2018 Taulbee Survey
Undergrad Enrollment Continues Upward; Doctoral Degree Production Declines but Doctoral Enrollment Rises

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This article and the accompanying figures and tables present the results from the 48th annual CRA Taulbee Survey[1]. The survey, conducted annually by the Computing Research Association, documents trends in student enrollment, degree production, employment of graduates, and faculty salaries in academic units in the United States and Canada that grant the Ph.D. in computer science (CS), computer engineering (CE), or information (I)[2]. Most of these academic units are departments, but some are colleges or schools of information or computing. In this report, we will use the term "department" to refer to the unit offering the program.

CRA gathers survey data during the fall. Responses received by February 14, 2019 are included in the analysis. The period covered by the data varies from table to table. Degree production and enrollment (Ph.D., Master's, and Bachelor's) refer to the previous academic year (2017-18). Data for new students in all categories refer to the current academic year (2018-19). Projected student production and information on faculty salaries are also for the current academic year; salaries are those effective January 1, 2019.

We surveyed a total of 283 Ph.D.-granting departments and received responses from 174, for an overall response rate of 61 percent. This is lower than last year's 181 respondents and 64 percent response rate. One contributing factor to the lower response rate may be the additional questions about department profiles that are only asked every three years, along with some new questions to learn more about enrollment responses and the use of teaching faculty. The response rates from CE and Canadian departments in particular continue to be low. The U.S. CS response rate of 73 percent is, as usual, the highest of all of the categories, although it also dropped from last year's 77 percent. Figure 1 shows the history of the survey's response rates. Response rates are inexact because some departments provide only partial data, and some institutions provide a single joint response for multiple departments. Thus, in some tables the number of departments shown as reporting will not equal the overall total number of respondents shown in Figure 1 for that category of department.

To account for the changes in response rate, we will comment not only on aggregate totals but also on averages per department reporting or data from those departments that responded to both 2017 and 2018 surveys. This is a more meaningful indication of the one-year changes affecting the data.

Departments that responded to the survey were sent preliminary results about faculty salaries in December 2018; these results included additional distributional information not contained in this report. The CRA Board views this as a benefit of participating in the survey.

Degree, enrollment, and faculty salary data for the U.S CS departments are stratified according to: a) whether the institution is public or private; and b) the tenure-track faculty size of the reporting department. The faculty size strata deliberately overlap, so that data from most departments affect multiple strata. This may be especially useful to departments near the boundary of one stratum. Salary data is also stratified according to the population of the locale in which the institution is located.[3] These stratifications allow our readers to see multiple views of important data, and hopefully gain new insights from them. In addition to tabular presentations of data, we will use "box and whisker" diagrams to show medians, quartiles, and the range between the 10th and 90th percentile data points.

This year's survey includes for the first time data about the existence of online and hybrid master's programs, and about the size of startup packages for new assistant professors. We also obtained more fine-grained information about teaching faculty and about the previous position held by new faculty hires. This year's survey also included questions asked only every three years, about such matters as teaching loads, space, support staff, recruitment incentives and reasons for salary differential among grad students, and sources of external research funding.

2018 Taulbee Survey *(continued)*

We took advantage of this extra section to also include a few questions about the manner that departments are responding to the undergraduate enrollment surge, to see if there are any noticeable changes from three years ago. We will comment on the results of one of these enrollment surge questions in this report; a supplementary report with more complete results will be published in the June issue of *Computing Research News*.

We thank all of the respondents to this year's questionnaire. The participating departments are listed at the end of this article. CRA member respondents will again be given the opportunity to obtain certain survey information for a self-selected peer group. Instructions for doing this will be emailed to all such departments.

Figure 1. Number of Respondents to the Taulbee Survey

Year	US CS Depts.	US CE Depts.	Canadian	US Information	Total
1995	110/133 (83%)	9/13 (69%)	11/16 (69%)		130/162 (80%)
1996	98/131 (75%)	8/13 (62%)	9/16 (56%)		115/160 (72%)
1997	111/133 (83%)	6/13 (46%)	13/17 (76%)		130/163 (80%)
1998	122/145 (84%)	7/19 (37%)	12/18 (67%)		141/182 (77%)
1999	132/156 (85%)	5/24 (21%)	19/23 (83%)		156/203 (77%)
2000	148/163 (91%)	6/28 (21%)	19/23 (83%)		173/214 (81%)
2001	142/164 (87%)	8/28 (29%)	23/23 (100%)		173/215 (80%)
2002	150/170 (88%)	10/28 (36%)	22/27 (82%)		182/225 (80%)
2003	148/170 (87%)	6/28 (21%)	19/27 (70%)		173/225 (77%)
2004	158/172 (92%)	10/30 (33%)	21/27 (78%)		189/229 (83%)
2005	156/174 (90%)	10/31 (32%)	22/27 (81%)		188/232 (81%)
2006	156/175 (89%)	12/33 (36%)	20/28 (71%)		188/235 (80%)
2007	155/176 (88%)	10/30 (33%)	21/28 (75%)		186/234 (79%)
2008	151/181 (83%)	12/32 (38%)	20/30 (67%)	9/19 (47%)	192/264 (73%)
2009	147/184 (80%)	13/31 (42%)	16/30 (53.3%)	12/20 (60%)	188/265 (71%)
2010	150/184 (82%)	12/30 (40%)	18/29 (62%)	15/22 (68%)	195/265 (74%)
2011	142/185 (77%)	13/31 (42%)	13/30 (43%)	16/21 (76%)	184/267 (69%)
2012	152/189 (80%)	11/32 (34%)	14/30 (47%)	16/26 (62%)	193/277 (70%)
2013	144/188 (77%)	10/30 (33%)	14/26 (54%)	11/22 (50%)	179/266 (67%)
2014	143/188 (76%)	13/31 (42%)	12/26 (46%)	13/19 (68%)	181/268 (68%)
2015	146/190 (77%)	8/32 (25%)	12/26 (46%)	12/18 (67%)	178/266 (67%)
2016	150/188 (80%)	8/33 (24%)	11/26 (42%)	14/21 (67%)	183/268 (68%)
2017	148/192 (77%)	8/35 (23%)	11/30 (37%)	14/24 (58%)	181/281 (64%)
2018	143/195 (73%)	5/34 (15%)	12/30 (40%)	14/24 (58%)	174/283 (61%)

Doctoral Degree Production, Enrollment, and Employment

(Tables 1, D1-D10; Figures D1-D6)

Degree Production

On a per department basis, doctoral degree production declined somewhat in 2017-18. This year's respondents produced 12.6 degrees per U.S. CS department, and 12.1 degrees per department overall. This compares with 13.1 and 12.4, respectively, reported last year. Although more departments reported their Ph.D. production this year, the 2017-18 production was 1,787 compared with 1,818 degrees produced in 2016-17 (Table D1).

Among all departments reporting both this year and last year, the number of total doctoral degrees declined by 1.8 percent. Among U.S. CS departments reporting both years, the decline was 2.8 percent (Table 1).

Table D1. PhD Production and Pipeline by Department Type

Department Type	# Depts	PhDs Awarded		PhDs Next Year		Passed Qualifier		Passed Thesis (if dept has)		
		#	Avg/ Dept	#	Avg/ Dept	#	Avg/ Dept	#	# Dept	Avg/ Dept
US CS Public	97	1,114	12.2	1,446	14.9	1,494	17.4	1091	82	11.8
US CS Private	33	407	13.6	601	18.2	536	16.8	222	22	8.8
US CS Total	130	1,521	12.6	2,047	15.7	2,030	17.2	1,313	104	11.1
US CE	4	31	7.8	32	8.0	101	25.3	68	4	28.9
US Info	13	115	9.6	118	9.1	114	8.8	88	11	8.0
Canadian	9	120	10.9	125	13.9	107	11.9	70	8	12.8
Grand Total	156	1,787	12.1	2,322	14.9	2,352	16.3	1,539	127	12.0

Table D2. PhDs Awarded by Gender

	CS		CE		I		Total	
Male	1,252	80.7%	76	88.4%	78	52.3%	1,406	78.7%
Female	300	19.3%	10	11.6%	71	47.7%	381	21.3%
Total Known Gender	1,552		86		149		1,787	
Gender Unknown	0		0		0		0	
Grand Total	1,552		86		149		1,787	

Table D3. PhDs Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	904	64.4%	55	76.4%	56	40.0%	1015	62.8%
Amer Indian or Alaska Native	2	0.1%	0	0.0%	1	0.7%	3	0.2%
Asian	81	5.8%	2	2.8%	13	9.3%	96	5.9%
Black or African-American	19	1.4%	0	0.0%	9	6.4%	28	1.7%
Native Hawaiian/Pac Islander	0	0.0%	0	0.0%	0	0.0%	0	0.0%
White	365	26.0%	12	16.7%	59	42.1%	436	27.0%
Multiracial, not Hispanic	7	0.5%	1	1.4%	0	0.0%	8	0.5%
Hispanic, any race	25	1.8%	2	2.8%	2	1.4%	29	1.8%
Total Residency & Ethnicity Known	1,403		72		140		1,615	
Resident, ethnicity unknown	89		1		5		95	
Residency unknown	60		13		4		77	
Grand Total	1,552		86		149		1,787	

Table D4. Employment of New PhD Recipients By Specialty

	Artificial Intelligence/ Machine Learning	Computing Education	Databases / Information Retrieval	Graphics/Visualization	Hardware/Architecture	High-Performance Computing	Human-Computer Interaction	Informatics: Biomedical/ Other Science	Information Science	Information Systems	Networks	Operating Systems	Programming Languages/ Compilers	Robotics/Vision	Scientific/ Numerical Computing	Security/ Information Assurance	Social Computing/ Social Informatics	Software Engineering	Theory and Algorithms	Other	Unknown	Total		
North American PhD Granting Depts.																								
Tenure-track	22	4	5	3	6	4	17	3	6	1	8	5	4	4	1	14	6	7	7	4	2	133	9.9%	
Researcher	7	1	1	5	1	2	2	4	3	0	1	0	1	3	1	6	1	1	5	0	1	46	3.4%	
Postdoc	36	0	7	4	5	0	3	10	6	0	6	4	5	12	2	9	5	5	24	12	5	160	11.9%	
Teaching Faculty	5	7	6	2	1	2	3	1	3	1	2	0	5	2	1	3	1	5	3	2	1	56	4.2%	
North American, Other Academic																								
Other CS/CE/I Dept.	2	0	2	0	0	2	3	2	0	0	1	0	0	1	0	0	1	2	1	0	0	17	1.3%	
Non-CS/CE/I Dept	1	0	0	0	0	2	0	0	1	0	0	0	0	0	0	2	0	0	0	0	1	7	0.5%	
North American, Non-Academic																								
Industry	162	2	54	55	19	26	22	17	15	10	59	35	17	37	7	54	9	75	30	37	24	766	57.0%	
Government	3	0	0	0	1	3	1	2	4	2	2	0	0	2	2	3	0	0	0	2	2	29	2.2%	
Self-Employed	2	0	1	2	0	0	0	1	0	0	2	0	1	1	0	1	0	0	0	0	0	11	0.8%	
Unemployed	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	5	0.4%	
Other	1	0	1	0	0	0	0	0	1	2	0	0	1	1	1	0	0	1	2	2	1	14	1.0%	
Total Inside North America																								
	242	14	78	71	33	41	51	40	40	16	81	44	34	63	15	93	23	96	72	59	38	1,244	92.6%	
Outside North America																								
Ten-Track in PhD	5	0	3	0	1	0	1	1	2	0	3	2	1	0	0	2	0	2	1	3	0	27	2.0%	
Researcher in PhD	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	0	6	0.4%	
Postdoc in PhD	4	2	1	0	0	1	1	0	1	0	0	0	0	0	0	2	0	0	1	1	0	14	1.0%	
Teaching in PhD	0	0	0	0	2	0	1	0	0	1	2	0	1	0	1	1	1	0	1	0	0	11	0.8%	
Other Academic	1	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	1	0	0	5	0.4%	
Industry	5	0	2	1	0	0	0	1	1	0	0	2	1	2	0	4	0	2	2	3	0	26	1.9%	
Government	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	5	0.4%	
Self-Employed	2	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	4	0.3%	
Unemployed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	0.1%	
Total Outside NA	19	2	7	2	3	1	3	2	5	1	7	4	4	4	1	13	1	4	8	8	1	100	7.4%	
Total with Employment Data, Inside North America plus Outside North America																								
	261	16	85	73	36	42	54	42	45	17	88	48	38	67	16	106	24	100	80	67	39	1,344		
Employment Type & Location Unknown																								
	36	0	7	18	20	5	18	10	10	6	31	4	7	7	2	8	2	26	9	206	11	443		
Grand Total	**297**	**16**	**92**	**91**	**56**	**47**	**72**	**52**	**55**	**23**	**119**	**52**	**45**	**74**	**18**	**114**	**26**	**126**	**89**	**273**	**50**	**1,787**		

Table D4a. Detail of Industry Employment

	Artificial Intelligence/ Machine Learning	Computing Education	Databases/Information Retrieval	Graphics/Visualization	Hardware/Architecture	High Performance Computing	Human-Computer Interaction	Informatics: Biomedical/Other Science	Information Science	Information Systems	Networks	Operating Systems	Programming Languages/Compilers	Robotics/Vision	Scientific/Numerical Computing	Security/ Information Assurance	Social Computing/Social Informatics	Software Engineering	Theory and Algorithms	Other	Unknown	Total	
Inside North America																							
Research	107	1	32	37	12	11	18	9	10	5	30	22	6	20	6	27	2	35	19	24	14	447	58.4%
Non-Research	41	1	17	15	5	12	3	7	4	3	23	13	10	13	1	20	5	36	5	4	7	245	32.0%
Postdoctorate	5	0	0	1	2	1	1	1	0	0	0	0	0	3	0	0	0	0	1	1	0	16	2.1%
Type Not Specified	9	0	5	2	0	2	0	0	1	2	6	0	1	1	0	7	2	4	5	8	3	58	7.6%
Total Inside NA	162	2	54	55	19	26	22	17	15	10	59	35	17	37	7	54	9	75	30	37	24	766	
Outside North America																							
Research	4	0	1	0	0	0	0	1	1	0	0	1	0	2	0	3	0	0	1	2	0	16	61.5%
Non-Research	1	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	0	2	1	1	0	9	34.6%
Postdoctorate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Type Not Specified	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	3.8%
Total Outside NA	5	0	2	1	0	0	0	1	1	0	0	2	1	2	0	4	0	2	2	3	0	26	

Table D5. New PhD Students by Department Type

	CS				CE				I				Total	
Department Type	**New Admit**	**MS to PhD**	**Total**	**Avg. per Dept.**	**New Admit**	**MS to PhD**	**Total**	**Avg. per Dept.**	**New Admit**	**MS to PhD**	**Total**	**Avg. per Dept.**	**Total**	**Avg. per Dept**
US CS Public	2,064	160	2,224	22.5	132	4	136	8.0	67	7	74	10.6	2,434	24.3
US CS Private	845	98	943	28.6	9	1	10	2.5	7	1	8	8.0	961	29.1
US CS Total	2,909	258	3,167	24.0	141	5	146	7.0	74	8	82	10.3	3,395	25.5
US CE	0	0	0		46	5	51	12.8	0	0	0		51	12.8
US Information	15	0	15	7.5	0	0	0		127	9	136	9.7	151	10.8
Canadian	151	16	167	15.2	5	0	5	5.0	0	0	0		172	15.6
Grand Total	3,075	274	3,349	23.1	192	10	202	7.8	201	17	218	9.9	3,769	23.3

Table D5a. New PhD Students from Outside North America

Department Type	CS	CE	I	Total New Outside	Total New	% outside North America
US CS Public	1,347	101	20	1,468	2,434	60.3%
US CS Private	533	7	9	549	961	57.1%
Total US CS	1,880	108	29	2,017	3,395	59.4%
US CE		29		29	51	56.9%
US Info	11	0	84	95	151	62.9%
Canadian	79	5	0	84	172	48.8%
Grand Total	1,970	142	113	2,225	3,769	59.0%

Table D6. PhD Enrollment by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	104	10,075	68.4%	700	54.9%	373	33.5%	11,148	65.2%
US CS Private	35	3,727	25.3%	77	6.0%	40	3.6%	3,844	22.5%
Total US CS	139	13,802	93.8%	777	60.9%	413	37.1%	14,992	87.6%
US CE	5		0.0%	487	38.2%		0.0%	487	2.8%
US Info	14	110	0.7%		0.0%	673	60.5%	783	4.6%
Canadian	11	809	5.5%	12	0.9%	27	2.4%	848	5.0%
Grand Total	169	14,721		1,276		1,113		17,110	

Table D7. PhD Enrollment by Gender

	CS		CE		I		Total	
Male	11,180	77.7%	1,015	80.7%	639	57.5%	12,834	76.6%
Female	3,212	22.3%	242	19.3%	472	42.5%	3,926	23.4%
Total Known Gender	14,392		1,257		1,111		16,760	
Gender Unknown	329		19		2		350	
Grand Total	14,721		1,276		1,113		17,110	

Table D8. PhD Enrollment by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	8,588	63.2%	789	66.2%	530	50.5%	9,907	62.6%
Amer Indian or Alaska Native	69	0.5%	0	0.0%	1	0.1%	70	0.4%
Asian	991	7.3%	135	11.3%	68	6.5%	1194	7.5%
Black or African-American	198	1.5%	23	1.9%	47	4.5%	268	1.7%
Native Hawaiian/Pac Islander	19	0.1%	2	0.2%	1	0.1%	22	0.1%
White	3,057	22.5%	206	17.3%	359	34.2%	3,622	22.9%
Multiracial, not Hispanic	404	3.0%	13	1.1%	16	1.5%	433	2.7%
Hispanic, any race	265	1.9%	24	2.0%	27	2.6%	316	2.0%
Total Known	13,591		1,192		1,049		15,832	
Resident, ethnicity unknown	434		68		18		520	
Residency unknown	696		16		46		758	
Grand Total	14,721		1,276		1,113		17,110	

Table D9. PhDs Awarded by Gender and Ethnicity, From 148 Departments

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	726	178	0	64	69	52	3	0	80	43	31	25	0	44	36	1,015	62.8
Amer Indian or Alaska Native	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	3	0.2
Asian	62	19	0	5	7	1	1	0	2	14	4	9	0	6	13	96	5.9
Black or African-American	11	8	0	1	3	0	0	0	0	0	5	4	0	7	6	28	1.7
Native Hawaiian/ Pac Islander	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0.0
White	316	49	0	28	19	10	2	0	15	29	31	28	0	44	41	436	27.0
Multiracial, not Hispanic	6	1	0	1	0	0	1	0	0	14	0	0	0	0	0	8	0.5
Hispanic, any race	21	4	0	2	2	2	0	0	3	0	0	2	0	0	3	29	1.8
Total Res & Ethnicity Known	1,143	260	0	0	0	65	7	0			71	69	0			1,615	
Resident, ethnicity unknown	60	29	0			1	0	0			4	1	0			95	
Not Reported (N/R)	49	11	0			10	3	0			3	1	0			77	
Gender Totals	1,252	300	0			76	10	0			78	71	0			1,787	
%	80.7%	19.3%				88.4%	11.6%				52.3%	47.7%					
* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known																	

Table D10. PhD Enrollment by Gender and Ethnicity, From 169 Departments

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	6,588	1,914	86	63	64	623	158	8	66	70	304	226	0	51	50	9,907	62.6%
Amer Indian or Alaska Native	52	17	0	1	1	0	0	0	0	0	0	1	0	0	0	70	0.4%
Asian	710	256	25	7	9	107	26	2	11	12	36	32	0	6	7	1194	7.5%
Black or African-American	131	66	1	1	2	15	7	1	2	3	18	29	0	3	6	268	1.7%
Native Hawaiian/ Pac Islander	12	7	0	0	0	1	1	0	0	0	1	0	0	0	0	22	0.1%
White	2,425	587	45	23	20	171	29	6	18	13	214	143	2	36	32	3,622	22.9%
Multiracial, not Hispanic	305	95	4	3	3	10	2	1	1	1	11	5	0	2	1	433	2.7%
Hispanic, any race	208	52	5	2	2	21	3	0	2	1	13	14	0	2	3	316	2.0%
Total Res & Ethnicity Known	10,431	2,994	166			948	226				597	450	2			15,832	
Resident, ethnicity unknown	327	95	12			53	14				10	8	0			520	
Not Reported (N/R)	422	123	151			14	2				32	14	0			758	
Gender Totals	11,180	3,212	329			1,015	242				639	472	2			17,110	
%	77.7%	22.3%				80.7%	19.3%				57.5%	42.5%					
* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known																	

For the second year in a row, the percentage of women among Ph.D. recipients increased. In 2017-18, women received 19.3 percent of CS doctoral degrees and 21.3 percent of all doctoral computing degrees (Table D2). A greater percentage of non-resident Aliens comprised 2017-18 Ph.D. recipients in all three areas (CS, CE and I) compared with 2016-17 recipients. A smaller percentage of Ph.D.s were Asian and and a larger percentage were Black/African-American in 2017-18 among CS recipients, while a smaller percentage were Hispanic and a larger percentage were White among I recipients (Table D3). The combined percentage of CS doctoral graduates who were American Indian or Alaska Native, Black or African American, Native Hawaiian/Pacific Islander, Hispanic, or Multiracial Non-Hispanic was only 3.8 percent, though that represents a gain of about one percentage point over 2016-17.

As we have found in previous years, Non-resident Aliens comprised a higher percentage of the CS female doctoral graduates than they did CS male graduates, while Whites comprised a lower percentage of the female graduates as compared with male graduates. The percentage differences are greater for 2017-18 graduates than they were for 2016-17 graduates (Table D9).

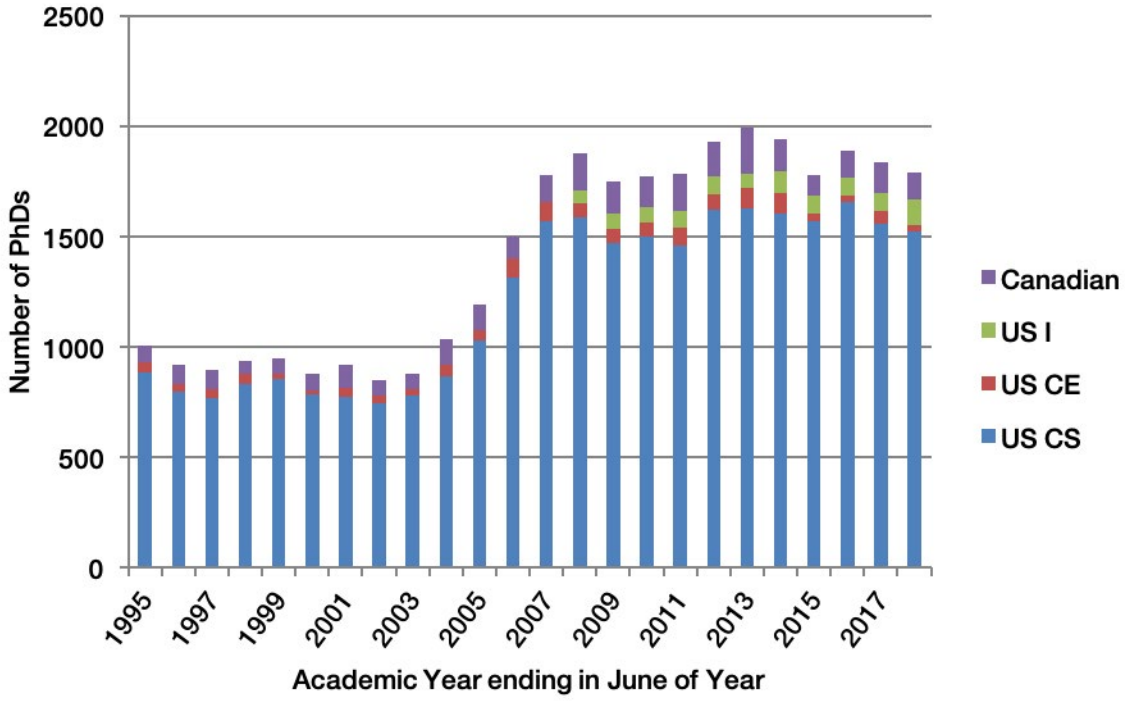
Doctoral Program Enrollment

Despite the decline in doctoral degree production, total doctoral enrollment increased by 7.9 percent among programs that reported both years. If only U.S. computer science departments are considered, the increase was 7.7 percent (Table 1). For the third straight year, total doctoral enrollment by gender is more diverse in all department areas (CS, CE, and I). The overall fraction of current doctoral students who are women is 23.5 percent, versus 22.1 percent last year (Table D7). In CS, women comprise 22.3% of the students currently enrolled. The fraction of doctoral students who are neither Non-resident Aliens, Asian, nor White rose to 7 percent from under 5 percent. This is true overall and also within CS programs (Table D8).

As has been true in previous years, Non-resident Aliens comprise a higher percentage of the enrolled women than they do the enrolled men, although only by one percentage point. Whites continue to comprise a lower percentage of enrolled women than

Figure DI. PhD Production

CRA Taulbee Survey 2018



enrolled men. Again this year, resident Asians comprise a higher percentage of enrolled Asian women than they do Asian men.

Among those pursuing I degrees, 57 percent of the men and an equal percent of the women are Non-resident Aliens or Resident Asians. For the second consecutive year, Whites comprise a higher percentage of men than they do women among those pursuing I degrees (Table D10).

At U.S. CS departments, the average number of students per department who passed qualifier exams in 2017-18 was 17.2, an increase over the 16.1 reported the previous year. Both public and private institutions reported increases for the second year in a row. The average number per U.S. CS department who passed thesis candidacy exams in 2017-18 (most, but not all, departments have such exams) also increased from 2016-17 at both public and private institutions (Table D1).

The number of new Ph.D. students per department reporting increased this year compared with those from last year's reporting departments (Tables 1 and D5) among all types of departments except CE. U.S. CS departments reported an average increase of 17.2 percent. Among departments that reported both years, the number of new Ph.D. students increased 16.9 percent overall and 18.2 percent among U.S. CS departments.

The proportion of new doctoral students from outside North America dropped this year to 59.3% from 64.5% last year. There were increases at US CE and US Info departments, while there were decreases in U.S. CS and Canadian departments (Table D5a).

Figure D5 shows a graphical view of the Ph.D. pipeline for U.S. computer science and Canadian departments, the main producers of CS doctoral degrees. The data in this graph are normalized by the number of reporting departments. The graph offsets the qualifier data by two years from the data for new students, and offsets the graduation data by five years from the data for new students. These data have been useful in estimating the timing of changes in production rates. The graph suggests little change in doctoral production during the next year, but growth afterward. However, departments are forecasting a double-digit percent increase in production during 2018-19 (Table D1). Last year's forecast double-digit percentage increase in departmental production clearly was not realized.

