graduate school. As undergraduates, future doctoral recpients in the social sciences and humanities have less than $5,000 in debt and are very likely to have no debt at all.

Graduate assistants are potentially being used as low–cost substitutes for full–time faculty members, especially for menial tasks avoided by tenured faculty (Julius and Gumport, 2003; Lafer, 2003). Faculty salaries range from $55,000 to $110,000 (Snyder et al., 2006), while graduate assistants earn roughly $15,000. Roughly 14% of courses in the humanities are taught by teaching assistants (American Historical Association,

2000, Tables 1, 2A). When looking at first year courses only, the proportion taught by GAs increases to 20%, indicating teaching assistants are more likely to teach introductory courses rather than upper level undergraduate courses.

Spending time away as a graduate student and working as a teaching assistant does appear to have adverse effects on time–to–degree (Ehrenberg and Mavros, 1995). Thus, as federal funding for graduate students has decreased, the need for assistantships has risen, which has contributed to longer time–to–degree and higher opportunity costs of staying in graduate school. In turn, graduate assistants are using unions as a way argue for higher stipends or limited workloads.

In addition to the plight of graduate students in school, students are also concerned about finding jobs after graduation. Graduates in the humanities and the social sciences are facing a tougher job market than their colleagues. First, universities are decreasing the proportion of tentured faculty members. In the past decade, the share of tenured faculty has fallen 10 percent, below 50 percent for the first time (see Snyder et al., 2006, Table 242). Second, humanities doctoral graduates are less likely to participate in the labor market and are less likely to find work in their field. While unemployment is low for humanities graduates, over eleven percent are involuntarily employed outside their field—twice the overall average (Hoffer et al., 2002, Table 28). Moreover, 84% of humanities graduates participate in the labor market, which is 4% lower than the overall average. Third, real wages has declined 1.3 percent for full–time instructional faculty in the humanities between 1987 and 2006 (Snyder et al., 2006, Table 234). Meanwhile, the salaries in all other fields rose between 2 and 25 percent. American Association of University Professors (2011, Table H) showed that English, philosophy, and fine arts were the lowest paying fields for assistant professors. Moreover, the disparity in wages for assistant professors in these fields has grown between 1981 and 2010. Specifically, the average assistant professor salary was approximately 14 percent higher than the average English assistant professors wage. By 2010, that figure grew to 27 percent.

The statistical evidence indicates that graduates in the humanities, and to a lesser extent, social sciences, have been hit hardest by longer graduation times, lower tenure rates, and lower salaries. At the same time, there is evidence graduate students in the humanities and social sciences are the instigators of unions. In a survey of attitudes toward graduate–student unions, an administrator notes, "[t]here is no need [to unionize]. They [in the sciences] have all they want, high compensation and jobs when they graduate..." (Julius and Gumport, 2003, p. 202). It would not be surprising, then, to suspect that graduate students in the humanities fight hardest for unionization and receive the highest comparative benefit.[5]

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[5]This does not imply they will have higher wages compared to other departments on the same campus. There is reason to believe that the intra-university standard deviation of wages will decrease with unionization.

The catalysts for unionization extends beyond self–interest. Graduate assistants have also objected to the "corporatization" of universities (Rhoads and Rhoades, 2005; Lafer, 2003). Universities are able to generate revenue by patenting research and offering distance learning. Pro-union scholars argue these revenue–generating programs benefit administrators, tenured faculty, and corporations (Lafer, 2003).

Another catalyst for graduate–student unionization is legislation that permits unions to bargain with universities and increasing support from university faculty members. Faculty unions have helped graduate assistants establish successful unions, often voicing support for graduate–student union efforts (e.g., Fogg, 2004). GA union drives that occur on campuses with full-time faculty unions have had better success at achieving recognition than union drives that "go it alone" (Julius and Gumport, 2003).

Graduate-student unions have sought to reduce workloads and improve working conditions. Namely, they seek stipend increases; fringe benefits for themselves and their families; reduce workloads; receive additional benefits such as daycare; job security; and an improved grievance process (Rhoades and Rhoads, 2003; DeCew, 2003). These demands have had some success. The NYU graduate union, for instance, has secured annual raises of 3.5% and full health benefits (Smallwood, 2002b). The University of Michigan–Ann Arbor gave their students free daycare for children of GAs.

Opposition to Unions

Opponents to graduate-student unions have argued that graduate assistants are not employees, but rather, apprentices for future jobs. University administrators, who often vigorously oppose unionization efforts, and faculty members fear that unions will interfere with faculty-student relationships (Boghossain and Velleman, 2007) or unions will attempt to gain control and negotiate over academic policy (Cavell, 2000). Lastly, union opponents, including graduate students, are concerned increased benefits will come at the cost of higher undergraduate tuition or smaller department sizes (DeCew, 2003; Smallwood, 2002a).

Unions may interfere with faculty-student relationships. Under a union regime, tasks are carefully enumerated and grievance processes are outlined. Some faculty and graduate students claim the role of the mentor will decline and the individual faculty member will be looked upon as an employer, and not as a mentor (Gehman, 2001; Boghossain and Velleman, 2007). However, this claim has not been supported in the literature. Case studies have revealed that faculty members do not perceive their relationship with students has been inhibited by unions (Hewitt, 2000). In fact, Julius and Gumport (2003) suggest that carefully enumerating tasks and duties may enhance the mentoring relationship because of clear expectations given

to the students.

The economic gains made by graduate-student unions will eventually have some economic impact on other areas of the university. Increasing stipends, fringe benefits, or providing other facilities such as day-care, might lead to higher tuition rates for undergraduate students. It does not seem to be the case, *prima facie*, that unionization causes catastrophic increases in tuition or reduces department size. In particular, no one to the author's knowledge has blamed unionization at the oldest GA unionized institutions—University of Wisconsin–Madison and University of Michigan–Ann Arbor—for chronic tuition increases or smaller department sizes. Of course, a number of factors other than unionization has gone into tuition increases, which does not exclude the possibility of some relationship between unionization and costs.

Literature Review

Graduate stipends are not published regularly to let researchers analyze how unions affect stipends. This paper relies on a survey conducted by *The Chronicle of Higher Education* of stipends in 2001, 2002, and 2004 that makes it possible to begin some analysis.

Ehrenberg et al. (2004)—the only study of graduate-student remunerations—showed graduate–student unions were ineffective at increasing stipends. In a five-year period from 1996 to 2001, stipends at nonunionized universities rose 13.9%, while stipends at unionized institutions rose 10.7%. However, unionized schools were better able to reduce the amount of required fees. Total compensation (stipends minues required fees) at unionized schools increased 18.5% compared to 14.5% for nonunionized institutions, implying graduate unions were better able to reduce required fees. Unfortunately, the authors of the study were bounded by strict confidentiality agreements and only compared averages instead of using traditional econometric analysis. Moreover, their study was not able to directly compare health benefits for graduate assistants.

Notwithstanding the paucity of research on graduate-assistant stipends, a number of studies have investigated the economic effects of faculty unionization. The evidence from faculty unions studies were mixed. Some studies found faculty with unions had higher salary and compensation levels relative to nonunionized universities (Freeman, 1978; Birnbaum, 1974, 1976; Barbezat, 1989; Monks, 2000). A handful of other studies found faculty wages had little or negative effects (Morgan and Kearney, 1977; Marshall, 1979; Guthrie-Morse et al., 1981; Rees, 1993; Hosios and Siow, 2004).

Results from the faculty unionization movement provides some indication about graduate–student unions. Both groups are well–educated and work on university campuses with a department–university organization

structure. The main services provided by both are teaching and research. The research has shown that the length of organization has played a significant role in unionized faculty salaries. The returns from unionization are generally non-linear (Freeman, 1978). Unions are unable to win salary gains at first, but eventually earn more than their nonunion peers over time. In fact, positive returns from unionization do not appear until the second year. By the seventh year, the salary affect from unionization disappears again and the returns become negative (Barbezat, 1989, Table 1).

Besides increasing wages, unions also seem able to increase fringe benefits—such as health insurance—to union members (Freeman, 1981; Huchmueller et al., 2001; Budd, 2005). In addition, unions are effective at narrowing the distribution of wages within firms (Freeman and Medoff, 1986; Card et al., 2004). Both of these empirical regularities have been stated goals of union advocates for graduate assistants (Rhoades and Rhoads, 2003; DeCew, 2003; Julius and Gumport, 2003).

However, graduate assistants also differ in important ways from the faculty and other unions studied in the above literature. Namely, GA's do not have a tenure system like their faculty counterparts. They also only receive short–term employment which is terminated upon graduation. Because of this, unions face enormous turn over rates that could hamper their ability to effectively bargain. Therefore, researchers cannot simply assume the effects for other unions will be similar for graduate unions.

