2020 Taulbee Survey
Bachelor's and Doctoral Degree Production Growth Continues but New Student Enrollment Shows Declines

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This article and the accompanying figures and tables present the results from the 50th 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 22, 2021 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 (2019-20). Data for new students in all categories refer to the current academic year (2020-21). Projected student production and information on faculty salaries are also for the current academic year; salaries are those effective January 1, 2021.

We surveyed a total of 279 Ph.D.-granting departments and received responses from 179, for an overall response rate of 64 percent. Last year we had two more total respondents and a 65 percent response rate. The response rates from CE and Canadian departments in particular continue to be low. The U.S. CS response rate of 78 percent is, as usual, the highest of all of the categories; it is slightly higher than last year's 77 percent and is typical of the response rates for the past decade. 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 2019 and 2020 surveys. This is a more meaningful indication of the one-year changes affecting the data.

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 was conducted in the middle of the COVID-19 pandemic. With institutions closed for part of 2019-20, varying approaches to learning once classes resumed in Spring 2020, and the fact that these educational decisions persisted in the 2020-21 academic year, the data we report here should be interpreted with appropriate COVID-related caveats. This is particularly true of comparisons with prior years. We asked special questions this year to gain some appreciation for the effect of these educational adjustments on new student enrollment in 2020-21. Those results are included in this report where they naturally fall, e.g., changes in new Ph.D. student enrollment are reported with the usual data on new Ph.D. students. In the Concluding Observations section, we summarize where we think this year's reported data was particularly affected by COVID-19. Other insights into department experiences were obtained by two special surveys conducted by CRA in early summer 2020, one of individual faculty and one of chairs or other department representatives; those results are available from the Data tab of the CRA website **https://cra.org/**.

We thank all of the respondents to this year's questionnaire, and especially appreciate their willingness to provide data during such an unusual and trying time. 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%)
2019	148/192 (77%)	7/35 (20%)	11/29 (38%)	15/22 (68%)	181/278 (65%)
2020	150/193 (78%)	6/35 (17%)	8/29 (28%)	15/22 (68%)	179/279 (64%)

Doctoral Degree Production, Enrollment, and Employment
(Tables 1, D1-D10; Figures D1-D6)

Degree Production
Doctoral degree production was higher in 2019-20 than in 2018-19 despite fewer departments reporting. This year's respondents produced 14.2 degrees per U.S. CS department, and 13.4 degrees per department overall. This compares with 13.2 and 12.2, respectively, reported last year. Only 149 departments reported their Ph.D. production this year, compared with 160 last year. The 149 departments produced 1,997 Ph.D.s in 2019-20, compared with 1,860 degrees produced in 2018-19 by the 160 departments (Table D1).

Among all departments reporting both this year and last year, the number of total doctoral degrees rose by 5.9 percent. Among U.S. CS departments reporting both years, the increase was 4.4 percent (Table 1).

In 2019-20, 19.9 percent of CS doctoral degree recipients were female, and 21.7 percent of all doctoral computing degree recipients were female (Table D2). The respective percentages in 2018-19 were 20.3 and 20.8. Non-resident Aliens comprised a higher percentage of 2018-20 Ph.D. recipients in all three areas (CS, CE and I) compared with 2018-19 recipients. This is the reverse of what was experienced last year, but last year's experience was the reverse of that from two years ago. In contrast, resident Asians comprised a smaller percentage of 2019-20 graduates compared with 2018-19 among recipients in all three areas (Table D3), again the reverse of what last year's data showed. 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 3.8 percent, the same as it was two years prior; it was 3.1 percent in 2018-19.

Also similar to two years ago, Non-resident Aliens had a higher percentage of female than male CS graduates, while Whites had a higher percentage of male than female CS graduates (Table D9). In 2018-19, Non-resident Aliens comprised a somewhat smaller percentage of the CS female doctoral graduates than they did CS male graduates, and Whites comprised an equal percentage of the female and male graduates.

