<u>**Supplemental Appendix**</u>

The Impact of Unions on Wages in the Public Sector: Evidence from Higher Education

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January 2025

Description of University and College Academic Staff System (UCASS)

The survey captures all professors/teachers within faculties, academic staff in teaching hospitals, visiting academic staff, and research staff who have academic rank and salary similar to teaching staff, for all those whose term of appointment is not less than twelve months. It excludes administrative and support staff, librarians, and research and teaching assistants.
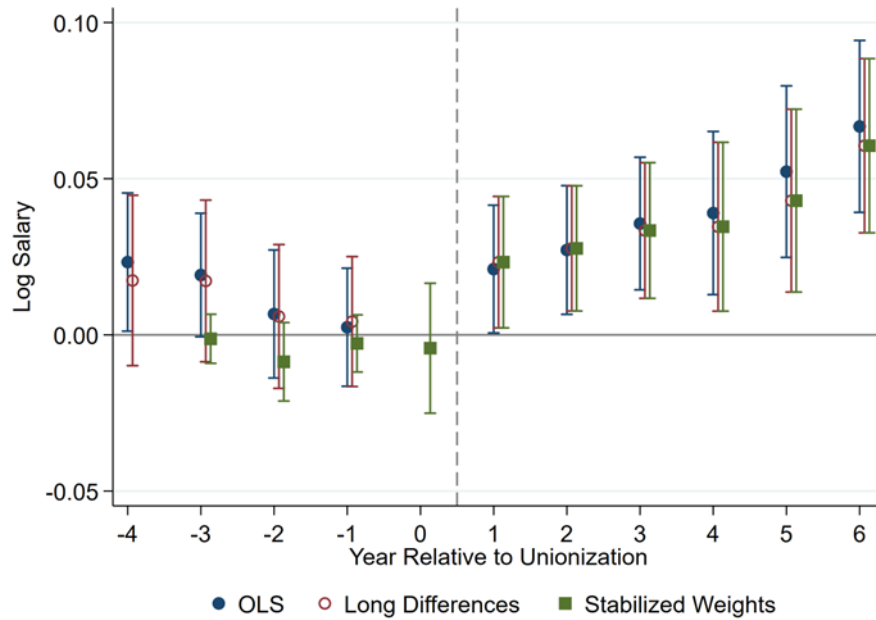
Participation in UCASS is mandatory and it is administered directly to institutions. The unit of observation in the data is the individual but the survey unit is the institution. Information on the economic and demographic characteristics of staff—including pay—are obtained directly from payroll records. Individuals are assigned (anonymized) internal identification numbers, which allow us to follow them over time within institutions. However, because the numbers are university specific we cannot track mobility of individuals across institutions. Statistics Canada works closely with institutions to maintain consistent reporting each year and to ensure the data are comparable across institutions.[1]

Our primary measure of wages is the annual (12 month) rate of pay contractually negotiated and agreed upon between the employee and employer. Because the data are collected typically in October, they provide a view of salaries for the fiscal year at this time. Statistics Canada has worked closely with the institutions to obtain a measure of base salary that is comparable across institutions and over time. It excludes other components/factors of actual salary including unpaid leave (including maternity or parental leave) and stipend pay for senior administrative duties. It also excludes income paid out of research grants and other external funding sources.

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[1] Baker et al. (2023) provide further detail of these data including the suspension of collection between 2011 and 2015 which has been remedied by Statistics Canada using the National Faculty Data Pool.

As a robustness check, we also consider a measure of compensation corresponding to the actual salary which is generally available for the sample period from 1985 onwards. In the available years, we find there a close relationship between base and actual salary in practice; base salary accounts for 104.0 percent of actual salary on average within institutions and years for which actual salary is observed and the correlation coefficient is 0.9215 within the analytical sample. On average, base salary exceeds actual salary due to unpaid leave.

Figure S1: Effect of Unionization on Average Salaries using OLS, Long Differences or Stabilized Weights

Notes: The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The model specifications include individual and year fixed effects. The estimators used are ordinary least squares (OLS) with two-way fixed effects as well as the version of the Callaway and Sant'Anna estimator that uses either the universal reference period where pre-treatment effects are estimated using "long-differences" (i.e., the "long2" option in the "csdid.ado" Stata command) or the Callaway and Sant'Anna estimator with stabilized weights (i.e., the "stdipw" option in the "csdid.ado" Stata command), but all other options as the default options, as stated in the legend. By design, the universal reference period is set to event-time 0, as shown. The corresponding regression results are shown in Table S9 of the Supplemental Appendix. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Figure S2: Effect of Unionization on Average Salaries with Never-treated and Not-yet-treated in Control Group
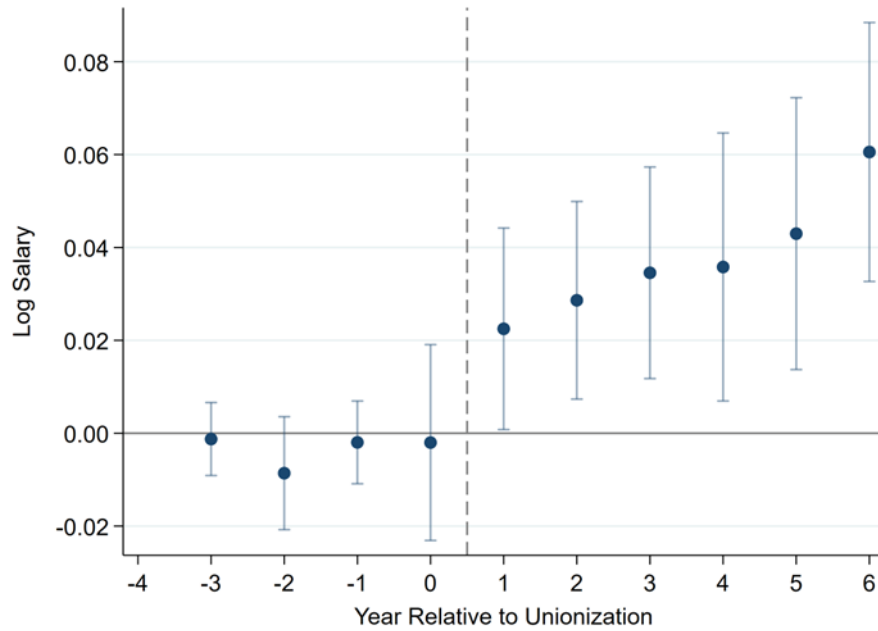
Notes: The Callaway and Sant'Anna estimator is used. The default option (i.e., "short gaps" for periods before treatment) is selected, except that the control group now comprises both never-treated and not-yet-treated. See the "csdid.ado" Stata command help file for further information. The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The model specification includes individual and year fixed effects. The corresponding regression results are shown in Table S10 of the Supplemental Appendix. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.
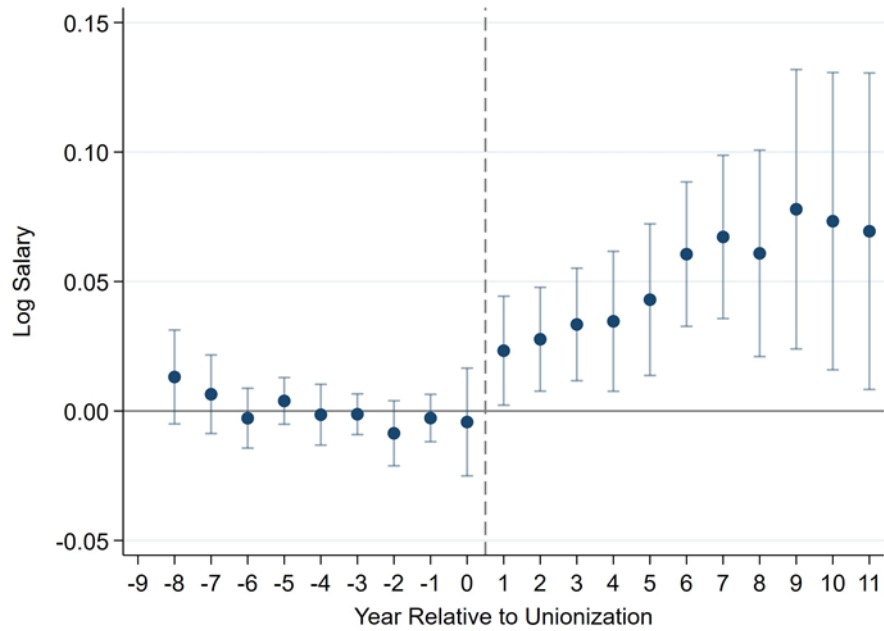
Figure S3: Effect of Unionization on Average Salaries using Wide Time Interval

Notes: The Callaway and Sant'Anna estimator is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The model specification is identical to panel A in Figure 2 except that the event-time window is extended to range from 9 years before treatment to 11 years after treatment (i.e., including an additional five years on either side of the treatment). The corresponding regression results are shown in column (1) of Table S11 of the Supplemental Appendix. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution

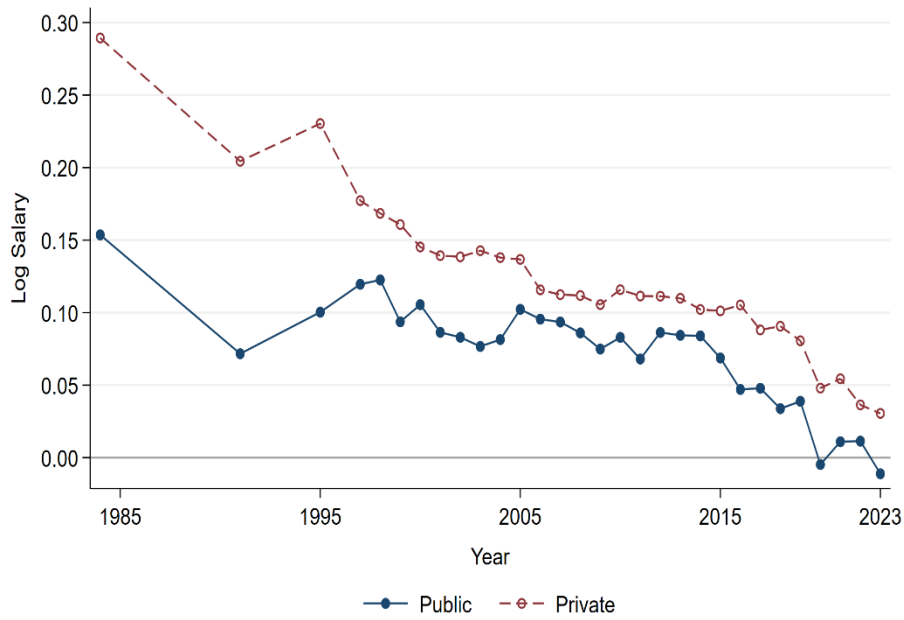**Source:** Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Figure S4: Union Wage Premium in the Canadian Public and Private Sectors by Year, 1997 to 2022

Notes: The estimates of β_1 and β_2 are plotted from the regression $\ln(salary_{it}) = \beta_1 public_{it} \times union_{it} + private_{it} \times union_{it} + \Gamma X_{it} + \varepsilon_{it}$ using data on all individuals aged 15-64 in the labor force. $public_{it}$ and $private_{it}$ are indicators equal to one if individual i in year t is an employee in that sector and union is an indicator equal to one if they are either a union member or covered by a collective bargaining agreement. X_{it} is a vector of controls for gender, education-by-age group, province, and sector fixed effects. X_{it} also includes month fixed effects for 1997 to 2003. Salaries are deflated using national CPI in 2002. Individuals are dropped if their wage is below 2.5 CAD per hour and are topcoded to 74.3 in the Labour Force Survey for consistency with the Survey of Union Membership. Topcoded salaries in the Survey of Work Arrangements are multiplied by an adjustment factor of 1.143. These adjustments are consistent with Card, Lemieux, and Riddell (2020).
Source: Statistics Canada, Survey of Union Membership, 1984; Statistics Canada, Survey of Work Arrangements, 1991, 1995; and Statistics Canada, Labour Force Survey, March and November, 1997 to 2023.

Figure S5: Effect of Unionization on Average Salaries using Various Controls
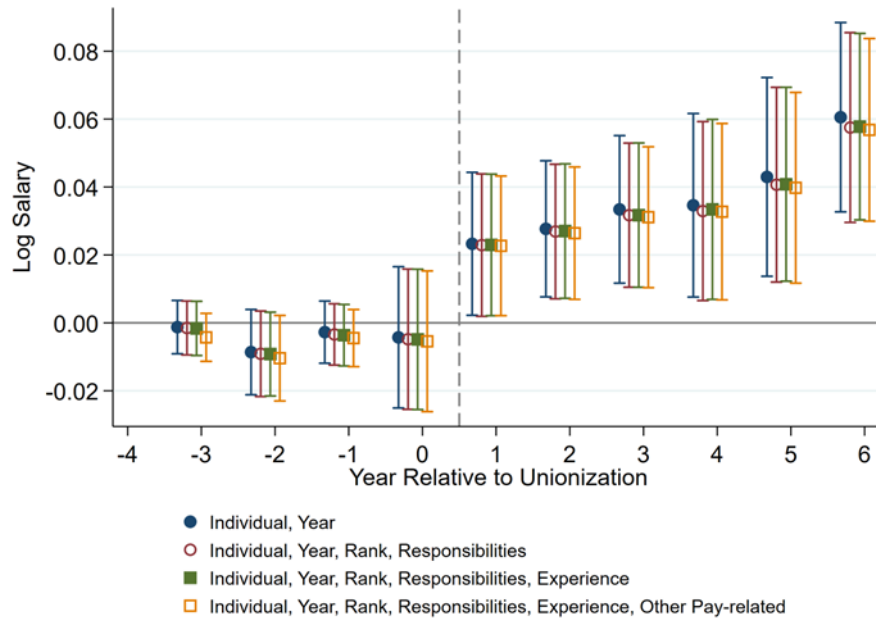
Notes: The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The model specifications include individual and year fixed effects. The Callaway and Sant'Anna estimator is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. Additional controls are included as stated in the legend. See the "csdid.ado" Stata command help file for further information. The categories for administrative responsibilities are: none; Chairs/Heads/Directors; Associate/Vice Deans; and Deans. Years of experience is controlled for using a cubic polynomial. Other pay-related fixed effects (Fixed Effect) consist of indicators for: receiving a stipend; being on sabbatical; having reduced pay; and taking unpaid leave. The corresponding regression results are shown in Table S2 of the Supplemental Appendix. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Figure S6: Effect of Unionization on Average Salaries by Measure of Pay
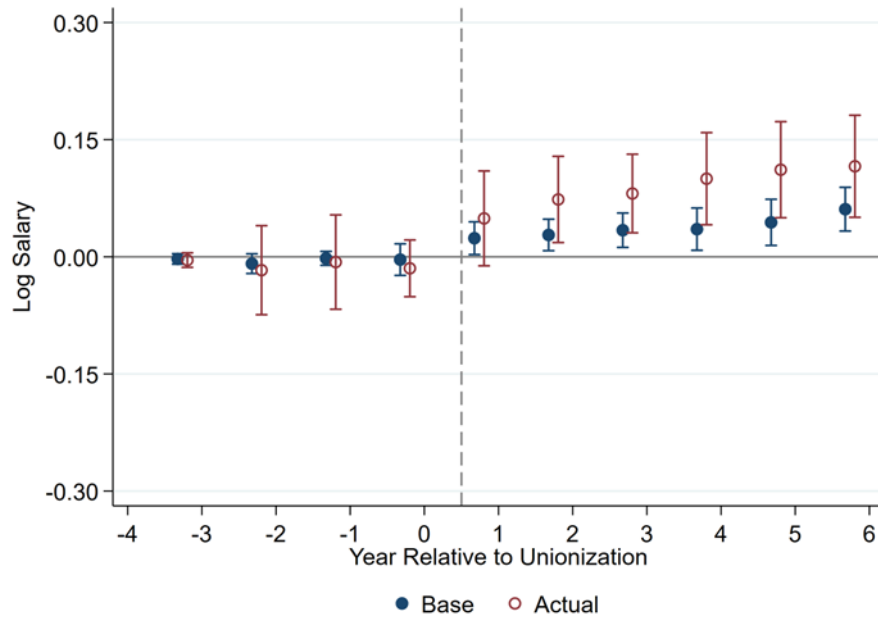
Notes: Restricted to observations with both non-missing and non-zero base and actual pay in the year. Actual pay is not available before 1985. The Callaway and Sant'Anna estimator is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is either the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time, or actual pay, which may be less than base pay due to unpaid leave or higher than base pay due to stipends, as stated in the legend. The model specification includes individual and year fixed effects. The corresponding regression results are shown in Table S12 of the Supplemental Appendix. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution
Source: Statistics Canada, University and College Academic Staff System, 1985 to 2022; and self-collected union data.