Ph.D. Employment

Figure D6 shows the employment trend of new Ph.D.s in academia and industry within North America, those taking employment outside of North America, and those going to academia in North America who took positions in departments other than Ph.D.-granting CS and CE departments. Table D4

Figure D2. Nonresident Aliens as Fraction of PhD Enrollments

CRA Taulbee Survey 2018

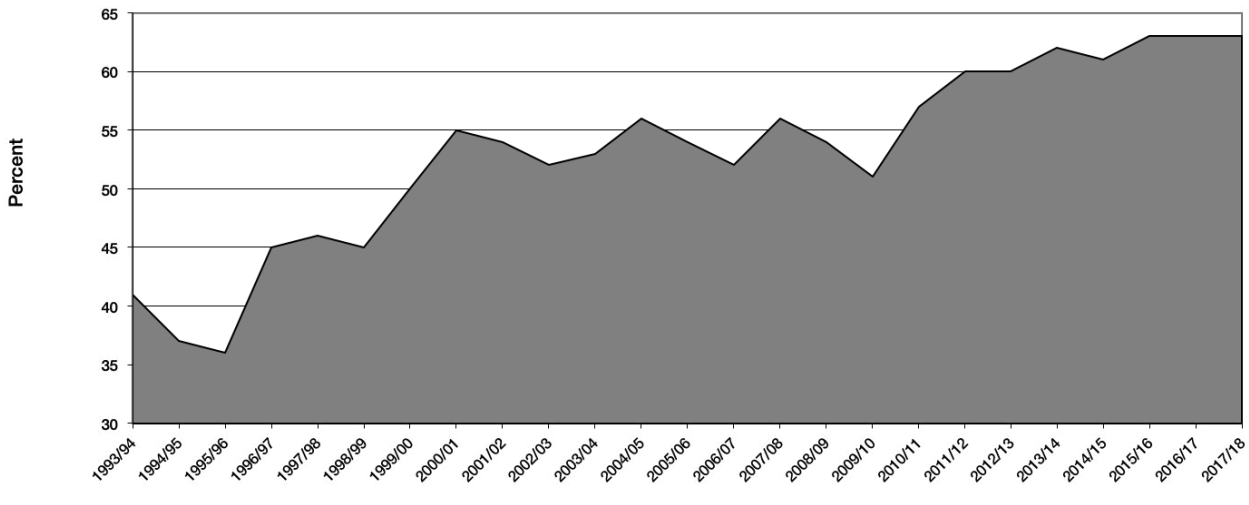


Figure D3. PhD Degrees Granted by Tenure-Track Size

CRA Taulbee Survey 2018

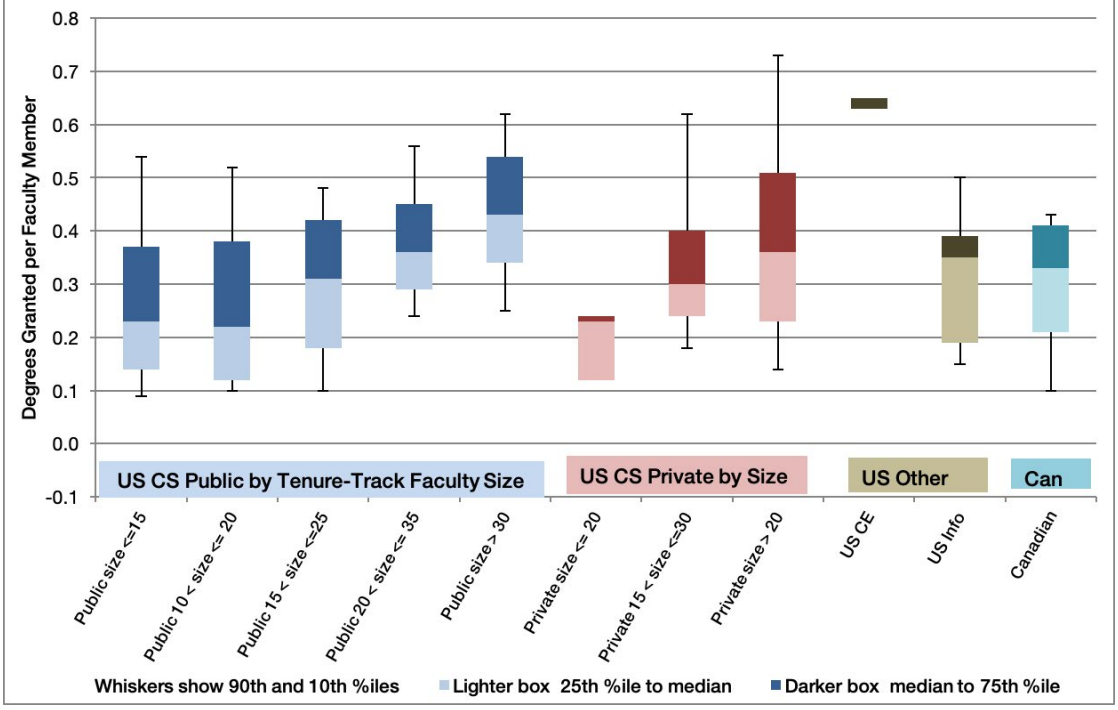
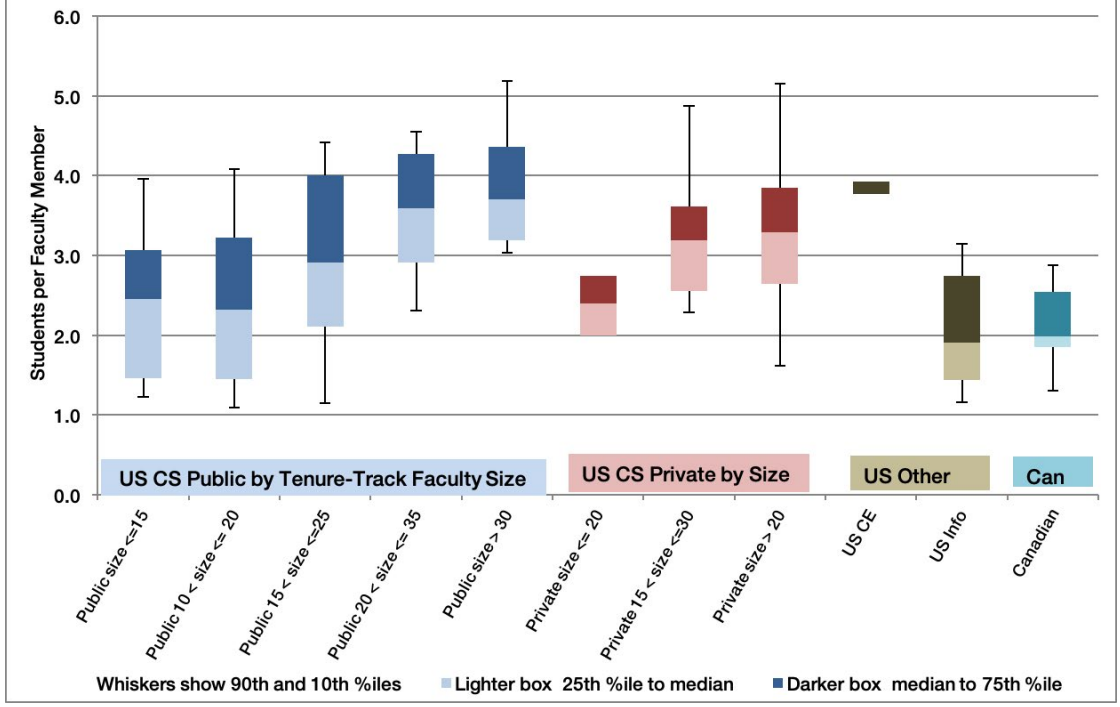


Figure D4. PhD Enrollment Normalized by Tenure-Track Size

CRA Taulbee Survey 2018



shows a more detailed breakdown of the employment data for new Ph.D.s. The percentage of new Ph.D.s who took positions in North American industry was 57.0 percent, down from the 59.4 percent reported last year but similar to the level of two years ago. Among those doctoral graduates who went to North American industry and for whom the type of industry position was known, about 63 percent took research positions (Table D4a). This is higher than the 57 percent reported in 2017. This year, definitive data was provided for over 92 percent of the graduates who went to North American industry, an increase over the 89 percent last year.

After a dip reported last year, the percentage of Ph.D. graduates who took North American academic jobs rose in 2017-18 to 31.2 from 28.2 in 2016-17. The percentage of graduates taking tenure-track positions in North American doctoral-granting computing departments rose from to 9.8 in 2016-17 to 10.7 in 2017-18. The percentage taking positions in North American non-Ph.D.-granting computing departments dropped from 2.8 percent in last year's report to 1.8 percent, while the percentage taking North American academic postdoctoral positions rose from 10.7 percent to 11.9 percent.

Among those whose employment is known, the proportion of Ph.D. graduates who were reported taking positions outside of North America was 7.4 percent, similar to last year's reported value. In 2017-18, 26 percent of those employed outside of North America went to industry. This is similar to the percentage reported in each of the past two years. Twenty-seven percent went to tenure-track academic positions, lower than last year's 30 percent, while 14 percent went to academic postdoctoral positions, lower than the 18 percent reported last year but near the level of two years ago. Most of the doctoral graduates who went to non-North American industry positions take non-research positions. Definitive data was provided for 96 percent of the graduates who went to non-North American industry positions.

When academic and industry postdocs are combined, the result is that 14.8 percent of 2017-18 doctoral graduates whose employment was known took some type of postdoctoral position. This is slightly higher than the 13.8 percent reported last year. As was the case in 2016-17, thirteen percent of these were industry postdocs.

Figure D5. CS Pipeline corrected for year of entry

CRA Taulbee Survey 2018

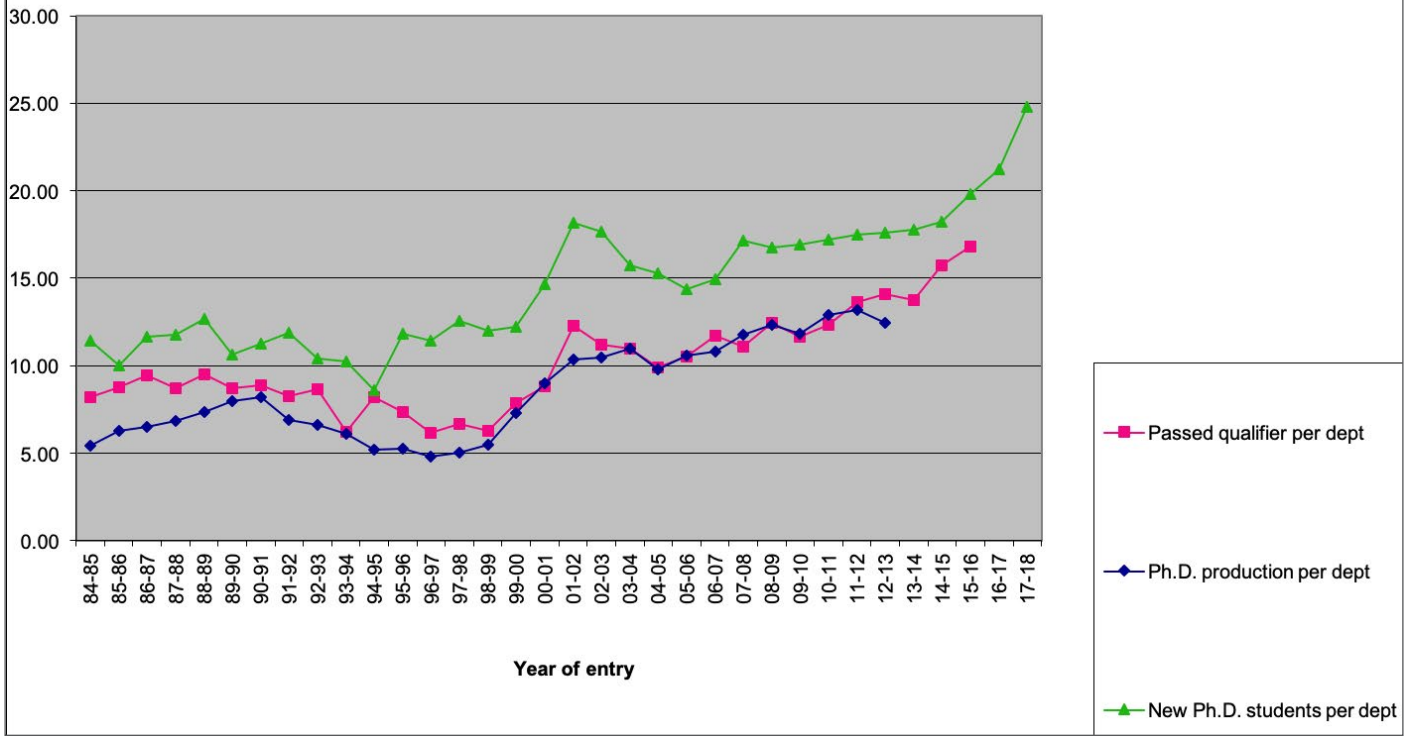


Figure D6. Employment Trends for New Ph.D.s

CRA Taulbee Survey 2018

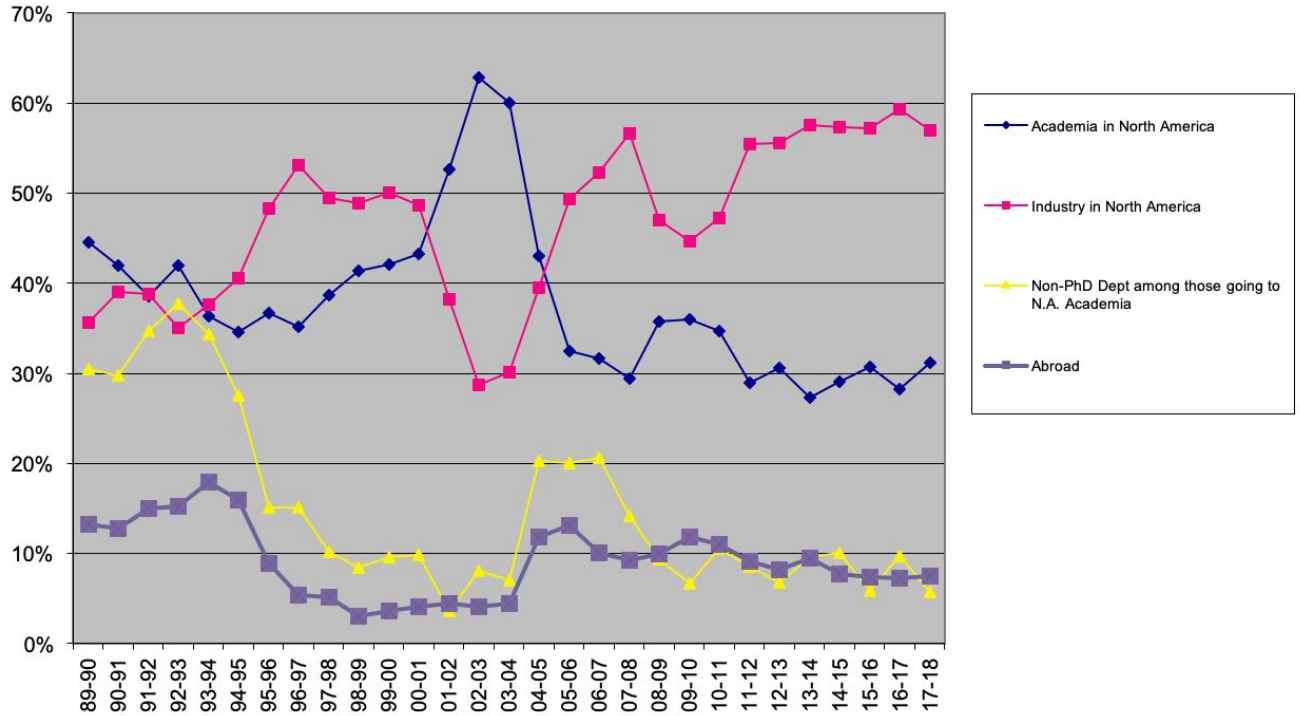


Table 1. Degree Production and Enrollment Change From Previous Year

	Total						Only Departments Responding Both Years					
	US CS Only			All Departments			US CS Only			All Departments		
PhDs	**2017**	**2018**	**% chg**	**2017**	**2018**	**% chg**	**2017**	**2018**	**% chg**	**2017**	**2018**	**% chg**
PhD Awarded	1,557	1,521	-2.3%	1,834	1,787	-2.6%	1,450	1,409	-2.8%	1,674	1,644	-1.8%
#Units PhD Awd	119	121	1.7%	148	148	0.0%	107	107		131	131	
PhD Enrollment	13,856	14,992	8.2%	15,951	17,110	7.3%	13,645	14,696	7.7%	15,312	16,516	7.9%
#Units PhD Enr	135	139	3.0%	166	169	1.8%	132	132		160	160	
New PhD Enroll	2,875	3,395	18.1%	3,264	3,769	15.5%	2,828	3,344	18.2%	3,175	3,713	16.9%
#Units New PhD	132	133	0.8%	164	162	-1.2%	126	126		154	154	
Bachelor's	**2017**	**2018**	**% chg**	**2017**	**2018**	**% chg**	**2017**	**2018**	**% chg**	**2017**	**2018**	**% chg**
BS Awarded	24,291	28,698	18.1%	29,587	33,853	14.4%	23,413	28,125	20.1%	28,061	33,162	18.2%
#Units BS Awd	131	130	-0.8%	157	155	-1.3%	125	125		147	147	
BS Enrollment	127,739	141,259	10.6%	153,610	163,735	6.6%	117,966	138,359	17.3%	139,168	160,249	15.1%
#Units BS Enr	131	131	0.0%	160	156	-2.5%	126	126		150	150	
New BS Majors	30,734	35,245	14.7%	35,902	40,774	13.6%	27,003	33,990	25.9%	31,149	39,141	25.7%
#Units New BS	113	112	-0.9%	138	133	-3.6%	102	102		121	121	
BS Enroll/Dept	975.1	1,078.3	10.6%	960	1,050	9.3%	936	1098.1	17.3%	927.8	1068.3	15.1%

2018 Taulbee Survey *(continued)*

Table M1. Master's Degrees Awarded by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	102	7,537	56.4%	419	45.8%	850	28.1%	8,806	50.9%
US CS Private	34	5,283	39.6%	119	13.0%	341	11.3%	5,743	33.2%
Total US CS	136	12,820	96.0%	538	58.9%	1,191	39.3%	14,549	84.1%
US CE	3		0.0%	176	19.3%		0.0%	176	1.0%
US Info	12	55	0.4%		0.0%	1,814	59.9%	1,869	10.8%
Canadian	11	482	3.6%	200	21.9%	22	0.7%	704	4.1%
Grand Total	162	13,357		914		3,027		17,298	

Table M2. Master's Degrees Awarded by Gender

	CS		CE		I		Total	
Male	9,179	73.5%	658	72.5%	1,538	51.2%	11,375	69.4%
Female	3,312	26.5%	249	27.5%	1,466	48.8%	5,027	30.6%
Total Known Gender	12,491		907		3,004		16,402	
Gender Unknown	866		7		23		896	
Grand Total	13,357		914		3,027		17,298	

Table M3. Master's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	8,349	70.0%	476	70.8%	1,240	44.4%	10,065	65.4%
Amer Indian or Alaska Native	7	0.1%	2	0.3%	2	0.1%	11	0.1%
Asian	1,199	10.1%	47	7.0%	300	10.7%	1,546	10.0%
Black or African-American	112	0.9%	9	1.3%	133	4.8%	254	1.6%
Native Hawaiian/Pac Island	2	0.0%	0	0.0%	2	0.1%	4	0.0%
White	1,949	16.3%	100	14.9%	944	33.8%	2,993	19.4%
Multiracial, not Hispanic	72	0.6%	4	0.6%	57	2.0%	133	0.9%
Hispanic, any race	239	2.0%	34	5.1%	116	4.2%	389	2.5%
Total Residency & Ethnicity Known	11,929		672		2,794		15,395	
Resident, ethnicity unknown	426		233		184		843	
Residency unknown	1,022		9		49		1,080	
Grand Total	13,357		914		3,027		17,298	

Table M4. Master's Degrees Expected Next Year by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	93	7,082	56.1%	382	60.0%	669	21.9%	8,133	49.8%
US CS Private	30	4,993	39.5%	129	20.3%	364	11.9%	5,486	33.6%
US CS Total	123	12,075	95.6%	511	80.2%	1,033	33.8%	13,619	83.4%
US CE	3		0.0%	120	18.8%		0.0%	120	0.7%
US Info	12	38	0.3%	0	0.0%	2,022	66.2%	2,060	12.6%
Canadian	10	522	4.1%	6	0.9%	0	0.0%	528	3.2%
Grand Total	148	12,635		637		3,055		16,327	

The unemployment rate for new Ph.D.s again this year was below 1 percent. However, 24.8 percent of new Ph.D.s' employment status was unknown; in 2016-17 it was 22.7 percent. The lack of information about the employment of nearly one in four graduates may skew the real overall percentages for certain employment categories.

Table D4 also indicates the areas of specialty of new Ph.D.s. Artificial intelligence/machine learning, software engineering, networks, and security/information assurance are the most popular areas of specialization for doctoral graduates, in that order. These four areas comprise 37 percent of all the doctoral degrees produced in 2017-18. There are many Ph.D.s categorized as "other," and some whose specialty area is reported as "unknown".

Master's and Bachelor's Degree Production and Enrollments

This section reports data about enrollment and degree production for master's and bachelor's programs in the doctoral-granting departments. Although the absolute number of degrees and enrolled students reported herein only reflect departments that offer the doctoral degree, the trends observed in the master's and bachelor's data from these departments tend to strongly reflect trends in the larger population of programs that offer such degrees.

Master's

(Tables M1-M8; Figures M1-M2)

On a per department basis, CS master's degree production in U.S. CS departments was about 2.5 percent less than in 2016-17; however, this follows three consecutive years of double-

Table M5. New Master's Students by Department Type

Department Type	CS			CE			I			Total			Outside North America	
	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	Total	%
US CS Public	9,870	98	100.7	412	22	18.7	604	16	37.8	10,886	98	111.1	6,309	58.0%
US CS Private	4,832	32	151.0	21	4	5.3	320	4	80.0	5,173	32	161.7	3,322	64.2%
US CS Total	14,702	130	113.1	433	26	16.7	924	20	46.2	16,059	130	123.5	9,631	60.0%
US CE		0		118	3	39.3		0		118	3	39.3	95	80.5%
US Information	54	2	27.0	0	0		1,782	12	148.5	1,836	12	153.0	738	40.2%
Canadian	776	11	70.5	11	1	11.0	0	0		787	11	71.5	576	73.2%
Grand Total	15,532	143	108.6	562	30	18.7	2,706	32	84.6	18,800	156	120.5	11,040	58.7%

Table M6. Total Master's Students by Department Type

Department Type	CS			CE			I			Total		
	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.	Total	# Depts	Avg. per Dept.
US CS Public	22,487	103	218.3	1,236	24	51.5	1,976	18	109.8	25,699	103	249.5
US CS Private	10945	33	331.7	858	6	143.0	1149	4	287.3	12952	34	380.9
US CS Total	33,432	136	245.8	2,094	30	69.8	3,125	22	142.0	38,651	137	282.1
US CE		0		341	3	113.7		0		341	3	113.7
US Information	91	2	45.5		0		4979	12	414.9	5070	12	422.5
Canadian	1569	11	142.6	293	2	146.5		0		1862	11	169.3
Grand Total	35,092	149	235.5	2,728	35	77.9	8,358	32	261.2	45,924	163	281.7

digit percent increases. There was a 4.5 percent drop among departments at public institutions and a 3.5 percent increase among those at private institutions.

Overall master's degree production per department in the Information area rose 3.7 percent in 2017-18, while Canadian production showed a 34 percent increase. Only three CE departments reported master's production, so no comparison is made for this area (Table M1).

The proportion of female graduates among CS master's degree recipients rose slightly, from 26.1 percent to 26.5 percent. The CE and I areas also showed increases in gender diversity, with the I area now close to parity between men and women. Aggregating all areas, the percentage of master's degrees to women increased from 29.6 to 30.6 percent (Table M2).

In CS, 70.0 percent of master's degrees went to Non-resident Aliens, a decrease from the 73.8 percent in 2016-17 and 75.6 percent in 2015-16. Drops in the percentage of Non-resident Aliens also occurred in the CE and I areas, with the aggregate percentage over all three areas declining from 69.2 to 65.4 percent. As was the case in last year's report, the CS decline in non-resident Alien percentage was countered by gains among Whites and resident Asians. The percentage of master's recipients among American Indian/Alaska Native, Black/African-American, Native Hawaiian/Pacific Islander, Hispanic, and Multiracial in CS was approximately 3.6 percent in 2017-18 versus 3.0 percent in 2016-17; the increase occurred largely among Hispanics. (Table M3).

As has been the case in recent years, Non-resident Aliens again comprised a much larger proportion of female CS and CE degree recipients than male CS and CE degree recipients, while Whites comprised a larger percentage of male CS and CE degree recipients than female CS and CE degree recipients (Table M7). In the I area, Non-resident Aliens again comprised a larger percentage of male master's graduates than female master's

Table M7. Masters Degrees Awarded by Gender and Ethnicity, From 163 Departments

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	5,845	2,459	31	68	78	338	136	2	68	80	695	545	0	49	40	10,065	65.4
Amer Indian or Alaska Native	6	0	1	0	0	1	1	0	0	1	0	2	0	0	0	11	0.1
Asian	824	356	19	10	11	34	13	0	7	8	168	132	0	12	10	1546	10.0
Black or African-American	87	19	6	1	1	6	2	1	1	1	60	73	0	4	5	254	1.6
Native Hawaiian/ Pac Islander	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	4	0.0
White	1,621	286	37	19	9	87	10	3	18	6	418	525	1	29	38	2,993	19.4
Multiracial, not Hispanic	66	4	2	1	0	3	1	0	1	1	25	32	0	2	2	133	0.9
Hispanic, any race	186	32	20	2	1	27	7	0	5	4	59	56	1	4	4	389	2.5
Total Res & Ethnicity Known	8,637	3,156	116			496	170	6			1,425	1,367	2			15,395	
Resident, ethnicity unknown	299	78	49			156	77	0			94	90	0			843	
Not Reported (N/R)	229	72	701			6	2	1			19	9	21			1080	
Gender Totals	9,179	3,312	866			658	249	7			1,538	1,466	23			17,298	
%	73.5%	26.5%				72.5%	27.5%				51.2%	48.8%					
* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known																	

graduates, and Whites comprised a smaller percentage of male master's graduates than female master's graduates. This trend is likely to continue into the near future based on the current enrollment breakdown by gender and ethnicity (Table M8).

The average number of new master's students enrolled in U.S. CS departments rose from 106.5 to 123.5. As was the case last year, U.S. CS departments at both public and private institutions experienced increases (Table M5). This suggests that this year's observed master's production decline is likely to be short-lived.

The fraction of new master's students in U.S. CS departments that is reported to be from outside North America in 2018-19 was 60.0 percent, compared with 63.6 percent in 2017-18 from 67.5 percent in 2016-17 (Table M5). This year there was a sharp decline among departments at public institutions, from 70.6 to 58.0 percent; private institutions showed only a slight decline, from 65.0 percent to 64.2 percent. At U.S. Information departments, the fraction of new master's students from outside North America declined from 42.8 percent to 40.2 percent, the second straight year of decline.

This year, we asked for information about the types of master's programs offered by our departments; specifically, we asked if the department offered only professional master's, only "academic" master's, or both types. Of the 167 departments that responded to this year's Taulbee Survey, all but one reported having master's programs. Of the 159 departments who responded to the question about the breakdown of these programs into professional and academic, 36 (23 percent) had only professional master's, and 55 (35 percent) had both. Of the 123 total professional master's programs, 23 percent were offered totally online and another seven percent were offered in hybrid format. Of the 148 total academic master's programs, 11 percent were offered online and six percent were offered in hybrid form. About 78 percent of the online programs are reported to the Taulbee survey and so are included in the master's statistics reported earlier in this section.

Table M8. Masters Enrollment by Gender and Ethnicity, From 163 Departments

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	13,774	5,672	213	59	73	815	320	6	67	78	1,770	1,397	0	47	37	23,967	58.8
Amer Indian or Alaska Native	22	4	1	0	0	0	0	0	0	0	3	7	0	0	0	37	0.1
Asian	2708	920	76	12	12	88	24	1	7	6	337	304	0	9	8	4,458	10.9
Black or African-American	453	118	3	2	2	25	4	0	2	1	195	220	0	5	6	1018	2.5
Native Hawaiian/ Pac Islander	12	2	0	0	0	2	0	0	0	0	1	3	0	0	0	20	0.0
White	5,420	872	118	23	11	188	37	5	15	9	1,218	1,559	3	32	42	9,420	23.1
Multiracial, not Hispanic	255	66	10	1	1	15	5	0	1	1	63	106	0	2	3	520	1.3
Hispanic, any race	745	129	9	3	2	86	21	0	7	5	196	165	1	5	4	1352	3.3
Total Res & Ethnicity Known	23,389	7,783	430			1,219	411	12			3,783	3,761	4			40,792	
Resident, ethnicity unknown	1407	421	26			283	153	1			217	182	1			2691	
Not Reported (N/R)	1,024	385	227			21	8	620			3	3	150			2,441	
Gender Totals	25,820	8,589	683			1,523	572	633			4,003	3,946	155			45,924	
%	75.0%	25.0%				72.7%	27.3%				50.4%	49.6%					

* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known

Figure M1. Master's Degrees Granted by Tenure-Track Size

CRA Taulbee Survey 2018

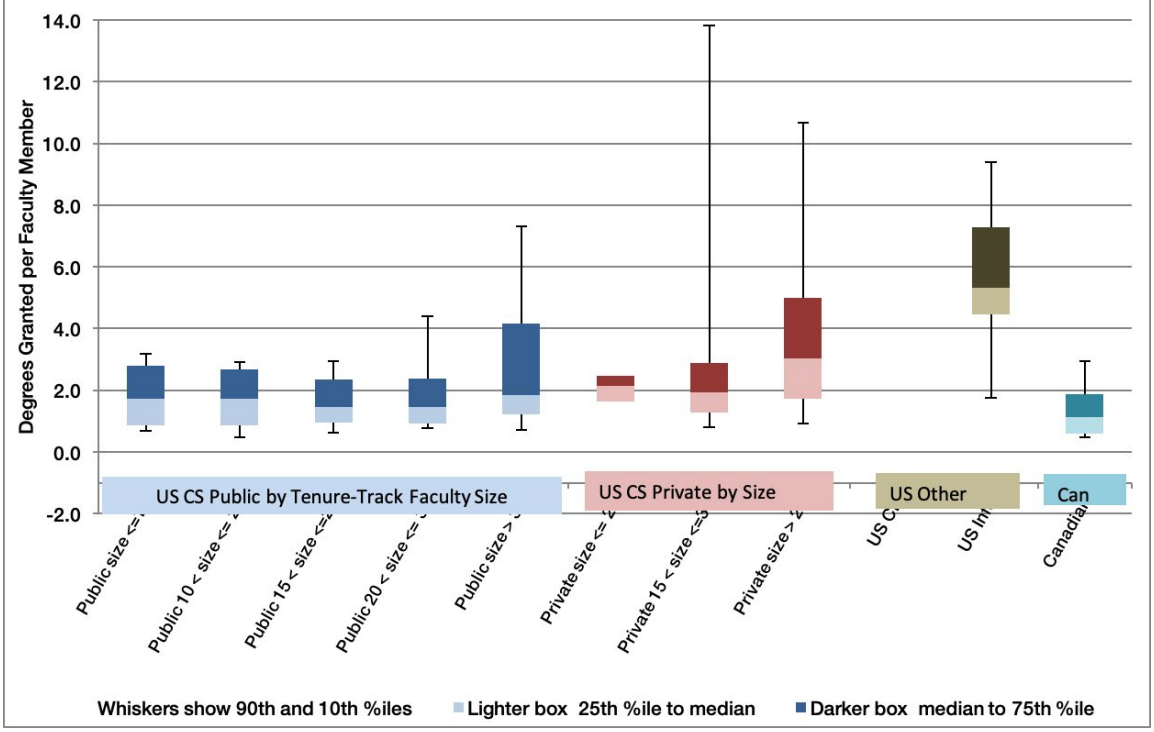
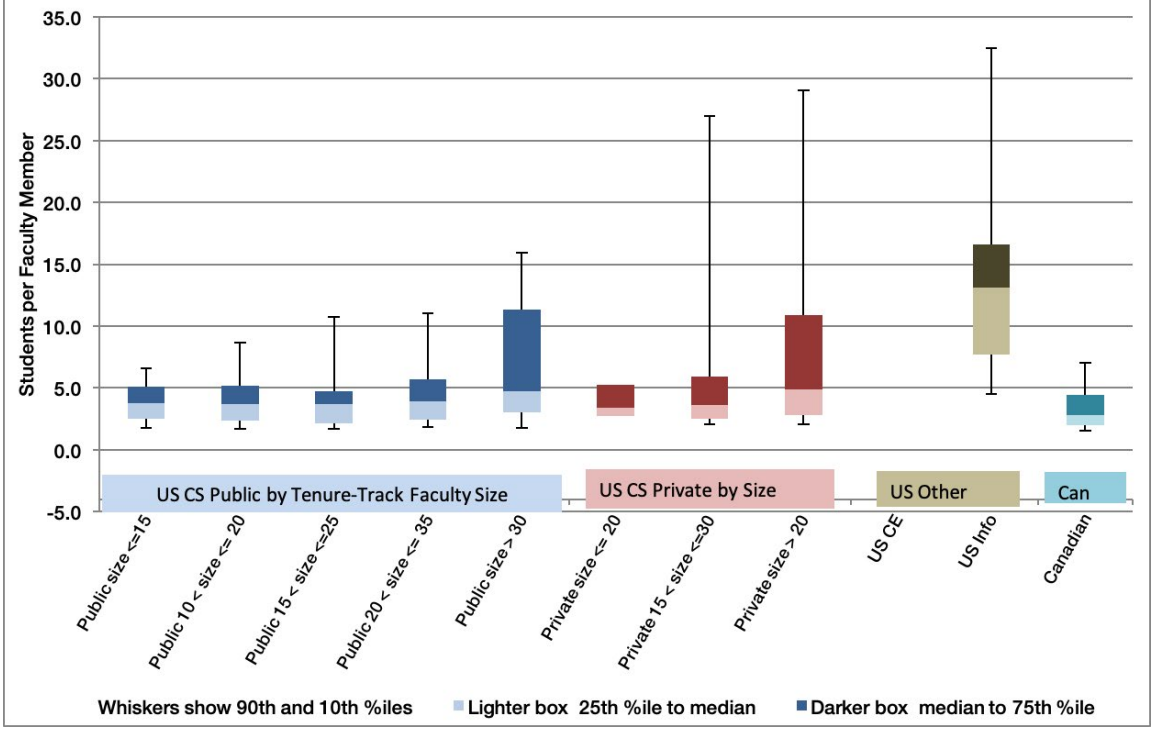


Figure M2. Master's Enrollment Normalized by Tenure-Track Size

CRA Taulbee Survey 2018



Bachelor's

(Tables 1, B1-B8; Figures B1-B4)

The 2017-18 academic year marked the fifth consecutive year of double-digit percentage increases in bachelor's degree production. Overall degree production, aggregated across all three areas of computing, is 14.4 percent higher at this year's reporting departments than it was at last year's reporting departments. In U.S. CS departments, the increase is 18.1 percent.