Doctoral Program Enrollment

Total doctoral enrollment increased by 7.9 percent, and increased 6.8 percent among programs that reported both years. If only U.S. computer science departments are considered, the respective increases were 5.2 and 6.6 percent (Table 1). In each case, the percent increases are higher than last year when all departments are considered, and lower when only departments that reported both years are considered.

The fraction of females among enrolled students rose for the fifth straight year, but only slightly, Across the three areas of CS, CE and I combined, the fraction of females among 2019-20 doctoral students was 24.8 percent, versus 24.5 percent in 2018-19. In CS, females comprised 23.4 percent of the 2019-20 students currently enrolled, versus 23.2 percent the previous year (Table D7).

Doctoral enrollment diversity by race/ethnicity rebounded in 2019-20. The overall fraction of doctoral students who were neither Non-resident Aliens, Asian, nor White was 6.2 percent; it was 4.9 percent in 2018-19 and 6.9 percent the previous year. In CS programs, the fraction rose to 6.0 percent from 4.5 percent in 2018-19 and 7.0 percent the previous year (Table D8).

Non-resident Aliens comprise a higher percentage of the enrolled female CS students than they do the enrolled CS male students,

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	**2019**	**2020**	**% chg**	**2019**	**2020**	**% chg**	**2019**	**2020**	**% chg**	**2019**	**2020**	**% chg**
PhD Awarded	1,701	1,777	4.5%	1,860	1,997	7.4%	1,538	1,605	4.4%	1,643	1,740	5.9%
#Units PhD Awd	129	125	-3.1%	153	149	-2.6%	111	111		127	127	
PhD Enrollment	15,621	16,429	5.2%	17,355	18,725	7.9%	14,746	15,724	6.6%	15,959	17,037	6.8%
#Units PhD Enr	138	136	-1.4%	164	162	-1.2%	126	126		144	144	
New PhD Enroll	3,365	2,874	-14.6%	3,732	3,329	-10.8%	3,187	2,765	-13.2%	3,471	3,062	-11.8%
#Units New PhD	137	136	-0.7%	164	162	-1.2%	125	125		144	144	
Bachelor's	**2019**	**2020**	**% chg**	**2019**	**2020**	**% chg**	**2019**	**2020**	**% chg**	**2019**	**2020**	**% chg**
BS Awarded	29,377	33,984	15.7%	35,298	39,870	13.0%	27,312	30,880	13.1%	31,573	35,590	12.7%
#Units BS Awd	134	130	-3.0%	159	152	-4.4%	118	118		135	135	
BS Enrollment	143,457	150,331	4.8%	172,264	177,290	2.9%	129,907	138,504	6.6%	149,004	159,158	6.8%
#Units BS Enr	135	128	-5.2%	160	151	-5.6%	118	118		135	135	
New BS Majors	33,184	32,180	-3.0%	39,226	40,103	2.2%	30,377	27,968	-7.9%	34,530	32,629	-5.5%
#Units New BS	121	119	-6.3%	142	141	-5.4%	106	106		120	120	
BS Enroll/Dept	1,062.6	1,174.5	10.5%	1,077	1,174	9.0%	1,101	1,173.8	6.6%	1,103.7	1,178.9	6.8%

while a lower percentage of enrolled CS females than enrolled CS males are White. The same relationships hold for CE. In I, the same pattern holds for White students (they comprise a lower percentage of female I students than of male I students), but Non-resident Aliens also comprise a smaller percentage of enrolled female I students than of enrolled male I students (Table D10). All of these relationships are consistent with last year's data.

At U.S. CS departments, the average number of students per department who passed qualifier exams in 2019-20 declined to 16.3 from last year's reported 17.0. For the second straight year, both public and private institutions reported declines. The average number per U.S. CS department who passed thesis candidacy exams in 2019-20 (most, but not all, departments have such exams) also declined from its 2018-19 level at public institutions, but increased at private institutions (Table D1).