Figure S7: Robust Inference Using Honest DiD

Notes: The robust inference approach in Rambachan and Roth (2022) is implemented using the Honest DiD postestimation Stata command to the Callaway and Sant'Anna estimator. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The model specification includes individual and year fixed effects. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.
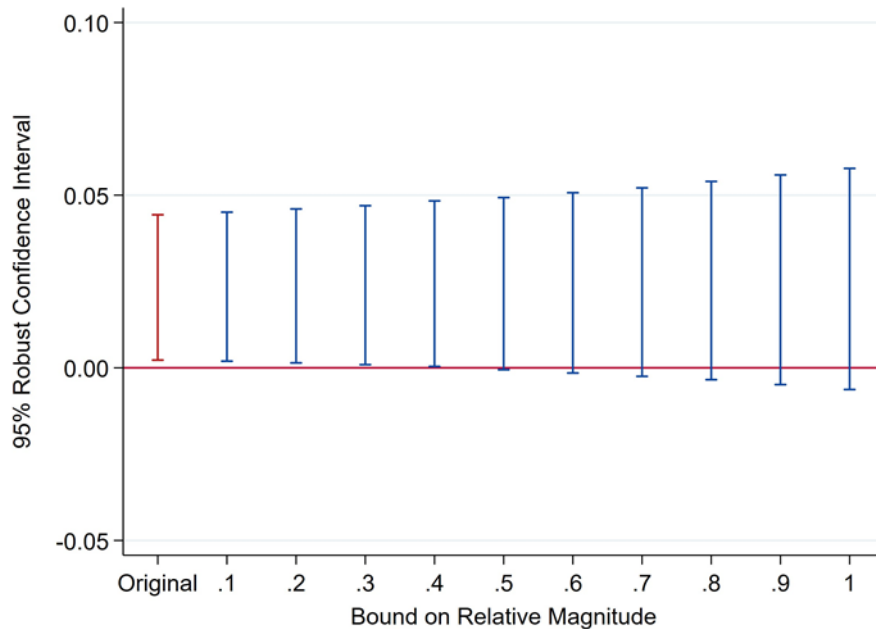
Figure S8: Effect of Unionization on Low-Income Status
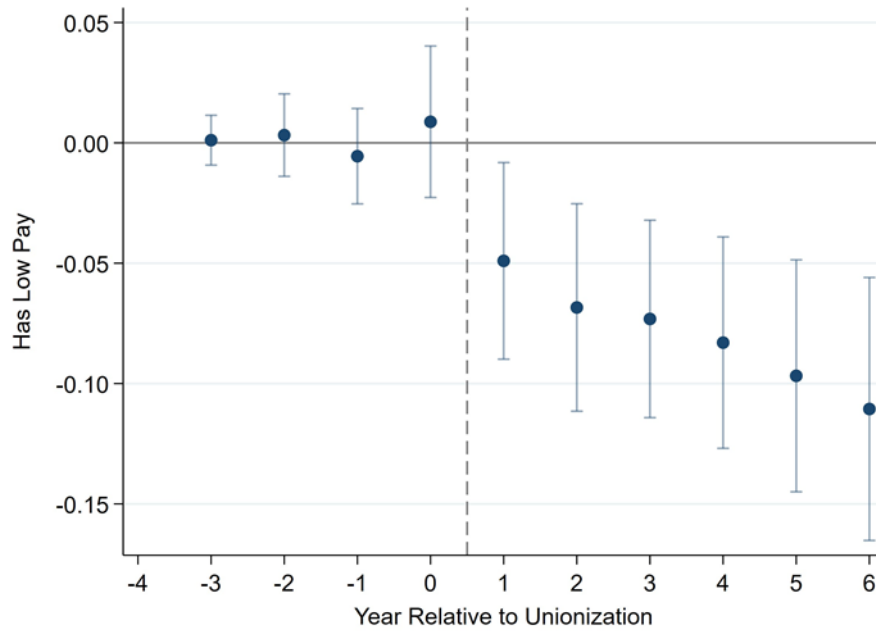
Notes: The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable uses base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. Specifically, the dependent variable is an indicator equal to "1" if the income for the year is below the 25th percentile and "0" otherwise, where this percentile is based on total (inflation-adjusted) earnings for the treatment group in the pre-treatment period. The model specification includes individual and year fixed effects. The corresponding regression results are shown in column (1) of Table S13 of the Supplemental Appendix. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.
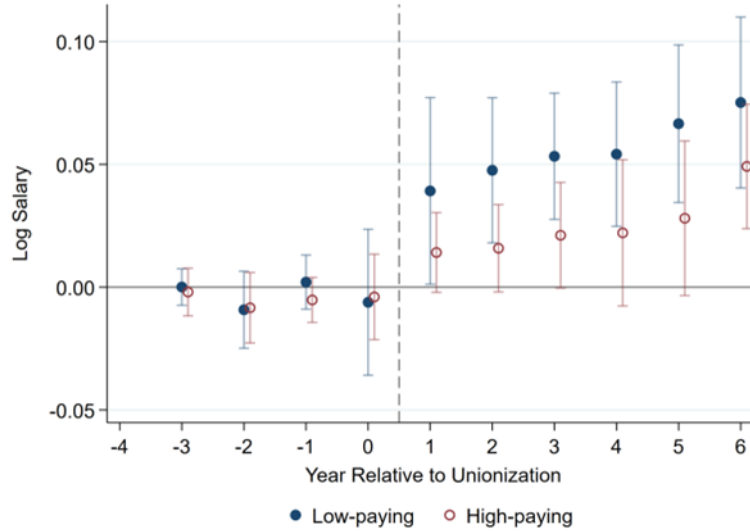
Figure S9: Effect of Unionization on Average Salaries by Department Characteristics

(A) Low-paying versus High-paying
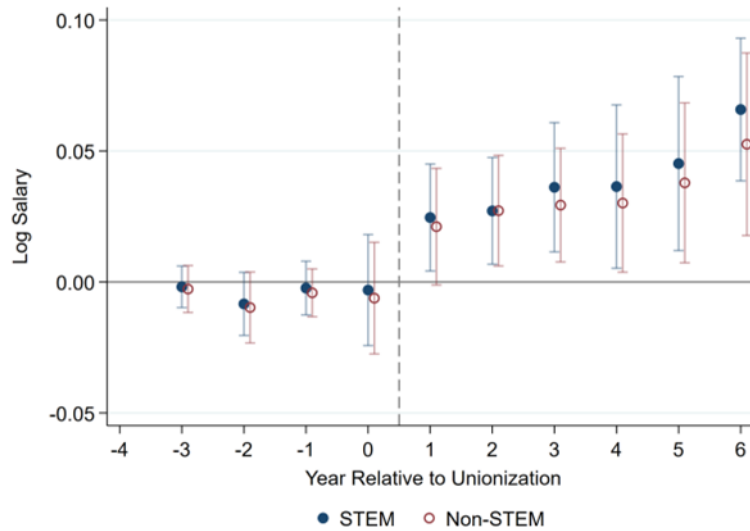
(B) STEM versus Non-STEM

Notes: The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. Panel A carries out the analysis separately for departments at institutions that are low-paying versus high-paying. Departments are assigned to one category or the other based on whether their pay was below or above the median for all departments at event-time −4, respectively. This assignment is time invariant and based on the level of pay in the earliest pre-treatment year included in the analysis (i.e., the reference or normalization year). The same control group is used in both regressions to ensure a common control group across the regressions and because it is not possible to condition on treatment year for the never-treated. Panel B carries out the analysis in the same way as Panel A except that departments at institutions are grouped into science, technology, engineering and mathematics (STEM) fields versus non-STEM fields. The model specification is otherwise identical to panel A in Figure 2. The corresponding regression results are shown in Table S14 of the Supplemental Appendix. The 95% confidence intervals are shown as vertical bars.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Figure S10: Effect of Unionization on Salaries at Institution or Institution-Department Level by Time Period

(A) Institution

(B) Institution and Department

Notes: Restricted to institutions that unionized in the relevant time period as stated in the legend or never unionized. The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The model is estimated on data collapsed to institution-year cells in panel A and on data collapsed to institution-department-year cells in panel B. The dependent variable is the cell-level average of the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The model specification includes institution and year fixed effects in panel A and institution-department and year fixed effects in panel B. The corresponding regression results are shown in Table S15 of the Supplemental Appendix. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Figure S11: Employment Effects of Unionization by Time Period

(A) Number of New Hires

(B) Number of Promotions
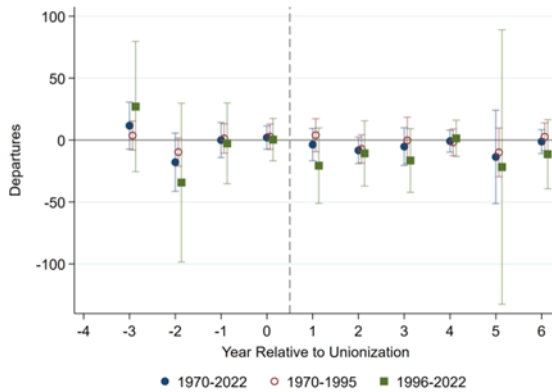
(C) Number of Early Departures