When considering only those departments that reported both years, the increase was 18.2 percent among all departments and 20.1 percent among U.S. CS departments (Table 1). When only the CS area is considered, bachelor's degree production per department increased 21.4 percent at U.S. CS departments, and it increased 21.1 percent among all reporting departments (Table B1).

Figure B1 shows the trend in total computing bachelor's degree production since 1995 for all departments reporting to the

Table B1. Bachelor's Degrees Awarded by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	97	18,675	69.9%	2,156	74.8%	2,021	47.4%	22,852	67.5%
US CS Private	33	5,313	19.9%	301	10.4%	232	5.4%	5,846	17.3%
US CS Total	130	23,988	89.8%	2,457	85.3%	2,253	52.9%	28,698	84.8%
US CE	3		0.0%	279	9.7%		0.0%	279	0.8%
US Info	12	278	1.0%		0.0%	1,893	44.4%	2,171	6.4%
Canadian	10	2,443	9.1%	146	5.1%	116	2.7%	2,705	8.0%
Grand Total	155	26,709		2,882		4,262		33,853	

Table B2. Bachelor's Degrees Awarded by Gender

	CS		CE		I		Total	
Male	19,488	79.1%	2,379	84.4%	3,034	73.2%	24,901	78.8%
Female	5,162	20.9%	440	15.6%	1,111	26.8%	6,713	21.2%
Total Known Gender	24,650		2,819		4,145		31,614	
Gender Unknown	2,059		63		117		2,239	
Grand Total	26,709		2,882		4,262		33,853	

Table B3. Bachelor's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	3,086	13.9%	342	13.0%	336	8.4%	3,764	13.0%
Amer Indian or Alaska Native	47	0.2%	13	0.5%	10	0.3%	70	0.2%
Asian	5,899	26.5%	631	24.1%	820	20.5%	7,350	25.4%
Black or African-American	692	3.1%	128	4.9%	283	7.1%	1,103	3.8%
Native Hawaiian/Pac Islander	63	0.3%	3	0.1%	19	0.5%	85	0.3%
White	10,117	45.4%	1,150	43.9%	1,941	48.6%	13,208	45.7%
Multiracial, not Hispanic	637	2.9%	72	2.7%	182	4.6%	891	3.1%
Hispanic, any race	1,725	7.7%	282	10.8%	406	10.2%	2,413	8.4%
Total Residency & Ethnicity Known	22,266		2,621		3,997		28,884	
Resident, ethnicity unknown	941		184		113		1,238	
Residency unknown	3,557		77		152		3,786	
Grand Total	26,709		2,882		4,262		33,853	

Table B4. Bachelor's Degrees Expected Next Year by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	92	18,611	66.0%	2,442	73.8%	1,638	43.3%	22,691	64.3%
US CS Private	28	5,340	18.9%	278	8.4%	224	5.9%	5,842	16.6%
US CS Total	120	23,951	85.0%	2,720	82.2%	1,862	49.2%	28,533	80.9%
US CE	3	0	0.0%	368	11.1%	0	0.0%	368	1.0%
US Info	11	385	1.4%		0.0%	1,919	50.8%	2,304	6.5%
Canadian	10	3,845	13.6%	219	6.6%	0	0.0%	4,064	11.5%
Grand Total	144	28,181		3,307		3,781		35,269	

Table B5. New Bachelor's Students by Department Type

	CS				CE				I				Total	
Department Type	Major	Pre-Major	# Depts	Avg. Major /Dept	Total	Pre-Major	# Depts	Avg. Major /Dept	Total	Pre-Major	# Depts	Avg. Major /Dept	Total Major	Avg. Major /Dept
US CS Public	23,835	8,786	87	274.0	2,992	1,272	30	99.7	1,767	273	17	103.9	28,594	328.7
US CS Private	6,035	1,726	25	241.4	213	175	8	26.6	403	30	4	100.8	6,651	266.0
US CS Total	29,870	10,512	112	266.7	3,205	1,447	38	84.3	2,170	303	21	103.3	35,245	314.7
US CE	0	0	0		22	130	2	11.0	0	0	0		22	11.0
US Information	513	0	2	256.5		0	0		1,276	180	10	127.6	1,789	178.9
Canadian	3,496	1,343	9	388.4	222	0	3	74.0	0	0	0		3,718	413.1
Grand Total	33,879	11,855	123	275.4	3,449	1,577	43	80.2	3,446	483	31	111.2	40,774	306.6

Table B6. Total Bachelor's Enrollment by Department Type

	CS				CE				I				Total	
Department Type	Major	Pre-Major	# Depts	Avg. Major /Dept	Total	Pre-Major	# Depts	Avg. Major /Dept	Total	Pre-Major	# Dept	Avg. Major /Dept	Total Major	Avg. Major /Dept
US CS Public	95,100	20,433	98	970.4	12,829	2,253	36	356.4	9,594	919	26	369.0	117,523	1199.2
US CS Private	21,339	3,984	33	646.6	1,006	565	11	91.5	1,391	33	4	347.8	23,736	719.3
US CS Total	116,439	24,417	131	888.8	13,835	2,818	47	294.4	10,985	952	30	366.2	141,259	1078.3
US CE		0	0		1,131	694	3	377.0		0	0		1,131	377.0
US Information	1,346	403	2	673.0		0	0		6,021	962	12	501.8	7,367	613.9
Canadian	13,218	3,893	10	1321.8	760	188	3	253.3		0	0		13,978	1397.8
Grand Total	131,003	28,713	143	916.1	15,726	3,700	53	296.7	17,006	1,914	42	404.9	163,735	1049.6

Taulbee Survey. Based on current and recent enrollments, continued increases in CS bachelor's degree production are likely to continue for the next few years.

The upward trajectory in bachelor's enrollment continues; there was an increase in the number of new undergraduate computing majors for the eleventh consecutive year. This year's respondents reported 13.6 percent more new majors than did last year's respondents, with an average of 17.8 percent more per department (Tables 1 and B5). The increase in new majors is 25.7 percent when considering only those departments reporting both this year and last year. Among U.S. computer science departments, the increase in overall new majors was 14.7 percent overall (15.7 percent per department), and 25.9 percent among departments reporting both this year and last year. If only increases in new CS majors at U.S. CS departments are

Table B7. Bachelors Degrees Awarded by Gender and Ethnicity, From 155 Departments

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	2,203	783	62	13	20	273	66	3	13	16	222	114	0	8	11	3,764	13.0
Amer Indian or Alaska Native	39	6	1	0	0	10	3	0	1	1	9	1	0	0	0	70	0.2
Asian	4,223	1,357	279	25	34	493	136	2	23	34	552	268	0	19	25	7,350	25.4
Black or African-American	483	144	60	3	4	105	23	0	5	6	195	88	0	7	8	1,103	3.8
Native Hawaiian/ Pac Islander	35	26	1	0	1	2	1	0	0	0	14	5	0	1	1	85	0.3
White	7,912	1,303	710	48	33	999	126	25	46	31	1,487	454	0	51	42	13,208	45.7
Multiracial, not Hispanic	465	119	43	3	3	67	5	0	3	1	120	62	0	4	6	891	3.1
Hispanic, any race	1,264	249	174	8	6	230	45	7	11	11	324	81	1	11	8	2,413	8.4
Total Res & Ethnicity Known	16,624	3,987	1,330			2,179	405	37			2,923	1,073	1			28,884	
Resident, ethnicity unknown	668	139	127			155	29	0			78	35	0			1,238	
Not Reported (N/R)	1,849	985	599			45	6	26			33	3	116			3,786	
Gender Totals	19,488	5,162	2,059			2,379	440	63			3,034	1,111	117			33,853	
%	79.1%	20.9%				84.4%	15.6%				73.2%	26.8%					
* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known																	

Table B8. Bachelors Enrollment by Gender and Ethnicity, From 156 Departments

	CS					CE					I					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	9,878	2,944	220	12	15	1,054	221	19	9	10	946	434	0	8	12	15,716	11.6
Amer Indian or Alaska Native	227	56	27	0	0	54	15	0	1	1	26	11	0	0	0	416	0.3
Asian	18,429	6,257	405	22	32	2,555	642	17	22	30	2,115	940	0	19	25	31,428	23.1
Black or African-American	3,649	1,027	75	4	5	685	158	7	6	7	875	361	0	8	10	6,874	5.1
Native Hawaiian/ Pac Islander	133	42	6	0	0	24	7	0	0	0	15	8	0	0	0	235	0.2
White	39,891	6,522	1,155	47	33	5,207	708	80	45	33	5,611	1,461	1	49	39	60,958	44.8
Multiracial, not Hispanic	3,270	854	58	4	4	460	74	5	4	3	387	152	0	3	4	5,260	3.9
Hispanic, any race	9,189	1,921	173	11	10	1,672	321	14	14	15	1,440	384	0	13	10	15,136	11.1
Total Res & Ethnicity Known	84,666	19,623	2,119			11,711	2,146	142			11,415	3,751	1			136,023	
Resident, ethnicity unknown	3,323	865	219			690	168	2			290	98	1			5,656	
Not Reported (N/R)	13,101	4,002	2,629			474	87	306			203	49	1,198			22,056	
Gender Totals	102,026	24,709	4,268			12,875	2,401	450			11,908	3,898	1,200			163,735	
%	80.5%	19.5%				84.3%	15.7%				75.3%	24.7%					
* % of M and % of F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known																	

Table B9. Undergraduate Representative Course Enrollments 2015-2018, Department-Level Percentiles

Number of Students In Course					% of Students Who Are Majors					% of Students Who Are Female					% of Students Who Are URM				
Intro for Non-Majors																			
(N=44)	**2015**	**2016**	**2017**	**2018**	**(N=25)**	**2015**	**2016**	**2017**	**2018**	**(N=23)**	**2015**	**2016**	**2017**	**2018**	**(N=17)**	**2015**	**2016**	**2017**	**2018**
25	71.8	70.3	72.3	76.3	25	0.6	0.0	0.7	0.2	25	26.2	28.6	35.1	29.0	25	11.2	10.2	11.2	10.7
50	174.0	199.5	154.0	200.0	50	2.9	3.1	2.8	3.6	50	40.8	38.9	40.7	38.5	50	15.9	12.5	15.8	13.8
75	352.3	374.5	356.3	402.5	75	12.2	10.9	12.8	14.3	75	48.8	51.4	50.0	51.3	75	21.4	22.3	28.5	25.6
Intro for Majors																			
(N=50)	**2015**	**2016**	**2017**	**2018**	**(N=32)**	**2015**	**2016**	**2017**	**2018**	**(N=28)**	**2015**	**2016**	**2017**	**2018**	**(N=29)**	**2015**	**2016**	**2017**	**2018**
25	182.0	192.5	235.5	187.8	25	20.5	21.4	22.6	21.5	25	16.9	17.1	18.1	16.2	25	8.4	8.3	9.1	9.1
50	310.0	291.0	319.5	350.5	50	42.0	43.2	36.6	48.4	50	20.6	20.6	23.0	21.6	50	12.2	14.2	14.0	15.2
75	455.0	437.8	478.5	629.0	75	64.1	63.7	70.9	67.5	75	31.5	33.2	35.2	35.5	75	17.7	18.4	21.9	26.9
Mid-Level																			
(N=52)	**2015**	**2016**	**2017**	**2018**	**(N=36)**	**2015**	**2016**	**2017**	**2018**	**(N=31)**	**2015**	**2016**	**2017**	**2018**	**(N=20)**	**2015**	**2016**	**2017**	**2018**
25	85.3	107.0	110.5	93.5	25	45.2	43.5	39.0	48.6	25	12.7	14.3	14.6	18.0	25	7.2	8.1	9.3	9.3
50	134.5	151.5	176.5	196.0	50	61.5	60.8	55.5	58.8	50	18.4	20.0	19.2	23.3	50	12.0	11.2	12.9	14.1
75	249.3	289.5	359.3	327.5	75	80.0	86.1	83.2	81.9	75	26.0	28.3	29.7	30.2	75	16.7	16.8	19.7	20.6
Upper-Level																			
(N=49)	**2015**	**2016**	**2017**	**2018**	**(N=34)**	**2015**	**2016**	**2017**	**2018**	**(N=28)**	**2015**	**2016**	**2017**	**2018**	**(N=18)**	**2015**	**2016**	**2017**	**2018**
25	54.0	56.0	69.5	74.0	25	64.5	75.7	66.0	68.4	25	8.3	11.0	11.6	13.4	25	3.4	4.3	6.2	6.0
50	101.0	123.0	133.0	124.0	50	83.3	83.8	88.5	86.8	50	15.6	16.0	19.0	17.6	50	9.4	7.9	10.3	12.2
75	186.0	190.0	191.0	253.5	75	95.4	97.6	96.3	97.2	75	23.4	23.0	29.5	27.4	75	15.9	15.3	16.5	26.9

Figure B1. BS Production (CS & CE)

CRA Taulbee Survey 2018

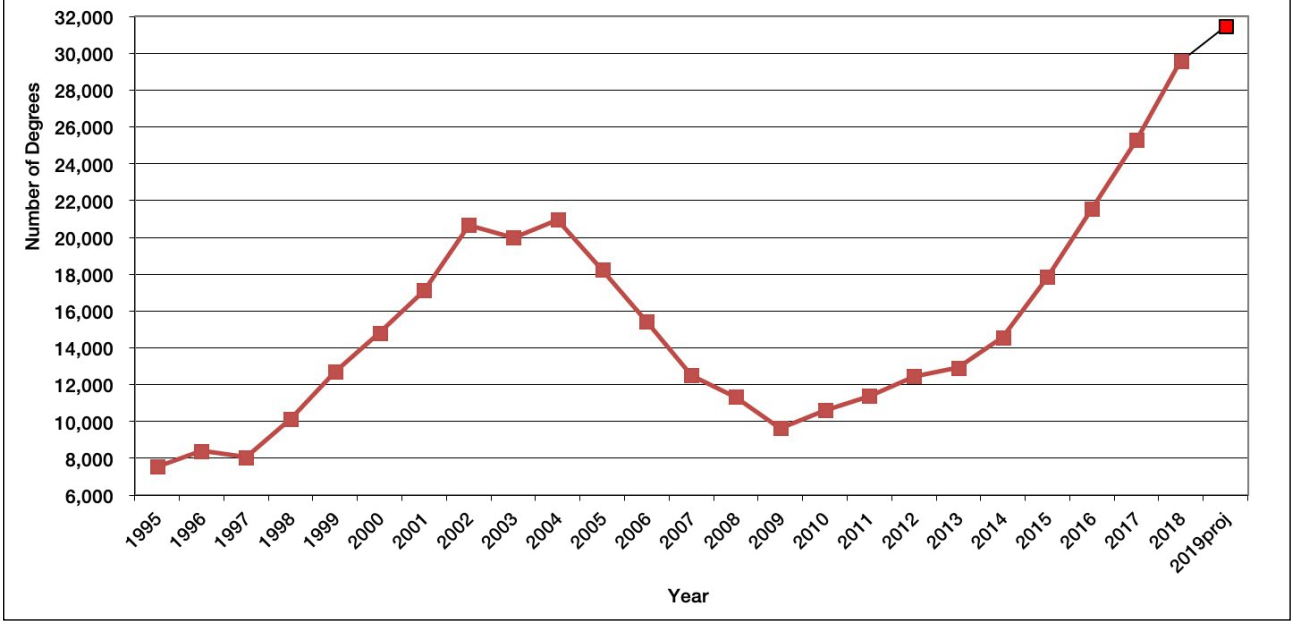


Figure B2. Newly Declared Undergraduate Majors: CS, CE, and I (beginning in 2008)

CRA Taulbee Survey 2018

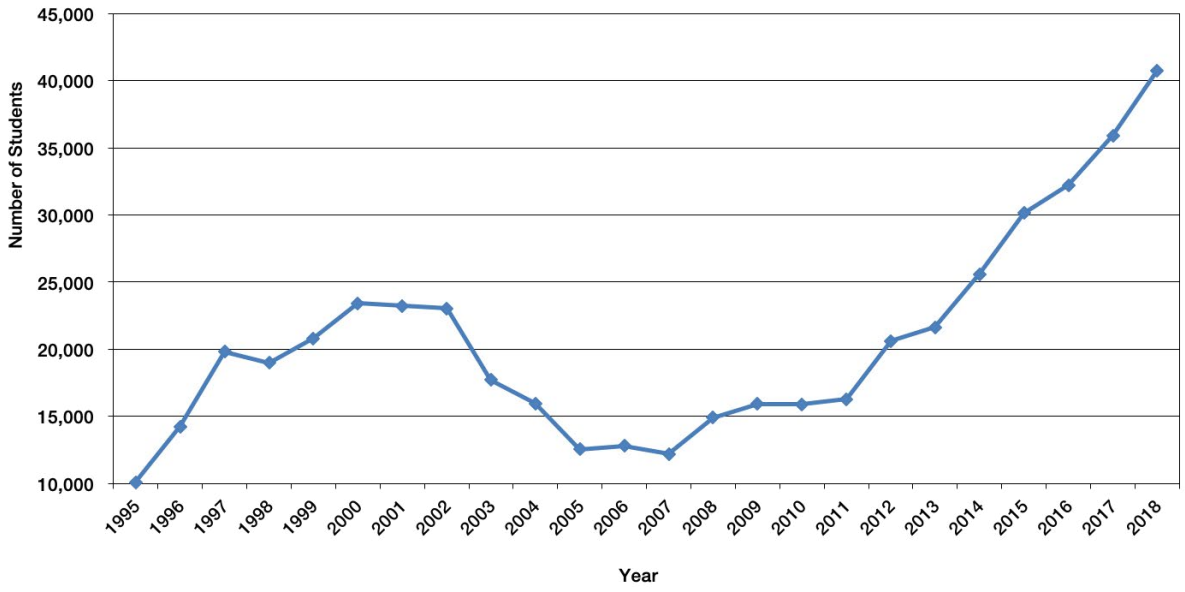


Figure B3. Bachelor's Degrees Granted by Tenure-Track Size

CRA Taulbee Survey 2018

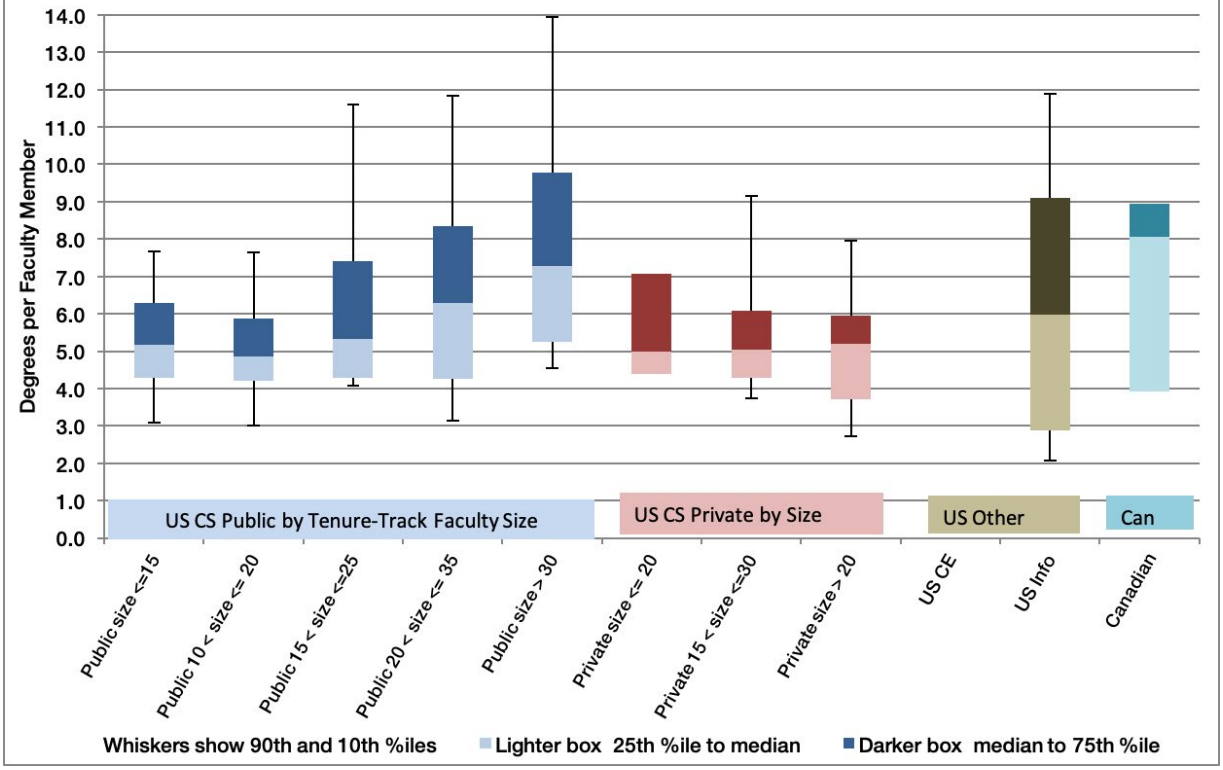
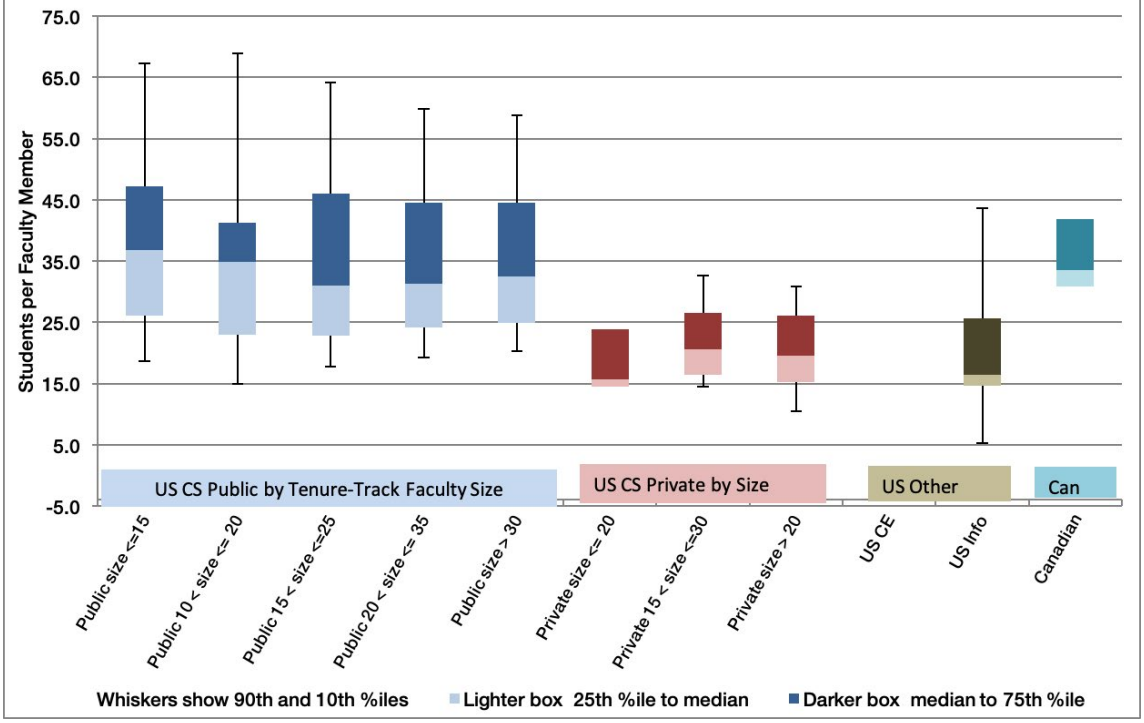


Figure B4. Bachelor's Enrollment Normalized by Tenure-Track Size
CRA Taulbee Survey 2018



considered, the average increase is 13.9 percent per department. Figure B2 illustrates the trend in the total number of newly declared computing undergraduate majors as reported in the Taulbee Survey.

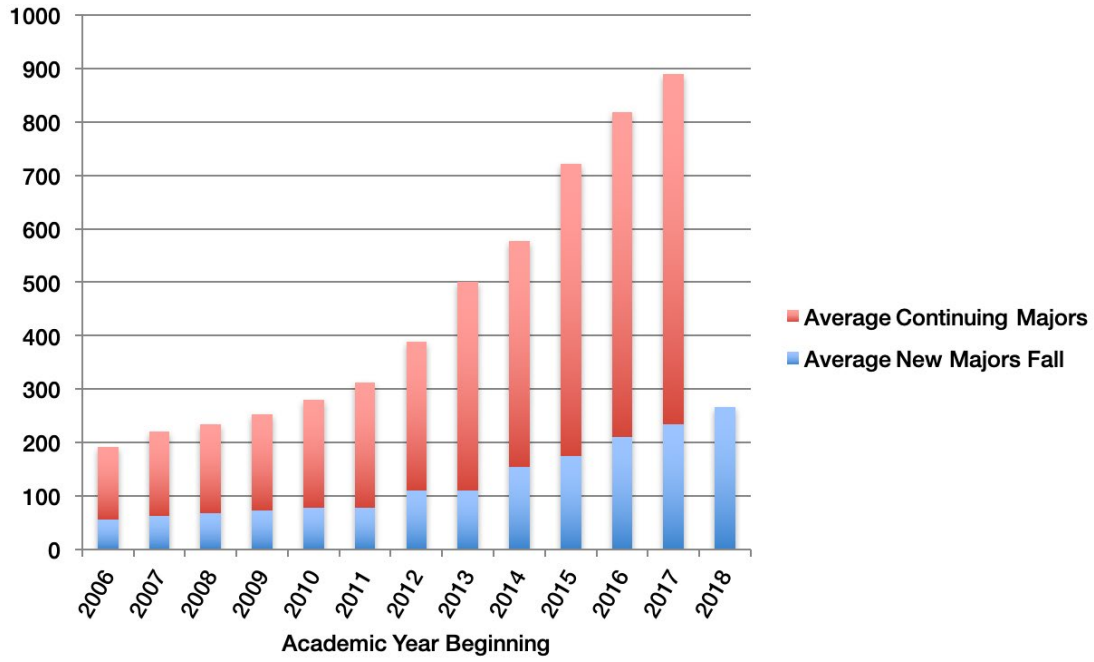
Total undergraduate enrollment in computing majors among U.S. CS departments (i.e., the sum of the number of new and continuing majors in CS, CE, and I at these departments) increased 6.6 percent (also 9.3 percent per department) when all respondents are compared, and increased 10.6 percent among U.S. CS departments reporting both this year and last year (Tables 1 and B6).