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	96	1,420	14.9	1,393	14.5	1,493	16.6	1,133	78	14.5
US CS Private	29	357	11.9	515	17.8	448	15.4	253	22	11.5
US CS Total	125	1,777	14.2	1,908	15.3	1,941	16.3	1,386	100	13.9
US CE	3	56	18.7	95	31.7	90	30.0	94	2	47.0
US Info	14	114	8.1	128	9.1	116	8.9	99	12	8.3
Canadian	7	50	7.1	92	13.1	95	13.6	55	4	13.8
Grand Total	149	1,997	13.4	2,223	14.9	2,242	15.8	1,634	118	13.8

Table D2. PhDs Awarded by Gender

	CS		CE		I		Total	
Male	1,353	80.1%	130	84.4%	80	52.6%	1,563	78.3%
Female	336	19.9%	24	15.6%	72	47.4%	432	21.7%
Nonbinary/Other	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total Known Gender	1,689		154		152		1,995	
Gender Unknown	2		0		0		2	
Grand Total	1,691		154		152		1,997	

Table D3. PhDs Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	1,027	65.0%	114	76.5%	67	47.5%	1,208	64.6%
Amer Indian or Alaska Native	1	0.1%	0	0.0%	0	0.0%	1	0.1%
Asian	146	9.2%	16	10.7%	16	11.3%	178	9.5%
Black or African-American	19	1.2%	0	0.0%	7	5.0%	26	1.4%
Native Hawaiian/Pac Islander	1	0.1%	0	0.0%	0	0.0%	1	0.1%
White	347	22.0%	18	12.1%	47	33.3%	412	22.0%
Multiracial, not Hispanic	12	0.8%	0	0.0%	1	0.7%	13	0.7%
Hispanic, any race	26	1.6%	1	0.7%	3	2.1%	30	1.6%
Total Residency & Ethnicity Known	1,579		149		141		1,869	
Resident, ethnicity unknown	45		5		6		56	
Residency unknown	67		0		5		72	
Grand Total	1,691		154		152		1,997	

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	0	7	6	5	2	17	3	4	2	9	5	7	3	0	14	4	8	6	4	13	141	10.3%
Researcher	9	0	0	0	1	1	3	2	3	1	1	0	2	2	0	2	0	2	2	4	3	39	2.9%
Postdoc	19	0	5	4	4	7	10	11	3	3	5	2	4	9	1	6	8	4	24	12	11	147	10.7%
Teaching Faculty	7	7	2	4	1	1	3	0	3	2	3	2	1	2	1	3	1	1	6	2	5	57	4.2%
North American, Other Academic																							
Other CS/CE/I Dept.	2	1	0	0	0	0	1	0	1	0	2	2	3	0	0	0	1	3	0	1	3	20	1.5%
Non-CS/CE/I Dept	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2	0	0	0	0	6	0.4%
North American, Non-Academic																							
Industry	153	1	57	26	27	23	39	25	10	20	44	27	16	48	5	45	20	65	32	28	60	771	56.4%
Government	5	0	1	2	0	2	2	1	1	0	0	1	1	1	1	4	0	2	1	2	0	27	2.0%
Self-Employed	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	1	4	0.3%
Unemployed	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	5	0.4%
Other	3	1	0	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	1	1	1	11	0.8%
Total Inside North America																							
	222	10	72	42	39	36	78	43	27	29	64	39	35	66	8	75	36	81	72	55	99	1,228	89.8%
Outside North America																							
Ten-Track in PhD	8	0	3	1	0	0	2	1	0	2	9	2	0	0	1	7	1	5	0	0	4	46	3.4%
Researcher in PhD	1	1	0	0	0	0	0	1	0	0	2	0	0	1	0	0	0	0	0	1	1	8	0.6%
Postdoc in PhD	3	0	0	0	1	0	0	1	0	1	1	1	2	2	0	2	0	0	3	0	2	19	1.4%
Teaching in PhD	1	0	0	0	0	0	0	0	0	0	4	2	0	0	0	3	0	1	2	1	1	15	1.1%
Other Academic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.1%
Industry	6	1	1	2	0	1	1	0	0	0	2	0	2	3	0	2	0	3	2	1	2	29	2.1%
Government	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2	0.1%
Self-Employed	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0.1%
Unemployed	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.1%
Other	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	5	0	18	1.3%
Total Outside NA	32	2	4	3	1	1	3	3	0	3	21	5	4	6	1	15	2	9	7	8	10	140	10.2%
Total with Employment Data, Inside North America plus Outside North America																							
	254	12	76	45	40	37	81	46	27	32	85	44	39	72	9	90	38	90	79	63	109	1,368	
Employment Type & Location Unknown																							
	43	1	15	22	9	8	18	14	21	9	12	16	7	23	3	12	5	26	22	25	318	629	
Grand Total	**297**	**13**	**91**	**67**	**49**	**45**	**99**	**60**	**48**	**41**	**97**	**60**	**46**	**95**	**12**	**102**	**43**	**116**	**101**	**88**	**427**	**1,997**	