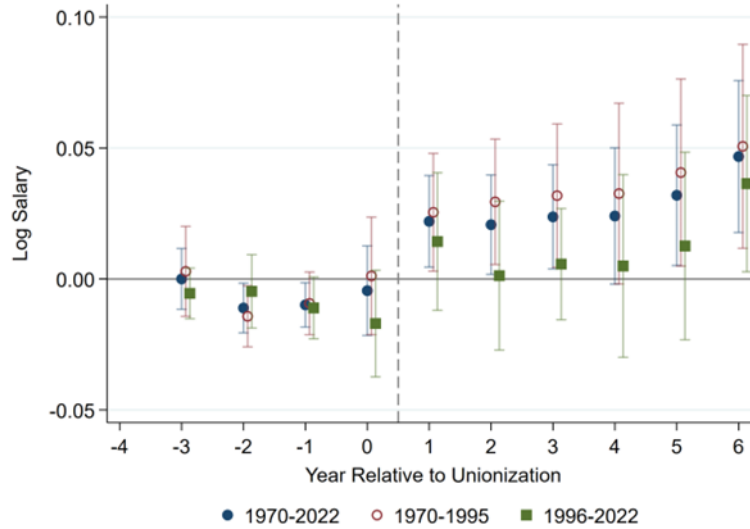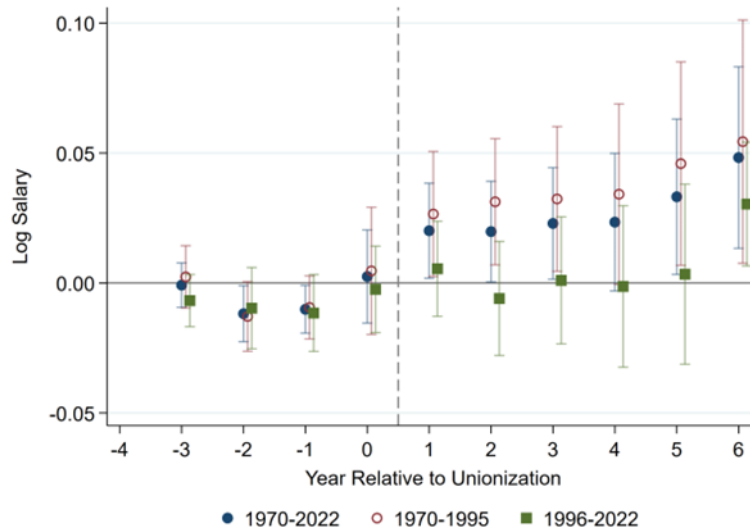**Notes:** Restricted to institutions that unionized in the relevant time period as stated in the legend or never unionized. The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The model is estimated on data collapsed to institution-year cells. The dependent variable in panel A is the number of new hires at the institution and year. The dependent variable in panel B is the number of promotions to a higher rank (i.e., assistant to associate, or associate to full) at the institution and year. The dependent variable in panel C is the number of early departures at the institution and year, defined as a worker who stops being observed at the institution before the age of 65. The model specification includes institution and year fixed effects in all panels. The corresponding regression results for the full sample analyses are shown in columns (2) to (4) of Table S6 and for the analyses by time period are shown in columns (3) to (8) of Table S7. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Figure S12: Effect of Unionization on Selected Demographics by Time Period
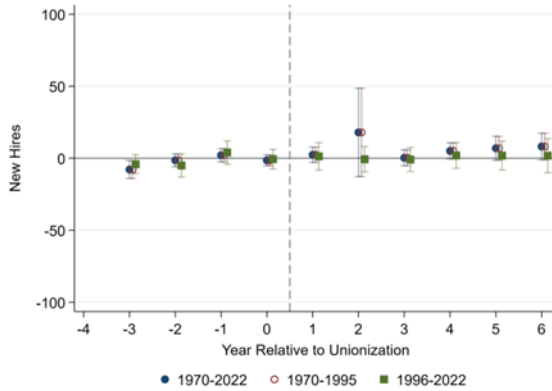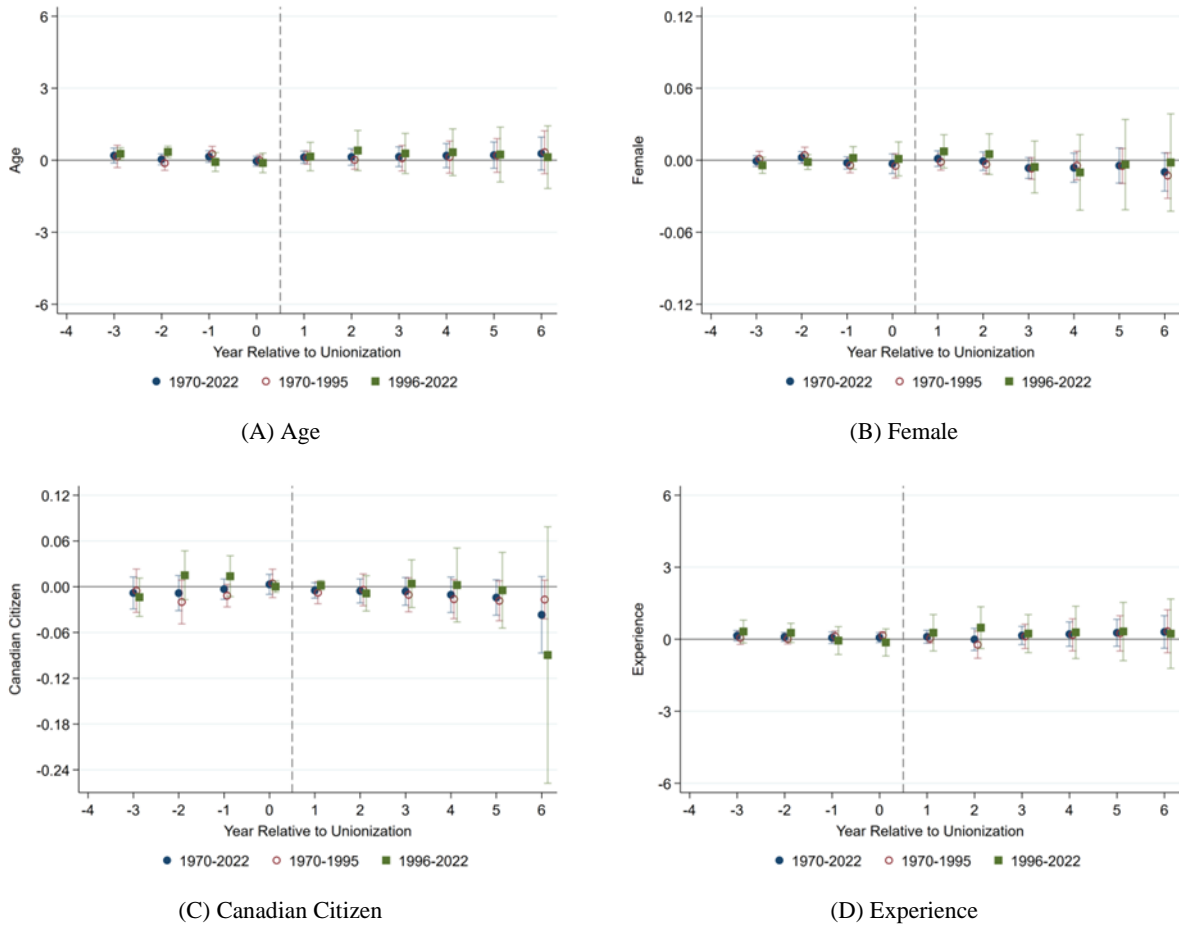

(A) Age

(B) Female

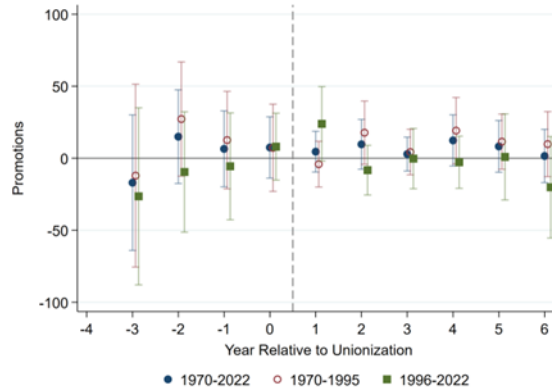(C) Canadian Citizen

(D) Experience

Notes: Restricted to institutions that unionized in the relevant time period as stated in the legend or never unionized. The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The model is estimated on data collapsed to institution-year cells. The dependent variable is the cell-level average of the stated variable. The dependent variable in panel A is the average age of workers at the institution and year. The dependent variable in panel B is the percent of workers who are female at the institution and year. The dependent variable in panel C is the percent of workers who are Canadian at the institution and year. The dependent variable in panel D is the average years of experience of workers at the institution and year. The model specification includes institution and year fixed effects. The corresponding regression results for the full-sample analyses are shown in Table S16 and for the analyses by time period are shown in Table S17. The 95% confidence intervals are shown as vertical bars, with standard errors clustered by institution.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S1: University Union Information

	Arts, Military, Private or Theological (1)	Year Unionized, if Known and Applicable (2)	Source of Unionization Data (3)	Salary Floors Known and Applicable (4)
Memorial University of Newfoundland		1988	Contract	✓
University of Prince Edward Island		2001	Contract	✓
Acadia University		1976	Contract	✓
Acadia Divinity College	✓		Other	
Atlantic School of Theology	✓		None	
Cape Breton University			Other	
Dalhousie University		1978	Contract	✓
University of King's College	✓		Other	
Mount Saint Vincent University		1988	Contract	✓
Nova Scotia Agricultural College			None	
Nova Scotia College of Art and Design University			None	
Université Sainte-Anne			Other	
St. Francis Xavier University		2005	Contract	✓
Saint Mary's University			None	
Dalhousie University			None	
Nova Scotia Teachers College			None	
Pine Hill Divinity Hall	✓		None	
Bethany Bible College	✓		None	
Mount Allison University		1982	Contract	✓
University of New Brunswick		1979	Contract	✓
Université de Moncton (parent)			None	
Université de Moncton - Campus de Moncton			None	
Université de Moncton - Campus de Shippagan			None	
Université de Moncton - Campus d'Edmundston			None	
St. Thomas University		1976	Contract	✓
College de Bathurst			None	
College Saint-Louis/Maillet			None	
Bishop's University		1992	Contract	✓
McGill University		2022, 2024	Other	
Université de Montréal		1975	Contract	✓
Polytechnique Montréal		1999	Contract	✓
École des hautes études commerciales			Other	
Université du Québec			None	
Université Laval		1975	Contract	✓
Université de Sherbrooke		1974	Contract	✓
Concordia University		1981	Contract	✓
Université du Québec à Chicoutimi		1970	Contract	✓
Université du Québec à Montréal		1971	Other	
Université du Québec en Abitibi-Témiscamingue		1972	Other	
Université du Québec à Trois-Rivières		1971	Contract	✓
Université du Québec en Outaouais		1980	Contract	✓
Université du Québec, École nationale d'administration publique		2012	Contract	✓
Université du Québec, Institut national de la recherche scientifique			None	
Université du Québec à Rimouski		1973	Contract	✓
Université du Québec, École de technologie supérieure		1984	Contract	✓
Université du Québec, Télé-université du Québec		1982	Other	
Institut Armand-Frappier			None	
Collège Militaire Royal de St-Jean	✓		None	
Loyola College			None	
Sir George Williams			None	
Montreal Diocesan Theological College	✓		None	
Presbyterian College of Montreal	✓		None	
United Theological College of Montreal	✓		None	
Brock University		1996	Contract	✓
Concordia Lutheran Theological Seminary	✓		Other	
Carleton University		1975	Other	
Collège Dominicain de Philosophie et Théologie	✓		Other	
University of Guelph		2006	Contract	✓
Lakehead University		1979	Other	
Laurentian University of Sudbury		1979	Other	
Algoma University College		1976	Other	
Université de Hearst			None	
Huntington University			None	
University of Sudbury		2002	Other	

Table S1 (Continued)