Per-department averages smooth out comparisons from year to year when there are differences in the number of reporting departments, but the averages include both very large and very small departments. Figures B3 and B4 show the distribution of number of degrees awarded (Figure B3) and total enrollment (Figure B4) per tenured or tenure-track faculty member, in department size groupings for the U.S. CS departments. Among public institutions, larger departments produce more bachelor's degrees per tenure-track faculty member than do smaller departments; for private institutions, there is little difference by department size. Departments from private institutions enroll fewer bachelor's students per tenure-track faculty than do departments from public institutions. Neither public nor private institutions show a clear relationship between faculty size and enrollment per tenure-track faculty member.

The enrollment increases in CS continue to be of particular interest to our community. This year's Taulbee Survey data shows that the per-department enrollment of CS bachelor's majors in U.S. CS departments increased by 8.7 percent over last year. While lower than the 13.3 percent increase reported last year and the 24.8 percent increase reported two years ago, this increase is still considerable given the sustained growth surge of more than decade and the capacity barriers that have caused several departments to limit entrance into the major. Figure B5 shows the enrollment trend from Taulbee Survey data since this surge began. The average enrollment per U.S. CS department has increased over 360 percent during this period; that is, it has more than quadrupled. For the past five years, it has exceeded the previous peak reached during the dot-com enrollment surge.

As noted in the introduction, we asked various questions this year about how departments are responding to the enrollment

Figure B5. Average New and Continuing CS Majors per Academic Unit (U.S. CS Programs Only)
CRA Taulbee Survey 2018



surge, so that we may compare the situation today with that of three years ago when CRA issued its "Generation CS" report. A separate report on the results of this year's questions is expected to be distributed in the June 2019 issue of *Computing Research News*, However, we can report here the results of one basic question comparing the difficulty in managing the bachelor's level enrollment situation now versus three years ago. As might be expected from the enrollment data we have reported above, most departments find it harder to manage now than they did three years ago. Among the 141 total departments responding to this question, 44 percent said that it is much more difficult to manage now, and an additional 29 percent said it was somewhat more difficult to manage now. Only four percent said it was somewhat easier, and the rest said it was about the same. These statistics are similar when only U.S. CS departments (122 of the 141) are considered.

Another view of bachelor's enrollments can be gleaned from CS course-level data. Such data was first reported in CRA's Generation-CS report for the fall terms in 2005, 2010 and 2015. The Taulbee Survey began collecting follow-up data in the 2016 survey, and now does so annually. Table B9 shows four-year enrollment trends for the four types of courses for which data is collected (representative introductory course for non-majors, introductory course for majors, mid-level course, and upper-level course). For each type of course, only those departments are included that reported data for each of the four years and reported on the same course in each of the four years. The data indicate that median enrollment in the introductory course for non-majors, the introductory course for CS majors, and the mid-level course each is at its highest level in 2018 among the four years 2015-18. However, only the mid-level course shows a steadily increasing median over the four-year period. The table further shows that the median percent of non-majors in the introductory course for majors is at its highest level in 2018. In last year's survey, we observed that the median percent of non-majors in the introductory course for majors had been declining over a three-year period. This year's observation about the percent of non-majors in the introductory course for majors may reflect differences in what is happening at the seven departments that did not report in 2018 but reported in 2015-17, relative to the 32 departments that reported all four years.

Gender diversity among bachelor's graduates, both overall and in CS, improved again in 2017-18. Women comprised 21.2 percent

Table F1. Actual and Anticipated Faculty Size by Position and Department Type

	Actual		Projected				Expected 2-Yr Growth	
	2018-2019		2019-2020		2020-2021			
US CS Public	Total	Average	Total	Average	Total	Average	#	%
TenureTrack	3,117	30.9	3,326	32.9	3,487	34.5	370	11.9%
Teaching Prof	441	7.6	499	8.3	535	8.9	94	21.3%
Other Instruc	401	7.9	428	8.2	439	9.0	38	9.5%
Research	257	5.1	277	5.2	294	5.8	37	14.4%
Postdoc	280	5.4	312	5.7	334	6.1	54	19.3%
Total	4,496	44.5	4,842	47.9	5,089	50.4	593	13.2%
US CS Private								
TenureTrack	1,249	34.7	1,320	36.7	1,368	38.0	119	9.5%
Teaching Prof	230	9.2	252	10.1	268	10.7	38	16.5%
Other Instruc	35	3.2	39	3.9	42	4.2	7	20.0%
Research	169	9.9	175	10.3	183	10.8	14	8.3%
Postdoc	251	10.9	272	11.8	292	12.7	41	16.3%
Total	1,934	53.7	2,058	57.2	2,153	59.8	219	11.3%
All US CS								
TenureTrack	4,366	31.9	4,646	33.9	4,855	35.4	489	11.2%
Teaching Prof	671	8.1	751	8.8	803	9.4	132	19.7%
Other Instruc	436	7.0	467	7.5	481	8.2	45	10.3%
Research	426	6.4	452	6.5	477	7.0	51	12.0%
Postdoc	531	7.1	584	7.5	626	8.0	95	17.9%
Total	6,430	46.9	6,900	50.4	7,242	52.9	812	12.6%
US CE								
TenureTrack	73	18.3	76	19.0	78	19.5	5	6.8%
Teaching Prof	6	3.0	6	3.0	6	3.0	0	0.0%
Other Instruc	2	2.0	2	2.0	2	2.0	0	0.0%
Research	19	19.0	19	19.0	19	19.0	0	0.0%
Postdoc	9	3.0	10	3.3	11	3.7	2	22.2%
Total	109	27.3	113	28.3	116	29.0	7	6.4%
US I								
TenureTrack	379	27.1	414	29.6	443	31.6	64	16.9%
Teaching Prof	100	10.0	119	11.9	134	13.4	34	34.0%
Other Instruc	42	5.3	46	5.8	49	6.1	7	16.7%
Research	11	1.9	11	2.3	12	2.4	1	9.1%
Postdoc	27	2.7	38	3.4	36	3.6	9	33.3%
Total	559	39.9	628	44.8	673	48.1	114	20.4%
Canadian								
TenureTrack	396	39.6	411	41.1	424	42.4	28	7.1%
Teaching Prof	54	7.7	56	8.0	55	9.2	1	1.9%
Other Instruc	14	3.5	9	2.3	9	2.3	-5	-35.7%
Research	9	3.0	9	3.0	10	3.3	1	11.1%
Postdoc	86	10.8	89	11.1	88	11.0	2	2.3%
Total	559	55.9	574	57.4	586	58.6	27	4.8%
Grand Total								
TenureTrack	5,214	31.6	5,547	33.6	5,799	35.1	585	11.2%
Teaching Prof	831	8.2	932	9.0	998	9.7	167	20.1%
Other Instruc	494	6.6	524	7.0	541	7.5	47	9.5%
Research	465	6.0	492	6.2	518	6.7	53	11.4%
Postdoc	653	6.8	720	7.2	761	7.7	108	16.5%
Total	7,657	46.4	8,214	49.8	8,616	52.2	959	12.5%

of all graduates and 20.9 percent of CS graduates in 2017-18. In CE, the percentage of women among bachelor's graduates was 15.6 percent compared with the 12.6 percent reported last year, and the percentage of women among I graduates increased from 25.0 percent to 26.8 percent (Table B2). The percentage of CS bachelor's degrees awarded to Whites continued to decline, from 47.6 percent in 2016-17 to 45.4 percent in 2017-18, while the percentage awarded to Asians rose from 25.9 percent to 26.5 percent and the percentage awarded to Non-resident Aliens rose from 12.5 percent to 13.9 percent. As was the case in last year's report, changes in other ethnicity categories were less than 1 percent in CS. In aggregate across the three areas of computing, 45.7 percent of the graduates were White, 25.4 percent Asian, 13.0 percent Non-resident Aliens, and 15.8 percent all other ethnicity categories combined. However, in I programs, the other ethnicity categories accounted for approximately 23 percent of the graduates (Table B3).Gender and ethnicity distributions of enrolled students (Table B8) suggest that improvements in the diversity of computing graduates are not likely to happen any time soon.

In all three computing areas (CS, CE, and I), Resident Asians and Non-resident Aliens continue comprise a larger fraction of female enrollment than male enrollment, while Whites comprise a larger fraction of male enrollment than female enrollment (Table B8). Table B7 indicates that the same comparisons continue to hold true for degree awardees.

Faculty Demographics

(Tables F1-F9; Figure F1)[4]

Table F1 shows the current and anticipated sizes, in FTE, for tenure-track, teaching, and research faculty, and postdocs. The total tenure-track faculty count in U.S. CS departments increased by 4.5 percent over last year, and the average tenure-track faculty size increased by 3.2 percent. In U.S. CS departments, the total teaching faculty count increased from 947 to 1107 (16.9 percent).

This year, we asked departments to report their teaching faculty in two categories, based on results of last year's Teaching Positions survey conducted by a CRA special committee. Because position titles vary widely across institutions, the survey instructions gave guidance on categorizing faculty based on

Table F2. Vacant Positions 2016-2017 by Position and Department Type

	Tried to fill	Filled
US CS Public		
TenureTrack	315	250
Teaching Prof	95	82
Other Instruc	107	99
Research	41	38
Postdoc	81	93
Total	638	562
US CS Private		
TenureTrack	125	91
Teaching Prof	45	34
Other Instruc	15	11
Research	26	24
Postdoc	45	45
Total	256	205
All US CS		
TenureTrack	440	341
Teaching Prof	140	116
Other Instruc	122	110
Research	67	62
Postdoc	126	138
Total	894	767
US CE		
TenureTrack	4	5
Teaching Prof	1	1
Other Instruc	0	0
Research	18	18
Postdoc	4	4
Total	27	28
US I		
TenureTrack	35	29
Teaching Prof	21	20
Other Instruc	5	5
Research	1	1
Postdoc	7	9
Total	69	64
Canadian		
TenureTrack	41	27
Teaching Prof	5	5
Other Instruc	5	5
Research	2	2
Postdoc	18	41
Total	71	80
Grand Total		
TenureTrack	520	402
Teaching Prof	167	142
Other Instruc	132	120
Research	88	83
Postdoc	155	192
Total	1,061	939

responsibilities and expectations. "Teaching Professors" on average have more varied responsibilities in teaching, scholarship, service/governance, etc., and higher expectations for visibility outside the unit or the institution. "Other Instructors" are more focused on teaching introductory or mid-level courses and tend to have shorter contract lengths, though they are still full time faculty (Taulbee does not collect data on course-by-course adjuncts). In U.S. CS departments, the number of persons in these two categories was split fairly evenly at public institutions, but decidedly in favor of Teaching Professors at private institutions. U.S. CE and I departments, as well as Canadian departments, also reported a decided preference for the Teaching Professor category of teaching faculty.

Table F2a. Reasons Positions Left Unfilled

Reason	# Reported	% of Reasons
Didn't find a person who met our hiring goals*	19	14.1%
Offers turned down	69	51.1%
Technically vacant, not filled for admin reasons	4	3.0%
Hiring in progress	36	26.7%
Other	7	5.2%
Total Reasons Provided	135	
***What hiring goals could not be met?**		**# Given**
Specialty areas (varied, but expected: data science, cybersecurity)		6
Teaching needs		2
Senior level position (dean, chair, endowed)		3
Joint teaching and admin position		1

Table F3. Gender of Newly Hired Faculty

	Tenure-Track		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Male	313	77.1%	83	73.5%	81	73.0%	43	79.6%	135	81.8%	655	77.1%
Female	93	22.9%	30	26.5%	30	27.0%	11	20.4%	30	18.2%	194	22.9%
Unknown	0		0		0		1		28		29	
Total	406		113		111		55		193		878	

Table F4. Ethnicity of Newly Hired Faculty

	Tenure-Track		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Nonresident Alien	64	18.0%	14	14.6%	8	7.1%	8	15.1%	31	24.2%	125	16.8%
American Indian / Alaska Native	0	0.0%	0	0.0%	1	0.9%	0	0.0%	0	0.0%	1	0.1%
Asian	117	33.0%	9	9.4%	10	8.9%	13	24.5%	38	29.7%	187	25.1%
Black or African-American	7	2.0%	1	1.0%	6	5.4%	3	5.7%	5	3.9%	22	3.0%
Native Hawaiian/ Pacific Islander	3	0.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3	0.4%
White	133	37.5%	62	64.6%	76	67.9%	23	43.4%	42	32.8%	336	45.2%
Multiracial, not Hispanic	6	1.7%	2	2.1%	0	0.0%	1	1.9%	3	2.3%	12	1.6%
Hispanic, any race	7	2.0%	4	4.2%	5	4.5%	2	3.8%	1	0.8%	19	2.6%
Resident, race/ethnic unknown	18	5.1%	4	4.2%	5	5.4%	3	5.7%	8	6.3%	39	5.2%
Total known residency	355		96		111		53		128		744	
Residency Unknown	51		17		0		2		65			
Total	406		113		111		55		193		878	

2018 Taulbee Survey *(continued)*

The total number of research faculty reported at U.S. CS departments rose to 426 from the 408 reported last year, while the total number of postdocs dropped from 567 to 531. About half of the U.S. CS departments providing faculty data to this year's survey reported having any research faculty, and this was true among both public and private universities. About half of public and two-thirds of private U.S. CS departments reported having any postdocs.

Figure F1 illustrates the comparative changes at U.S. CS departments in undergraduate enrollment, tenure-track faculty and teaching faculty since 2006, when the current enrollment surge began. This figure updates with recent years' data a figure from the Generation-CS report. It illustrates the continuing challenge to obtain sufficient instructional resources to deal effectively with the increased enrollments.

Canadian departments, on average, are larger than U.S. CS departments, in terms of both tenure-track and total faculty, while U.S. I and CE departments, on average, are smaller than U.S. CS departments on both counts. This follows the pattern of previous years. The observations about U.S. CE and I departments may reflect the fact that we ask departments to report only computing-related faculty, so departments with Library Science or EE programs may report only part of their faculty.

Among U.S. CS departments, those at private universities are on average larger than those at public universities in both tenure-

Table F5. Faculty Losses

Died	7
Retired	94
Took Academic Position Elsewhere	126
Took Nonacademic Position	34
Remained, but Changed to Part Time	23
Other	11
Unknown	8
Total	303

Table F6. Gender of Current Faculty

	Full		Associate		Assistant		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Male	2,131	85.1%	993	76.8%	1,081	77.3%	659	71.9%	426	72.9%	343	79.2%	529	81.0%	6,162	79.2%
Female	374	14.9%	300	23.2%	318	22.7%	258	28.1%	158	27.1%	90	20.8%	124	19.0%	1,622	20.8%
Unknown	70		13		22		18		18		2		25		168	
Total	2,575		1,306		1,421		935		602		435		678		7,952	

Table F7. Ethnicity of Current Faculty

	Full		Associate		Assistant		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Nonresident Alien	6	0.3%	8	0.7%	179	13.9%	35	4.2%	21	3.8%	33	8.3%	158	28.2%	440	6.2%
American Indian / Alaska Native	20	0.9%	2	0.2%	4	0.3%	0	0.0%	2	0.4%	0	0.0%	0	0.0%	28	0.4%
Asian	643	28.3%	369	32.1%	458	35.5%	111	13.3%	46	8.4%	88	22.2%	173	30.8%	1,888	26.7%
Black or African-American	19	0.8%	27	2.3%	29	2.2%	14	1.7%	24	4.4%	5	1.3%	10	1.8%	128	1.8%
Native Hawaiian/ Pacific Islander	5	0.2%	0	0.0%	2	0.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	7	0.1%
White	1,455	63.9%	667	57.9%	537	41.7%	623	74.6%	406	74.0%	237	59.7%	187	33.3%	4,112	58.3%
Multiracial, not Hispanic	11	0.5%	4	0.3%	5	0.4%	7	0.8%	3	0.5%	0	0.0%	1	0.2%	31	0.4%
Hispanic, any race	47	2.1%	33	2.9%	28	2.2%	23	2.8%	29	5.3%	13	3.3%	12	2.1%	185	2.6%
Resident, race/ethnic unknown	70	3.1%	41	3.6%	47	3.6%	22	2.6%	659	71.9%	21	5.3%	20	3.6%	239	3.4%
Total known residency	2,276		1,151		1,289		835		549		397		561		7,058	
Residency Unknown	299		155		132		100		53		38		117		894	
Total	2,575		1,306		1,421		935		602		435		678		7,952	

Table F8. Current Tenured and Tenure-Track Faculty by Gender and Ethnicity, From 164 Departments

	Full Professor					Associate Professor					Assistant Professor					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	6	0	0	0	0	8	0	0	1	0	137	42	0	14	15	193	4
Amer Indian or Alaska Native	19	1	0	1	0	2	0	0	0	0	1	3	0	0	1	26	1
Asian	563	80	0	30	25	271	98	0	32	37	371	87	0	39	31	1,470	32
Black or African-American	15	4	0	1	1	16	11	0	2	4	16	13	0	2	5	75	2
Native Hawaiian/ Pac Islander	4	1	0	0	0	0	0	0	0	0	1	1	0	0	0	7	0
White	1,219	220	16	65	69	522	145	0	62	55	403	134	0	42	47	2,659	58
Multiracial, not Hispanic	10	1	0	1	0	4	0	0	1	0	4	1	0	0	0	20	0
Hispanic, any race	35	12	0	2	4	25	8	0	3	3	25	3	0	3	1	108	2
Total Res & Ethnicity Known	1,871	319	16			848	262	0			958	284	0			4,558	
Resident, ethnicity unknown	59	9	2			30	11	0			37	9	1			158	
Not Reported (N/R)	201	46	52			115	27	13			86	25	21			586	
Gender Totals	2,131	374	70			993	300	13			1,081	318	22			5,302	
%	85.1%	14.9%				76.8%	23.2%				77.3%	22.7%					
* %M and %F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known																	

Table F9a. Current Non-Tenure-Track Teaching by Gender and Ethnicity, From 154 Departments

	Teaching Professors					Other Instructors					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	27	8	0	5	3	15	6	0	4	4	56	4
Amer Indian or Alaska Native	0	0	0	0	0	2	0	0	1	0	2	0
Asian	65	46	0	11	20	30	16	0	8	11	157	12
Black or African-American	12	2	0	2	1	12	12	0	3	9	38	3
Native Hawaiian/ Pac Islander	0	0	0	0	0	0	0	0	0	0	0	0
White	454	169	0	78	73	304	102	0	78	72	1,029	77
Multiracial, not Hispanic	6	1	0	1	0	1	2	0	0	1	10	1
Hispanic, any race	17	6	0	3	3	25	4	0	6	3	52	4
Total Res & Ethnicity Known	581	232	0	0	0	389	142	0	0	0	1,344	0
Resident, ethnicity unknown	16	6	0			14	4	0			40	
Not Reported (N/R)	62	20	18			23	12	18			153	
Gender Totals	659	258	18			426	158	18			1,537	
%	71.9%	28.1%				72.9%	27.1%					
* %M and %F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known												

Table F9b. Current Non-Tenure-Track Research Faculty and Postdoctorates by Gender and Ethnicity, From 132 Departments

	Non-Tenure-Track Research					Postdocs					Ethnicity Totals	
	Male	Fem	N/R	% of M*	% of F*	Male	Fem	N/R	% of M*	% of F*	Total	%
Nonresident Alien	27	6	0	9	8	140	16	2	31	18	191	21
Amer Indian or Alaska Native	0	0	0	0	0	0	0	0	0	0	0	0
Asian	69	19	0	23	24	148	25	0	33	28	261	29
Black or African-American	3	2	0	1	3	5	5	0	1	6	15	2
Native Hawaiian/ Pac Islander	0	0	0	0	0	0	0	0	0	0	0	0
White	188	49	0	64	61	146	41	0	32	46	424	46
Multiracial, not Hispanic	0	0	0	0	0	0	1	0	0	1	1	0
Hispanic, any race	9	4	0	3	5	11	1	0	2	1	25	3
Total Res & Ethnicity Known	296	80	0			450	89	2			917	
Resident, ethnicity unknown	18	3	0			14	6	0			41	
Not Reported (N/R)	29	7	2			65	29	23			155	
Gender Totals	343	90	2			529	124	25			1,113	
%	79.2%	20.8%				81.0%	19.0%					
* %M and %F columns are the percent of that gender who are of the specified ethnicity, of those whose ethnicity is known												

track and total faculty size. This also follows the pattern of previous years.

Table F2 summarizes faculty hiring this past year. The success rate for hiring tenure-track faculty at U.S. CS departments was 77.5 percent this year. The success rate among departments at public universities was again higher than that at private universities (79.4 percent vs 72.8 percent). Again this year, Canadian departments had lower success rates, on average, than did other types of departments. In aggregate across all types of departments, the tenure-track hiring success rate decreased from 82.7 percent to 77.3 percent.

Among those hired into all categories of academic positions (tenure-track, teaching faculty, research faculty, and postdoc) for 2018-19, 22.9 percent were women, down from last year's 24.9 percentage (Table F3). However, among those newly hired into tenure-track positions, the proportion of women rose from 20.8 percent last year to 22.9 percent this year. The percentage of women among new tenure-track faculty hires and the percentage of women among newly hired faculty overall both are once again higher than the percentage of new female Ph.D.s produced during the past year.

Among new tenure-track faculty, the fraction who are White again declined, from 41.8 percent to 37.5 percent, while the fraction who are Non-resident Alien or Asian new hires increased from 47.7 percent to 51.0 percent. Whites dominated both categories of newly hired teaching faculty, with Asians and Non-resident Aliens accounting for much of the remainder. Among research faculty, Whites comprised 43.4 percent of new hires, while Non-resident Aliens or resident Asians in aggregate comprised 39.6 percent of new hires. Both figures are lower than those reported last year. Among postdoc new hires, Whites comprised 32.8 percent, compared to 28.7 percent last year, while Non-resident Aliens and resident Asians collectively comprised 53.9 percent, similar to last year's percentage (Table F4).

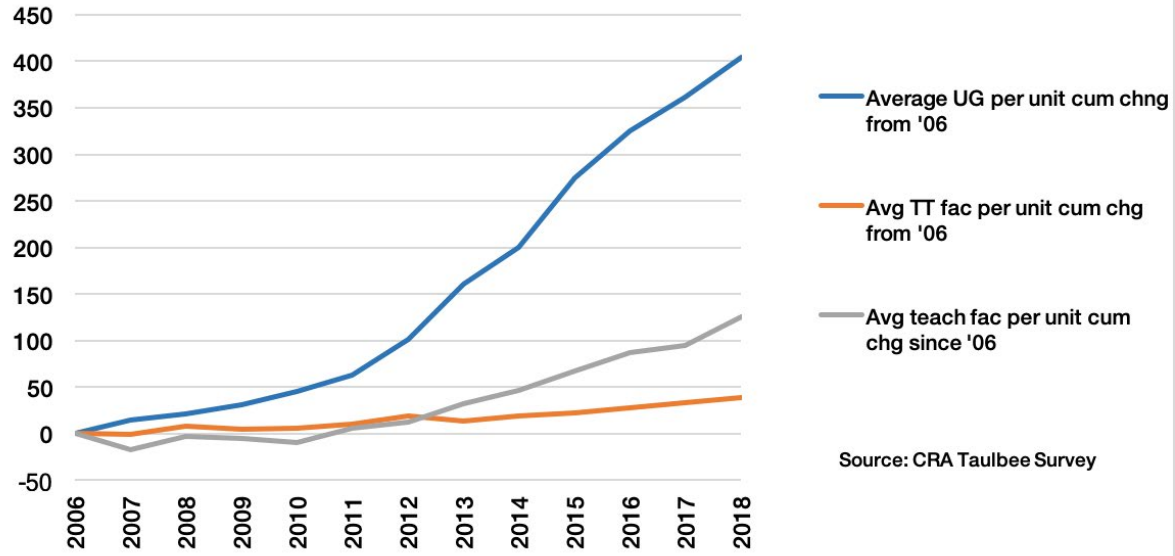
Since 2015, the Taulbee Survey has been collecting information on the number of new faculty hires who had been postdocs in the previous year. For newly hired assistant professors, the fraction who had been postdocs ranged from 21 to 31 percent over the three years of prior data collection. We expanded the question on sources of new faculty this year to learn more about faculty movement between industry and academia, and between academic institutions. Table F10 summaries the results. Of the

Table F10. Source of New Faculty

	Full	Associate	Assistant	Teaching Prof	Other Instruc	Research	Postdoc	Total	% Total from Source
New PhD	1	5	111	19	17	7	99	259	38%
From Postdoc	0	0	75	5	1	5	18	104	15%
From Other Academic	27	25	84	25	28	10	34	233	34%
From Industry	4	5	18	10	28	19	5	89	13%
Total With Hire Source	32	35	288	59	74	41	156	685	
Hired Without PhD	0	0	0	15	55	14	0	84	
% Hired Without PhD				25%	74%	34%			

Figure F1. Comparative Change in Majors and Instructional Resources per Unit

CRA Taulbee Survey 2018



288 assistant professors hired for the 2018-2019 academic year for whom the source was known, 39 percent were new PhDs, 26 percent had postdocs the previous year (this is within the range of the previous three years), 29 percent came from other academic institutions, and 6 percent came from industry. We don't know the previous academic rank of the new assistant professors who came from other institutions; they might have been teaching faculty or research faculty as a transitional position, or they might have come from other tenure-track positions. Of the 67 full and associate professors whose source was reported, 78 percent came from other academic institutions and 13 percent from industry. We also asked about faculty hired without PhDs; in the two teaching faculty categories, 25 percent of Teaching Professors and 74 percent of Other Instructors were hired without PhDs.

Another new feature of this year's survey was the collection of certain information about startup packages, exclusive of equipment costs, for new assistant professors. Among the 107 U.S. CS departments that responded to our question about the size of the startup package, the median of the average offered package was $250K. The median among departments at public institutions was slightly lower ($240K), while the median for

those at private institutions was slightly over $350K. Packages at I-departments had a median of $220K, while those at Canadian institutions has a median of $97.5K in Canadian dollars. We also asked the departments if there were limits to how long this startup funding was available for use. Of the 140 total departments that responded, only 18 percent had no set limit. The typical maximum number of years was three.

There was a 29.5 percent increase in faculty losses reported this year as compared with last year (Table F5). The biggest increase was in persons taking academic positions elsewhere; not only did the raw number increase (from 85 to 126), but also this category's fraction of the total losses increased (from 36.3 percent to 41.6 percent). This is consistent with what we learned about the source of new hires. A greater percentage of the faculty losses this year also were due to persons who changed to part time (from 5.1 percent to 7.6 percent of the total). While retirements were up from 80 to 94, this category's percent of the total dropped from 34.2 to 31.0. The number of persons taking nonacademic positions elsewhere went from 26 to 34, but this was the same fraction of the total losses as was reported last year.

The proportion of women currently at each of the three tenure-track faculty ranks stayed within one-half of a percentage point of the corresponding value reported last year, with slight drops at the assistant and full professor level and a slight increase at the associate professor level. There was a slight increase in the proportion of women among teaching faculty, with only a one percentage point difference in the proportion of women between the two teaching faculty categories. The proportion of women among research faculty and postdocs each were within one percentage point of their respective values reported last year (Table F6).

Among the 164 departments who report gender by ethnicity breakdowns (which represents the vast majority of departments), Whites comprise a slightly greater percentage of female full professors than they do male full professors; a similar situation is present at the assistant professor level, while the reverse is true at the associate professor level. Asians comprise a greater percentage of males than they do females at both the full and assistant professor levels while the reverse is true at the associate professor level (Table F8). Among teaching and research faculty, Whites comprise over three-fourths of those for whom ethnicity was known, while they comprise only slightly over one-third of the postdocs (Tables F9a and F9b). Non-resident Aliens and Asians account for 50 percent of the postdocs.

For next year, U.S. CS departments forecast an average 6.4 percent growth in tenure-track faculty and 7.3 percent growth in teaching faculty (Table F1). The tenure-track forecast is lower than that made last year, while the teaching faculty forecast is the same as that last year. Departments also forecast an average 10.0 percent growth in postdocs, higher than that forecast last year. Actual hiring exceeded last year's expectations for teaching faculty hiring, while falling short in their expected hiring for both tenure-track faculty and postdocs.