The number of new Ph.D. students per U.S. CS department declined this year compared with last year's reporting departments for departments at both public and private institutions, and in all three disciplines. U.S. I departments reported a slight increase, and Canadian departments also reported an increase in new students per department. Among departments that reported both years, the number of new Ph.D.

students declined by 11.8 percent overall and 13.2 percent among U.S. CS departments (Tables 1 and D5).

The proportion of new doctoral students from outside North America declined quite a bit this year to 51.9% from 61.2% last year. The declines were at U.S. CS and U.S. CE departments, while there were increases at Canadian departments and slight increases at

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 /N umerical Computing	Security / Information Assurance	Social Computing / Social Informatics	Software Engineering	Theory and Algorithms	Other	Unknown	Total	
Inside North America																							
Research	100	0	31	15	8	6	24	16	5	8	27	9	3	42	4	24	12	23	20	19	13	409	53.0%
Non-Research	45	0	25	11	18	15	12	7	5	7	12	13	13	5	0	18	7	41	8	21	15	298	38.7%
Postdoctorate	1	0	0	0	0	1	1	1	0	0	1	2	0	0	1	0	0	0	1	1	0	10	1.3%
Type Not Specified	7	1	1	0	1	1	2	1	0	5	4	3	0	1	0	3	1	1	3	19	0	54	7.0%
Total Inside NA	153	1	57	26	27	23	39	25	10	20	44	27	16	48	5	45	20	65	32	60	28	771	
Outside North America																							
Research	4	1	1	0	0	1	0	0	0	0	0	0	0	3	0	1	0	1	2	1	1	16	73.3%
Non-Research	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	1	0	5	17.2%
Postdoctorate	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	4	13.8%
Type Not Specified	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	4	13.8%
Total Outside NA	6	1	1	2	0	1	1	0	0	0	2	0	2	3	0	2	0	3	2	2	1	29	

Table D5. New PhD Students by Department Type

Department Type	CS				CE				I				Total	
	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	1,681	204	1,885	19.2	69	8	77	4.3	98	9	107	10.7	2,069	20.5
US CS Private	726	27	753	22.8	3	0	3	1.5	8	0	8	4.0	764	23.2
US CS Total	2,407	231	2,638	20.1	72	8	80	4.0	106	9	115	9.6	2,833	21.1
US CE	0	0	0	0.0	91	1	92	30.7	0	0	0	0.0	92	30.7
US Information	15	0	15	7.5	0	0	0	0.0	165	8	173	11.5	188	12.5
Canadian	151	20	171	21.4	4	0	4	4.0	0	0	0	0.0	175	21.9
Grand Total	2,573	251	2,824	20.0	167	9	176	7.3	271	17	288	10.7	3,288	20.6