	Arts, Military, Private or Theological (1)	Year Unionized, if Known and Applicable (2)	Source of Unionization Data (3)	Salary Floors Known and Applicable (4)
Thorneloe University	✓	1990	Other	
McMaster University			Other	
McMaster Divinity College	✓		None	
Nipissing University		1994	Contract	✓
Tyndale University College	✓		None	
Tyndale Seminary	✓		None	
University of Ottawa		1977	Contract	✓
Université Saint-Paul	✓	2008	Contract	
Queen's University		1995	Contract	✓
Queen's Theological College	✓		None	
Redeemer University College	✓		None	
Royal Military College of Canada	✓		None	
Toronto Metropolitan University		1969	Contract	✓
University of Toronto			Other	✓
Saint Augustine's Seminary	✓		Other	
University of Saint Michael's College	✓	2011	Contract	✓
University of Trinity College	✓		Other	
Victoria University	✓		Other	
Knox College	✓		Other	
Wycliffe College	✓		Other	
Regis College	✓		Other	
Ontario Institute for Studies in Education			Other	
Trent University		1980	Contract	✓
University of Waterloo			Other	
St. Jerome's University	✓	2009	Contract	✓
Renison College	✓	2020	Contract	
Conrad Grebel University College	✓		Other	
Saint-Paul College			None	
University of Western Ontario		1998	Contract	✓
Brescia University College	✓	2011	Contract	✓
Huron University College	✓	2019	Contract	✓
King's College	✓	2020	Contract	
Wilfrid Laurier University		1988	Other	
University of Windsor		1977	Contract	✓
York University		1977	Contract	✓
Ontario College of Art and Design	✓		Other	
University of Ontario Institute of Technology			Other	
Algoma University College			None	
Université de Hearst			None	
Ontario Teacher Education College			None	
Althouse College Of Education			None	
Brandon University		1978	Contract	✓
Canadian Mennonite University	✓		Other	
Concord College			None	
Canadian Mennonite Bible College	✓		None	
University of Manitoba		1974	Contract	✓
Université de Saint-Boniface		1983	Contract	✓
Saint Andrew's College - University of Manitoba	✓		None	
University of Winnipeg		1981	Contract	✓
Canadian Nazarene College	✓		None	
Canadian Bible College	✓		None	
Canadian Theological Seminary	✓		None	
University of Regina		1977	Contract	✓
Campion College	✓		None	
Luther College	✓		None	
University of Saskatchewan		1977	Contract	✓
College of Emmanuel and Saint Chad	✓		None	
Lutheran Theological Seminary	✓		None	
St. Andrew's College - University of Saskatchewan	✓		None	
St. Thomas More College	✓	1977	Other	
Horizon College and Seminary	✓		None	
St Charles Scholasticate	✓		None	
Notre Dame College of Canada	✓		None	

Table S1 (Continued)

	Arts, Military, Private or Theological (1)	Year Unionized, if Known and Applicable (2)	Source of Unionization Data (3)	Salary Floors Known and Applicable (4)
University of Alberta		2017	Contract	✓
Augustana University College	✓		None	
Athabasca University			None	
University of Calgary		1979	Contract	✓
Canadian Nazarene University College	✓		None	
Burman University	✓		None	
Concordia University of Edmonton		2012	Contract	✓
University of Lethbridge		2017	Contract	✓
Newman Theological College	✓		None	
The King's University	✓		None	
Alliance University College	✓		None	
Ambrose University College			None	
Grant MacEwan University			None	
Mount Royal University		2017	Contract	✓
University of British Columbia			Other	
Vancouver School of Theology	✓		None	
University of Northern British Columbia		2014	Contract	✓
Northwest Baptist Theological College	✓		None	
Royal Roads University			None	
Seminary of Christ the King	✓		None	
Simon Fraser University		2014	Contract	✓
Trinity Western University	✓		None	
University of Victoria		2014	Contract	✓
Royal Roads Military College	✓		None	
Thompson Rivers University		1974	Other	
Capilano University		1973	Other	
Vancouver Island University			None	
Emily Carr University of Art and Design			None	
Kwantlen Polytechnic University		1975	Contract	✓
University of the Fraser Valley			None	
Notre Dame University of Nelson	✓		None	
Yukon University			None	

Notes: Institutions that are deemed to be arts institutes, military, private or theological as shown in column (1) are excluded from this analysis on the basis that pay determination is less clear at these institutions. Column (2) reports the year of unionization at institutions at which this information is applicable (i.e., unionized at some point) and known. The source of union data is reported in column (3), where "Contract" indicates that the first contract was obtained; "Other" indicates that some information about timing of unionization was obtained but a first contract could not be accessed; and "None" indicates that union details at the institution could not be determined and remain unknown. Professors of Law unionized in 2022 and many other academic staff two years later, although this occurred after the end of the data sample period covered in this study.

Sources: Self-collected union data, prepared after extensive engagements with faculty unions and associations at universities across Canada.

Table S2: Effect of Unionization on Average Salaries with Various Controls

	(1)	(2)	(3)	(4)
Event-Time −3	-0.001	-0.002	-0.002	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)
Event-Time −2	-0.009	-0.009	-0.009	-0.010
	(0.006)	(0.006)	(0.006)	(0.006)
Event-Time −1	-0.003	-0.003	-0.004	-0.004
	(0.005)	(0.005)	(0.005)	(0.004)
Event-Time 0	-0.004	-0.005	-0.005	-0.005
	(0.011)	(0.011)	(0.011)	(0.011)
Event-Time 1	0.023**	0.023**	0.023**	0.023**
	(0.011)	(0.011)	(0.011)	(0.010)
Event-Time 2	0.028***	0.027***	0.027***	0.026***
	(0.010)	(0.010)	(0.010)	(0.010)
Event-Time 3	0.033***	0.032***	0.032***	0.031***
	(0.011)	(0.011)	(0.011)	(0.011)
Event-Time 4	0.035**	0.033**	0.033**	0.033**
	(0.014)	(0.013)	(0.014)	(0.013)
Event-Time 5	0.043***	0.041***	0.041***	0.040***
	(0.015)	(0.015)	(0.015)	(0.014)
Event-Time 6	0.061***	0.058***	0.058***	0.057***
	(0.014)	(0.014)	(0.014)	(0.014)
Individual Fixed Effect	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓
Rank Fixed Effect		✓	✓	✓
Responsibilities Fixed Effect		✓	✓	✓
Years of Experience			✓	✓
Other Pay-related Fixed Effect				✓
Observations	499,667	499,012	498,968	498,968

Notes: The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The categories for administrative responsibilities are: none; Chairs/Heads/Directors; Associate/Vice Deans; and Deans. Years of experience is controlled for using a cubic polynomial. Other pay-related fixed effects (Fixed Effect) consist of indicators for being on sabbatical and taking unpaid leave. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S3: Effect of Unionization on Average Salaries by Time Period

	Time Period	
	1970-1995	1996-2022
	(1)	(2)
Event-Time −3	0.005	-0.009*
	(0.006)	(0.005)
Event-Time −2	-0.011	-0.005
	(0.007)	(0.010)
Event-Time −1	0.001	-0.008
	(0.006)	(0.005)
Event-Time 0	-0.003	-0.007
	(0.017)	(0.006)
Event-Time 1	0.033**	0.007
	(0.016)	(0.009)
Event-Time 2	0.043***	0.001
	(0.014)	(0.011)
Event-Time 3	0.049***	0.008
	(0.014)	(0.014)
Event-Time 4	0.051***	0.008
	(0.017)	(0.021)
Event-Time 5	0.061***	0.013
	(0.018)	(0.022)
Event-Time 6	0.068***	0.043***
	(0.019)	(0.014)
Individual Fixed Effect	✓	✓
Year Fixed Effect	✓	✓
Observations	285,010	273,252

Notes: Restricted to institutions that unionized in the relevant time period as stated in the column headings or that never unionized**.** The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S4: Effect of Unionization on Salaries by Percentile

	10th	25th	50th	75th	90th
	(1)	(2)	(3)	(4)	(5)
Event-Time −3	0.016**	-0.001	-0.009*	-0.006	-0.002
	(0.007)	(0.006)	(0.005)	(0.004)	(0.004)
Event-Time −2	0.003	-0.007	-0.009	-0.016**	-0.013***
	(0.013)	(0.008)	(0.007)	(0.008)	(0.005)
Event-Time −1	0.010	-0.002	-0.006	-0.006	-0.007
	(0.012)	(0.007)	(0.005)	(0.004)	(0.006)
Event-Time 0	-0.003	-0.003	-0.002	0.003	-0.005
	(0.022)	(0.017)	(0.012)	(0.007)	(0.004)
Event-Time 1	0.065**	0.041**	0.018**	0.005	-0.010**
	(0.027)	(0.019)	(0.009)	(0.006)	(0.005)
Event-Time 2	0.081***	0.058***	0.024***	-0.000	-0.022**
	(0.030)	(0.019)	(0.009)	(0.008)	(0.009)
Event-Time 3	0.084***	0.067***	0.037**	0.010	-0.025*
	(0.028)	(0.018)	(0.015)	(0.012)	(0.015)
Event-Time 4	0.097***	0.071***	0.036*	0.007	-0.027
	(0.030)	(0.021)	(0.019)	(0.017)	(0.020)
Event-Time 5	0.104***	0.082***	0.046**	0.014	-0.022
	(0.031)	(0.022)	(0.022)	(0.019)	(0.016)
Event-Time 6	0.124***	0.101***	0.070***	0.033	-0.019
	(0.037)	(0.025)	(0.026)	(0.023)	(0.019)
Individual Fixed Effect	✓	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓	✓
Observations	499,667	499,667	499,667	499,667	499,667

Notes: The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is derived from base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. Specifically, the dependent variable is the re-centered influence function (RIF) of earnings evaluated at each percentile shown in the event-study sample. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S5: Effect of Unionization on Average Salaries by Academic Rank

	Academic Rank		
	Assistant	Associate	Full
	(3)	(4)	(5)
Event-Time −3	-0.004	0.000	-0.003
	(0.004)	(0.005)	(0.005)
Event-Time −2	-0.009	-0.012*	-0.008
	(0.006)	(0.007)	(0.007)
Event-Time −1	-0.008	-0.004	-0.000
	(0.006)	(0.005)	(0.004)
Event-Time 0	-0.005	-0.008	-0.004
	(0.013)	(0.010)	(0.008)
Event-Time 1	0.021**	0.023*	0.021**
	(0.009)	(0.013)	(0.010)
Event-Time 2	0.025**	0.031**	0.020**
	(0.010)	(0.012)	(0.009)
Event-Time 3	0.028**	0.033***	0.025***
	(0.013)	(0.011)	(0.010)
Event-Time 4	0.026	0.035***	0.024*
	(0.016)	(0.013)	(0.014)
Event-Time 5	0.048**	0.041***	0.030**
	(0.019)	(0.014)	(0.015)
Event-Time 6	0.065***	0.056***	0.047***
	(0.022)	(0.016)	(0.014)
Individual Fixed Effect	✓	✓	✓
Year Fixed Effect	✓	✓	✓
Observations	105,882	176,635	188,850