Research Expenditures

(Table R1; Figures R1-R2)

Table R1 shows the distribution of departments' total research expenditure (including indirect costs or "overhead" as stated on project budgets) from external sources of support. Figures R1 and R2 show the per capita expenditure, where capitation is computed two ways. The first (Figure R1) is relative only to the number of tenure-track faculty members. The second (Figure R2)

Table R1. Total Expenditure from External Sources for Computing Research

	Percentile of Department Averages					
Department Type	**# Depts**	**10th**	**25th**	**50th**	**75th**	**90th**
US CS Public	71	$1,246,262	$2,572,994	$5,296,966	$9,861,560	$19,188,028
US CS Private	24	$2,707,554	$3,986,388	$9,394,133	$13,227,435	$21,234,887
US CE	1	*	*	*	*	*
US Information	12	$1,242,574	$2,022,869	$4,194,343	$4,649,739	$4,706,532
Canadian	5	*	*	$2,051,893	*	*

Figure R1. Research Expenditures Normalized by Tenure-Track Size

CRA Taulbee Survey 2018

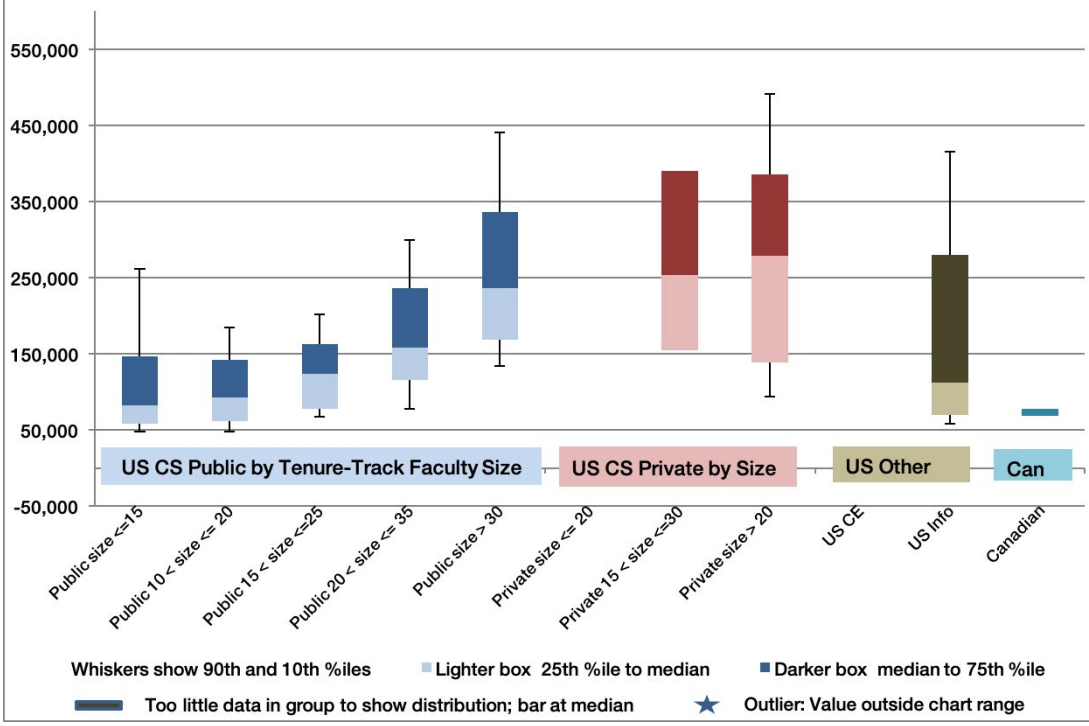
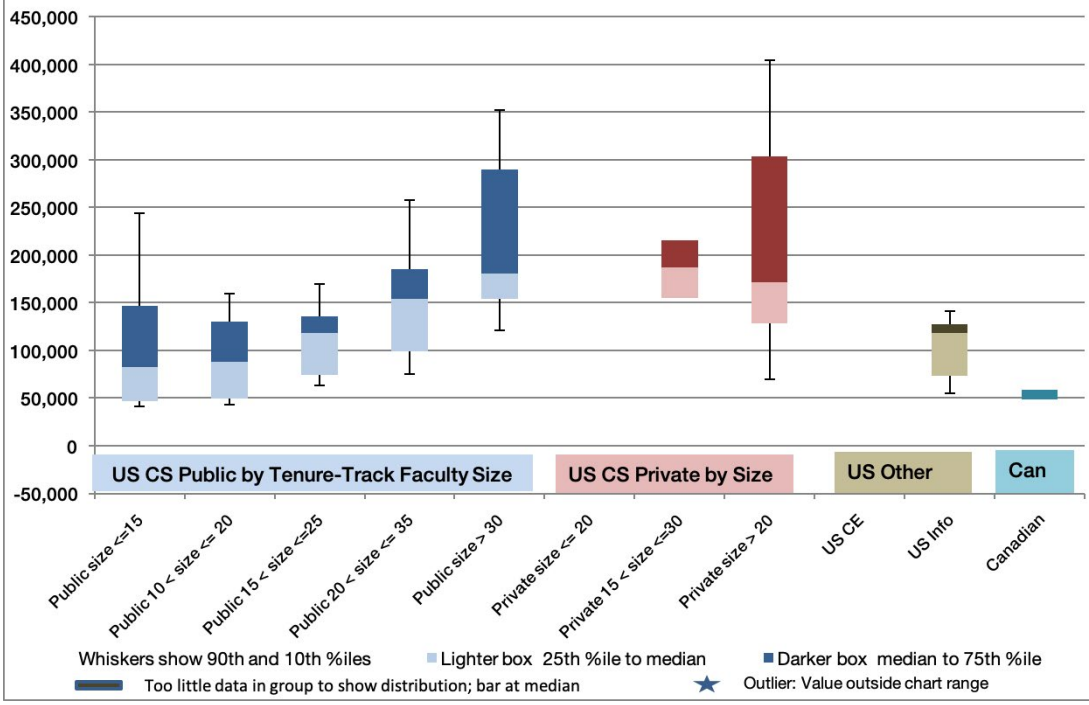


Figure R2. Research Expenditures Normalized by Tenure-Track + Research Faculty + Postdoctorates

CRA Taulbee Survey 2018



is relative to research faculty and postdocs as well as tenure-track faculty. Canadian levels are shown in Canadian dollars.

Overall median research expenditures for 2017-18 at U.S. CS public departments increased 30.7 percent in comparison with 2016-17. Last year's reported increase was just 8.7 percent. At U.S. CS departments in private institutions, median expenditures rose 25.8 percent compared with a 19.6 percent increase last year. The median research expenditure at U.S. CS departments in private institutions remains considerably higher that of public institutions. Median expenditures at U.S. I departments rose 49.4 percent over last year's figure, after being relatively flat in last year's report. Canadian departments showed a 9.7 percent increase in median expenditure over last year, versus a one percent increase last year. The sample size for I departments and Canadian departments is small, which makes these comparisons subject to more volatility.

The U.S. CS data show a tendency for larger departments to have more external funding per capita than smaller departments among the public institutions. There is not a clear pattern for size among the private institutions, but data for smaller private institutions is limited.

Table G1. Doctoral Students Supported as Full-Time Students by Department Type

		On Institutional Funds						On External Funds						Total
Department Type	# Dept	Teaching Assistants		Research Assistants		Full-Support Fellows		Teaching Assistants		Research Assistants		Full-Support Fellows		
US CS Public	92	3,395.0	38.3%	867.8	9.8%	476.0	5.4%	22.7	0.3%	3,845.0	43.4%	251.5	2.8%	8,858.1
US CS Private	31	763.3	19.2%	1,144.0	28.8%	373.0	9.4%	2.0	0.1%	1,591.5	40.1%	94.8	2.4%	3,968.5
US CS Total	123	4,158.3	32.4%	2,011.8	15.7%	849.0	6.6%	24.7	0.2%	5,436.5	42.4%	346.3	2.7%	12,826.6
US CE	3	55.0	30.6%	32.0	17.8%	0.0	0.0%	0.0	0.0%	93.0	51.7%	0.0	0.0%	180.0
US I	14	302.8	38.2%	77.0	9.7%	67.0	8.4%	2.0	0.3%	324.0	40.9%	20.2	2.5%	793.0
Canadian	10	332.5	50.9%	117.0	17.9%	6.0	0.9%	0.0	0.0%	198.0	30.3%	0.0	0.0%	653.5
Grand Total	150	4,848.6	33.5%	2,237.8	15.5%	922.0	6.4%	26.7	0.2%	6,051.5	41.9%	366.4	2.5%	14,453.1

Table G1a. Master's Students Supported as Full-Time Students by Department Type

		On Institutional Funds						On External Funds						Total
Department Type	# Dept	Teaching Assistants		Research Assistants		Full-Support Fellows		Teaching Assistants		Research Assistants		Full-Support Fellows		
US CS Public	80	1,759.5	73.0%	133.5	5.5%	16.0	0.7%	0.0	0.0%	491.0	20.4%	9.0	0.4%	2,408.9
US CS Private	17	119.0	69.8%	14.0	8.2%	12.0	7.0%	1.5	0.9%	13.0	7.6%	11.0	6.5%	170.5
US CS Total	97	1,878.4	72.8%	147.5	5.7%	28.0	1.1%	1.5	0.1%	504.0	19.5%	20.0	0.8%	2,579.4
US CE	3	47.0	39.2%	0.0	0.0%	0.0	0.0%	0.0	0.0%	73.0	60.8%	0.0	0.0%	120.0
US I	9	79.2	40.0%	31.6	16.0%	33.8	17.1%	1.8	0.9%	49.2	24.9%	2.2	1.1%	197.8
Canadian	9	417.5	57.0%	82.0	11.2%	38.0	5.2%	0.0	0.0%	195.0	26.6%	0.0	0.0%	732.5
Grand Total	118	2,422	66.7%	261	7.2%	100	2.7%	3	0.1%	821	22.6%	22	0.6%	3,630

Table G1b. Master's Students Eligibility for Assistantship Support

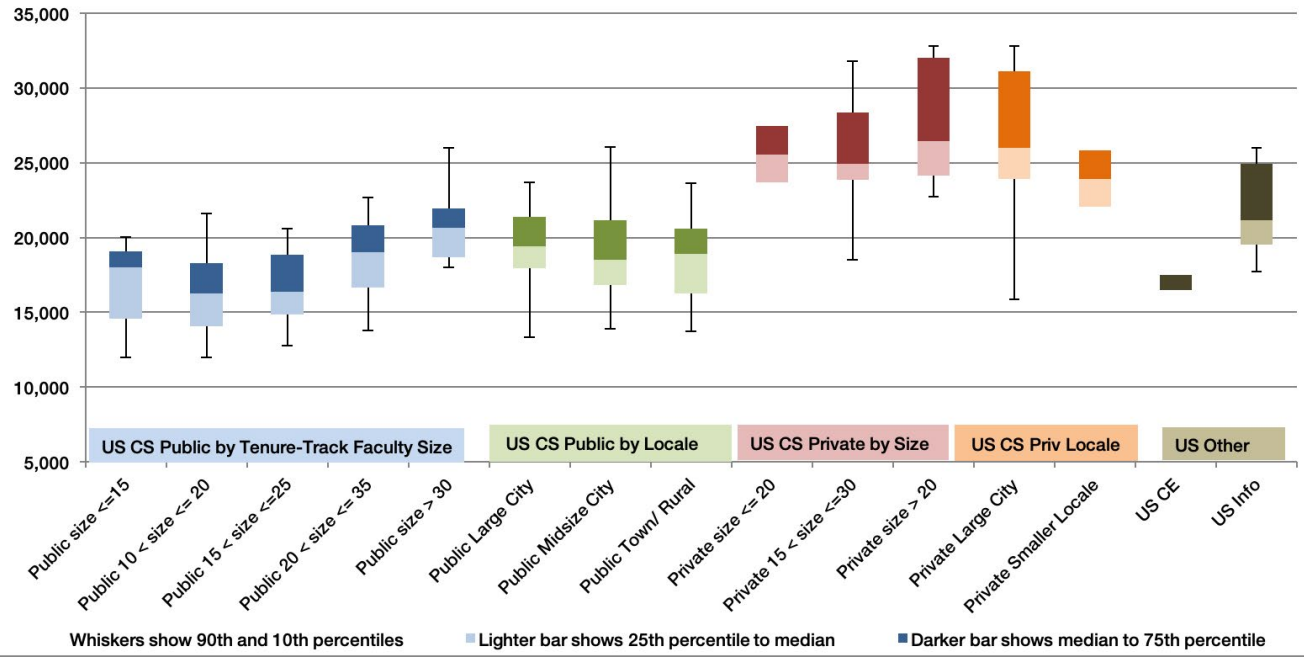
	# Depts	% of Depts
All master's students are eligible for assistantships	84	61.8%
No master's students are eligible for assistantships	16	11.8%
Students in some master's programs but not others are eligible for assistantships	24	17.6%
Other (combination of individual qualifications, research needs, and funds available)	12	8.8%
No Response	31	
Valid Total	136	100.0%
Overall Total	167	

Table G2. Fall 2018 Academic-Year Graduate Stipends by Department Type and Support Type

Teaching Assistantships						
		Percentiles of Department Averages				
Department Type	**# Depts**	**10th**	**25th**	**50th**	**75th**	**90th**
US CS Public	99	$13,451	$16,457	$19,000	$21,212	$24,126
US CS Private	27	$20,070	$23,108	$25,713	$29,436	$32,450
US CE	4	*	*	$15,437	*	*
US Info	12	$17,568	$19,815	$21,825	$25,204	$26,001
Canadian	9	*	$8,185	$15,000	$17,788	*
Research Assistantships						
		Percentiles of Department Averages				
Department Type	**# Depts**	**10th**	**25th**	**50th**	**75th**	**90th**
US CS Public	100	$14,011	$17,811	$19,910	$22,556	$26,050
US CS Private	34	$21,719	$23,123	$25,757	$30,729	$31,864
US CE	4	*	*	$18,475	*	*
US Info	13	$18,733	$20,177	$21,230	$24,649	$25,788
Canadian	8	*	$9,879	$11,500	$16,675	*
Full-Support Fellows						
		Percentiles of Department Averages				
Department Type	**# Depts**	**10th**	**25th**	**50th**	**75th**	**90th**
US CS Public	63	$15,244	$19,750	$24,300	$30,000	$34,000
US CS Private	32	$23,037	$24,744	$27,099	$31,659	$33,999
US CE	2	*	*	*	*	*
US Info	6	*	*	$25,000	*	*
Canadian	3	*	*	*	*	*

Figure G1. Teaching Assistantship Stipends

CRA Taulbee Survey 2018



Graduate Student Support

(Tables G1-G2; Figures G1-G3)

Table G1 shows the number of doctoral students supported as full-time students as of fall 2017, further categorized as teaching assistants (TAs), research assistants (RAs), and full-support fellows. The table also shows the split between those on institutional vs. external funds. Table G1a shows similar data for supported master's students.

The average number of TAs on institutional funds among doctoral students in U.S. CS departments dropped slightly from last year's value, from 34.5 to 33.8. A similar decline was reported last year. Public universities reported a slight increase, while the average at private universities dropped considerably, from 35.2 to 24.6. The reported values at private universities have been somewhat volatile in recent years. Since there are fewer of them, compared with public universities, they are more sensitive to the specific units reporting in a given year. The small number of CE, I, and Canadian departments also make these comparative averages subject to volatility.

Among doctoral students, the average number of RAs on external funding was higher in U.S. CS departments at public universities and lower in those at private universities compared with last year's report, while the average number of RAs supported on institutional funds increased sharply at private universities and declined at publics. In both cases, these were the reverse situations from what was reported last year. The average number of full-support fellows on internal funds increased in U.S. CS departments at both public and private universities. The average number of full-support fellows on external funds increased at U.S. CS departments in public universities but fell in those at private universities.

Among master's students, 66.8 percent of support is for TAs, an increase over the 64.2 percent reported last year. Conversely, 29.8 percent of support is for RAs, lower than last year's 32.0 percent. Among the 97 U.S. CS departments that provided master's support data, the average number of TAs per department on institutional funds is 19.4, compared to the 16.7 average reported in last year's survey (Table G1a). This suggests that the use of master's students is increasing to help

Figure G2. Research Assistantship Stipends

CRA Taulbee Survey 2018

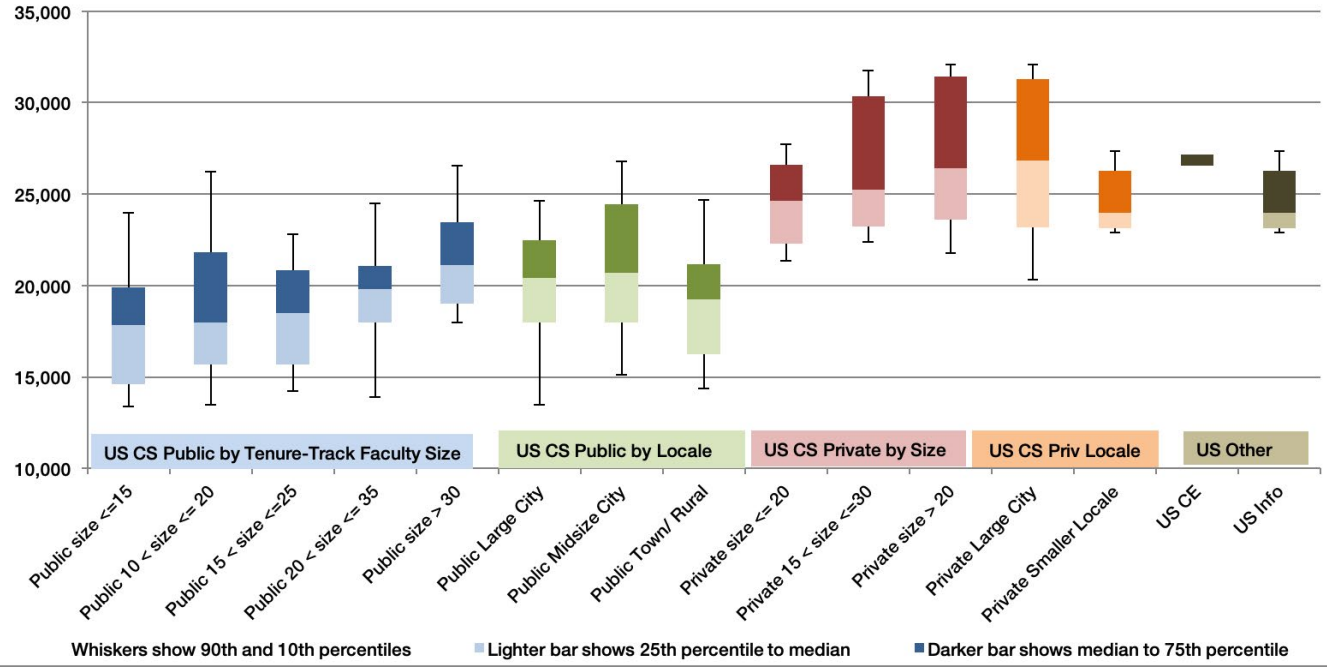
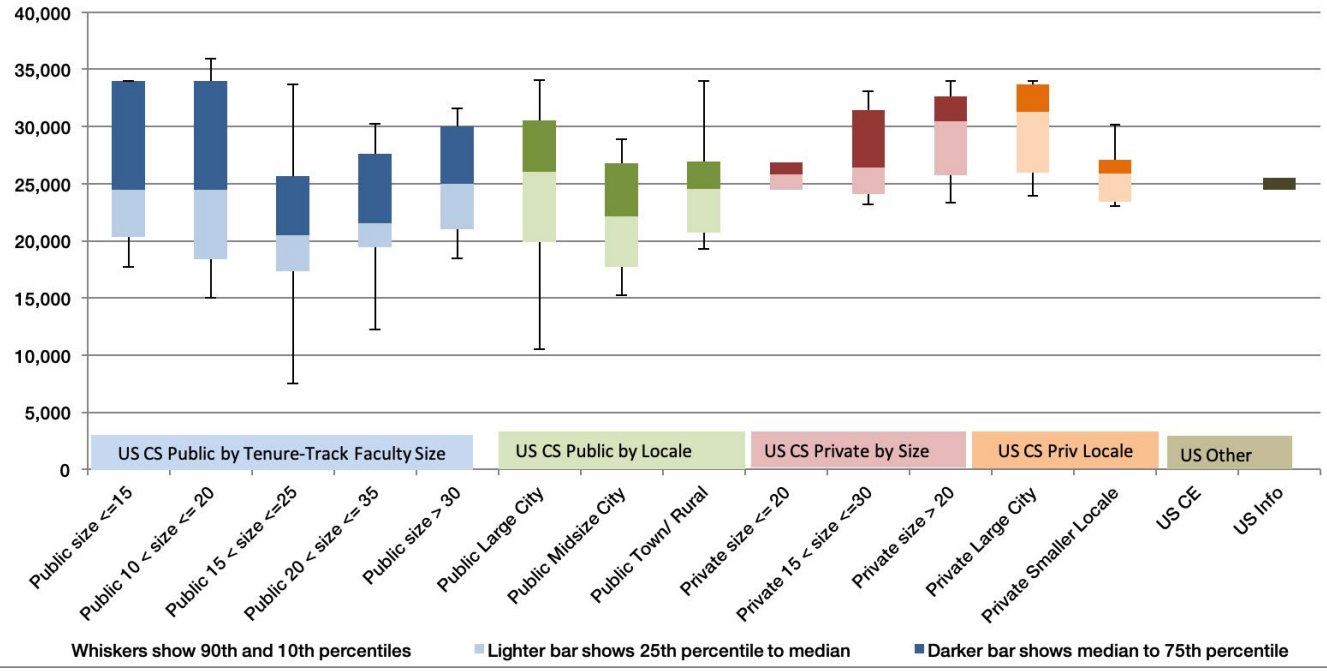


Figure G3. Full Support Fellows Stipends

CRA Taulbee Survey 2018



departments cope with the CS enrollment surge. Note, however, that master's students are not eligible for assistantships in several departments (Table G1b).

Table G2 shows the distribution of stipends for TAs, RAs, and full-support fellows. U.S. CS data are further broken down in this table by public and private institution. Figures G1-G3 further break down the U.S. CS data by size of department and by geographic location of the university.

The median TA salaries at U.S. CS departments increased 2.7 percent at public universities and increased 6.1 percent at private universities. Median salaries of RAs rose 4.3 percent at public universities and 2.9 percent at private universities. For full-support fellows, median salaries rose 5.7 percent at U.S. public universities and 4.2 percent at U.S. private universities. The TA change at public universities is slightly below the change reported last year; each of the other increases at both public and private institutions is larger than the corresponding change reported last year.

Compared with public U.S. CS departments, median stipends are higher at private U.S. CS departments in each of the three stipend categories. Median stipends for TAs and RAs at U.S. I schools fall in between those at public and private U.S. CS departments. These relationships are unchanged from previous years. Median stipends for full-support fellows at I schools fell in between the public and private U.S. CS medians, as in previous years. However, there only were six U.S. I schools reporting full-support fellow stipends this year, versus nine last year.

At U.S. CS departments in public institutions, larger departments have higher salaries than do smaller departments for both TAs and RAs, except that the smallest public departments (those of size 15 or less) have higher TA (but not RA) stipends than those of size 16-25. Stipends in U.S. CS departments at private institutions do not exhibit a clear relationship based on department size for TAs, but for RAs, stipends are slightly higher at larger departments.

Table S1. Nine-month Salaries, 138 Responses of 195 US CS Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	121	121	123	138	114	126	136	136	104	46	42
N Indiv	730	561	721	2,086	422	569	1,020	1,182	927	275	347
10 %tile	$134,550	$130,305	$125,483	$129,873	$99,437	$105,705	$102,998	$93,292	$63,464	$62,361	$44,219
25 %tile	$148,927	$147,364	$139,837	$145,563	$106,847	$113,170	$110,023	$98,266	$73,063	$66,841	$49,031
50 %tile	$172,929	$167,877	$153,056	$164,541	$114,288	$123,557	$119,484	$105,449	$83,657	$90,000	$56,016
75 %tile	$199,936	$195,279	$176,150	$186,517	$128,378	$133,802	$132,919	$114,529	$96,511	$122,661	$66,742
90 %tile	$223,616	$214,288	$194,443	$198,425	$140,267	$144,675	$145,257	$122,253	$117,765	$153,459	$72,004

Table S2. Nine-month Salaries, 102 Responses of 142 US CS Public (All Public), Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	86	88	91	102	88	91	100	100	79	30	28
N Indiv	512	400	509	1,482	313	381	721	873	671	179	173
10 %tile	$134,183	$126,371	$124,630	$128,760	$99,189	$102,389	$102,165	$92,437	$61,786	$60,116	$43,598
25 %tile	$144,980	$145,329	$132,726	$142,409	$105,112	$108,959	$108,050	$96,165	$69,797	$65,655	$47,470
50 %tile	$163,739	$160,230	$149,663	$156,251	$113,088	$121,331	$116,519	$101,174	$79,155	$77,065	$52,679
75 %tile	$184,562	$183,754	$166,830	$177,710	$124,584	$128,358	$127,648	$109,777	$88,353	$117,960	$60,978
90 %tile	$203,165	$202,797	$184,672	$189,358	$138,826	$137,557	$137,676	$116,384	$102,221	$136,254	$65,337

Table S3. Nine-month Salaries, 36 Responses of 53 US CS Private (All Private), Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	35	33	32	36	26	35	36	36	25	16	14
N Indiv	218	161	212	604	109	188	299	309	256	96	174
10 %tile	$142,006	$142,498	$145,874	$147,796	$108,789	$113,629	$112,911	$101,146	$82,555	$72,468	$55,425
25 %tile	$171,489	$169,438	$150,841	$167,283	$111,882	$118,735	$117,241	$106,907	$88,625	$89,688	$58,850
50 %tile	$202,589	$196,636	$168,896	$189,693	$117,007	$135,345	$132,865	$114,855	$97,896	$109,711	$67,281
75 %tile	$231,583	$214,288	$188,278	$206,146	$132,752	$144,723	$144,236	$123,033	$114,526	$157,235	$70,976
90 %tile	$257,133	$228,611	$209,352	$229,134	$150,349	$161,998	$153,593	$130,793	$122,055	$192,747	$74,125

Table S4. Nine-month Salaries, 22 Responses of US CS Public With <=15 Tenure-Track Faculty, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	14	16	15	21	17	17	20	20	16	2	1
N Indiv	30	29	39	98	46	41	87	73	69		
10 %tile	$116,368	$114,520	$111,229	$117,387	$95,054	$99,283	$96,436	$85,005	$59,259		
25 %tile	$123,243	$124,983	$113,852	$124,788	$98,863	$101,139	$99,673	$87,471	$62,438		
50 %tile	$134,382	$146,160	$132,537	$139,841	$99,707	$106,999	$103,004	$96,351	$66,447		
75 %tile	$146,397	$157,980	$151,475	$155,953	$116,744	$118,717	$111,883	$99,131	$73,007		
90 %tile	$160,224	$181,440	$179,011	$160,073	$124,782	$124,339	$124,315	$100,024	$81,689		

Table S5. Nine-month Salaries, 29 Responses of US CS Public With 10 < Tenure-Track Faculty <=20, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	20	21	25	29	23	26	27	27	20	5	1
N Indiv	46	54	73	182	62	65	135	114	88	37	
10 %tile	$116,792	$109,172	$111,229	$119,288	$95,407	$100,501	$99,518	$87,060	$58,069		
25 %tile	$134,198	$126,387	$116,554	$128,376	$98,988	$104,323	$102,287	$91,328	$60,103		
50 %tile	$142,861	$136,634	$129,054	$139,841	$104,000	$109,512	$108,000	$96,438	$66,233	$60,210	
75 %tile	$158,336	$160,104	$144,115	$156,289	$114,484	$119,347	$114,396	$99,616	$77,486		
90 %tile	$166,242	$178,690	$165,997	$167,382	$125,873	$124,960	$126,119	$100,701	$84,078		

Faculty Salaries

(Tables S1-S21 and S1a-S19a; Figures S1-S9)

Each department was asked to report individual (but anonymous) faculty salaries if possible; otherwise, the department was requested to provide the mean salary for each rank (full, associate, and assistant professors and non-tenure-track teaching faculty, research faculty, and post-doctorates) and the number of persons at each rank. The salaries are those in effect on January 1, 2019 for U.S. departments; nine-month salaries are reported in U.S. dollars. For Canadian departments, twelve-month salaries are reported in Canadian dollars. Respondents were asked to include salary supplements such as salary monies from endowed positions.

U.S. CS data are reported in Tables S1-S16 and in the box and whiskers diagrams. Data for CE, I, Canadian, and new Ph.D.s are reported in Tables S17-S20. The tables and diagrams contain distributional data (first decile, quartiles, and ninth decile) computed from the department averages only. Thus, for example, a table row labeled "50" or the median line in a diagram is the median of the averages for the departments that reported within the stratum (the number of such departments reporting is shown in the "depts" row). Therefore, it is not a true median of all of the salaries.