Thus, this paper will study a number of questions: is there a difference in stipends for GAs between union and nonunionized universities for teaching and research assistants; is net compensation higher for GA unions; are unions more likely to provide health insurance coverage for assistants or their families; and finally, does unionization lower the variation of wages within the university (e.g., between departments)?

Data Set

The data used in this study is collected from a number of sources. Stipend data was collected by *The Chronicle of Higher Education* for the 2000-01, 2001-02, and 2003-04 academic years (Smallwood, 2001, 2004). The *Chronicle* collected the average stipends at the department level for teaching assistants (TAs) and research assistants (RAs) in biology, economics, English, mechanical engineering, and sociology. Additionally, the surveys provided some simple data on health-care benefits. Universities indicated whether the university paid for health benefits for graduate assistants or dependents.

Forty-five universities from the Association of American Universities were observed in the surveys for the 2000-01 and 2001-02 academic years. For the 2003-04 survey, eighty-three "leading universities" were

sampled. In total, 101 unique universities were sampled. Twenty-five universities were included in the 2000-01, 2001-02, and 2003-04 surveys.[6]

Stipend data was then paired to institutional and departmental characteristics for that given year. The Integrated Postsecondary Education Data System (IPEDS) was used to find the type of institution (public or private); the cost–of–living for students attending the university; tuition costs; endowment size of the university; and total enrollment. Ranks for academic departments was obtained from the National Research Council (1995).

Union data was obtained from the Coalition of Graduate Employee Unions (CGEU), newspapers, and other writings. Union status has been divided into three categories: *contract union*, *noncontract union*, and *no union*. A *contract union* is a union that has secured a labor contract with the university administration. A *noncontract union*, on the other hand, is one where there is an active union presence, but they have not secured a contract. Some of the noncontract unions are simply not permitted to unionize (e.g., NYU), while others have yet to receive recognition. These unions have no formal bargaining power, but many maintain a presence through strikes, campaigns, and union drives. Finally, *no union* is simply a university without a graduate–student labor union.

When there is a contractual union, teaching assistants are always included. However, some research assistants are not part of a contractual union. Thus, contractual unions have also been decomposed into two groups, *TA union* and *TA+RA union*. *TA union* only includes teaching assistants, while *TA+RA union* included both teaching and research assistants.

Noncontractual unions may strike and protest, but they lack the ability to formally bargain and sign contracts. Since contractual unions *are* able to sign legally binding contracts and can appeal to state labor boards concerning unfair labor practices, they will likely have the strongest impact on stipends, health benefits, and wage variation. The main negotiating tool for noncontract unions, however, are strikes since they have no negotiating power, thus, noncontract unions are likely to have little or no impact on stipends.

[TABLE 2 HERE]

A summary of the data is listed in Table 2. Roughly 22 percent of departments who reported TA wages in this sample belong to a union and 29 percent of departments who reported RA wages are unionized. Ten percent of the sampled universities are noncontract unions. The mean stipends for nonunion teaching assistants are similar to unionized assistants. Research assistants at nonunionized universities earn more.

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[6]This is an unbalanced panel data set, which have been used in the past to estimate the causal effect through fixed–effect regression. Unfortunately, the union status only changed for one university—University of Washington—which is insufficient for causal estimates.

Years organized is the length of time since the date of the first union contract and subtracting it from the observed year. For instance, in the 2001, the years organized for the University of Michigan, which unionized in 2001, is zero. University of Wisconsin, the first campus to organize, has a value of thirty. The literature suggests one of two effects may be evident. Unions may witness increasing returns over time because they become more experienced and effective (e.g. Barbezat, 1989; Freeman, 1978). Alternatively, but with the same outcome, unions may initially bargain for union security provisions and only initially produce small wage gains (Freeman and Kleiner, 1990). Otherwise, unions may experience decreasing returns over time. Douglas (1930) argued unions initially establish large wage gains as a show of effectiveness to union members, but focus on other areas in later contracts.

Key departmental and university characteristics are also likely to affect stipends. First, universities in high cost–of–living areas will be associated with higher wages. *Cost–of–living* is estimated by summing the estimated housing cost and other expenses for off–campus students (Hoffer et al., 2002). Highly ranked departments pay noticeably more than lower ranked departments (Smallwood, 2001), which likely the result of universities competing for top students. The rank for each department is included from the somewhat dated ranking from the National Research Council (1995).[7] Finally, wealthier universities will probably pay more. A wealth-per-student ratio was constructed by dividing endowment size by total enrollment.

Finally, some graduate assistants may be more productive. Directly measuring productivity for teaching and research assistants is difficult. Universities typically report graduate assistants work 20 hours a week, but the figures are usually recommended times and not true averages.

Econometric Model

Even though each department independently reports stipend levels, departments within the same university cannot be assumed to be independent of each other. University policies, economic characteristics, organizational structure, and informal attitudes universally affect all departments. Departments, while unique, are nested within universities. The relationship can be dichotomized into two levels: level 1 are individual departments within a university and departments are nested within universities (level 2). Departmental stipends are likely to be correlated within each university, even though inter-university stipends can be distinct. For instance, Emory University reported average stipends of $12,235 for economics, English, history, and sociology students, while biology students received $19,000. While there is some distinct characteristics

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[7]At the time of publication, the National Research Council had updated their rankings in 2010 (Ostriker et al., 2010). However, the data from the 1995 rankings is more relevant to this data set since it reflected data prior to the stipend data available here.

between social science and humanities departments, the rigid correlation between those departments is likely caused by a university–level policy.

The amount of wage correlation within a university can be measured by the intraclass correlations coefficient (ICC). A straightforward way of obtaining an is through an F-statistic obtained from an Analysis of Variance (ANOVA) table:

$$\rho_{icc} = \frac{F-1}{F+\tilde{n}-1},$$

where F is the F-statistic obtained from an ANOVA table, $\tilde{n}$ is the weighted number of observations within each university, and $p \in [-1,1]$. The weighted average number of observations for each university ($\tilde{n}$) is 13.72 and the intraclass correlation of stipends within universities is 22.7 percent.[8] That is, there is a sufficiently large amount of correlation of stipends within the universities that must be accounted.

OLS regressions will increase the probability of committing Type I errors when intraclass correlation is present (Kreft and de Leeuw, 1998; Barcikowski, 1980) for two reasons. First, the degrees of freedom in the sample will be inflated. In this paper, there are 1,372 observed stipend levels over three years; however, there are only 101 universities in the sample. While it appears there are $n = 1,372$ independent observations, the error terms between departments in the same university are correlated, violating the OLS assumption that error terms are independent.[9] Second, OLS will also underestimate standard errors of the coefficients (Goldstein, 2002, p. 23). Models with inflated degrees of freedom will have a higher critical value, while the lower standard errors will artificially increase the chance of accepting a coefficient as significant.

We use a multilevel model to capture the variation within universities (between departments) and between universities themselves.[10] A two-level random-intercept multilevel regression model will produce unbiased and consistent estimates with a nested data set. To build the model, first consider a standard OLS model:

$$y_{ij} = \alpha + \sum_{k=1}^{m} \beta_k x_k + \epsilon_{ij} \tag{1}$$

where x is the kth random variable for the ith department and j^{th} university, β_k is the kth regression coefficient, and ϵ_{ij} is the error term. The intercept in equation 1 is always fixed. However, the intercepts for individual universities may differ since unobserved university characteristics can change the overall baseline

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[8]Even though there are only six departments observed, $\tilde{n}$ exceeds six because departments were observed over three years. This implies each university reported stipends in each department at least twice on average.

[9]Obviously, correlation is also important for the success of OLS regressions. One solution is to assign a dummy variable for each university, but using dummy variables will fail to account for "casual heterogeneity." See Steenbergen and Jones (2002) for a further discussion on this issue.