Notes: The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The analysis is carried out separately by level of responsibilities in the reference year. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S6: Employment Effects of Unionization

	Number of Workers	Number of New Hires	Number of Promotions	Number of Early Departures
	(1)	(2)	(3)	(4)
Event-Time −3	-20.290	-7.853**	-16.984	11.644
	(13.405)	(3.170)	(24.016)	(9.683)
Event-Time −2	-5.889	-1.451	14.963	-17.873
	(5.339)	(2.256)	(16.592)	(11.993)
Event-Time −1	-7.199	2.060	6.510	-0.025
	(7.776)	(2.349)	(13.452)	(7.225)
Event-Time 0	-10.608*	-1.463	7.476	2.032
	(5.631)	(1.947)	(10.853)	(4.778)
Event-Time 1	-18.587	2.414	4.553	-3.657
	(17.457)	(2.701)	(7.218)	(6.650)
Event-Time 2	-2.587	17.937	9.681	-8.293
	(8.979)	(15.639)	(8.819)	(5.418)
Event-Time 3	-12.187	0.268	2.884	-5.260
	(10.460)	(2.840)	(6.010)	(7.767)
Event-Time 4	-5.335	5.063*	12.374	-0.846
	(11.885)	(2.847)	(9.069)	(4.528)
Event-Time 5	-10.177	6.922	8.221	-13.603
	(12.089)	(4.233)	(9.158)	(19.251)
Event-Time 6	-4.539	8.141*	1.554	-1.213
	(16.291)	(4.730)	(9.442)	(4.931)
Institution Fixed Effect	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓
Observations	909	909	909	909

Notes: The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The model is estimated on data collapsed to institution-year cells. The dependent variable in column (1) is the number of faculty by institution and year. The dependent variable in column (2) is the number of new hires by institution and year. The dependent variable in column (3) is the number of promotions to a higher rank (i.e., assistant to associate, or associate to full) by institution and year. The dependent variable in column (4) is the number of early departures at the institution and year, defined as a worker who stops being observed by institution before the age of 65. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data

Table S7: Employment Effects of Unionization by Time Period

	Number of Workers		Number of New Hires		Number of Promotions		Number of Early Departures	
	1970-1995	1996-2022	1970-1995	1996-2022	1970-1995	1996-2022	1970-1995	1996-2022
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event-Time −3	-22.781	-15.474*	-9.763**	-4.160	-12.088	-26.448	3.674	27.053
	(19.291)	(8.765)	(4.433)	(3.372)	(32.382)	(31.358)	(5.977)	(26.836)
Event-Time −2	-4.062	-9.544	0.352	-5.057	27.212	-9.534	-9.664*	-34.291
	(7.515)	(7.148)	(2.470)	(4.101)	(20.219)	(21.318)	(5.777)	(32.708)
Event-Time −1	-5.358	-10.882	1.127	3.926	12.581	-5.630	1.292	-2.661
	(9.548)	(19.384)	(2.606)	(4.142)	(17.267)	(18.932)	(6.063)	(16.635)
Event-Time 0	-9.504	-13.071*	-1.840	-0.623	7.225	8.035	2.773	0.380
	(6.438)	(7.742)	(2.388)	(3.469)	(15.446)	(11.844)	(5.212)	(8.731)
Event-Time 1	-25.785	-2.529	2.916	1.294	-4.111	23.880*	3.950	-20.628
	(24.773)	(12.208)	(3.413)	(4.846)	(8.097)	(13.192)	(6.787)	(15.532)
Event-Time 2	-2.659	-2.426	26.287	-0.690	17.739	-8.297	-7.172	-10.792
	(10.339)	(27.485)	(22.420)	(4.511)	(11.199)	(8.794)	(5.825)	(13.437)
Event-Time 3	-2.780	-33.173	0.791	-0.898	4.298	-0.269	-0.239	-16.461
	(11.843)	(20.853)	(4.115)	(4.266)	(8.070)	(10.668)	(9.550)	(13.102)
Event-Time 4	1.475	-20.526	6.468	1.927	19.176	-2.799	-1.853	1.399
	(14.234)	(35.051)	(3.963)	(4.555)	(11.729)	(9.234)	(5.475)	(7.458)
Event-Time 5	5.612	-45.398	9.205	1.828	11.504	0.896	-9.954	-21.745
	(17.137)	(34.991)	(6.536)	(5.124)	(9.770)	(15.237)	(10.034)	(56.527)
Event-Time 6	17.772	-63.359	10.558	1.770	9.792	-20.163	2.655	-11.412
	(20.509)	(40.029)	(6.697)	(6.038)	(11.519)	(17.980)	(5.730)	(14.221)
Institution Fixed Effect	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓	✓	✓	✓	✓
Observations	584	411	584	411	584	411	584	411

Notes: Restricted to institutions that unionized in the relevant time period as stated in the column headings or never unionized. The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The model is estimated on data collapsed to institution-year cells. The dependent variable in columns (1) and (2) is the number of faculty by institution and year. The dependent variable in columns (3) and (4) is the number of new hires by institution and year. The dependent variable in columns (5) and (6) is the number of promotions to a higher rank (i.e., assistant to associate, or associate to full) at the institution and year. The dependent variable in columns (7) and (8) is the number of early departures by institution and year, defined as a worker who stops being observed at the institution before the age of 65. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S8: Effects of Unionization on Enrollment, Tuition and Government Transfers by Time Period

	Enrollment			Tuition			Government Transfers		
	1972-2022	1972-1995	1996-2022	1972-2022	1972-1995	1996-2022	1979-2022	1979-1995	1996-2022
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Event-Time −3	0.002	0.011	-0.010	0.007	0.012	-0.002	0.007	0.054**	-0.012
	(0.020)	(0.036)	(0.014)	(0.011)	(0.016)	(0.011)	(0.024)	(0.025)	(0.032)
Event-Time −2	-0.009	-0.005	-0.015	0.013	0.010	0.021	-0.028	-0.017	-0.033
	(0.015)	(0.023)	(0.016)	(0.018)	(0.022)	(0.020)	(0.021)	(0.030)	(0.027)
Event-Time −1	-0.005	-0.004	-0.005	0.007	0.007	0.005	0.043	0.047**	0.041
	(0.019)	(0.031)	(0.022)	(0.016)	(0.020)	(0.012)	(0.038)	(0.021)	(0.060)
Event-Time 0	-0.031*	-0.033	-0.027	0.010	0.007	0.025	-0.009	0.036*	-0.044*
	(0.017)	(0.026)	(0.019)	(0.016)	(0.018)	(0.022)	(0.019)	(0.021)	(0.025)
Event-Time 1	0.015	0.030	-0.009	-0.009	-0.015	0.015	-0.026	-0.034	-0.017
	(0.014)	(0.022)	(0.013)	(0.016)	(0.018)	(0.023)	(0.036)	(0.065)	(0.024)
Event-Time 2	0.009	0.034	-0.027	-0.013	-0.020	0.027	-0.044	-0.035	-0.053
	(0.020)	(0.029)	(0.021)	(0.022)	(0.024)	(0.040)	(0.050)	(0.080)	(0.057)
Event-Time 3	0.025	0.068**	-0.043*	-0.017	-0.031	0.044	-0.042	-0.024	-0.062
	(0.023)	(0.031)	(0.024)	(0.031)	(0.033)	(0.041)	(0.048)	(0.082)	(0.051)
Event-Time 4	0.045	0.101**	-0.045	-0.031	-0.050	0.051	-0.026	0.002	-0.056
	(0.037)	(0.050)	(0.035)	(0.044)	(0.050)	(0.044)	(0.053)	(0.072)	(0.079)
Event-Time 5	0.078*	0.143***	-0.065	-0.017	-0.033	0.052	-0.055	-0.015	-0.098
	(0.040)	(0.047)	(0.045)	(0.054)	(0.063)	(0.044)	(0.056)	(0.077)	(0.086)
Event-Time 6	0.073*	0.144***	-0.098**	-0.008	-0.017	0.041	0.035	0.039	0.028
	(0.042)	(0.051)	(0.047)	(0.064)	(0.071)	(0.059)	(0.034)	(0.059)	(0.041)
Institution Fixed Effect	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	710	423	357	584	454	200	645	323	407

Notes: Restricted to institutions that unionized in the relevant time period as stated in the column headings or that never unionized. The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable in columns (1) to (3) is the log of total enrollment at the institution and year. This includes full-time and part-time students who are in both undergraduate and graduate programs. It excludes students who are enrolled in courses but not seeking an academic degree, diploma or certificate. The dependent variable in columns (4) to (6) is the log of tuition at the institution and year. The measure of tuition is the price paid for a Bachelor's degree in the Arts or Humanities by resident (i.e., domestic or non-international) students. The dependent variable in columns (7) to (9) is the log of transfers from the provincial government to the university in the year. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Sources: Statistics Canada, University Student Information System, 1972 to 1994, and Postsecondary Information System, 1995 to 2022 (columns (1) to (3)); Statistics Canada, Tuition and Living Accommodation Costs, 1972 to 2022 (columns (4) to (6)); Statistics Canada and Canadian Association of University Business Officers, Financial Information of Universities and Colleges, 1979 to 2022 (columns (7) to (9)) ; and self-collected union data.