Table S6. Nine-month Salaries, 28 Responses of US CS Public With 15 < Tenure-Track Faculty <=25, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	24	23	26	28	26	25	27	27	17	6	2
N Indiv	83	71	98	261	64	63	136	167	90	30	
10 %tile	$135,472	$121,016	$122,649	$128,851	$97,056	$103,035	$102,617	$93,326	$59,393		
25 %tile	$144,107	$128,374	$127,940	$137,587	$104,345	$107,102	$106,813	$94,892	$62,045		
50 %tile	$153,934	$150,782	$140,097	$146,748	$110,559	$113,928	$111,200	$97,874	$72,762	$95,301	
75 %tile	$166,471	$162,343	$148,400	$157,752	$114,638	$122,221	$117,159	$102,989	$79,155		
90 %tile	$186,421	$181,054	$165,609	$174,606	$123,451	$126,071	$125,586	$107,835	$83,351		

Table S7. Nine-month Salaries, 33 Responses of US CS Public With 20 < Tenure-Track Faculty <=35, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	29	30	32	33	30	30	33	33	25	9	9
N Indiv	160	109	138	416	103	97	209	270	202	22	27
10 %tile	$142,787	$137,553	$128,967	$138,481	$103,503	$106,319	$105,727	$94,491	$68,138		
25 %tile	$152,375	$145,888	$134,756	$146,127	$107,030	$110,705	$109,579	$96,705	$72,762	$66,398	$47,484
50 %tile	$169,297	$159,989	$149,292	$155,663	$112,595	$120,652	$116,737	$101,863	$78,739	$72,639	$50,152
75 %tile	$183,051	$186,530	$170,176	$180,386	$119,209	$126,179	$123,978	$107,696	$90,210	$88,935	$61,911
90 %tile	$194,371	$207,820	$181,199	$193,819	$132,206	$137,629	$135,369	$113,553	$109,981		

Table S8. Nine-month Salaries, 44 Responses of US CS Public With Tenure-Track Faculty >30, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	41	41	43	44	37	43	44	44	39	19	22
N Indiv	354	277	346	1020	169	257	436	568	458	130	159
10 %tile	$154,464	$151,150	$136,176	$150,291	$108,336	$115,439	$112,276	$100,933	$74,416	$64,925	$42,794
25 %tile	$167,605	$161,906	$150,176	$160,090	$111,206	$122,762	$118,219	$103,914	$79,049	$67,200	$46,916
50 %tile	$182,621	$180,118	$162,327	$177,077	$122,107	$127,880	$125,737	$109,909	$87,640	$88,935	$53,167
75 %tile	$199,197	$193,338	$173,236	$189,165	$134,177	$134,244	$136,092	$115,685	$96,555	$117,221	$60,660
90 %tile	$211,529	$210,832	$194,544	$194,805	$140,845	$144,573	$144,134	$119,486	$120,994	$129,280	$65,479

Table S9. Nine-month Salaries, 12 Responses of US CS Private With <=20 Tenure-Track Faculty, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank n		Teach	Research	Postdoc
N Depts	11	10	8	12	8	12	12	12	7	4	4
N Indiv	43	26	21	90	19	31	51	44	36	22	13
10 %tile	$130,076	$135,773		$132,375		$112,619	$107,385	$100,404			
25 %tile	$146,192	$143,217	$151,010	$158,155	$108,795	$114,093	$113,789	$104,268	$87,738		
50 %tile	$178,000	$174,473	$174,000	$184,346	$111,922	$130,210	$123,372	$116,833	$97,896	$77,403	$65,901
75 %tile	$208,017	$198,169	$184,387	$191,548	$125,664	$136,701	$133,109	$121,261	$111,668		
90 %tile	$230,832	$221,691		$202,999		$138,850	$140,029	$127,580			

Table S10. Nine-month Salaries, 17 Responses of US CS Private With 15 < Tenure-Track Faculty <=30, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	17	17	15	17	12	16	17	17	13	6	6
N Indiv	76	59	66	203	24	57	82	116	66	20	44
10 %tile	$152,479	$158,077	$147,277	$159,857	$108,325	$114,149	$113,117	$104,671	$85,341		
25 %tile	$169,125	$169,125	$150,556	$175,061	$110,660	$125,233	$117,360	$107,023	$86,851		
50 %tile	$201,011	$194,022	$161,523	$188,398	$115,178	$134,383	$131,057	$112,742	$103,335	$94,405	$63,942
75 %tile	$223,616	$207,367	$180,464	$192,595	$126,748	$138,670	$140,429	$120,333	$120,000		
90 %tile	$234,489	$211,130	$191,909	$215,938	$135,351	$156,720	$150,418	$130,339	$122,365		

We also report salary data for senior faculty based on time in rank, for more meaningful comparison of individual or departmental faculty salaries with national averages. We report associate professor salaries for time in rank of 7 years or less, and of more than 7 years. For full professors, we report time in rank of 7 years or less, 8 to 15 years, and more than 15 years.

Those departments reporting salary data were provided a summary report in December 2018. Those departments that provided individual salaries were additionally provided more comprehensive distributional information based on these individual salaries. This year, 68 percent of those reporting salary data provided salaries at the individual level.

The remainder of this section summarizes the basic report provided in December 2018 to all departments that provided salary data.

Salaries at private institutions tend to be higher than those at public institutions for all faculty types (Tables S2 and S3). This pattern is consistent with data from previous years.

Table S11. Nine-month Salaries, 24 Responses of US CS Private With Tenure-Track Faculty >20, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	24	23	24	24	18	23	24	24	18	12	10
N Indiv	175	135	191	514	90	157	248	265	220	74	161
10 %tile	$163,110	$169,188	$147,264	$159,958	$110,557	$117,190	$116,300	$106,450	$83,811	$91,006	$53,898
25 %tile	$182,158	$176,999	$150,841	$174,593	$114,065	$128,688	$122,800	$107,755	$89,948	$107,081	$59,083
50 %tile	$209,800	$202,525	$166,614	$191,915	$122,642	$141,982	$138,974	$114,770	$100,688	$129,088	$67,281
75 %tile	$237,863	$216,348	$194,907	$216,830	$134,978	$147,455	$147,920	$125,228	$114,000	$167,391	$69,493
90 %tile	$264,326	$231,229	$213,937	$234,836	$152,759	$163,540	$154,816	$133,202	$122,676	$198,624	$72,374

Table S12. Nine-month Salaries, 40 Responses of US CS Public In Large City or Suburbs, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	35	37	35	40	35	37	39	39	31	16	12
N Indiv	203	158	217	587	126	173	307	317	284	106	94
10 %tile	$145,238	$138,548	$129,051	$142,076	$102,583	$106,717	$104,882	$94,766	$62,045	$60,705	$44,219
25 %tile	$157,109	$154,340	$135,573	$146,962	$107,499	$111,546	$109,987	$98,410	$73,333	$64,978	$46,607
50 %tile	$172,929	$167,440	$149,572	$161,045	$115,458	$122,221	$118,121	$103,885	$80,689	$101,013	$51,255
75 %tile	$182,935	$190,145	$166,830	$180,015	$125,629	$127,880	$129,727	$110,409	$87,109	$119,903	$55,255
90 %tile	$208,203	$205,341	$187,272	$189,130	$136,966	$138,057	$138,969	$115,652	$110,531	$142,683	$65,226

Table S13. Nine-month Salaries, 25 Responses of US CS Public In Midsize City or Suburbs, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
Depts	N Depts	20	19	23	22	23	25	24	17	6	5
Indiv	N Indiv	145	99	142	70	94	173	219	148	44	31
10	10 %tile	$143,543	$119,399	$126,692	$104,996	$106,886	$104,447	$93,677	$59,393		
25	25 %tile	$152,744	$143,082	$143,172	$107,030	$111,964	$111,728	$96,638	$65,979		
50	50 %tile	$166,452	$155,124	$153,731	$114,370	$123,552	$118,445	$103,880	$82,261	$92,122	$53,333
75	75 %tile	$192,332	$181,283	$170,744	$128,027	$131,897	$132,649	$113,291	$91,257		
90	90 %tile	$203,406	$197,327	$195,309	$140,314	$137,074	$140,745	$122,732	$112,117		

Table S14. Nine-month Salaries, 37 Responses of US CS Public in Small City, Town, or Rural, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	31	32	33	37	31	31	36	37	31	8	11
N Indiv	164	143	150	500	117	114	241	337	239	29	48
10 %tile	$123,666	$126,338	$117,377	$123,833	$99,112	$102,112	$99,585	$86,693	$64,548		$40,875
25 %tile	$134,573	$139,999	$127,598	$133,321	$99,934	$106,939	$103,612	$94,184	$69,459	$65,991	$47,455
50 %tile	$146,266	$154,023	$143,268	$149,333	$109,519	$119,199	$112,667	$99,623	$76,685	$70,405	$55,000
75 %tile	$181,701	$172,740	$164,457	$170,928	$122,263	$125,723	$123,245	$106,236	$87,401	$78,129	$62,556
90 %tile	$189,575	$195,153	$175,733	$183,519	$137,320	$130,600	$133,355	$113,004	$96,643		$65,167

Table S15. Nine-month Salaries, 24 Responses of US CS Private in Large City or Suburbs, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	24	21	22	24	20	24	24	24	16	11	8
N Indiv	132	110	158	411	90	135	226	222	215	80	116
10 %tile	$139,259	$136,160	$146,188	$134,887	$108,063	$113,875	$111,196	$98,951	$85,959	$88,750	
25 %tile	$167,001	$169,125	$153,946	$166,139	$111,648	$125,810	$119,971	$107,472	$92,771	$90,000	$65,434
50 %tile	$202,240	$194,022	$170,070	$188,729	$120,587	$135,890	$132,865	$115,267	$103,413	$109,421	$67,576
75 %tile	$229,346	$218,407	$184,647	$197,232	$133,734	$143,672	$142,403	$123,647	$112,949	$138,577	$70,325
90 %tile	$251,053	$225,675	$204,758	$227,502	$148,890	$162,769	$154,537	$133,202	$120,563	$161,388	

When viewed relative to faculty size (Figures S1-S7), salaries tend to be higher for larger departments at both public and private institutions (perhaps best seen in Figures S1-S9). This pattern holds for all tenure-track ranks except at private institutions for a) full professors with 0-7 years in rank, and b) assistant professors. The pattern also holds for teaching faculty, research faculty and postdoc salaries.

When viewed relative to type of locale (also Figures S1-S7), public institution salaries appear to be generally lower in smaller locales than in mid-size or large cities for all tenure-track faculty ranks. Private institution salaries exhibit a less clear pattern.

Teaching faculty salaries at both public and private institutions generally are higher in large cities than in smaller locales.

Our analysis of faculty salary changes from one year to the next uses only those departments that reported both years; otherwise, the departments that reported during only one year can skew the comparison. Because some departments that reported both years provided only aggregate salaries for their full and associate professors during one year and in the other year reported them by years in rank, we only report salary changes for all full professors and for all associate professors in the year-to-year comparison. Table S21 shows, by type of faculty

Table S16. Nine-month Salaries, 12 Responses of US CS Private in Other than Large City, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	11	12	10	12	6	11	12	12	9	5	6
N Indiv	86	51	54	193	19	53	73	87	41	16	58
10 %tile	$160,532	$161,659	$147,045	$159,336		$114,425	$113,989	$106,115			
25 %tile	$179,655	$172,091	$148,236	$177,771		$115,633	$116,626	$106,868	$86,438		
50 %tile	$205,616	$197,979	$157,514	$193,054	$115,953	$134,946	$130,380	$114,355	$92,554	$136,873	$62,842
75 %tile	$235,029	$210,341	$193,165	$215,504		$147,455	$146,992	$121,300	$119,418		
90 %tile	$267,025	$227,839	$212,308	$227,711		$150,535	$150,399	$127,841			

Table S17. Nine-month Salaries, 5 Responses of 34 US Computer Engineering Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	4	3	4	5	4	4	5	5	4	1	2
N Indiv	21		30	73	14	19	43	39	20		
10 %tile											
25 %tile											
50 %tile	$210,127		$137,110	$187,457	$118,842	$122,273	$120,005	$99,455	$85,051		
75 %tile											
90 %tile											

Table S18. Nine-month Salaries, 14 Responses of 24 US Information Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	12	13	13	15	11	15	15	15	14	6	4
N Indiv	39	67	74	180	46	95	141	152	136	17	21
10 %tile	$165,441	$139,701	$127,227	$143,920	$98,686	$110,052	$104,163	$92,103	$74,280		
25 %tile	$170,298	$150,468	$143,268	$151,474	$108,568	$111,458	$113,355	$96,135	$84,284		
50 %tile	$179,881	$164,693	$154,346	$167,021	$114,357	$121,865	$121,865	$102,068	$86,740	$75,766	$49,327
75 %tile	$191,765	$177,900	$159,591	$171,907	$129,690	$131,817	$132,926	$108,064	$93,695		
90 %tile	$250,665	$193,010	$168,203	$186,626	$135,911	$142,995	$143,421	$120,062	$109,287		

Table S19. Twelve-month Salaries, 8 Responses of 30 Canadian Departments, Percentiles from Department Averages

	Full Professor				Associate			Assistant	Non-Tenure Track		
	In rank 16+ yrs	In rank 8-15 yrs	In rank 0-7 years	All years in rank	In rank 8+ years	In rank 0-7 years	All years in rank		Teach	Research	Postdoc
N Depts	8	8	8	8	7	7	8	8	7	3	5
N Indiv	56	46	56	158	58	32	90	64	91		52
10 %tile											
25 %tile	$181,064	$178,746	$152,696	$179,134	$142,086	$120,472	$134,124	$105,388	$89,926		
50 %tile	$205,021	$193,693	$167,590	$183,085	$154,037	$134,534	$145,892	$122,762	$113,048		$58,790
75 %tile	$221,656	$206,743	$197,396	$206,835	$162,342	$158,567	$157,724	$131,620	$127,862		
90 %tile											

Table S20. Nine-month Salaries for New PhDs (Twelve-month for Canadian)

	US (CS, CE, and Info Combined)				Canadian			
	Tenure-Track	Non-ten Teaching	Non-ten Research	Postdoc	Tenure-Track	Non-ten Teaching	Non-ten Research	Postdoc
Depts	84	22	4	24	3	1	0	2
Indiv	200	37	7	102	22	2		19
10	$92,145	$62,434		$44,858				
25	$98,000	$65,000		$45,625				
50	$106,672	$75,000	$90,000	$52,140				
75	$112,995	$94,000		$64,500				
90	$120,400	$107,000		$73,205				

and type of department, the change in the median of the average salaries from departments that reported both years (the number of departments being compared is indicated in parentheses in each column heading). Using the cell showing full professors at U.S. CS departments as an example, the table indicates that the median of the 130 average salaries for full professors was 3.1 percent higher in 2018 than was the median of the average full professor salaries in 2017 from these same 130 departments.

When interpreting these changes, it is important to remember the effect that promotions have on the departmental data from one year to the next, since a promotion causes an individual faculty member to move from one rank to another. Thus, a department with a small number of faculty members in a particular rank can have its average salary in that rank change appreciably (in either direction) by a single promotion to or from that rank. Departures via resignation or retirement also impact

Table S21. Change in Salary Median for Departments that Reported in Both 2017 and 2018

	US CS (130)	US CE (5)	US IN (13)	Canadian (8)
Full Profs	3.1%	4.9%	2.8%	2.7%
Assoc. Profs.	2.0%	5.8%	2.8%	-3.5%
Asst. Profs.	2.5%	2.5%	1.8%	-1.7%
Non-ten-track teaching faculty	2.2%		-8.4%	-2.7%
Research faculty	-2.4%	11.1%	8.3%	10.4%
Post doctorates	-1.6%	6.8%	-10.8%	5.9%

Table S1a. Nine-Month Salaries for Teaching Faculty, 138 Responses of 195 US CS Departments, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	33	25	41	50	73	31	15	26	33	60
N Indiv	86	43	96	142	506	83	32	77	90	421
10 %tile	$65,790	$71,406	$72,578	$61,813	$67,013	$60,220	$59,806	$60,594	$60,200	$60,725
25 %tile	$84,556	$81,125	$78,000	$74,621	$78,480	$69,494	$61,214	$63,423	$66,667	$67,144
50 %tile	$95,645	$92,002	$82,629	$83,762	$86,578	$81,568	$68,161	$68,213	$74,880	$74,297
75 %tile	$118,857	$107,438	$102,540	$97,715	$100,144	$92,139	$92,446	$82,491	$85,170	$84,721
90 %tile	$138,330	$119,483	$112,653	$115,018	$120,900	$118,140	$115,357	$95,750	$99,629	$103,686

Table S2a. Nine-Month Salaries for Teaching Faculty, 102 Responses of 142 US CS Public (All Public), Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	24	15	29	37	53	27	12	21	26	49
N Indiv	50	22	65	98	344	76	28	60	74	327
10 %tile	$62,174	$63,849	$71,769	$60,840	$64,547	$59,724	$60,043	$60,000	$59,655	$60,063
25 %tile	$79,053	$77,260	$78,000	$69,576	$76,898	$68,448	$61,609	$63,018	$63,046	$66,486
50 %tile	$86,324	$82,446	$79,866	$77,000	$83,378	$79,940	$65,911	$67,097	$69,280	$71,793
75 %tile	$100,061	$94,501	$98,623	$89,044	$94,082	$91,608	$85,001	$77,417	$82,035	$80,852
90 %tile	$120,089	$105,652	$114,414	$101,650	$114,531	$97,290	$97,529	$83,586	$88,206	$91,046

Table S3a. Nine-Month Salaries for Teaching Faculty, 36 Responses of 53 US CS Private (All Private), Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	9	10	12	13	20	4	3	5	7	11
N Indiv	36	21	31	44	162	7		17	16	94
10 %tile		$83,545	$72,987	$84,508	$83,877					$67,600
25 %tile	$102,157	$93,668	$83,429	$87,539	$89,512				$83,185	$81,132
50 %tile	$125,881	$103,719	$99,341	$96,444	$100,905	$104,474		$95,495	$89,053	$91,440
75 %tile	$146,369	$111,370	$108,535	$113,388	$120,281				$98,804	$100,688
90 %tile		$125,895	$111,252	$116,480	$133,575					$108,523

Table S4a. Nine-Month Salaries for Teaching Faculty, 22 Responses of US CS Public With <=15 Tenure-Track Faculty, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	2	3	2	9	10	5	1	5	7	10
N Indiv				21	30	8		8	14	39
10 %tile					$56,900					$56,581
25 %tile				$63,000	$63,307				$59,000	$61,062
50 %tile				$65,813	$66,114	$70,468		$65,943	$62,000	$66,233
75 %tile				$70,000	$77,394				$65,000	$70,222
90 %tile					$83,438					$72,278

Table S5a. Nine-Month Salaries for Teaching Faculty, 29 Responses of US CS Public With 10 < Tenure-Track Faculty <=20, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	6	3	4	10	11	7	1	8	8	12
N Indiv	6		5	21	35	13		13	18	53
10 %tile				$52,400	$56,207					$57,128
25 %tile				$60,150	$60,069	$58,795		$62,780	$60,000	$60,131
50 %tile	$83,429		$74,016	$63,858	$65,822	$60,220		$67,427	$62,667	$64,022
75 %tile				$77,500	$81,988	$90,267		$69,218	$67,842	$70,060
90 %tile				$84,633	$84,986					$76,163

these figures, particularly in the non-tenure-track categories. Because of the small number of Canadian, CE, and I departments reporting, the values in those columns are considerably more volatile; this is evident in several of the entries in Table S21.

For new Ph.D.s in tenure-track positions at U.S. CS, CE, and I school departments (Table S20) the median of the averages was $106,672, an increase of 4.1 percent vs. last year. There was an insufficient response from Canadian institutions to report any results regarding Canadian salaries for new Ph.Ds.

This year, for the first time, we requested salaries for non-tenure-track teaching faculty separated into two classifications: Teaching Professors and Other Instructors, as described above. The salary data was further divided by years teaching at their current institution. The data for both classifications and all year ranges have been merged into a single "Teaching Faculty" entry in the main salary tables for comparability with previous years. This report adds figures showing box and whisker plots for all years combined for Teaching Professors (Figure S7a) and Other

Table S6a. Nine-Month Salaries for Teaching Faculty, 28 Responses of US CS Public With 15 < Tenure-Track Faculty <=25, Percentiles from Department Average

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	7	2	6	8	9	7	2	5	5	9
N Indiv	9		10	22	43	16		8	12	47
10 %tile										
25 %tile	$77,064			$60,900	$69,435	$62,788				$62,046
50 %tile	$81,853		$75,929	$68,199	$74,700	$65,657		$67,514	$75,000	$67,372
75 %tile	$92,483			$78,421	$78,739	$70,119				$79,155
90 %tile										

Table S7a. Nine-Month Salaries for Teaching Faculty, 33 Responses of US CS Public With 20 < Tenure-Track Faculty <=35, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	7	4	8	10	16	11	5	8	8	17
N Indiv	11	6	18	36	120	24	9	17	17	82
10 %tile				$73,145	$75,590	$65,657				$59,405
25 %tile	$81,760		$75,536	$75,267	$77,215	$70,119		$60,891	$67,157	$67,372
50 %tile	$86,640	$91,276	$78,179	$77,875	$79,448	$81,000	$63,660	$63,679	$72,500	$75,000
75 %tile	$105,260		$79,119	$81,050	$96,813	$90,094		$69,990	$85,353	$81,034
90 %tile				$87,697	$109,258	$99,920				$92,087

Table S8a. Nine-Month Salaries for Teaching Faculty, 44 Responses of US CS Public With Tenure-Track Faculty >30, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	13	8	17	16	29	11	8	7	12	25
N Indiv	36	12	45	41	238	44	22	38	43	220
10 %tile	$61,937		$77,913	$76,000	$81,451	$70,781			$63,480	$63,247
25 %tile	$84,556	$82,511	$79,250	$83,238	$84,929	$76,761	$66,622	$64,834	$68,357	$68,519
50 %tile	$88,233	$94,501	$91,787	$89,542	$93,348	$86,320	$78,180	$67,097	$74,440	$74,593
75 %tile	$118,857	$103,813	$112,624	$101,504	$100,869	$94,258	$89,269	$80,718	$84,850	$85,816
90 %tile	$133,263		$126,232	$116,953	$120,292	$156,639			$89,500	$100,472

Table S9a. Nine-Month Salaries for Teaching Faculty, 12 Responses of US CS Private With <=20 Tenure-Track Faculty, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	2	3	4	3	6	1	1	0	1	1
N Indiv			10		32					
10 %tile										
25 %tile										
50 %tile			$92,382		$93,261					
75 %tile										
90 %tile										

Table S10a. Nine-Month Salaries for Teaching Faculty, 17 Responses of US CS Private With 15 < Tenure-Track Faculty <=30, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	6	5	7	7	11	3	2	2	3	5
N Indiv	11	9	11	14	51					15
10 %tile					$85,067					
25 %tile			$79,909	$86,040	$88,329					
50 %tile	$110,267	$100,000	$93,017	$88,203	$103,335					$81,384
75 %tile			$103,144	$109,194	$120,563					
90 %tile					$137,557					

Table S11a. Nine-Month Salaries for Teaching Faculty, 24 Responses of US CS Private With Tenure-Track Faculty >20, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	7	7	8	10	14	3	2	5	6	10
N Indiv	31	16	21	37	130			17	15	90
10 %tile				$84,260	$86,489					$67,340
25 %tile	$122,129	$98,212	$88,005	$87,705	$92,916					$81,006
50 %tile	$127,265	$107,438	$101,655	$93,946	$108,471			$95,495	$90,247	$90,260
75 %tile	$148,185	$118,199	$108,535	$103,250	$123,467					$97,625
90 %tile				$118,319	$136,230					$103,994

Table S12a. Nine-Month Salaries for Teaching Faculty, 40 Responses of US CS Public In Large City or Suburbs, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	13	9	12	17	21	11	6	8	7	17
N Indiv	28	14	35	42	156	25	10	20	18	128
10 %tile	$80,214		$76,168	$68,040	$76,479	$68,376				$60,901
25 %tile	$84,693	$81,125	$78,363	$75,000	$78,739	$70,191		$61,847	$60,500	$67,372
50 %tile	$99,515	$90,520	$81,248	$80,200	$83,572	$89,290	$65,450	$63,093	$62,950	$73,865
75 %tile	$110,559	$97,000	$89,322	$90,040	$88,365	$93,754		$70,437	$81,150	$83,188
90 %tile	$120,265		$110,540	$116,599	$110,531	$156,639				$116,242

Table S13a. Nine-Month Salaries for Teaching Faculty, 25 Responses of US CS Public In Midsize City or Suburbs, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	4	2	5	4	9	5	2	3	8	11
N Indiv	12		10	14	64	19			23	84
10 %tile										$58,276
25 %tile					$72,762				$68,333	$63,244
50 %tile	$82,867		$78,357	$58,000	$84,929	$65,657			$74,500	$75,000
75 %tile					$100,144				$84,263	$83,308
90 %tile										$90,993

Instructors (Figure S7b). In addition, there are supplemental salary tables S1a – S19a that show the year-band breakdowns for each group. The salaries for the two categories show expected patterns: In general, salaries are higher for Teaching Professors than for Other Instructors (more so at private and large public institutions than at smaller public institutions), higher at private than at public institutions, and higher with increased years of teaching at the institution.

We may adjust the "years teaching" bands to broader year groupings for next year's data collection to reduce the number of cells with insufficient data to report.

Table S14a. Nine-Month Salaries for Teaching Faculty, 37 Responses of US CS Public in Small City, Town, or Rural, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	7	4	12	16	23	11	4	10	11	21
N Indiv	10	6	20	42	124	32	9	22	33	115
10 %tile			$73,950	$64,161	$65,939	$58,609		$63,772	$62,000	$62,000
25 %tile	$68,472		$78,928	$68,635	$72,138	$70,625		$66,083	$67,459	$66,616
50 %tile	$81,853	$72,249	$82,048	$78,034	$82,000	$76,040	$67,692	$68,004	$68,483	$70,500
75 %tile	$85,823		$101,354	$90,998	$91,912	$82,826		$75,307	$73,124	$76,648
90 %tile			$130,651	$100,868	$100,654	$92,307		$82,664	$101,676	$81,034

Table S15a. Nine-Month Salaries for Teaching Faculty, 24 Responses of US CS Private in Large City or Suburbs, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	8	7	8	9	12	2	2	4	4	6
N Indiv	34	14	23	36	130			16	13	85
10 %tile					$87,566					
25 %tile	$100,529	$101,931	$95,148	$96,444	$96,923					
50 %tile	$122,129	$110,147	$101,655	$105,000	$108,471			$95,750	$97,610	$97,366
75 %tile	$132,041	$118,199	$109,156	$115,000	$120,281					
90 %tile					$123,936					

Table S16a. Nine-Month Salaries for Teaching Faculty, 12 Responses of US CS Private in Other than Large City, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	1	3	4	4	8	2	1	1	3	5
N Indiv			8	8	32					9
10 %tile										
25 %tile					$84,760					
50 %tile			$83,090	$86,372	$91,181					$81,384
75 %tile					$108,245					
90 %tile										

Table S17a. Nine-Month Salaries for Teaching Faculty, 5 Responses of 34 US Computer Engineering Departments, Percentiles from Department Average

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	2	1	2	3	4	1	0	1	1	2
N Indiv					16					
10 %tile										
25 %tile										
50 %tile					$86,500					
75 %tile										
90 %tile										

Table S18a. Nine-Month Salaries for Teaching Faculty, 14 Responses of 24 US Information Departments, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	6	1	5	6	10	4	4	4	7	8
N Indiv	15		15	15	73	12	8	19	24	63
10 %tile					$73,015					
25 %tile					$83,965				$81,045	$84,970
50 %tile	$99,702		$98,322	$84,604	$90,904	$94,418	$75,010	$91,759	$84,975	$87,837
75 %tile					$98,952				$91,334	$94,410
90 %tile					$115,124					

Table S19a. Twelve-month Salaries for Teaching Faculty, 8 Responses of 30 Canadian Departments, Percentiles from Department Averages

	Teaching Professor					Other Instructor				
	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years	Teaching 9+ Years	Teaching 6-8 Years	Teaching 3-5 Years	Teaching <3 Years	All Years
N Depts	5	1	3	2	6	1	1	2	1	5
N Indiv	25				54					37
10 %tile										
25 %tile										
50 %tile	$138,453				$125,779					$84,780
75 %tile										
90 %tile										