[10]A university system with multiple campuses (e.g., University of California California, SUNY) could be treated as a level as well; however, of 87 university systems, only five had more than one campus—an insufficient number for a three-level regression. See Schenk Jr. (2007) for alternative formulations.

stipend levels. That is, some universities may simply pay higher stipends to students notwithstanding other observed factors. By adding a random variable, u_j, for each university j to allow for a unique intercept, the multilevel model can be written as:

$$y_{ij} = (\alpha_j + u_j) + \sum_{k=1}^{m} \beta_k x_k + \epsilon_{ij}. \tag{2}$$

The error terms, ϵ_{ij} and u_j have the following properties:

$$u_j \sim \mathrm{N}\left(0, \sigma_{\mathrm{u}}\right)$$

$$\epsilon_{ij} \sim \mathrm{N}\left(0, \sigma_{\epsilon}\right)$$

Given these properties and equation 2, the following can be derived:

$$\mathrm{E}\left(y_{ij}\right) = \alpha + \sum_{k=1}^{m} \beta_k x_k$$
$$\mathrm{Var}\left(y_{ij}\right) = \sigma_u^2 + \sigma_{\epsilon}$$

Equation 2 is used in the subsequent analysis to estimate the effect unionization has on stipend levels and health care coverage.[11] Dummy variables representing *Contract* and *Noncontract* unions will be used to measure the union–nonunion gap. The dummy variables *TA Union* and *TA+RA Union* will also be used in the multilevel regression regression. A third model that analyzes the effects of unionization on intra–university wage variances will use traditional OLS regression. For the regressions in this paper, the omitted binary variables are the 2000-01 academic year, biology major, nonunionized and public universities.

Results

Stipends

The first question to be addressed is whether unions are effective at raising stipends. The dependent variable for the regression, which is based on equation 2, is the log of stipends. Year, major, union status, department rank, whether it is a private university, cost-of-living, log of tuition cost, and the ratio of endowment wealth to total enrollment are included as control variables.

Tables 3 and 4 shows the results using two different union controls for teaching and research assistants,

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[11]See Goldstein (2002) for a more intensive discussion on multilevel models

respectively. Models 1 and 2 uses *contract union* and *nonunion contract* as the union control. Models 3 and 4 uses *TA union*, *TA+RA union*, and *contract union* for union controls. Furthermore, since years organized is correlated with union status, models 2 and 4 are ran with and without the *years organized* variable.

[TABLE 3 ABOUT HERE]

The union–nonunion wage gap for contractual unions varies between 8 and 24 percent, depending on the inclusion of the *years organized* and *years organized squared* variables. The results imply returns to unionization are initially around 20 percent, but the gap decreases for the first 19 years, supporting Douglas (1930) hypothesis.

When *years organized* is omitted, the union coefficient drops to around 8 percent. One possible explanation is the average returns for the nonlinear models (2 and 4) are roughly 8 percent. To test this idea, the mean value theorem for Integrals can be applied. Model 2 from Table 3 indicate the union–nonunion wage gape is $0.23 - 0.038t + 0.001t^2$, where t is years organized, can be evaluated over the *years organized* values observed in this study (between 0 and 34 years). The results indicate implies the average returns to unionization is at a negative 3 percent.

The major caveat with this, however, is most unions have formed during the 1990s. Only a handful of universities unionized before 1990, (see Table 1) thus according to these results, most of them are still earning more compared to nonunion universities. The seemingly apocryphal returns for contractual unions when years organized is included can be attributed to a large union cohort and econometric problems. All of the universities in this study were either organized in the 1990s or before 1981. Thus, *years organized* does not have values between 11 and 19 years and intermittent values between 20 and 34 years. Furthermore, *years organized* and union status is correlated since only unionized schools can have a positive *years organized* value. While this is true for all studies including *years organized*, past studies worked with much larger data sets. It appears this study, with 558 observations for TAs and 410 for RAs, is inhibited by the correlation. The variance inflation factors (VIFs) after estimating Model 2 in Table 3, and, as expected, the values for *years organized* and *years organized squared* are above the commonly accepted threshold. Due to the interpolation and econometric issues, the statistical significance of union estimates with Years Organized are not reliable without obtaining more samples. The subsequent discussion and statistical analysis will exclude *years organized*.

Interestingly, returns for unionization are higher for teaching assistants when only teaching assistants are included in the union. Teaching assistant–only unions earn approximately 2% more compared to when re-

search assistants are included. Noncontract unions, those which do not have collective bargaining agreements with the university, do not earn a statistically significant higher wage than nonunionized universities.

Table 4 shows the regression on the log of stipends for research assistants. Contrary to the findings for teaching assistants, contract unions do not help research assistants. Even when unions are explicitly included in unions (models 3 and 4) they do not see wage gains. Not surprisingly, noncontract unions also do not increase RA stipends. This finding is in line with the hypothesis that research assistants are not as active participants in graduate–student unions in terms of negotating wage increases.

[TABLE 4 ABOUT HERE]

The *annual* variable indicates wages were received over a 12-month period instead of an academic year (9-months). If wages were strictly proportional to time worked, stipends for an Annual worker would be 33% more than over an academic year. For a teaching assistant, the coefficient is almost exactly 33 percent. For research assistants, the coefficient indicates stipends are 25% higher; however, the 95% confidence interval includes 33 percent.

The regression outputs also reports estimates of the variation for the random intercept, σ_u, and the model's error term, σ_ϵ, from equation 2. The standard deviation of the intercept indicates the variation in the intercept attributable to unobserved university factors. For TA's and RA's, the random intercept terms are statistically significant. The random intercept variation is higher for research than teaching assistants, which implies there is more variation attributable to unobserved university effects for research assistants. One example is certain universities are better–able to obtain the requisite funding for RAs.

The random intercept variation and model error estimates can also be used to obtain the intraclass correlation of stipends while holding other factors constant (Rabe-Hesketh and Skrondal, 2005, p. 37):

$$\frac{\sigma_u^2}{\sigma_u^2 + \sigma_\epsilon^2} \tag{3}$$

When equation 3 is applied to Model 1 for teaching and research assistants, the intraclass correlation is 30.77 and 33.5 percent, respectively. These correlations are higher than the 23% correlation reported above.

The results from the regression support the earlier asserted notion that science students fare better than the social sciences and humanities. Teaching assistants in biology and mechanical engineering earn approximately 5 percent more than TA's in the humanities and social sciences. Research assistants in biology earn 15% more than engineers, roughly 17% more than social sciences, and 31% more than students in the humanities. These results are consistent with the descriptive analysis presented above.

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Finally, stipends are only a portion of remunerations. Unions often bargain for tuition waivers and reduction of fees. Fortunately, the *Chronicle* survey for the 2003-04 academic year provided information on tuition waivers and required fees. The sum of stipends and tuition wavers equals the student's total compensation. Subtracting health–care premiums and required fees from total compensation will equal the net compensation. Unfortunately, the survey for the 2000-01 and 2001-02 academic year did not include this information, therefore, the following regression is only a cross-section regression for the 2003–04 academic year.

Table 5 shows the output from the two–level, cross–section, random–intercept multilevel model for total and net compensation. Union status is controlled by *contract union* and *noncontract union* status. The *TA* and *TA+RA* variables were perfectly collinear, thus, were excluded from analysis. Unlike the previous results, there is not a union–nonunion wage gap disappears for total compensation for teaching assistants. Similarly, unions are not particularly effective at increasing net compensation compared to nonunion counterparts. Both of these results imply unions are not comparatively effective at raising fringe benefits, such as tuition remission, or lowering required fees.

[TABLE 5 ABOUT HERE]

Health Benefits

The data set also contains information related to health benefits for students, spouses, and their children. By using a binary variable to denote health care coverage, the effectiveness of unions bargaining for health benefits can be estimated with a multilevel logit regression. The same variables, x_k's, from the previous section are used in this regression.

Health benefits for the student and dependents were measured. Since benefits were observed at the department level, $y=1$ indicates health benefits are an option, even though students may or may not join the plan. Union status is controlled by contract union while noncontract unions has been dropped because it is perfectly correlated with student health. Notwithstanding, the hypothesis is unionized schools will be more likely to give health benefits to students and spouses.

Table 6 shows the output from the logit regression with student and spouse benefits as dependent variables. Neither contractual nor noncontractual unions appear to increase the probability of receiving health–care coverage for students. Similarly, unionized schools are not associated with a higher probability of receiving benefits for the dependents. High ranked departments are more likely to offer health insurance for

the student, and teaching assistants, humanities students are slightly less likely to receive health benefits, but neither department rank nor discipline contributes to dependent health–care coverage.

[TABLE 6 ABOUT HERE]

Wage Variance

The literature has also indicated unions lower the intra-firm wage variance, which is tested here. In particular, the test is to see if contract unions, lower the distribution of income between departments as it has in other industries (Freeman, 1982; Card et al., 2004). Although other literature for unionization in higher education has not focused on inequality, the inequality of stipends between departments have been noted here and in the literature (Julius and Gumport, 2003).

A reduction in overall wage variance would likely be accomplished by lowering the social science/humanities–to–natural sciences stipend gap. To close the stipend gap, unionization would have to increase stipends more for social science and humanities departments than engineering and biology. Table 7 is essentially the same analysis from tables 3 and 4, however, add interaction terms between contract union, noncontract union, and departments were added—only the interaction terms were displayed. A reduction in intra-university wage dispersion would be evident from positive coefficients for humanities (English and history) or social studies (econonmics and sociology), but not for the natural sciences. Table 7 shows, however, the interaction terms are largely not statistically significant so there was no evidence that unions reduce wage inequality.