Table S9: Effect of Unionization on Average Salaries using OLS, Long Differences or Stabilized Weights

	Ordinary Least Squares (1)	Long Differences (2)	Cohort Weights (3)
Event-Time −4	0.023**	0.017	
	(0.011)	(0.014)	
Event-Time −3	0.019*	0.017	-0.001
	(0.010)	(0.013)	(0.004)
Event-Time −2	0.007	0.006	-0.009
	(0.010)	(0.012)	(0.006)
Event-Time −1	0.002	0.004	-0.003
	(0.010)	(0.011)	(0.005)
Event-Time 0			0.023**
			(0.011)
Event-Time 1	0.021**	0.023**	0.028***
	(0.010)	(0.011)	(0.010)
Event-Time 2	0.027**	0.028***	0.033***
	(0.011)	(0.010)	(0.011)
Event-Time 3	0.036***	0.033***	0.035**
	(0.011)	(0.011)	(0.014)
Event-Time 4	0.039***	0.035**	0.043***
	(0.013)	(0.014)	(0.015)
Event-Time 5	0.052***	0.043***	0.061***
	(0.014)	(0.015)	(0.014)
Event-Time 6	0.067***	0.061***	-0.004
	(0.014)	(0.014)	(0.011)
Individual Fixed Effect	✓	✓	✓
Year Fixed Effect	✓	✓	✓
Observations	531,737	484,566	499,667

Notes: The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The model specifications include individual and year fixed effects. The estimators used are ordinary least squares (OLS) with two-way fixed effects as well as the version of the Callaway and Sant'Anna estimator that uses either the universal reference period where pre-treatment effects are estimated using "long-differences" (i.e., the "long2" option in the "csdid.ado" Stata command) or the estimator with stabilized weights (i.e., the "stdipw" option in the "csdid.ado" Stata command), but all other options as the default options, as stated in the column headings. The universal reference period is set to event-time 0, as shown. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S10: Effect of Unionization on Average Salaries with Never-treated and Not-yet-treated in Control Group

	(1)
Event-Time −3	-0.001
	(0.004)
Event-Time −2	-0.009
	(0.006)
Event-Time −1	-0.002
	(0.005)
Event-Time 0	-0.002
	(0.011)
Event-Time 1	0.022**
	(0.011)
Event-Time 2	0.029***
	(0.011)
Event-Time 3	0.035***
	(0.012)
Event-Time 4	0.036**
	(0.015)
Event-Time 5	0.043***
	(0.015)
Event-Time 6	0.061***
	(0.014)
Individual Fixed Effect	✓
Year Fixed Effect	✓
Observations	499,746

Notes: The Callaway and Sant'Anna estimator is used with all default options (i.e., "short gaps" for periods before treatment) except that the control group now comprises both never-treated and not-yet-treated.. See the "csdid.ado" Stata command help file for further information. The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S11: Effect of Unionization on Average Salaries with Various Controls using Wide Time Interval

	(1)	(2)	(3)	(4)
Event-Time −8	0.013	0.011	0.011	0.008
	(0.009)	(0.009)	(0.009)	(0.009)
Event-Time −7	0.006	0.006	0.006	0.005
	(0.008)	(0.008)	(0.008)	(0.008)
Event-Time −6	-0.003	-0.001	-0.001	-0.002
	(0.006)	(0.006)	(0.006)	(0.005)
Event-Time −5	0.004	0.003	0.003	0.001
	(0.005)	(0.005)	(0.005)	(0.004)
Event-Time −4	-0.001	-0.003	-0.002	-0.005
	(0.006)	(0.006)	(0.006)	(0.005)
Event-Time −3	-0.001	-0.002	-0.002	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)
Event-Time −2	-0.009	-0.009	-0.009	-0.010
	(0.006)	(0.006)	(0.006)	(0.006)
Event-Time −1	-0.003	-0.003	-0.004	-0.004
	(0.005)	(0.005)	(0.005)	(0.004)
Event-Time 0	-0.004	-0.005	-0.005	-0.005
	(0.011)	(0.011)	(0.011)	(0.011)
Event-Time 1	0.023**	0.023**	0.023**	0.023**
	(0.011)	(0.011)	(0.011)	(0.010)
Event-Time 2	0.028***	0.027***	0.027***	0.026***
	(0.010)	(0.010)	(0.010)	(0.010)
Event-Time 3	0.033***	0.032***	0.032***	0.031***
	(0.011)	(0.011)	(0.011)	(0.011)
Event-Time 4	0.035**	0.033**	0.033**	0.033**
	(0.014)	(0.013)	(0.014)	(0.013)
Event-Time 5	0.043***	0.041***	0.041***	0.040***
	(0.015)	(0.015)	(0.015)	(0.014)
Event-Time 6	0.061***	0.058***	0.058***	0.057***
	(0.014)	(0.014)	(0.014)	(0.014)
Event-Time 7	0.067***	0.063***	0.063***	0.062***
	(0.016)	(0.016)	(0.016)	(0.015)
Event-Time 8	0.061***	0.056***	0.055***	0.053***
	(0.020)	(0.021)	(0.020)	(0.019)
Event-Time 9	0.078***	0.071**	0.069**	0.067**
	(0.028)	(0.029)	(0.028)	(0.026)
Event-Time 10	0.073**	0.065**	0.063**	0.061**
	(0.029)	(0.030)	(0.029)	(0.027)
Event-Time 11	0.069**	0.061*	0.059*	0.057*
	(0.031)	(0.032)	(0.031)	(0.029)
Individual Fixed Effect	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓
Rank Fixed Effect		✓	✓	✓
Responsibilities Fixed Effect		✓	✓	✓
Years of Experience			✓	✓
Other Pay-related Fixed Effect				✓
Observations	595,249	592,035	591,972	591,972

Notes: The event-time window is extended to range from 9 years before treatment to 11 years after treatment (i.e., including an additional five years on either side of the treatment). The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The categories for administrative responsibilities are: none; Chairs/Heads/Directors; Associate/Vice Deans; and Deans. Years of experience is controlled for using a cubic polynomial. Other pay-related fixed effects (Fixed Effect) consist of indicators for being on sabbatical and taking unpaid leave. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S12: Effect of Unionization on Average Salaries by Measure of Pay

	Base Pay (1)	Actual Pay (2)
Event-Time −3	-0.003	-0.004
	(0.003)	(0.005)
Event-Time −2	-0.009	-0.017
	(0.006)	(0.029)
Event-Time −1	-0.002	-0.007
	(0.005)	(0.031)
Event-Time 0	-0.004	-0.015
	(0.010)	(0.019)
Event-Time 1	0.024**	0.049
	(0.011)	(0.031)
Event-Time 2	0.028***	0.073***
	(0.010)	(0.028)
Event-Time 3	0.034***	0.081***
	(0.011)	(0.026)
Event-Time 4	0.035**	0.100***
	(0.014)	(0.030)
Event-Time 5	0.044***	0.112***
	(0.015)	(0.031)
Event-Time 6	0.061***	0.116***
	(0.014)	(0.033)
Individual Fixed Effect	✓	✓
Year Fixed Effect	✓	✓
Observations	495,057	495,057

Notes: Restricted to observations with non-missing and non-zero base and actual pay in the year. Actual pay is not available before 1985. The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable in column (1) is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The dependent variable in column (2) is actual pay, which may be less than base pay due to unpaid leave or higher than base pay due to stipends. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1985 to 2022; and self-collected union data.

Table S13: Effect of Unionization on Low-Income Status with Various Controls

	(1)	(2)	(3)	(4)
Event-Time −3	0.001	0.006	0.006	0.008*
	(0.005)	(0.005)	(0.005)	(0.004)
Event-Time −2	0.003	0.006	0.006	0.008
	(0.009)	(0.009)	(0.009)	(0.009)
Event-Time −1	-0.006	-0.003	-0.003	-0.003
	(0.010)	(0.010)	(0.010)	(0.010)
Event-Time 0	0.009	0.011	0.011	0.012
	(0.016)	(0.016)	(0.016)	(0.016)
Event-Time 1	-0.049**	-0.047**	-0.047**	-0.047**
	(0.021)	(0.021)	(0.021)	(0.021)
Event-Time 2	-0.068***	-0.064***	-0.064***	-0.064***
	(0.022)	(0.022)	(0.022)	(0.022)
Event-Time 3	-0.073***	-0.067***	-0.067***	-0.066***
	(0.021)	(0.021)	(0.021)	(0.020)
Event-Time 4	-0.083***	-0.077***	-0.078***	-0.077***
	(0.022)	(0.022)	(0.022)	(0.022)
Event-Time 5	-0.097***	-0.089***	-0.090***	-0.089***
	(0.025)	(0.025)	(0.025)	(0.024)
Event-Time 6	-0.111***	-0.101***	-0.103***	-0.101***
	(0.028)	(0.029)	(0.029)	(0.028)
Individual Fixed Effect	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓
Rank Fixed Effect		✓	✓	✓
Responsibilities Fixed Effect		✓	✓	✓
Years of Experience			✓	✓
Other Pay-related Fixed Effect				✓
Observations	499,667	499,012	498,968	498,968

Notes: The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is derived from base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. Specifically, the dependent variable is an indicator equal to "1" if the income for the year is below the 25th percentile and "0" otherwise, where this percentile is based on total (inflation-adjusted) earnings for the treatment group in the pre-treatment period. The categories for administrative responsibilities are: none; Chairs/Heads/Directors; Associate/Vice Deans; and Deans. Years of experience is controlled for using a cubic polynomial. Other pay-related fixed effects (Fixed Effect) consist of indicators for being on sabbatical and taking unpaid leave. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S14: Effect of Unionization on Average Salaries by Department Characteristics