Figure S1. US CS Department Average Salary, Full Professor in Rank 16+ Years

CRA Taulbee Survey 2018

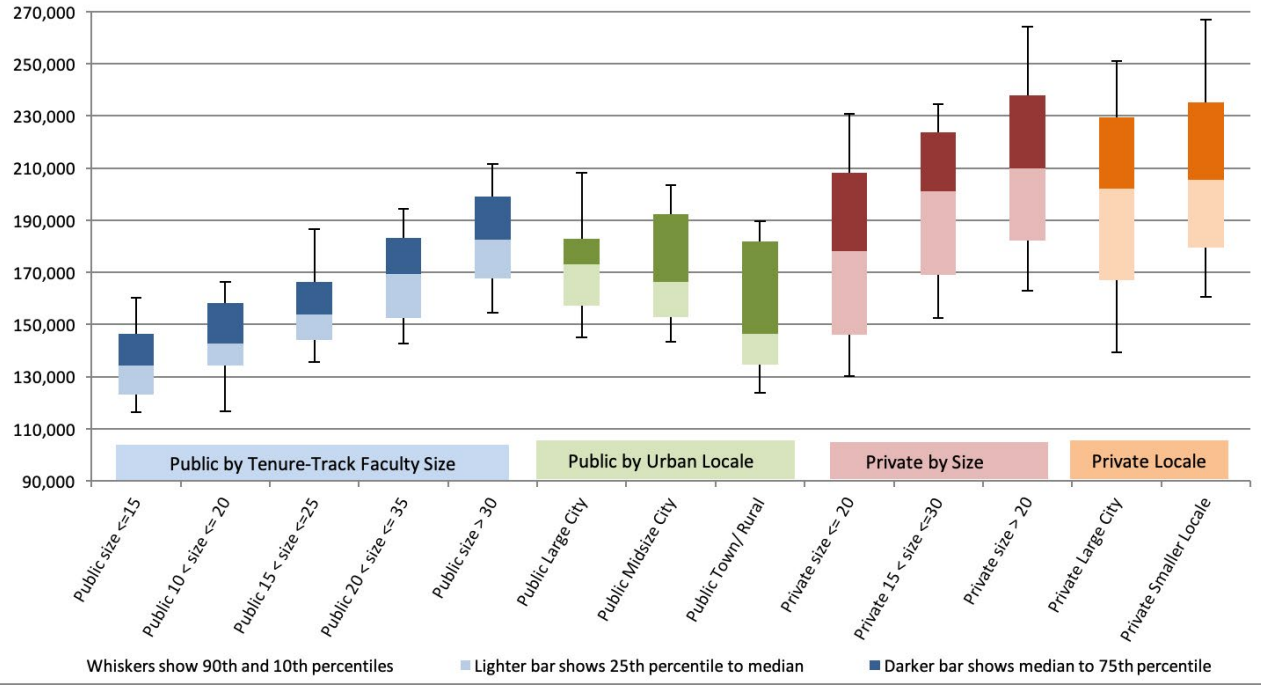


Figure S2. US CS Department Average Salary, Full Professor in Rank 8-15 Years

CRA Taulbee Survey 2018

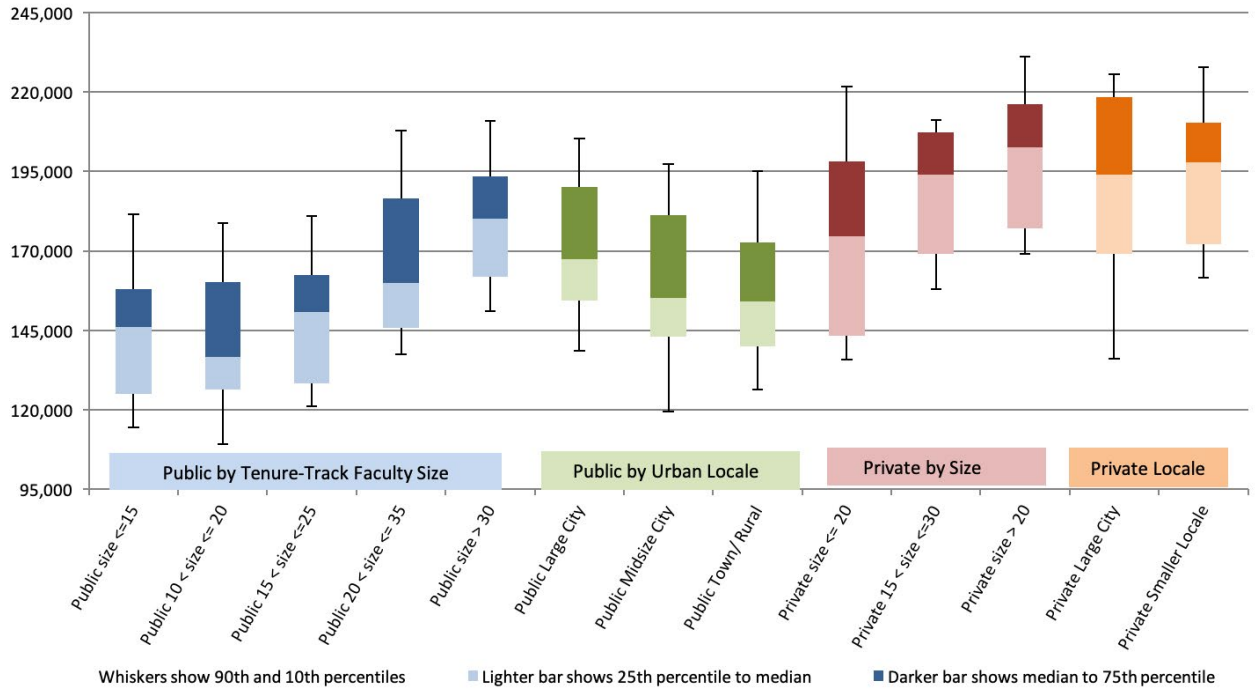


Figure S3. US CS Department Average Salary, Full Professor in Rank 0-7 Years

CRA Taulbee Survey 2018

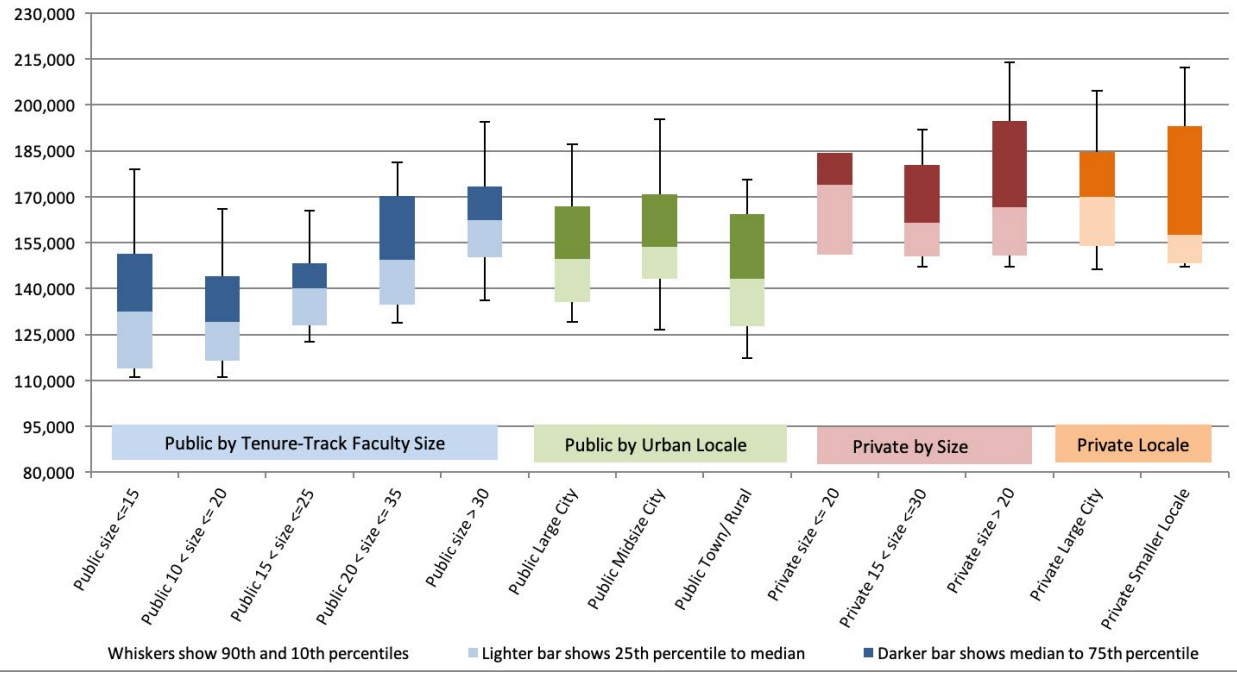


Figure S4. US CS Department Average Salary, Associate Professor in Rank 8+ Years

CRA Taulbee Survey 2018

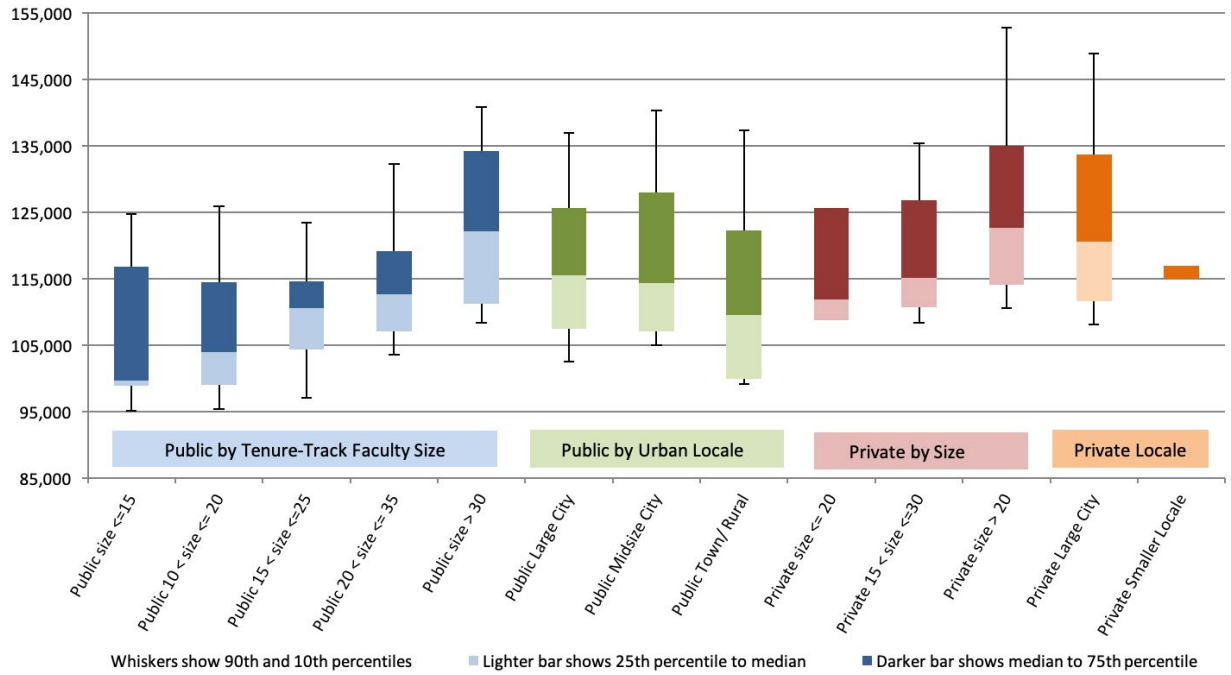


Figure S5. US CS Department Average Salary, Associate Professor in Rank 0-7 Years

CRA Taulbee Survey 2018

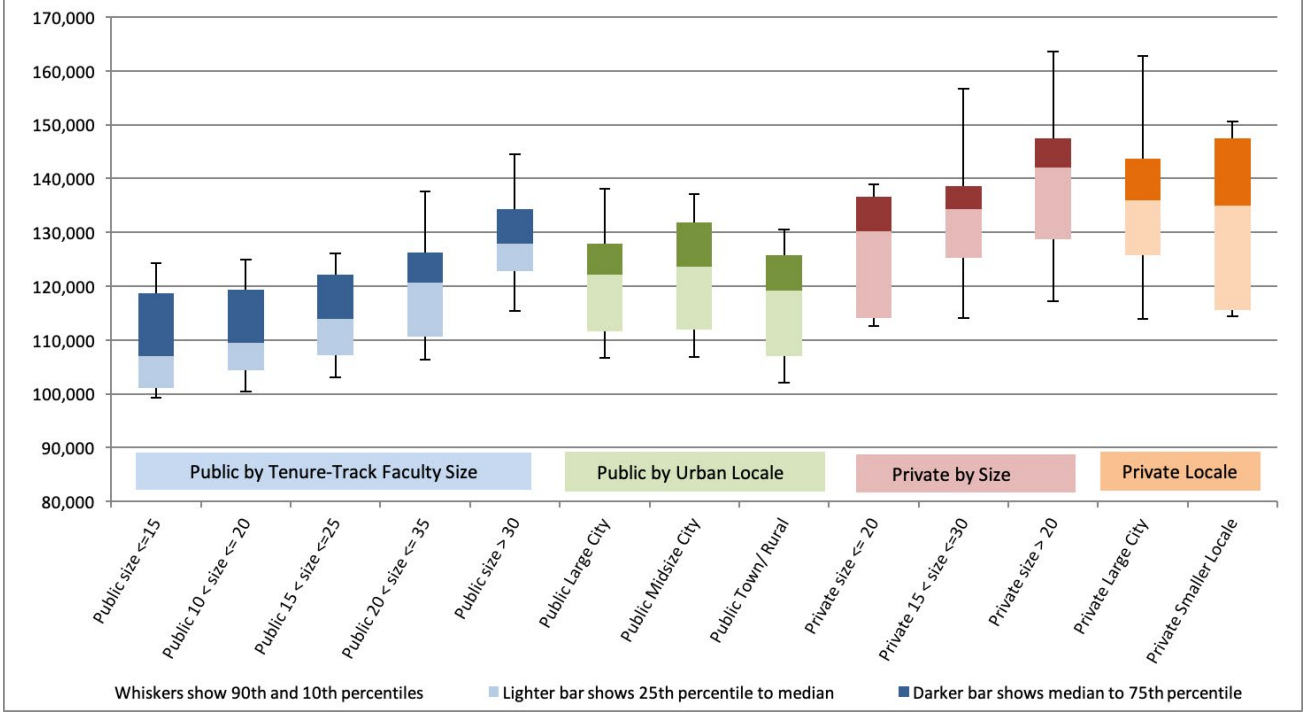


Figure S6. US CS Department Average Salary, Assistant Professor

CRA Taulbee Survey 2018

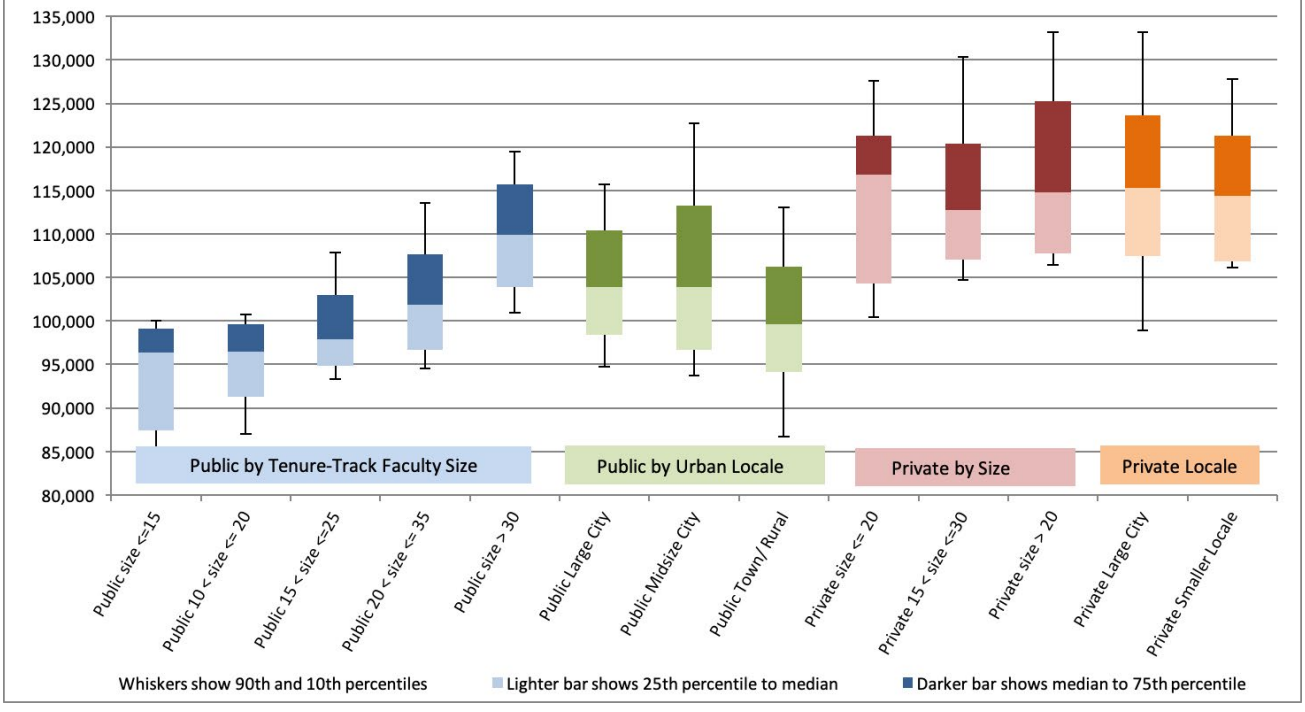


Figure S7. US CS Department Average Salary, Non-Tenure Track Teaching Faculty

CRA Taulbee Survey 2018

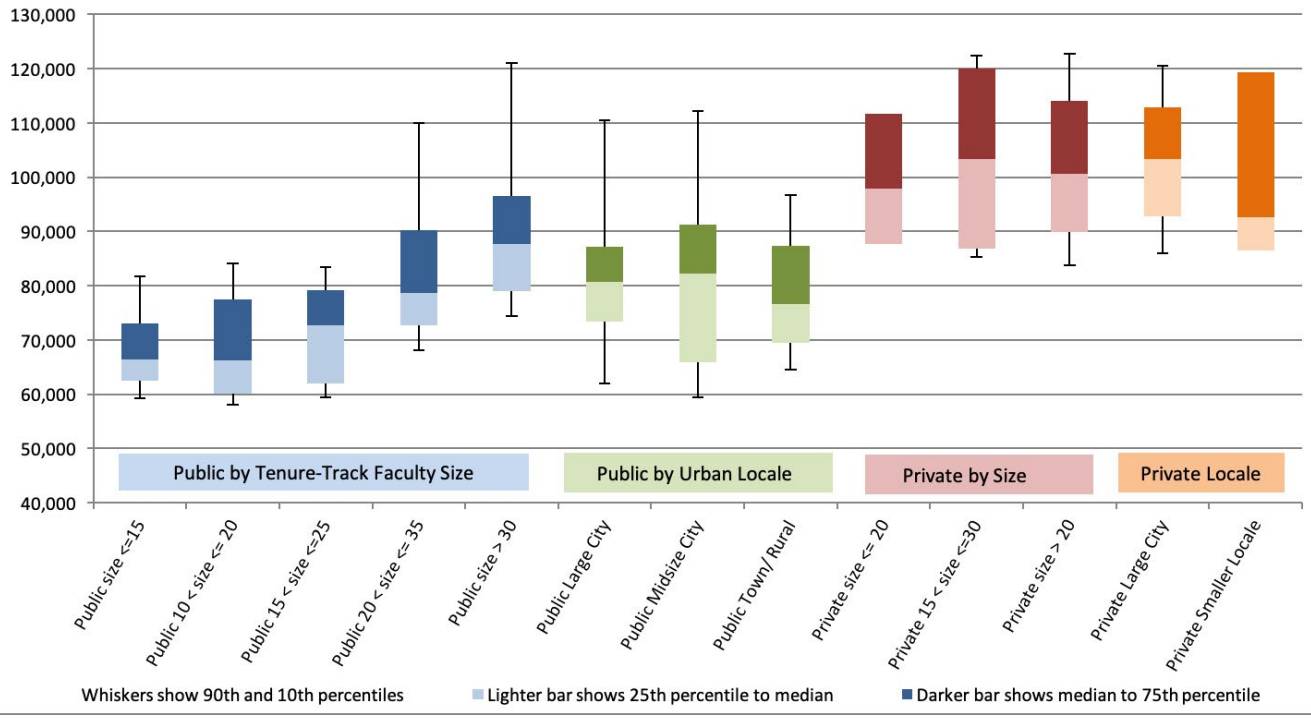


Figure S7a. US CS Department Average Salary, Teaching Professors

CRA Taulbee Survey 2018

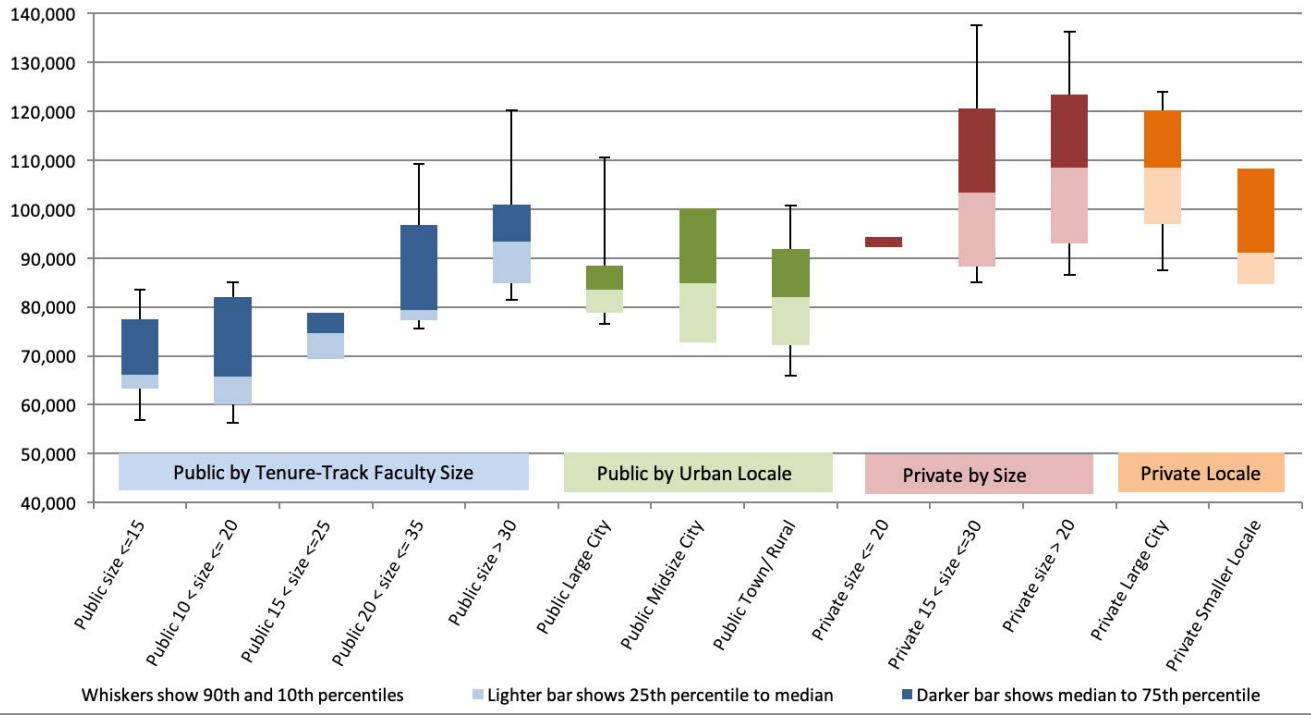


Figure S7b. US CS Department Average Salary, Other Instructors

CRA Taulbee Survey 2018

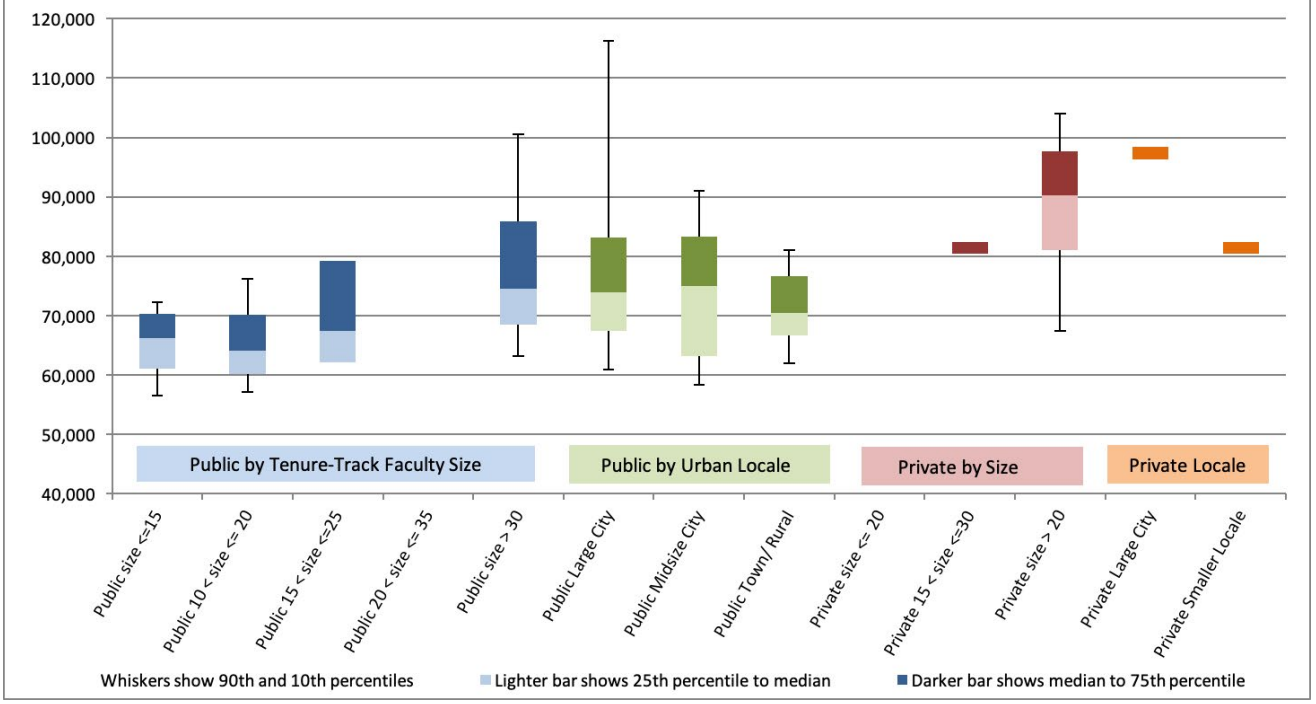


Figure S8. US CS Department Average Salary, Non-Tenure Track Research Faculty

CRA Taulbee Survey 2018

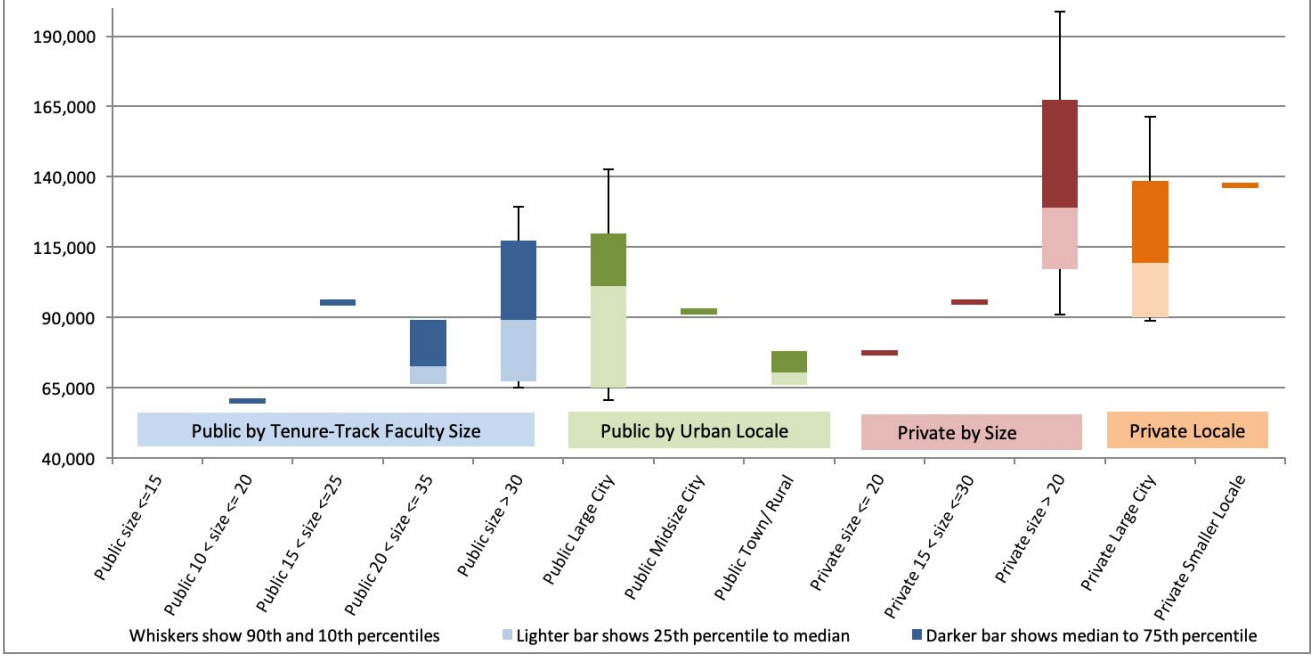
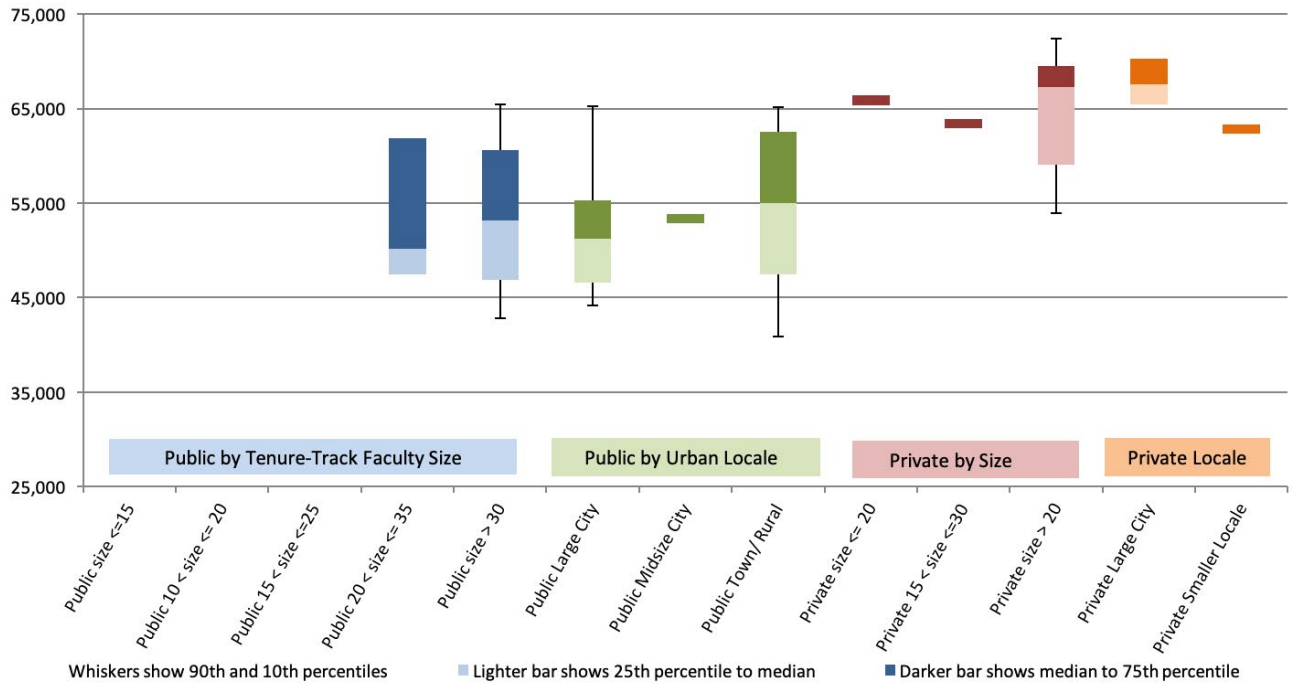


Figure S9. US CS Department Average Salary, Postdoctorates

CRA Taulbee Survey 2018



Department Profiles

Every three years, the Taulbee Survey collects data about elements of departmental activities that are not expected to change much from year to year. Included are data about teaching loads, sources of external funding, methods of recruiting graduate students, space, and department support staff. The most recent prior data about these activities were reported in the 2015 Taulbee Survey. The results of that survey are available on the CRA web site at https://cra.org/wp-content/uploads/2016/05/2015-Taulbee-Survey.pdf.

Teaching Loads

(Tables Prof1-Prof4)

Across all departments, the median teaching load for tenure-track faculty, as measured in semester courses per year, is 3.0. This median has not changed in a long time. The median load at public U.S. CS departments and at Canadian departments also is 3.0, and that for U.S. I departments is 3.5; each of these values is unchanged from three years ago. The median load at private U.S. CS departments is 2.0; it was 3.0 three years ago but was 2.0 six years ago (Table Prof1a).