[TABLE 7 ABOUT HERE]

The distribution of income within universities can be explored through other methods as well. An ANOVA table, similar to Freeman (1982) for the log of stipends is presented in Table 8. Mean–squared variances are presented for contractual, noncontractual, and nonunion universities. The mean–squared variance is a weighted measure of variance within each university. Since the total mean–squared variance is different for each group, the share of within university mean–squared variation indicates the relative inequality within each university.

[TABLE 8 ABOUT HERE]

Indeed, the share of within university variation is lowest for contract and non-contract unions with 15% of the total variation coming from within university variation. Wage variation for nonunion universities, on the other hand, is larger with 18% of the varation from within universities. This suggests unions—even those

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without bargaining power—lower the distribution of income within universities. Of course, outside factors may be influencing these results, which are not apparent in the ANOVA table.

To control for other factors, an OLS regression can be used to estimate the marginal effects on stipend variation. A multilevel model will not be necessary in this regression since stipend variation will be measured at the university level. Consider,

$$\sigma \left(\ln y_j \right) = \alpha_j + \sum_{k=1}^{m} \beta_{kj} x_{kj} + \epsilon_j \tag{4}$$

where $\sigma \left(\ln y_j \right)$ is a measure for the dispersion of stipends for the jth university. The subscript i has been dropped since the university is the sole unit of observation.

The wage variation is measured by three different coefficients: the standard deviation of stipends, the coefficient of variation, and the ratio of the lowest wage to highest wage. Freeman (1982) used the standard deviation of wages to measure wage variance and found the dispersion generally decreased in unionized companies. Similarly, Hosios and Siow (2004) used the difference of the log of earnings for faculty professors to measure unions impact on wage distribution. This study will also measure wage variation with the standard deviation of stipends within a university, where large standard deviation indicates the spread of wages is wide. An alternative measure is the ratio of the lowest average stipend in a university to the highest stipend. The ratio is strictly between 0 and 1 and can be literally interpreted as the percentage the lowest paid department makes relative to the highest paid university. Values close to 1 indicate the dispersion of wages is low. Finally, wage variation is also measured by the coefficient of variation, which is the mean of stipends divided by the standard deviation. Larger coefficients imply the dispersion is low.

Table 9 shows the results for wage variation. The control variables used in this regression have differed from previous regressions. The *rank mean* is the mean rank for all departments within the university as a measure for university quality. The *rank st. dev.* is a measure of the dispersion of quality within the university since wage variance may be attributable to the dispersion of departmental reputation. Finally, *all major* denotes when all majors within the university report stipends.

Contract unions, while effective at increasing wages, do not appear to be effective at lowering the variation of wages. In all three models, the coefficients for contractual unions are statistically insignificant. The results for noncontract union are mixed. For the regression on the standard deviation of wages, the coefficient is positive, indicating wage variance grows. However, when the coefficient of variation is used, the coefficient is also positive, indicating the variation is lower. Finally, the coeffcent for the Low–to–High ratio is statistically insignificant.

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Conclusion

This paper tested several hypothesis related to the pecucinary effects of graduate–student unionization. The evidence suggests:

- TAs at unionized universities earn nine percent more when unions are only comprised of teaching assistants, while TAs earn 13 percent more when the union includes teaching and research assistants;

- there is no discernable difference in the average stipends for research assistants at union and nonunion universities;

- TAs at universities with union activity but no contract (non–contract union) earn approximately the same as TAs at universities without any union activity;

- contractual and non-contractual unions do not raise total compensation (stipends + tuition remission) or net compensation (stipends + tuition remission – fees);

- unions do not increase the probability of receiving health benefits for the student or for dependents;

- there is little evidence that unions reduce the wage inequality between departments within the same university.

The unions ability to generate higher stipends is noticable since it has a substantial impact on all stakeholders. Wage increases are important to encourage further unionization and proving that unions are effective barginers on behalf of graduate students, despite their relatively high turn over. For administrators, they must balance these wages increases by moving money from other aspects of university operations. Since universities may have limited economic profits (Vedder and Gallaway, 1986), the increased stipends may come at the expense of fewer graduate students, rerouted department funds, or other sources in the operating budget.

Unionization activity, however, has slowed considerably. The likelihood that a public university will see a new unionization effort is considerably less now then in the late 1990s or early 2000s. The largest potential impact is on private university, where unionization has been stymied by NLRB rulings. However, these rulings are highly contigent on the political party of the U.S. President who appointed the NLRB board. The board will be more likely to allow unionization under a Democratic administration, either now or in the

future. If NLRB permits graduate assistants to unionize, private universities will likely see a wave of new unionization. Those administrators will need to be mindful that graduate assistant unions do seem to be effective at increasing stipends—despite their relatively high turnover.

Even supposing that unionization leads to fewer graduate students, it may improve the future economic welfare of those who do enter graduate school. Data presented earlier in this paper suggested that faculty in humanities have faced a reduction in wages and greater debt in graduate school. Unionization could certainly help these students reduce the debt accrued through graduate school. Additionally, a growing segment of literature in higher education has criticized universities for hiring more adjuncts, which is perceived as cost–saving measure for the university and effectively reducing the salaries of faculty overall (e.g., American Association of University Professors, 2003; Bousquet, 2008; Hacker and Dreifus, 2010). Although the demand for contingent faculty is likely related to rapidly growing enrollment in higher education, some scholars have suggested that universities are able to rely on contigent faculty because of a surfeit of docorate and near–docorate (e.g., A.B.D.) recipients that are qualified to teach in the field (Ehrenberg and Zhang, 2005). Based on traditional models of the academic labor supply (Ehrenberg, 1992b,a), reducing the number of incoming graduate students, while also securing higher stipends as graduate assistants, could be an effective measure of improving the overall welfare of graduate assistants in school and improving their job outlook.

Yet, the data suggests the increase in stipends may be offset elsewhere. Total and net compenstion for unionized universities was statistically similar to nonunionized universities The findings do not rule out the possibility that unionized workers pay higher tuition or more fees then their counterparts. Thus, the data suggests universities may be able to recoup the cost of paying higher stipends by generating higher revenues through mandatory fees for graduate students or more tuition.

The different experience between those in the life and physical sciences and those in the humanities and social sciences is quite important. The data shows those in the latter fields are taking longer to complete their degrees, accruing larger debts, and earning less in the profession. The data on stipends suggest there is a similar inequality for graduate assistant wages, but it is unclear whether inequality between fields is a major contributor to the unionization movement. Generally, RAs—who are mostly in the sciences—have not participated in unions as much. Only 15 of the 29 unionized schools permit RAs in the bargaining unit. Yet, there is growing incidence of GAs who unionize, including students at SUNY, CUNY, University of Wisconsin—Madison, and the unsuccessful efforts at the University of Michigan. This data suggests that RAs would not see a significant change in their salaries.

There is inconclusive evidence whether unionization reduced intra-university wage variation. However, there is evidence that unionization has a differing impact on the university. Unionization was shown to have a positive impact on TAs, which is the primary source of support for students in the humanities. Yet, unions did not appear to have any impact on RAs, which is the primary support for those in the sciences (e.g., engineering). Thus, unionization may reduce overall wage inequality within the university by specifically targeting the type of assistantship as opposed to the student's field of study.

Finally, this paper also investigated the effects of unionization on health benefits for students, their spouses, and dependants. While no union–nonunion gaps were found, this data was extremely limited to binary responses. Contemporary health benefit plans go far beyond coverage versus no coverage. Varying levels of deductables, co-payments, annual limits, and in-network versus out–of–network coverage requires much more detailed information for a complete analysis. While this data suggests unionization does not increase the rate of coverage, it is uncertain if it increases the quality of coverage.

Of course, unions are also pursing non–pecucinary benefits, such as limited working hours, clearly enumerated work protocols, and other protections. Unfortunately, this paper can not address these important concerns. It is unclear if the increase in stipends and any of the non–pecucinary benefits will help resolve the important difficulties facing graduate students. While union protocols may limit the demends on a GA, scholars do not know if this helps reduce time–to–degree, reduce dropouts, or reduce the ubiquitus A.B.D. It is crucial that further research continues to explore the pecucinary, non-pecucinary, and *academic* consequences of unionization.

The lack of data has been an obstacle to scholars. Even summary–level data—which is ubiquitous in almost all other educational arenas—on the earnings of graduate students is infrequent. While the publicly–available union contracts do clearly specify wages, scholars rarely know the wages of nonunionized universities. Researchers will also need to understand the effects of unionization on productivity by gathering course loads, actual hours worked, and other work outputs. As mentioned earlier, better data on health benefits can also unearth more robust findings.