	Pay Level		Subject	
	Low-paying	High-paying	STEM	Non-STEM
	(1)	(2)	(3)	(4)
Event-Time −3	0.000	-0.002	-0.002	-0.003
	(0.004)	(0.005)	(0.004)	(0.005)
Event-Time −2	-0.009	-0.008	-0.008	-0.010
	(0.008)	(0.007)	(0.006)	(0.007)
Event-Time −1	0.002	-0.005	-0.002	-0.004
	(0.006)	(0.005)	(0.005)	(0.005)
Event-Time 0	-0.006	-0.004	-0.003	-0.006
	(0.015)	(0.009)	(0.011)	(0.011)
Event-Time 1	0.039**	0.014*	0.025**	0.021*
	(0.019)	(0.008)	(0.010)	(0.011)
Event-Time 2	0.048***	0.016*	0.027***	0.027**
	(0.015)	(0.009)	(0.010)	(0.011)
Event-Time 3	0.053***	0.021*	0.036***	0.029***
	(0.013)	(0.011)	(0.013)	(0.011)
Event-Time 4	0.054***	0.022	0.036**	0.030**
	(0.015)	(0.015)	(0.016)	(0.013)
Event-Time 5	0.067***	0.028*	0.045***	0.038**
	(0.016)	(0.016)	(0.017)	(0.016)
Event-Time 6	0.075***	0.049***	0.066***	0.053***
	(0.018)	(0.013)	(0.014)	(0.018)
Individual Fixed Effect	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓
Observations	388,257	438,933	272,061	226,353

Notes: The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The dependent variable is the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. Columns (1) and (2) carry out the analysis separately for departments at institutions that are low-paying versus high-paying. Departments are assigned to one category or the other based on whether their pay was below or above the median for all departments at event-time −4, respectively. This assignment is time invariant and based on the level of pay in the earliest pre-treatment year included in the analysis (i.e., the reference or normalization year). The same control group is used in both regressions to ensure a common control group across the regressions and because it is not possible to condition on treatment year for the never-treated. Columns (3) and (4) carry out the analysis in the same way as columns (1) and (2) except that departments at institutions are grouped into science, technology, engineering and mathematics (STEM) fields versus non-STEM fields. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S15: Effect of Unionization on Salaries at Institution or Institution-Department Level by Time Period

	Institution			Institution and Department		
	1970-2022	1970-1995	1996-2022	1970-2022	1970-1995	1996-2022
	(1)	(2)	(3)	(4)	(5)	(6)
Event-Time −3	0.000	0.003	-0.006	-0.001	0.002	-0.007
	(0.006)	(0.009)	(0.005)	(0.004)	(0.006)	(0.005)
Event-Time −2	-0.011**	-0.014**	-0.005	-0.012**	-0.013*	-0.010
	(0.005)	(0.006)	(0.007)	(0.005)	(0.007)	(0.008)
Event-Time −1	-0.010**	-0.009	-0.011*	-0.010**	-0.009	-0.012
	(0.004)	(0.006)	(0.006)	(0.005)	(0.006)	(0.008)
Event-Time 0	-0.004	0.001	-0.017	0.002	0.005	-0.002
	(0.009)	(0.011)	(0.010)	(0.009)	(0.012)	(0.008)
Event-Time 1	0.022**	0.025**	0.014	0.020**	0.027**	0.005
	(0.009)	(0.011)	(0.013)	(0.009)	(0.012)	(0.009)
Event-Time 2	0.021**	0.029**	0.001	0.020**	0.031**	-0.006
	(0.010)	(0.012)	(0.014)	(0.010)	(0.012)	(0.011)
Event-Time 3	0.024**	0.032**	0.006	0.023**	0.032**	0.001
	(0.010)	(0.014)	(0.011)	(0.011)	(0.014)	(0.012)
Event-Time 4	0.024*	0.033*	0.005	0.023*	0.034*	-0.001
	(0.013)	(0.018)	(0.018)	(0.013)	(0.018)	(0.016)
Event-Time 5	0.032**	0.041**	0.013	0.033**	0.046**	0.003
	(0.014)	(0.018)	(0.018)	(0.015)	(0.020)	(0.018)
Event-Time 6	0.047***	0.051**	0.036**	0.048***	0.054**	0.030**
	(0.015)	(0.020)	(0.017)	(0.018)	(0.024)	(0.012)
Institution Fixed Effect	✓	✓	✓			
Institution-Department Fixed Effect				✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓	✓	✓
Observations	909	584	411	15,983	10,042	7,523

Notes: Restricted to institutions that unionized in the relevant time period as stated in the column headings or that never unionized. The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The model is estimated on data collapsed to institution-year cells in columns (1) to (3) and on data collapsed to institution-department-year cells in columns (4) to (6). The dependent variable is the cell-level average of the log of base annual salary, which excludes additional pay such as stipends and reduced pay due to leave, reflecting a consistent measure of earnings over time. The model specification includes institution and year fixed effects in panel A and institution-department and year fixed effects in panel B. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S16: Effect of Unionization on Selected Demographics

	Age	Female	Canadian Citizen	Experience
	(1)	(2)	(3)	(4)
Event-Time −3	0.195	-0.001	-0.008	0.146
	(0.158)	(0.002)	(0.011)	(0.110)
Event-Time −2	0.035	0.002	-0.008	0.098
	(0.115)	(0.002)	(0.012)	(0.095)
Event-Time −1	0.155	-0.002	-0.003	0.062
	(0.121)	(0.003)	(0.007)	(0.122)
Event-Time 0	-0.038	-0.003	0.003	0.068
	(0.103)	(0.004)	(0.007)	(0.105)
Event-Time 1	0.125	0.001	-0.005	0.105
	(0.129)	(0.003)	(0.005)	(0.136)
Event-Time 2	0.135	-0.001	-0.005	-0.009
	(0.176)	(0.004)	(0.008)	(0.235)
Event-Time 3	0.145	-0.006	-0.006	0.154
	(0.210)	(0.004)	(0.009)	(0.194)
Event-Time 4	0.193	-0.006	-0.011	0.213
	(0.256)	(0.006)	(0.012)	(0.259)
Event-Time 5	0.211	-0.004	-0.014	0.268
	(0.280)	(0.007)	(0.012)	(0.286)
Event-Time 6	0.276	-0.010	-0.037	0.303
	(0.351)	(0.008)	(0.026)	(0.346)
Institution Fixed Effect	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓
Observations	909	909	909	909

Notes: The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The model is estimated on data collapsed to institution-year cells. The dependent variable in column (1) is the average age of workers at the institution and year. The dependent variable in column (2) is the percent of workers who are female at the institution and year. The dependent variable in column (3) is the percent of workers who are Canadian at the institution and year. The dependent variable in column (4) is the average years of experience of workers at the institution and year. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.

Table S17: Effect of Unionization on Selected Demographics by Time Period

	Age		Female		Canadian Citizen		Experience	
	1970-1995	1996-2022	1970-1995	1996-2022	1970-1995	1996-2022	1970-1995	1996-2022
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Event-Time −3	0.158	0.267**	0.001	-0.004	-0.005	-0.014	0.055	0.321
	(0.237)	(0.130)	(0.003)	(0.003)	(0.014)	(0.013)	(0.138)	(0.242)
Event-Time −2	-0.122	0.348***	0.004	-0.002	-0.020	0.015	0.014	0.265
	(0.152)	(0.122)	(0.003)	(0.003)	(0.015)	(0.016)	(0.107)	(0.204)
Event-Time −1	0.269*	-0.073	-0.004	0.002	-0.012	0.014	0.121	-0.056
	(0.157)	(0.199)	(0.003)	(0.005)	(0.008)	(0.014)	(0.113)	(0.296)
Event-Time 0	-0.006	-0.111	-0.005	0.001	0.004	0.000	0.158**	-0.134
	(0.116)	(0.207)	(0.005)	(0.007)	(0.009)	(0.004)	(0.080)	(0.288)
Event-Time 1	0.111	0.154	-0.001	0.007	-0.008	0.002	0.032	0.267
	(0.138)	(0.302)	(0.004)	(0.007)	(0.007)	(0.003)	(0.098)	(0.387)
Event-Time 2	0.015	0.405	-0.003	0.005	-0.004	-0.009	-0.228	0.481
	(0.197)	(0.427)	(0.004)	(0.009)	(0.011)	(0.012)	(0.288)	(0.444)
Event-Time 3	0.084	0.282	-0.007	-0.006	-0.011	0.004	0.119	0.233
	(0.271)	(0.426)	(0.005)	(0.011)	(0.011)	(0.016)	(0.259)	(0.403)
Event-Time 4	0.131	0.332	-0.004	-0.010	-0.016	0.002	0.180	0.284
	(0.341)	(0.496)	(0.006)	(0.016)	(0.013)	(0.025)	(0.341)	(0.556)
Event-Time 5	0.199	0.236	-0.005	-0.004	-0.018	-0.005	0.244	0.321
	(0.358)	(0.583)	(0.007)	(0.019)	(0.013)	(0.025)	(0.375)	(0.619)
Event-Time 6	0.333	0.127	-0.013	-0.002	-0.017	-0.090	0.331	0.231
	(0.455)	(0.665)	(0.010)	(0.021)	(0.013)	(0.086)	(0.456)	(0.737)
Institution Fixed Effect	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓	✓	✓	✓	✓
Observations	584	411	584	411	584	411	584	411

Notes: Restricted to institutions that unionized in the relevant time period as stated in the column headings or never unionized. The Callaway and Sant'Anna estimator is used is used. The default options (i.e., control group is never-treated only; and "short gaps" for periods before treatment) are selected. See the "csdid.ado" Stata command help file for further information. The model is estimated on data collapsed to institution-year cells. The dependent variable in columns (1) and (2) is the average age of workers at the institution and year. The dependent variable in columns (3) and (4) is the percent of workers who are female at the institution and year. The dependent variable in columns (5) and (6) is the percent of workers who are Canadian at the institution and year. The dependent variable in columns (7) and (8) is the average years of experience of workers at the institution and year. Standard errors are clustered by institution. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Source: Statistics Canada, University and College Academic Staff System, 1970 to 2022; and self-collected union data.