Teaching loads for Teaching Professors are contained in Table Prof1b and for Other Instructors in Table Prof1c. At U.S. CS departments at public institutions, the median load is 6.0 for both categories of teaching faculty, while the median load in U.S. CS departments at private institutions is between 5 and 6 for each category. U.S. I departments have a median of 6.0 for the Teaching Professors and 5.0 for Other Instructors.

Changes from the standard teaching load are possible for all types of departments and both tenure-track and teaching faculty. Reductions in load are possible in a greater percentage

Table Prof1a. Official Teaching Load of Tenured and Tenure-Track Faculty

	Official Teaching Load*					Academic Calendar			
Department Type	# Dept	Minimum	Mean	Median	Maximum	# Dept	Semester	Quarter	Other
US CS Public	92	1	3.2	3	8	94	83	11	0
US CS Private	28	0.7	2.5	2	4.1	30	24	5	1
US CE	3					3	3	0	0
US I	14	2	3.3	3.5	4	14	12	2	0
Canadian	8	2	3.1	3	4	9	8	0	1
Grand Total	145	0.7	3.1	3	8	150	130	18	2

* Teaching load is given for a semester calendar. Loads for a quarter system were multiplied by 2/3. To convert back to quarter-system equivalent, multiply these values by 1.5.

Table Prof1b. Official Teaching Load of Teaching Professors

	Official Teaching Load*					Academic Calendar			
Department Type	# Dept	Minimum	Mean	Median	Maximum	# Dept	Semester	Quarter	Other
US CS Public	64	1	5.5	6	12	94	83	11	0
US CS Private	22	2	5	5.7	8	30	24	5	1
US CE	2					3	3	0	0
US I	10	4	6.5	6	9	14	12	2	0
Canadian	4					9	8	0	1
Grand Total	102	1	5.4	6	12	150	130	18	2

* Teaching load is given for a semester calendar. Loads for a quarter system were multiplied by 2/3. To convert back to quarter-system equivalent, multiply these values by 1.5.

Table Prof1c. Official Teaching Load of Other Instructors

	Official Teaching Load*					Academic Calendar			
Department Type	# Dept	Minimum	Mean	Median	Maximum	# Dept	Semester	Quarter	Other
US CS Public	49	2	5.7	6	12	94	83	11	0
US CS Private	12	1	4.5	5.2	6	30	24	5	1
US CE	1					3	3	0	0
US I	9	1	4.8	5	8	14	12	2	0
Canadian	4					9	8	0	1
Grand Total	75	1	5.4	6	12	150	130	18	2

* Teaching load is given for a semester calendar. Loads for a quarter system were multiplied by 2/3. To convert back to quarter-system equivalent, multiply these values by 1.5.

Table Prof2. Faculty Load Reductions and Increases

	% of Respondents Where Faculty Load Reduction Possible				% of Respondents Where Faculty Load Increase Possible			
Department Type	# Dept	Tenured/ Tenure-Track	Teaching Professor	Other Instructor	# Dept	Tenured/ Tenure-Track	Teaching Professor	Other Instructor
US CS Public	95	98.9%	68.8%	50.0%	92	78.0%	53.6%	42.2%
US CS Private	31	93.5%	64.3%	30.0%	29	78.6%	28.0%	30.0%
US CE	3	100.0%	100.0%	0.0%	3	100.0%	50.0%	100.0%
US I	14	100.0%	100.0%	75.0%	12	58.3%	54.5%	22.2%
Canadian	9	100.0%	100.0%	66.7%	9	88.9%	28.6%	20.0%
Grand Total	152	98.0%	73.2%	48.6%	145	77.6%	46.5%	37.4%

Table Prof3a. Types of Load Reductions Possible in Departments Offering Reductions - Tenured/Tenure Track

Department Type	# Dept	Special Package for New Faculty	Administrative Duties	Type or Size of Class Taught	Buy-out by % of salary	Buy-out by dollar amount	Strong Research Involvement	Strong Course of Curriculum Involvement	Other
US CS Public	102	79.4%	82.4%	42.2%	68.6%	13.7%	65.7%	44.1%	6.9%
US CS Private	34	67.6%	58.8%	17.6%	41.2%	2.9%	29.4%	23.5%	20.6%
US CE	3	100.0%	100.0%	66.7%	100.0%	0.0%	33.3%	33.3%	0.0%
US I	14	78.6%	85.7%	64.3%	42.9%	14.3%	35.7%	57.1%	14.3%
Canadian	10	90.0%	90.0%	10.0%	20.0%	10.0%	40.0%	40.0%	20.0%
Grand Total	163	77.9%	78.5%	37.4%	58.3%	11.0%	53.4%	40.5%	11.0%

Table Prof3b. Types of Load Reductions Possible in Departments Offering Reductions - Teaching Professors

Department Type	# Dept	Special Package for New Faculty	Administrative Duties	Type or Size of Class Taught	Buy-out by % of salary	Buy-out by dollar amount	Strong Research Involvement	Strong Course of Curriculum Involvement	Other
US CS Public	102	30.4%	43.1%	33.3%	14.7%	2.%	16.7%	34.3%	2.%
US CS Private	34	23.5%	38.2%	11.8%	5.9%	0.%	2.9%	26.5%	8.8%
US CE	3	33.3%	33.3%	33.3%	33.3%	0.%	0.%	66.7%	0.%
US I	14	50.0%	71.4%	57.1%	35.7%	0.%	21.4%	57.1%	7.1%
Canadian	10	20.0%	70.0%	10.0%	0.%	0.%	0.%	30.%	10.%
Grand Total	163	30.1%	46.0%	29.4%	14.1%	1.2%	12.9%	35.%	4.3%

Table Prof3c. Types of Load Reductions Possible in Departments Offering Reductions - Other Instructors

Department Type	# Dept	Special Package for New Faculty	Administrative Duties	Type or Size of Class Taught	Buy-out by % of salary	Buy-out by dollar amount	Strong Research Involvement	Strong Course of Curriculum Involvement	Other
US CS Public	102	12.7%	24.5%	21.6%	5.9%	0.0%	8.8%	20.6%	3.9%
US CS Private	34	0.0%	2.9%	2.9%	0.0%	0.0%	0.0%	8.8%	11.8%
US CE	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
US I	14	14.3%	42.9%	28.6%	7.1%	7.1%	14.3%	50.0%	0.0%
Canadian	10	10.0%	30.0%	10.0%	0.0%	0.0%	0.0%	30.0%	10.0%
Grand Total	163	9.8%	21.5%	17.2%	4.3%	0.6%	6.7%	20.9%	5.5%

Table Prof4a. Reasons for Increase in Teaching Load in Departments Where Increase is Possible - Tenured or Tenure-Track Faculty

Department Type	# Dept	Yes - Shifting Primary Resopnsibilities to Teaching	Yes - Other
US CS Public	71	66.2%	33.8%
US CS Private	22	68.2%	31.8%
US CE	3	33.3%	66.7%
US I	7	42.9%	57.1%
Canadian	8	62.5%	37.5%
Grand Total	111	64.0%	36.0%

Table Prof4b. Reasons for Increase in Teaching Load in Departments Where Increase is Possible - Teaching Professors

Department Type	# Dept	Yes - Shifting Primary Resopnsibilities to Teaching	Yes - Other
US CS Public	37	43.2%	56.8%
US CS Private	7	42.9%	57.1%
US CE	1	0.0%	100.0%
US I	6	50.0%	50.0%
Canadian	2	50.0%	50.0%
Grand Total	53	43.4%	56.6%

Table Prof4c. Reasons for Increase in Teaching Load in Departments Where Increase is Possible - Other Instructors

Department Type	# Dept	Yes - Shifting Primary Resopnsibilities to Teaching	Yes - Other
US CS Public	27	44.4%	55.6%
US CS Private	6	16.7%	83.3%
US CE	1	0.0%	100.0%
US I	2	50.0%	50.0%
Canadian	1	0.0%	100.0%
Grand Total	37	37.8%	62.2%

of departments than are increases in load; however, load changes (in either direction) are less likely for teaching faculty than for tenure-track faculty in U.S. CS departments, and tend to be less likely for Other Instructors than for Teaching Professors (Table Prof2). Tables Prof3a, b, and c provide, for tenure-track, Teaching Professor, and Other Instructor faculty respectively, statistics on the percentage of departments that afford teaching load reductions for different types of activities. Tables Prof4a, b, and c give statistics about possible increases in the teaching load above the standard level.

Sources of External Funding

(Table R2)

Table R2 shows a history of the sources of CS research funding, as reported every three years since 2003. Fewer departments provided this data in 2018, but the distribution is similar to previous years. NSF is by far the biggest funder of CS research, though its share of the total fell from 42.9 percent in 2015 to 38.3 percent in 2018. The share of CS funding from defense agencies including DARPA also fell in 2018, while industry funding and funding from unidentified other sources increased in percentage.

Table R2. Comparison of US CS External Funding 2003-2015.

	2003 (126 departments)		2006 (123 departments)		2009 (117 departments)		2012 (123 departments)		2015 (108 departments)		2018 (95 departments)	
	Total	% Fund	Total	% Fund	Total	% Fund	Total	% Fund	Total	% Fund	Total	% Fund
NSF	$354,451,309	40.7%	$255,089,816	43.0%	$281,076,341	43.1%	$368,922,448	42.2%	$342,335,280	42.93%	$347,041,991	38.26%
DARPA	$85,401,891	9.8%	$64,191,150	10.8%	$38,393,018	5.9%	$52,526,824	6.0%	$62,512,155	7.8%	$64,237,216	7.08%
NIH	$15,864,76	1.8%	$24,880,112	4.2%	$33,128,578	5.1%	$46,533,387	5.3%	$35,716,475	4.5%	$45,333,000	5.00%
DOE	$20,471,676	2.4%	$24,391,329	4.1%	$17,225,839	2.6%	$30,149,692	3.4%	$24,482,764	3.1%	$24,806,054	2.73%
State agencies	$24,438,483	2.8%	$16,875,578	2.8%	$17,861,292	2.7%	$17,725,647	2.0%	$17,648,938	2.2%	$14,326,866	1.58%
Industrial sources	$70,813,388	8.1%	$50,333,039	8.5%	$76,464,763	11.7%	$89,149,734	10.2%	$80,716,010	10.1%	$104,998,246	11.58%
Other defense	$50,555,980	20.4%	$97,512,961	16.4%	$109,510,806	16.8%	$173,606,289	19.8%	$148,555,418	18.6%	$154,468,063	17.03%
Other federal	$38,722,661	5.8%	$32,388,664	5.5%	$27,695,790	4.2%	$37,088,925	4.2%	$27,492,424	3.4%	$39,739,067	4.38%
Private foundation	$32,977,093	3.8%	$10,826,656	1.8%	$18,297,020	2.8%	$23,600,989	2.7%	$33,488,855	4.2%	$38,722,661	4.27%
IMLS							$288,059	0.0%	$79,692	0.0%	$315,218	0.03%
Other	$37,995,002	4.4%	$16,996,108	2.9%	$32,763,366	5.0%	$35,190,510	4.0%	$24,440,153	3.1%	$60,230,992	6.64%
Unallocated											$1,429,893	0.16%
Total	$870,327,187		$593,485,413		$652,416,813		$874,782,504		$797,468,164		$907,063,060	
Average/ Dept	$6,907,359		$4,825,085		$5,576,212		$7,112,053		$7,383,964		$9,548,032	

Table Prof5. Factors Affecting the Amount of a Graduate Student's Stipend

Department Type	# Dept	Advance to Next Stage of Program	Years of Service	GPA	Recruitment Enhancements	Different Stipend Sources	Other
US CS Public	102	54.9%	22.5%	9.8%	25.5%	28.4%	18.6%
US CS Private	34	20.6%	14.7%	5.9%	8.8%	11.8%	14.7%
US CE	3	0.0%	0.0%	33.3%	33.3%	0.0%	33.3%
US I	14	35.7%	7.1%	7.1%	0.0%	28.6%	21.4%
Canadian	11	36.4%	18.2%	18.2%	27.3%	54.5%	0.0%
Grand Total	164	43.9%	18.9%	9.8%	20.1%	26.2%	17.1%

Table Prof6. Departments Using Selected Graduate Student Recruitment Incentives

Department Type	# Dept	Upfront One-Time Signing Bonus	Stipend Enhancements	Guaranteed Multi-Year Support	Guaranteed Summer Support	Paid Visits to Campus	Other
US CS Public	102	15.7%	17.6%	44.1%	13.7%	40.2%	6.9%
US CS Private	34	8.8%	8.8%	41.2%	23.5%	55.9%	14.7%
US CE	3	0.0%	66.7%	66.7%	33.3%	66.7%	0.0%
US I	14	14.3%	14.3%	50.0%	7.1%	42.9%	14.3%
Canadian	11	9.1%	18.2%	72.7%	36.4%	9.1%	18.2%
Grand Total	164	13.4%	16.5%	46.3%	17.1%	42.1%	9.8%

Table Prof7. Median Amounts and Years of Selected Graduate Student Recruitment Incentives

Department Type	# Dept	Upfront One-Time Signing Bonus	Stipend Enhancements	Guaranteed Multi-Year Support	Guaranteed Summer Support	Paid Visits to Campus
US CS Public	60	2,000.00	5,000.00	4	6,859.00	500
US CS Private	21			5	8,425.00	800
US CE	2					
US I	9			4		425
Total US	92	2,000.00	5,000.00	4	7,175.00	725
Canadian	7			4		

Other Graduate Student Data

(Tables Prof5-Prof7)

Table Prof5 indicates the factors that affect the amount of the stipend of graduate students. In aggregate across all types of departments, advancement to the next stage of the graduate program is again the most likely factor, with stipend source generally next most likely. This is similar to previous reports, although there is again a decrease in the percentage of reporting departments that modify stipends based on advancement in the program (44 percent vs 48 percent three years ago and 52 percent six years ago). Stipend source also was reported as less likely than three years ago (26 percent vs 37 percent).

Table Prof6 indicates the types of incentives provided when recruiting graduate students. Compared with three years ago, a somewhat smaller percentage of departments report offering guaranteed multi-year support (46 vs 51 percent) and guaranteed summer support (17 vs 22 percent), while a somewhat higher percentage report offering paid campus visits (42 vs 37 percent). Table Prof7 indicates the median amounts reported for those that offered various recruiting incentives. The amount of signing bonuses was less than that reported three years ago, while the amounts of stipend enhancements and summer support was greater. Many fewer departments provided data this year than did three years ago (99 vs 172), so these comparisons must be interpreted with this in mind.

Space

(Tables Prof8-Prof22)

Median total space at U.S. departments increased 12.5 percent over that reported three years ago. However, median office space and instructional lab space actually declined by 3 and 15 percent, respectively. Median research lab space increased three percent (Table Prof8).

Table Prof8. Department Space, net square feet, All US (132 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	11,042	4,507	497	1,265	756
25	19,287	7,829	1,073	3,298	1,820
50	32,958	11,875	2,270	7,477	3,312
75	57,759	27,744	4,653	13,355	7,680
90	88,912	40,999	7,080	20,353	12,909

Table Prof9. Department Space, net square feet, US CS Public (88 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	10,045	4,019	497	1,299	1,212
25	18,470	7,275	988	4,042	2,309
50	31,744	10,598	1,572	9,140	3,916
75	61,868	25,483	4,276	14,572	8,171
90	97,592	48,329	6,520	20,692	13,422

U.S. CS departments at public universities experienced a smaller three-year overall median space increase than did those at private universities (6 vs 20 percent). Median instructional lab space declined at both public and private universities, while median research lab space increased at public universities and declined at private universities (Tables Prof9 and Prof10). Small median space increases were present among U.S. I and Canadian departments (Tables Prof12 and Prof13). Too few CE departments reported to this year's survey to allow any reported values to be displayed (Table Prof11).

A greater percentage of departments report definite plans to gain space in the near future than was the case three years ago, and this is true in all types of departments (Table Prof14). Institutional funds, as usual, is the most likely source of funding for this increased space (Table Prof15).

Tables Prof16-Prof21 show in turn for the various department types, the distribution of space of each type, normalized for faculty size. Once again, there were too few CE departments reporting to display any values for that type of department. Table Prof22 shows the distribution of percentage of space (as opposed to amount of space as reported above) among the various space categories at U.S. departments. Thus, for example, half of the departments allocate 40 percent or more of their space to offices, and half allocate 40 percent or less space for offices.

Table Prof10. Department Space, net square feet, US CS Private (28 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	17,440	6,706	477	2,122	0
25	21,225	10,020	1,506	3,167	1,301
50	33,208	18,564	2,921	4,523	2,059
75	58,180	28,615	4,965	8,569	4,099
90	66,177	35,159	6,256	15,799	8,813

Table Prof11. Department Space, net square feet, US CE (3 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10					
25					
50					
75					
90					

Table Prof12. Department Space, net square feet, US Information (13 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	15,143	8,233	1,872	1,257	750
25	20,519	10,521	2,528	1,816	810
50	34,063	22,806	4,283	3,555	2,250
75	46,755	27,490	5,901	4,480	4,527
90	53,281	30,824	8,704	10,065	5,040

Table Prof13. Department Space, net square meters, Canadian (10 Departments)

Percentiles	Total Space	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	2,265				
25	3,345				
50	6,019	1,998	300	1,207	1,145
75	7,405				
90	8,126				

Table Prof14. Definite Plans to Gain or Lose

Department Type	# Dept	Gain Space	No Change	Lose Space
US CS Public	92	35%	64%	1%
US CS Private	30	50%	50%	0%
US CE	3	33%	67%	0%
US I	13	62%	39%	0%
Canadian	10	40%	60%	0%
Grand Total	148	41%	59%	1%

Table Prof15. Sources of Funding for Additional Space

Department Type	# Dept	% Departments Adding Space Using Funds from Source				
		Institutional	Federal	State / Provincial	Industry	Private
US CS Public	102	25.50%	0.00%	10.80%	3.90%	10.80%
US CS Private	34	38.20%	0.00%	2.90%	0.00%	11.80%
US CE	3	33.30%	0.00%	0.00%	0.00%	0.00%
US I	14	50.00%	0.00%	0.00%	0.00%	0.00%
Canadian	10	30.00%	20.00%	20.00%	10.00%	20.00%
Grand Total	163	30.70%	1.20%	8.60%	3.10%	10.40%

Table Prof16. Department Space, net square feet per faculty member, All US Public CS (132 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10	708	577	217	185	14	13	13	12	0	0
25	893	713	317	261	41	33	108	86	53	44
50	1,123	980	455	383	74	66	250	207	118	97
75	1,535	1,347	747	604	115	102	400	330	241	172
90	2,285	2,045	1,036	822	186	156	568	478	398	357

Table Prof17. Department Space, net square feet per faculty member, US Public CS (88 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10	696	619	219	197	21	19	31	29	8	7
25	902	752	288	254	40	33	148	134	85	62
50	1,228	996	414	351	67	58	303	274	145	117
75	1,574	1,384	701	576	101	92	427	402	275	205
90	2,160	1,918	979	781	147	111	589	481	401	360

Table Prof18. Department Space, net square feet per faculty member, US Private CS (28 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10	708	522	270	233	6	4	57	36	0	0
25	797	589	368	278	35	31	99	63	19	18
50	1,012	784	514	383	89	68	139	122	76	63
75	1,258	1,009	674	498	134	105	270	211	120	105
90	2,449	1,983	1,086	867	188	135	365	269	266	211

Table Prof19. Department Space, net square feet per faculty member, US CE (3 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10										
25										
50										
75										
90										

Table Prof20. Department Space, net square feet per faculty member, US Information (13 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10	879	835	343	329	66	63	6	5	0	0
25	1,064	992	449	410	77	74	40	36	22	16
50	1,231	1,090	760	603	125	116	131	116	33	26
75	1,363	1,296	852	800	222	176	203	195	157	116
90	1,532	1,459	878	863	269	253	310	294	201	141

Table Prof21. Department Space, net square meters per faculty member, Canadian (9 Departments)

Percentiles	Total Space		Faculty, Staff, and Student Offices		Conference and Seminar Rooms		Research Labs		Instructional Labs	
	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	Tot-Fac	Ten-Track	TT+Rsrch	Ten-Track	TT+Teach
10		71								
25		82								
50	136	115	49	36	8	6	29	26	20	17
75		158								
90		200								

Table Prof22. Department Space, All US (132 Departments)

Percentiles	Percent of Total Space Allocated To			
	Faculty, Staff, and Student Offices	Conference and Seminar Rooms	Research Labs	Instructional Labs
10	21	1	2	0
25	30	4	8	4
50	40	6	22	11
75	55	8	35	18
90	66	14	43	28

Departmental Support Staff

(Tables Prof23-Prof28)

Tables Prof23-Prof28 show the distribution of department staff for the different department types. Across all institutions, there was an increase in the median number of administrative staff, from six reported in 2015 to seven reported in 2018, and an increase in the median number of research staff from one to two. The latter is a function of additional research support that is funding such staff. U.S. CS departments at private universities showed an increase in median staffing for all three types of staff (administrative, computing, and research), while U.S. CS departments at public universities had a median staff decrease in computing support and little change in the other two staff categories. U.S. I departments, which mainly are I-schools, had much larger median staffing than did U.S. CS departments, and had an increase in the median administrative staff size from 19 to 27.5 over the past three years. There are two more such I departments reporting this year, and since the total number of such departments is 12 this year, these two departments can have a larger influence on medians than likely would be the case for CS departments.

Table Prof23. Full Time Staff by Type of Support – All Institutions

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10	2	0	2	1	0	1	0	0	0
25	3	0	3.8	1	0	1	0	0	0
50	7	0.9	7	3	0	3	0	1.3	2
75	13	2	14	5	0.5	5.6	2	4	4.8
90	32.3	4	33.1	7	3.8	8.5	5	10.9	12.5
# Dept	149	70	149	130	53	131	67	70	86

Table Prof24. Full Time Staff by Type of Support – US CS Public

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10	2	0	2	1	0	1	0	0	0
25	3	0	3	1	0	1	0	0	0
50	5	1	5	2	0	2	0	1.1	1.5
75	11	2	11.8	4.9	0	5	1	3	3
90	20.2	4	21.2	7	1	7	3.7	7.8	9
# Dept	95	41	95	82	32	82	44	42	54

Table Prof25. Full Time Staff by Type of Support – US CS Private

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10	3	0	3.2	1	0	1	0	0	0
25	5	0	5.5	1.4	0	2	0	2	1.8
50	9	0.5	10	4	0.8	4	1	3	4.5
75	15	2.5	15.7	5.4	3	6	5	9	11.5
90	34	4.3	42.4	10	6.8	13	9.8	20.1	19.4
# Dept	31	18	31	26	13	27	13	17	20

Table Prof26. Full Time Staff by Type of Support – US CE

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10									
25									
50									
75									
90									
# Dept	3	1	3	3	1	3	1	1	1

Table Prof27. Full Time Staff by Type of Support – US Information

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10	4.3		4.3	1		1			0
25	14.1		14.1	2.5		2.5			0.3
50	27.5	0	27.5	5	0	5	0.1	1	1
75	33.5		34.3	6		6			1.6
90	41		41.4	7		7			5.6
# Dept	12	7	12	11	6	11	8	9	10

Table Prof28. Full Time Staff by Type of Support – Canadian

Percentiles	Secretarial / Administrative			Computer Support			Research		
	Institutional	External Support	Total	Institutional	External Support	Total	Institutional	External Support	Total
10									
25									
50	6.5		6.5	3.5		3.5			
75									
90									
# Dept	8	3	8	8	1	8	1	1	1

Concluding Observations

There still is no let-up in the undergraduate enrollment surge, which has resulted in more than a decade of sustained growth. Departments were successful in increasing teaching faculty above the level of enrollment increase this year; they also increased their average tenure-track faculty size and slightly increased the average number of TAs per department. While welcome, the overall growth in teaching capacity woefully lags the growth in students during the past eleven years, and the vast majority of departments report increased difficulty in managing the situation. There is no evidence that the enrollment growth has resulted in changes in teaching loads during the past three years. However, the number of students has been increasing in the typical introductory and mid-level course. The median course size of the typical mid-level course is 50 percent higher today than it was just three years ago. On top of the undergraduate enrollment growth, departmental research productivity has continued to increase and there has been another year of strong growth in the number of new students in doctoral programs. Departmental space has increased somewhat, but appears to have been directed mainly to support research growth rather than enrollment growth,

Gender diversity of degree recipients improved at all degree levels. However, in CS the representation of women would have to more than double in order to approach parity of representation with men among all U.S. students receiving bachelor's degrees. There is little change in ethnic diversity from year to year, where resident Asians are vastly over-represented and basically every other resident ethnic group (including Whites) is under-represented among CS bachelor's graduates relative to the population of U.S. bachelor's graduates.

It is remarkable how departments have been able to keep up their productivity. However, this year showed a marked increase in both the number of faculty who left for other faculty positions and the fraction of total faculty losses that were to faculty taking other academic positions. Whether this will become a trend is not clear, but it bears watching.

Participating CS, CE, I and Canadian Departments

*(Departments marked with * have participated in all 5 of the most recent Taulbee surveys)*

U.S. CS Public (104): Arizona State*, Auburn*, Binghamton, Boise State, Clemson*, College of William & Mary*, Colorado School of Mines*, Colorado State*, Florida International*, George Mason*, Georgia Tech*, Georgia State*, Indiana*, Indiana University Purdue University Indianapolis, Iowa State*, Kansas State*, Kent State*, Michigan State*, Michigan Technological University, Missouri University of Science and Technology, Montana State*, Naval Postgraduate School*, New Jersey Institute of Technology*, New Mexico State, North Carolina State*, North Dakota State*, Ohio State*, Ohio*, Oklahoma State*, Old Dominion, Oregon State, Pennsylvania State*, Portland State*, Purdue*, Rutgers*, Southern Illinois (Carbondale), Stony Brook (SUNY)*, Texas A&M*, Texas Tech, University at Buffalo, Universities of: Alabama (Birmingham*), Arizona, Arkansas*, Arkansas at Little Rock*, California (Berkeley*, Davis*, Irvine*, Los Angeles, Riverside*, San Diego, Santa Barbara*, and Santa Cruz*), Central Florida*, Colorado (Boulder)*, Connecticut*, Delaware*, Florida*, Georgia*, Hawaii, Houston*, Idaho, Illinois (Chicago and Urbana-Champaign), Iowa*, Kansas*, Kentucky, Louisiana at Lafayette*, Maryland (College Park* and Baltimore County*), Massachusetts (Amherst*, Boston*, and Lowell), Memphis, Michigan*, Minnesota*, Nebraska (Omaha* and Lincoln*), Nevada (Las Vegas and Reno*), New Hampshire*, New Mexico, North Carolina (Chapel Hill* and Charlotte*), North Dakota, North Texas*, Oklahoma*, Oregon*, Rhode Island*, South Carolina*, South Florida*, Tennessee (Knoxville)*, Texas (Arlington, Austin*, Dallas*, and El Paso*), Utah*, Vermont, Virginia*, Washington*, Wisconsin (Madison* and Milwaukee), and Wyoming; Virginia Tech*, Washington State*, Wayne State*, and Wright State.

U.S. CS Private (39): Boston University*, Brandeis, Brown*, Carnegie Mellon*, Case Western Reserve*, Clarkson, Columbia, Cornell*, DePaul*, Drexel*, Duke*, Emory*, George Washington, Harvard, Illinois Institute of Technology, Johns Hopkins, Lehigh*, MIT*, New York University*, Northeastern*, Northwestern, NYU

Tandon School of Engineering, Princeton*, Rensselaer*, Rice, Rochester Institute of Technology*, Stanford*, Stevens Institute of Technology, Toyota Technological Institute at Chicago*, Tufts*, Universities of: Chicago*, Notre Dame, Pennsylvania*, Rochester*, Southern California*, and Tulsa*, Washington in St. Louis*, Worcester Polytechnic Institute*, and Yale.

U.S. CE (6): North Carolina State*, Northeastern*, Universities of: Central Florida*, Illinois (Urbana-Champaign), New Mexico*, and Southern California.

U.S. Information (15): Cornell*, Drexel*, Florida State, Indiana*, Penn State*, Syracuse, Universities of: California (Berkeley)*, Colorado (Boulder), Illinois (Urbana-Champaign), Maryland (College Park ISchool and Baltimore County*), Michigan*, North Carolina (Chapel Hill)*, Pittsburgh*, and Washington*.

Canadian (12): Concordia*, McGill, Simon Fraser*, Universities of: British Columbia*, Calgary*, Manitoba*, New Brunswick, Toronto*, Victoria*, Waterloo, Western Ontario*, and York*.

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[1]The title of the survey honors Orrin E. Taulbee of the University of Pittsburgh, who conducted these surveys for the Computer Science Board until 1984, with retrospective annual data going back to 1970.

[2]Information (I) programs included here are Information Science, Information Systems, Information Technology, Informatics, and related disciplines with a strong computing component. Surveys were sent to CRA members, the CRA Deans group members, and participants in the iSchools Caucus (*www.ischools.org*) who met the criteria of granting Ph.D.s and being located in North America. Other I programs who meet these criteria and would like to participate in the survey in future years are invited to contact *survey@cra.org* for inclusion.

[3]Classification of the population of an institution's locale is in accordance with the Carnegie Classification database. Large cities are those with population >= 250,000. Mid-size cities have population between 100,000 and 250,000. Town/rural populations are less than 100,000.

[4]All faculty tables: The survey makes no distinction between faculty specializing in CS vs. CE programs. Every effort is made to minimize the inclusion of faculty in electrical engineering who are not computer engineers.