Data also needs to be collected repeatedly. The analysis presented here has limited causal interpretation. Although several variables were used to control for differences between institutions, it does not suffice for potential selection bias. However, causal estimates of graduate–student unionization could be obtained through a panel data (repeated cross section) that collects data from a sample of union and non–union universities before and after unionization efforts.

There is a limited amount of research on graduate–student unionization, but it remains an important topic to university administrators, lawmakers, and, of course, graduate students. Unions do seem to have the ability to increase stipends for graduate assistants, but that raises further questions on their impact on the university. This is especially significant since the question of graduate–student unionization at private universities is still unresolved. Moreover, it is uncertain if the 8 to 13 percent pecuinary gains can even help students wrestle with significant obstacles regarding their studies and future in academia after graduation.

References

Adelphi University: 1972. *NLRB* **195**, 639.

AFT-Wisconsin: 2009, 'Collective bargaining rights extended to UW Research Assistants'. *The Professional* (Summer).

American Association of University Professors: 2003, 'Contingent Appointments and the Academic Profession'.

American Association of University Professors: 2011, '2010-2011 Report on the Economic Status of the Profession'. Technical report, AAUP, Washington, D.C.

American Historical Association: 2000, 'Who is Teaching in U.S. College Classrooms? A Collaborative Study of Undergraduate Faculty, Fall 1999'. http://www.historians.org/caw/.

Aronowitz, S.: 1998, 'Are Unions Good for Professors?'. **84**(6), 12–17.

Barba, W. C.: 1994, 'The Unionization Movement: An Analysis of Graduate Student Employee Union Contracts.'. *Business Officer* **27**(5), 35–43.

Barbezat, D. A.: 1989, 'The Effect of Collective Bargaining on Salaries in Higher Education'. *Industrial & Labor Relations Review* **42**(3), 443–455.

Barcikowski, R. S.: 1980, 'Statistical Power with Group Mean as the Unit of Analysis'. *Statistical Power with Group Mean as the Unit of Analysis* **6**(3), 267–285.

Basu, K.: 2012, 'Unionization battle roils University of Michigan'. *InsideHigherEd*.

Bell, D.: 2012, 'Gov. Rick Snyder signs bill banning some grad student unions'. *Detroit Free Press*.

Birnbaum, R.: 1974, 'Unionization and Faculty Compensation'. *Educational Record* **55**, 29–33.

Birnbaum, R.: 1976, 'Unionization and Faculty Compensation: Part II'. *Educational Record* **57**(2), 116–118.

Boghossain, P. and J. D. Velleman: 2007, 'Should Graduate Assistants Be Represented by Labor Unions?'.

Bousquet, M.: 2008, *How the University Works: Higher Education and the Low-Wage Nation.* NYU Press.

Brown University: 2004. *NLRB* **342**.

Budd, J. W.: 2005, 'The Effect of Unions on Employee Benefits: Updated Employer Expenditure Results'. *Journal of Labor Research* **26**(4), 669 – 676.

Card, D., T. Lemieux, and W. C. Riddell: 2004, 'Unions and Wage Inequality'. *Journal of Labor Research* **25**(4), 519–562.

Cavell, L. J.: 2000, 'Graduate Student Unionization in Higher Education'. *ERIC Digest.*

Cedars Sinai Medical Center: 1976. *NLRB* **223**, 251.

DeCew, J. W.: 2003, *Unionization in the academy.* Rowman & Littlefield.

Douglas, P. H.: 1930, *Real wages in the United States, 1890-1926.* Boston, New York, Houghton Mifflin company: .

Ehrenberg, R. and L. Zhang: 2005, 'The Changing Nature of Faculty Employment'. In: R. L. Clark and J. Ma (eds.): *Recruitment, retention, and retirement in higher education: building and managing the faculty of the future.* Edward Elgar Publishing, pp. 32–52.

Ehrenberg, R. G.: 1992a, 'The Flow of New Doctorates'. *Journal of Economic Literature* **30**(2), 830–875.

Ehrenberg, R. G.: 1992b, 'A Stock Flow Model of Academic Labor Supply'. In: C. T. Clotfelter, R. G. Ehrenberg, M. Getz, and J. J. Siegfried (eds.): *Economic Challenges in Higher Education.* University Of Chicago Press, 1 edition, pp. 153–173.

Ehrenberg, R. G., D. B. Klaff, A. T. Kezsbom, and M. P. Nagowski: 2004, 'Collective Bargaining in American Higher Education'. In: R. G. Ehrenberg (ed.): *Governing Academia.* Cornell University Press, pp. 153–173.

Ehrenberg, R. G. and P. G. Mavros: 1995, 'Do Doctoral Students' Financial Support Patterns Affect Their Times-to-Degree and Completion Probabilities?'. *Journal of Human Resources* **30**(3), 581–609.

Ehrenberg, R. G., D. I. Rees, and D. J. Brewer: 1993, 'How Would Universities Respond to Increased Federal Support for Graduate Students?'. In: C. T. Clotfelter and M. Rothschild (eds.): *Studies of supply and demand in higher education*. Chicago: University of Chicago Press, pp. 183–210.

Fogg, P.: 2004, 'Faculty Union Calls for Better Treatment of Graduate Assistants'. *The Chronicle of Higher Education* p. A16.

Freeman, R. and J. Medoff: 1986, *What Do Unions Do?* Basic Books.

Freeman, R. B.: 1978, 'Should We Organize? Effects of Faculty Unionism on Academic Compensation'. *National Bureau of Economic Research Working Paper Series* **No. 301**.

Freeman, R. B.: 1981, 'The Effect of Unionism on Fringe Benefits'. *Industrial and Labor Relations Review* **34**(4), 489–509.

Freeman, R. B.: 1982, 'Union Wage Practicies and Wage Dispersion within Establishments'. *Industrial & Labor Relations Review* **36**(1), 3–21.

Freeman, R. B. and M. M. Kleiner: 1990, 'The Impact of New Unionization on Wages and Working Conditions'. *Journal of Labor Economics* **8**(1), 8.

Gehman, J.: 2001, 'Graduate Students Unite?'. *Regulation* **24**(1), 10–11.

Goldstein, H.: 2002, *Multilevel Statistical Models*, Vol. 3 of *Kendall's Library of Statistics*. New York, NY: Wiley.

Gravois, J.: 2005, 'A Union Symbol, Headed for Deletion - Faculty'. *The Chronicle of Higher Education* p. A8.

Guthrie-Morse, B., L. L. Leslie, and T. Hu: 1981, 'Assessing the Impact of Faculty Unions: The Financial Implications of Collective Bargaining'. *Journal of Higher Education* **52**(3), 237–55.

Hacker, A. and C. Dreifus: 2010, *Higher Education?: How Colleges Are Wasting Our Money and Failing Our Kids—and What We Can Do About It*. Times Books, first edition edition.

Hewitt, G. J.: 2000, 'Graduate Student Employee Collective Bargaining and the Educational Relationship Between Faculty and Graduate Students'. *Journal of Collective Negotiations* **29**(2), 153–166.

Heyboer, K.: 2010, 'New Jersey Institute of Technology graduate students, researchers seek to form union'. *The Star-Ledger*.

Hirsch, B. T. and D. A. Macpherson: 2003, 'Union Membership and Coverage Database from the Current Population Survey: Note'. *Industrial & Labor Relations Review* **56**(2), 249–354.

Hirsch, B. T., D. A. Macpherson, and W. G. Vroman: 2001, 'Estimates of Union Density by State'. *Monthly Labor Review* **124**(7), 51–55.

Hoffer, T. B., B. L. Dugoni, A. R. Sanderson, S. Sederstrom, V. Welch, I. Guzman-Barron, and S. Brown: 2002, 'Doctorate Recipients from United States Universities: Summary Report 2001'. Technical report, National Opinion Research Center, Chicago.

Hosios, A. J. and A. Siow: 2004, 'Unions without rents: the curious economics of faculty unions'. *Canadian Journal of Economics* **37**(1), 28–52.

Huchmueller, T. C., J. DiNardo, and R. G. Valletta: 2001, 'Union Effects on Health Insurance Provisions and Coverage in the United States'. Technical Report NBER Working Paper No. 8238, National Bureau of Economic Research, Cambridge, MA.

Iler, D.: 2012, 'CGE wants to unionize research assistants'. *The Daily Barometer*.

Julius, D. J. and P. J. Gumport: 2003, 'Graduate Student Unionization: Catalysts and Consequences'. *Review of Higher Education* **26**(2), 187–216.