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	1,018	47	23	1,088	2,069	52.6%
US CS Private	345	1	2	348	764	45.5%
Total US CS	1,363	48	25	1,436	2,833	50.7%
US CE	0	52	0	52	92	56.5%
US Info	8	0	99	107	188	56.9%
Canadian	108	4	0	112	175	64.0%
Grand Total	1,479	104	124	1,707	3,288	51.9%

Table D6. PhD Enrollment by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	102	11,039	70.4%	849	57.4%	574	41.4%	12,462	67.2%
US CS Private	33	3,688	23.5%	49	3.3%	45	3.2%	3,782	20.4%
Total US CS	135	14,727	94.0%	898	60.7%	619	44.6%	16,244	87.6%
US CE	3	0	0.0%	573	38.7%	0	0.0%	573	3.1%
US Info	15	96	0.6%	0	0.0%	768	55.4%	864	4.7%
Canadian	8	851	5.4%	8	0.5%	0	0.0%	859	4.6%
Grand Total	161	15,674		1,479		1,387		18,540	

Table D7. PhD Enrollment by Gender

	CS		CE		I		Total	
Male	11,766	76.2%	1,157	78.3%	677	54.2%	13,600	74.9%
Female	3,615	23.4%	317	21.4%	564	45.2%	4,496	24.8%
Nonbinary/Other	53	0.3%	4	0.3%	7	0.6%	64	0.4%
Total Known Gender	15,434	_	1,478	_	1,248	_	18,160	
Gender Unknown	240	_	1	_	139	_	380	
Grand Total	15,674	_	1,479	_	1,387	_	18,540	

Table D8. PhD Enrollment by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	9,191	65.1%	1,052	73.9%	666	52.8%	10,909	64.9%
Amer Indian or Alaska Native	29	0.2%	1	0.1%	2	0.2%	32	0.2%
Asian	1,151	8.1%	65	4.6%	92	7.3%	1,308	7.8%
Black or African-American	203	1.4%	23	1.6%	60	4.8%	286	1.7%
Native Hawaiian / Pac Islander	12	0.1%	2	0.1%	0	0.0%	14	0.1%
White	2,928	20.7%	239	16.8%	389	30.8%	3,556	21.2%
Multiracial, not Hispanic	203	1.4%	13	0.9%	19	1.5%	235	1.4%
Hispanic, any race	411	2.9%	28	2.0%	34	2.7%	473	2.8%
Total Known	14,128		1,423		1,262		16,813	
Resident, ethnicity unknown	471		48		106		625	
Residency unknown	1,075		8		19		1,102	
Grand Total	15,674		1,479		1,387		18,540	

Table D9. PhDs Awarded by Gender and Ethnicity, From 149 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	825	201	0	1	64.9%	65.5%		96	18	0	0	76.8%	75.0%		40	27	0	0	55.6%	39.1%		1,208	64.6%
Amer Indian or Alaska Native	0	1	0	0	0.0%	0.3%		0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%		1	0.1%
Asian	116	30	0	0	9.1%	9.8%		12	4	0	0	9.6%	16.7%		6	10	0	0	8.3%	14.5%		178	9.5%
Black or African-American	13	6	0	0	1.0%	2.0%		0	0	0	0	0.0%	0.0%		1	6	0	0	1.4%	8.7%		26	1.4%
Native Hawaiian/ Pac Islander	1	0	0	0	0.1%	0.0%		0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%		1	0.1%
White	286	61	0	0	22.5%	19.9%		16	2	0	0	12.8%	8.3%		25	22	0	0	34.7%	31.9%		412	22.0%
Multiracial, not Hispanic	9	3	0	0	0.7%	1.0%		0	0	0	0	0.0%	0.0%		0	1	0	0	0.0%	1.4%		13	0.7%
Hispanic, any race	21	5	0	0	1.7%	1.6%		1	0	0	0	0.8%	0.0%		0	3	0	0	0.0%	4.3%		30	1.6%
Total Res & Ethnicity Known	1,271	307	0	1				125	24	0	0				72	69	0	0				1,869	
Resident, ethnicity unknown	33	12	0	0				5	0	0	0				5	1	0	0				56	
Not Reported (N/R)	49	17	0	1				0	0	0	0				3	2	0	0				72	
Gender Totals	1,353	336	0	2				130	24	0	0				80	72	0	0				1,997	
%	80.1%	19.9%	0.0%					84.4%	15.6%	0.0%					52.6%	47.4%	0.0%						