Kreft, I. G. G. and J. de Leeuw: 1998, *Introducing Multilevel Modeling*. Sage Publications Ltd, 1998 edition.

Lafer, G.: 2003, 'Graduate Student Unions: Organizing in a Changed Academic Economy'. *Labor Studies Journal* **28**(2), 25.

Marshall, J. L.: 1979, 'The Effects of Collective Bargaining on Faculty Salaries in Higher Education.'. *Journal of Higher Education* **50**(3), 310–22.

Monks, J.: 2000, 'Unionization and Faculty Salaries: New Evidence from the 1990s'. *Journal of Labor Research* **21**(2), 305–314.

Morgan, D. R. and R. C. Kearney: 1977, 'Collective Bargaining and Faculty Compensation: A Comparative Analysis'. *Sociology of Education* **50**(1), 28–39.

National Research Council: 1995, *Research Doctorate Programs in the United States: Continuity and Change*. National Academies Press.

New York University: 2000. *NLRB* **332**, 1205.

Ostriker, J. P., C. V. Kuh, and J. A. Voytuk: 2010, 'A Data-based Assessment of Research-Doctorate Programs in the United States'. Technical report, National Research Council, Committee on an Assessment of Research Doctore Programs, Washington, D.C.

Rabe-Hesketh, S. and A. Skrondal: 2005, *Multilevel and Longitudinal Modeling Using Stata*. Stata Press, 1 edition.

Rees, D. I.: 1993, 'The Effect of Unionization on Faculty Salaries and Compensation: Estimates from the 1980s'. *Journal of Labor Research* **14**(4), 399–422.

Rhoades, G. and R. A. Rhoads: 2003, 'The Public Discourse of U.S. Graduate Employee Unions: Social Movement Identities, Ideologies, and Strategies'. *Review of Higher Education* **26**(2), 163–86.

Rhoads, R. A. and G. Rhoades: 2005, 'Graduate Employee Unionization as Symbol of and Challenge to the Corporatization of U.S. Research Universities'. *Journal of Higher Education* **76**(3), 243–Jun.

Schenk Jr., T.: 2007, 'The Effects of Graduate-Student Unionization'. Masters thesis, Iowa State University.

Schontzler, G.: 2012a, 'MSU graduate student union in hands of judge'. *The Bozeman Daily Chronicle*.

Schontzler, G.: 2012b, 'MSU graduate students vote to unionize'. *The Bozeman Daily Chronicle*.

Smallwood, S.: 2001, 'Stipends Are Key in Competition to Land Top Graduate Students'. *The Chronicle of Higher Education* p. A24.

Smallwood, S.: 2002a, 'Cornell's Teaching Assistants Reject Unionization'. *The Chronicle of Higher Education* p. A12.

Smallwood, S.: 2002b, 'NYU and Its TA Union Reach Pact on a Contract'. *The Chronicle of Higher Education* p. A18.

Smallwood, S.: 2004, 'The Stipend Gap'. *The Chronicle of Higher Education* p. A8.

Smallwood, S.: 2005, 'Unions Cope With a Crucial Loss'. *The Chronicle of Higher Education*.

Snyder, T. D., A. G. Tan, and C. M. Hoffman: 2006, 'Digest of Education Statistics 2005'. Technical Report NCES 2006-030, U.S. Department of Education, National Center for Education Statistics, Washington D.C.

State University of New York at Buffalo: 2010. *NLRB* **355**, 170.

Steenbergen, M. R. and B. S. Jones: 2002, 'Modeling Multilevel Data Structures'. *American Journal of Political Science* **46**(1), 218.

Vedder, R. and L. Gallaway: 1986, 'Rent–seeking, Distributional Coalitions, Taxes, Relative Prices and Economic Growth'. *Journal of Labor Research* **51**, 93–100.

Figure 1: Number of Universities with Graduate–student Unions: 1970–2009
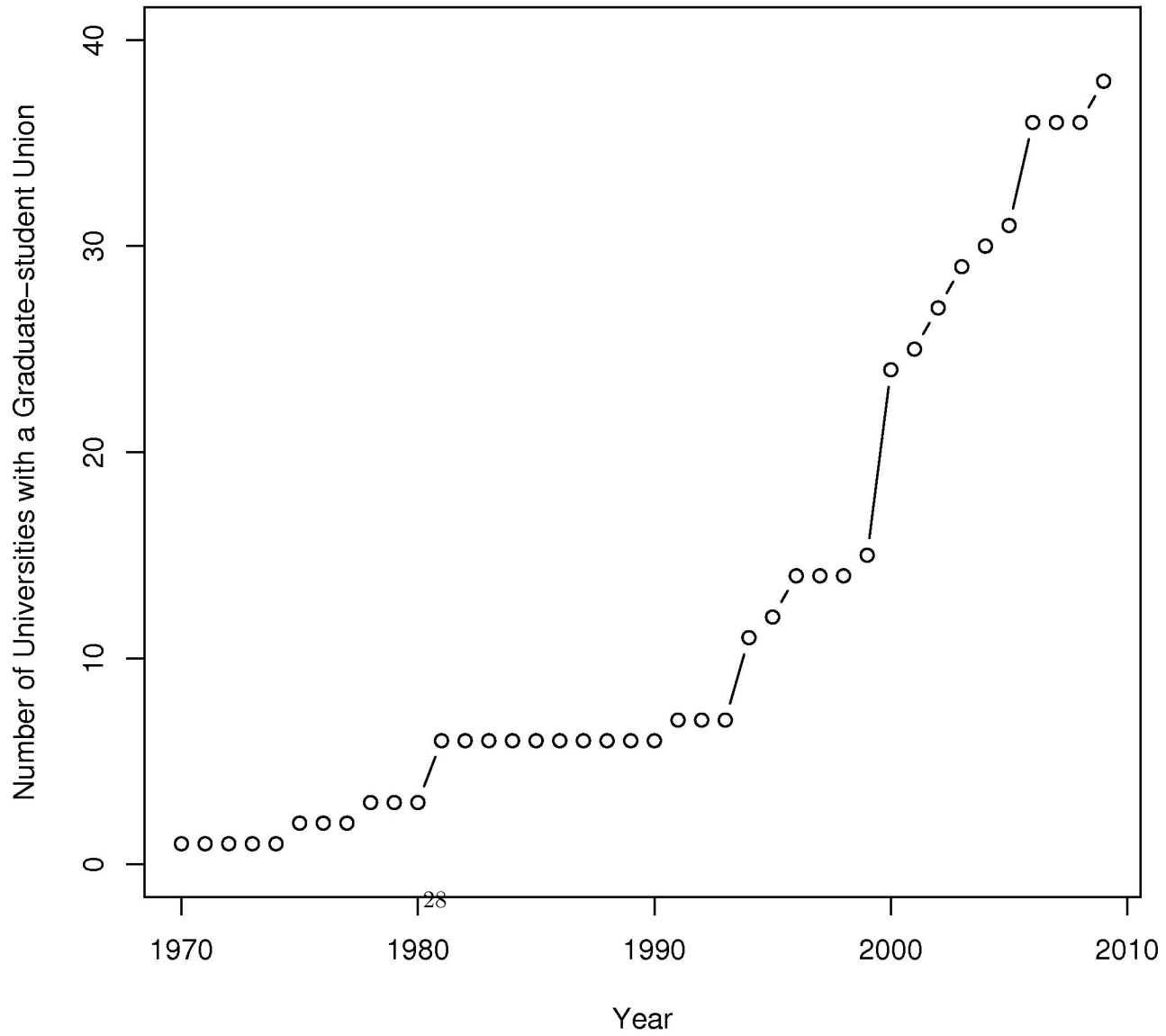

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Table 1: Recognized Unions and Important Dates

University	Formation	Recognized	First Contract	Membership
University of Wisconsin, Madison	1969	1969	1970	TA & RA[1]
Rutgers University	1972	1972	1972	TA & RA
University of Wisconsin, Milwaukee	1971	1991	1991	TA
University of Michigan	1975	1975	1975	TA[2]
University of Oregon	1975	1976	1978	TA
State University of New York, Buffalo	1975	1991	1994	TA
University of Florida	1976	1981	1981	TA & RA
University of South Florida	1981	1981	1981	TA & RA
Florida A & M	1981	1981	1981	TA & RA
University of California, Berkeley	1983	1988	2000	TA
State University of New York, Albany	1984	1991	1994	TA
State University of New York, Binghamton	1984	1991	1994	TA
State University of New York, Stony Brook	1984	1991	1994	TA
New York University (NYU)	1991	2000	2000[3]	TA & RA
University of California, San Diego	1992	1999	2000	TA
University of Iowa	1993	1996	1996	TA & RA
University of Illinois, Urbana–Champaign	1993	2002	2004	TA & RA
University of California, Davis	1993	1999	2000	TA
University of Massachusetts, Lowell	1993	1993	1996	TA & RA
University of California, Los Angeles	1994	1999	2000	TA
University of California, Santa Barbara	1994	1999	2000	TA
Wayne State University	1997	1998	1999	TA
University of California, Riverside	1997	1999	2000	TA
University of California, Irvine	1998	1999	2000	TA
Temple University	1997	2001	2002	TA & RA
Oregon State University	1999	1999	2000	TA & RA[4]
University of Washington	2000	2003	2003	TA & RA
Michigan State University	2001	2001	2002	TA
University of Kansas	1995	1995	1995	TA
University of Massachusetts, Boston	2000	2000	2001	TA & RA
University of Rhode Island	2001	2003	2003	TA & RA
University of Illinois, Chicago	2004	2004	2006	TA
California State University System	2004	2004	2006	TA
University of California, Merced	2005	2005	2005	TA
Southern Illinois University, Carbondale	2005	2006	2006	TA
University of Illinois, Springfield	2005	2005	2006	TA
Western Michigan University	2005	2005	2006	TA
Central Michigan University	2008	2009	2009	TA & RA
Florida State University	2007	2009	2009	TA & RA

TA denotes teaching assistants, RA denotes Research Assistants.

[1] Wisconsin legislature passed a law in 2009 permitting RAs to unionize (AFT-Wisconsin, 2009).

[2] RAs were included in Michigan's bargaining units until 1981 (Basu, 2012).

[3] NYU refused to renew contract (Smallwood, 2005).

[4] RA representation varies by department, so RAs are not universally covered by the union contract (Iler, 2012).

[5] At the time of writing, the New Jersey Institute of Technology won a union vote in 2010 (Heyboer, 2010); however, the first contract has not been successfully negotiated.

[6] Research and teaching assistants at Montana State University voted to formally unionize. Despite initial approval, the union status is under appeal and an initial contract has yet to be finalized (Schontzler, 2012b,a).

Table 2: List of Variables and Descriptive Statistics

	Averages	
Variable	TA's	RA's
STIPENDS		
Stipend (All)	$12,881	$13,725
Stipend (Non-union)	$12,837	$14,140
Stipend (Covered Unions)	$12,858	$12,831
Stipend (Non-covered Unions)	$13,178	$14,165
Stipend (TA union)	$12,814	$12,831
Stipend (RA union)	$13,148	$13,029
YEAR		
2000-01	0.30	0.27
2001-02	0.25	0.21
2003-04	0.44	0.52
MAJOR		
Biology	0.19	0.21
Economics	0.18	0.17
English	0.16	0.13
History	0.16	0.12
Mechanical Engineering	0.15	0.22
UNION STATUS		
Contract Union	0.22	0.29
Non-contractual Union	0.10	0.09
TA Union	0.27	0.27
TA + RA Union	0.23	0.21
Years Organized[1]	7.6	7.8
INSTITUTIONAL DATA		
Rank	44.78	38.44
Private	0.26	0.24
Cost–of–Living	$9,115	$9,270
Tuition Cost	$10,368	$10,114
Wealth	$1,924,673,422	$1,926,659,179
Total Enrollment	21,832	22,247

Numbers represent department–level averages and proportions for TAs and RAs.

Table 3: Two-Level Random-Intercept Multilevel Regression on Log of Stipends for Teaching Assistants

Variable	*Contract Union*				*TA and TA+RA Union*			
	Model 1		Model 2		Model 1		Model 2	
Fixed								
2001	0.033*	(0.019)	0.037*	(0.019)	0.046***	(0.022)	0.044***	(0.022)
2003	0.083**	(0.028)	0.101**	(0.027)	0.094**	(0.030)	0.106**	(0.029)
Economics	-0.034	(0.024)	-0.031	(0.024)	-0.033	(0.024)	-0.031	(0.024)
English	-0.046*	(0.025)	-0.044*	(0.024)	-0.045*	(0.025)	-0.044*	(0.024)
History	-0.069**	(0.025)	-0.069**	(0.025)	-0.070**	(0.025)	-0.069**	(0.025)
Engineering	-0.013	(0.024)	-0.012	(0.024)	-0.013	(0.024)	-0.011	(0.024)
Sociology	-0.054***	(0.026)	-0.053***	(0.025)	-0.053***	(0.025)	-0.052***	(0.025)
Annual Pay	0.338**	(0.031)	0.335**	(0.030)	0.338**	(0.031)	0.335**	(0.030)
Contract Union	0.086***	(0.037)	0.230**	(0.049)				
TA Union					0.122***	(0.048)	0.247**	(0.055)
TA+RA Union					0.080***	(0.037)	0.224**	(0.049)
Noncontract Union	0.061	(0.051)	0.070	(0.046)	0.063	(0.050)	0.071	(0.046)
Years Org.			-0.038**	(0.010)			-0.037**	(0.010)
Years Org.^{2}			0.001**	(3.3e-04)			0.001**	(3.4e-04)
Rank	2.8e-05	(3.7e-04)	9.4e-05	(3.6e-04)	3.8e-05	(3.8e-04)	9.2e-05	(3.7e-04)
Private	0.110	(0.110)	0.100	(0.103)	0.105	(0.110)	0.098	(0.103)
ln(COLA)	0.094	(0.078)	0.098	(0.074)	0.096	(0.078)	0.098	(0.074)
ln(Tuition)	0.005	(0.058)	0.002	(0.054)	0.008	(0.058)	0.004	(0.054)
Wealth Ratio	-1.7e-09	(5.8e-08)	1.6e-08	(5.4e-08)	5.4e-10	(5.76e-08)	1.6e-08	(5.4e-08)
Intercept	8.421**	(0.881)	8.394**	(0.837)	8.367**	(0.885)	8.375**	(0.838)
Random								
σ_u (Intercept)	0.106**	(0.013)	0.096**	(0.012)	0.107**	(0.014)	0.096**	(0.0124)
σ_ϵ (Model)	0.159**	(0.005)	0.158**	(0.005)	0.159**	(0.005)	0.158**	(0.0051)
Observations	558		558		558		558	
University Clusters	82		82		82		82	

Standard errors in parenthesis. Significance levels: *denotes significance at the .10 level; **at the .05 level; ***at the .01 level.

Omitted variables: 2000, biology, 9-month pay, nonunion, and public university.

Table 4: Two-Level Random-Intercept Multilevel Regression on Log of Stipends for Research Assistants

Variable	Contract Union				TA and TA+RA Union			
	Model 1		Model 2		Model 3		Model 4	
Fixed								
2001	0.023	(0.032)	0.032	(0.032)	0.034	(0.035)	0.033	(0.035)
2003	0.093***	(0.046)	0.127**	(0.049)	0.101**	(0.048)	0.128**	(0.049)
Economics	-0.168**	(0.040)	-0.164**	(0.040)	-0.168***	(0.040)	-0.164**	(0.040)
English	-0.291**	(0.043)	-0.286***	(0.043)	-0.292***	(0.043)	-0.286***	(0.043)
History	-0.330**	(0.043)	-0.328***	(0.043)	-0.331***	(0.043)	-0.328***	(0.043)
Engineering	-0.156**	(0.036)	-0.152**	(0.036)	-0.156***	(0.036)	-0.152**	(0.036)
Sociology	-0.188**	(0.040)	-0.185**	(0.040)	-0.188***	(0.040)	-0.185**	(0.040)
Annual	0.258**	(0.037)	0.260**	(0.038)	0.257***	(0.038)	0.260**	(0.038)
Contract Union	-0.028	(0.058)	0.117	(0.085)				
TA Union					0.013	(0.080)	0.121	(0.094)
TA+RA Union					-0.047	(0.065)	0.115	(0.090)
Noncontract Union	0.032	(0.076)	0.049	(0.078)	0.033	(0.077)	0.049	(0.078)
Years Org.			-0.035***	(0.016)			-0.035***	(0.017)
Years Org.^{2}			0.001*	(0.001)			0.001	(0.006)
Rank	-2.2e-04	(0.001)	-1.4e-04	(0.001)	-2.1e-04	(0.001)	-1.4e-04	(0.001)
Private	0.236	(0.175)	0.292	(0.179)	0.219	(0.177)	0.289	(0.182)
ln(COLA)	-0.073	(0.132)	-0.113	(0.134)	-0.065	(0.132)	-0.112	(0.135)
ln(Tuition Cost)	-0.042	(0.089)	-0.069	(0.091)	-0.033	(0.090)	-0.068	(0.092)
Wealth Ratio	-1.7e-07***	(8.79e-08)	-1.7e-07*	(8.9e-08)	-1.7e-07**	(8.8e-08)	-1.7e-07*	(8.87e-08)
Intercept	10.540**	(1.457)	11.100**	(1.501)	10.38***	(1.505)	11.07**	(1.524)
Random								
σ_u (Intercept)	0.154**	(0.021)	0.157**	(0.021)	0.156**	(0.0207)	0.157**	(0.0206)
σ_ϵ (Model)	0.217**	(0.009)	0.215**	(0.008)	0.216**	(0.0084)	0.215**	(0.0084)
Observations	410		410		410		410	
University Clusters	76		76		76		76	

Standard errors in parenthesis. Significance levels: *denotes significance at the .10 level; **at the .05 level; ***at the .01 level.

Omitted variables: 2000, Biology, 9-month pay, nonunion, and public university.

Table 5: Two-Level Multilevel Regression Log of Total and Net Compensation

Variable	Total Compensation				Net Compensation			
	(TA)		(RA)		(TA)		(RA)	
Fixed								
Economics	-0.110***	(0.033)	-0.215***	(0.050)	-0.106***	(0.034)	-0.219***	(0.051)
English	-0.110***	(0.034)	-0.245***	(0.056)	-0.117***	(0.035)	-0.247***	(0.056)
History	-0.164***	(0.034)	-0.306***	(0.057)	-0.164***	(0.036)	-0.307***	(0.057)
Engineering	-0.127***	(0.034)	-0.203***	(0.047)	-0.125***	(0.036)	-0.205***	(0.048)
Sociology	-0.147***	(0.036)	-0.266***	(0.052)	-0.145***	(0.037)	-0.269***	(0.053)
Annual	0.134***	(0.046)	0.121**	(0.050)	0.139***	(0.048)	0.122**	(0.051)
Contract Union	0.011	(0.102)	-0.037	(0.105)	0.074	(0.133)	-0.028	(0.109)
Noncontract Union	0.324	(0.285)	0.331	(0.295)	0.339	(0.377)	0.335	(0.305)
Rank	-0.001*	(0.001)	-0.002***	(0.001)	0.001	(0.001)	-0.002***	(0.001)
Private	0.292	(0.253)	0.379	(0.275)	0.585*	(0.332)	0.441	(0.284)
ln(COLA)	-0.491**	(0.221)	-0.586***	(0.226)	-0.495*	(0.289)	-0.590**	(0.234)
ln(Tuition Cost)	0.253*	(0.132)	0.199	(0.141)	0.122	(0.173)	0.177	(0.146)
Wealth Ratio	1.5e-07	(1.4e-07)	-1.1e-07	(1.5e-07)	1.7e-07	(1.9e-07)	-1.1e-07	(1.5e-07)
Intercept	12.052***	(2.387)	13.617***	(2.473)	13.113***	(3.118)	13.807***	(2.557)
Random								
σ_u (Intercept)	0.267***	(0.027)	0.252***	(0.029)	0.356***	(0.036)	0.262***	(0.030)
σ_ϵ (Model)	0.131***	(0.007)	0.177***	(0.011)	0.136***	(0.007)	0.179***	(0.011)
Observations	231		183		231		183	
University Clusters	61		55		61		55	

Standard errors in parenthesis. Significance levels: *denotes significance at the .10 level; **at the .05 level; ***at the .01 level. Omitted variables: 2000, Biology, 9-month pay, nonunion, and public university.

Table 6: Two-Level Multilevel Logit Regression on Student and Spouse Health Benefits

| Variable | Student Health | | Dependent Health | |
	(TA)	(RA)	(TA)	(RA)
2001	-0.101 (0.150)	-0.083 (0.212)	-0.093 (0.115)	-0.055 (0.108)
2003	-0.884 (0.809)	-1.083 (0.871)	-0.729 (0.593)	-0.135 (0.598)
Economics	-0.632 (0.485)	0.115 (0.513)	0.065 (0.192)	0.860** (0.358)
English	-1.349*** (0.452)	-1.245*** (0.430)	-0.061 (0.178)	0.805** (0.363)
History	-0.782* (0.463)	-0.909* (0.513)	0.129 (0.179)	0.623* (0.352)
Engineering	-0.611 (0.453)	-0.350 (0.378)	-0.248 (0.229)	0.224 (0.290)
Sociology	-0.536 (0.511)	-0.017 (0.494)	0.054 (0.235)	0.693** (0.324)
Annual	-0.714 (0.736)	-0.360 (0.552)	-0.226 (0.482)	0.856 (0.523)
Contract Union	0.562 (1.169)	0.201 (1.297)	0.348 (0.684)	-0.263 (0.736)
Rank	-0.037*** (0.011)	-0.032*** (0.009)	-0.010 (0.008)	-0.012 (0.009)
Private	-3.390 (3.877)	-3.669 (5.001)	-0.368 (1.815)	0.258 (1.801)
ln(COLA)	1.298 (1.351)	1.676 (1.867)	1.165 (1.865)	0.769 (1.830)
ln(Tuition Cost)	0.927 (2.090)	1.165 (2.483)	-0.508 (0.899)	-0.706 (0.834)
Wealth Ratio	-9.9e-08 (1.3e-07)	-1.4e-07* (1.0e-07)	2.4e-08 (1.2e-07)	-8.9e-08 (1.4e-07)
Intercept	-13.430 (21.748)	-7.615 (29.458)	-5.958 (19.189)	-1.545 (19.209)
Observations	559	413	523	387

Standard errors in parenthesis. Significance levels: *denotes significance at the .10 level; **at the .05 level; ***at the .01 level. Omitted variables: 2000, Biology, 9-month pay, nonunion, and public university.

Table 7: Union and Major Interaction Terms for Log of Stipends

Variable	(TA)		(RA)	
Contract*Economics	-0.034	(0.050)	0.062	(0.084)
Contract*English	-0.026	(0.050)	-0.062	(0.085)
Contract*History	-0.009	(0.051)	-0.064	(0.087)
Contract*Engineering	-0.049	(0.054)	-0.046	(0.080)
Contract*Sociology	-0.020	(0.053)	-0.042	(0.083)
Noncontract*Economics	-0.220***	(0.076)	-0.232**	(0.118)
Noncontract*English	-0.094	(0.080)	0.015	(0.143)
Noncontract*History	-0.082	(0.081)	0.059	(0.144)
Noncontract*Engineering	-0.017	(0.077)	-0.024	(0.119)
Noncontract*Sociology	-0.162**	(0.075)	-0.086	(0.111)

Standard errors in parenthesis. Significance levels: *denotes significance at
the .10 level; **at the .05 level; ***at the .01 level.

Coefficients shown holding year, years organized, department, and university
characters held constant in a two–level random intercept multilevel model.

Table 8: Analysis of Variance on Log of Stipends

	Contract Union		Noncontract Union		Nonunion	
	Mean–squared	Share	Mean-squared	Share	Mean-squared	Share
Between Universities	.323	.23	.368	.28	.217	.09
Within Universities	.057	.15	.065	.15	.049	.18
Total	.073	.38	.078	.43	.062	.27

Total Mean–squared is the sum of between and within university mean–squared error. The share of
variance is equal to the mean–squared error divided total mean–squared.

Table 9: OLS Regression on Standard Deviation of Stipends, Coefficient of Variation, and Low–to–High Ratio

	Std. Dev.		Coeff. of Var.		Low–High Ratio	
2001	-2.268	(356.356)	-0.008	(0.028)	0.018	(0.051)
2003	536.557	(335.521)	0.023	(0.026)	-0.056	(0.048)
Rank Mean	-5.627	(6.358)	0.001	(0.001)	0.001	(0.001)
Rank Std. Dev.	-19.810	(14.306)	-0.002	(0.001)	0.003	(0.002)
Contract Union	212.795	(325.993)	0.018	(0.025)	-0.021	(0.047)
Noncontract Union	1147.251**	(479.766)	0.080**	(0.037)	-0.087	(0.069)
Private	434.274	(335.664)	0.009	(0.026)	0.030	(0.048)
ln(COLA)	66.343	(622.100)	0.013	(0.049)	-0.074	(0.089)
Wealth Ratio	0.001**	(0.001)	4.3e-08*	(2.4e-08)	-7.8e-08*	(4.39e-08)
All Major	-816.166***	(275.966)	-0.058***	(0.022)	0.096**	(0.040)
Intercept	2192.297	(5627.607)	0.097	(0.440)	1.212	(0.809)
Observations	128		128		128	
Adjusted R^2	.178		.097		.088	

Standard errors in parenthesis. Significance levels: *denotes significance at the .10 level; **at the .05 level; ***at the .01 level.