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

CRA Computing Research Association

Table D10. PhD Enrollment by Gender and Ethnicity, From 161 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	6,971	2,165	25	30	65.0%	66.0%	49.0%	814	233	4	1	73.2%	76.1%	100.0%	313	249	0	104	51.7%	48.4%	0.0%	10,909	64.9%
Amer Indian or Alaska Native	28	1	0	0	0.3%	0.0%	0.0%	1	0	0	0	0.1%	0.0%	0.0%	0	2	0	0	0.0%	0.4%	0.0%	32	0.2%
Asian	802	323	14	12	7.5%	9.9%	27.5%	49	16	0	0	4.4%	5.2%	0.0%	42	45	0	5	6.9%	8.8%	0.0%	1,308	7.8%
Black or African-American	134	67	2	0	1.2%	2.0%	3.9%	15	8	0	0	1.3%	2.6%	0.0%	22	35	1	2	3.6%	6.8%	14.3%	286	1.7%
Native Hawaiian/ Pac Islander	5	6	0	1	0.0%	0.2%	0.0%	0	2	0	0	0.0%	0.7%	0.0%	0	0	0	0	0.0%	0.0%	0.0%	14	0.1%
White	2,289	603	10	26	21.3%	18.4%	19.6%	199	40	0	0	17.9%	13.1%	0.0%	210	151	6	22	34.7%	29.4%	85.7%	3,556	21.2%
Multiracial, not Hispanic	156	45	0	2	1.5%	1.4%	0.0%	9	4	0	0	0.8%	1.3%	0.0%	10	9	0	0	1.7%	1.8%	0.0%	235	1.4%
Hispanic, any race	342	68	0	1	3.2%	2.1%	0.0%	25	3	0	0	2.2%	1.0%	0.0%	9	23	0	2	1.5%	4.5%	0.0%	473	2.8%
Total Res & Ethnicity Known	10,727	3,278	51	72				1,112	306	4	1				606	514	7	135				16,813	
Resident, ethnicity unknown	352	116	1	2				39	9	0	0				58	48	0	0				625	
Not Reported (N/R)	687	221	1	166				6	2	0	0				13	2	0	4				1,102	
Gender Totals	11,766	3,615	53	240				1,157	317	4	1				677	564	7	139				18,540	
%	76.2%	23.4%	0.3%					78.3%	21.4%	0.3%					54.2%	45.2%	0.6%						

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

Table D11. New PhD Enrollment by Gender

	CS		CE		I		Total	
Male	1,712	74.7%	103	82.4%	103	48.4%	1,918	72.9%
Female	576	25.1%	22	17.6%	110	51.6%	708	26.9%
Nonbinary/Other	5	0.2%	0	0.0%	0	0.0%	5	0.2%
Total Known Gender	2,293		125		213		2,631	
Gender Unknown	70		7		54		131	
Grand Total	2,363		154		152		2,762	

Table D12. New PhD Enrollment by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	1,199	56.9%	89	73.0%	114	47.5%	1,402	56.8%
Amer Indian or Alaska Native	2	0.1%	0	0.0%	0	0.0%	2	0.1%
Asian	296	14.1%	2	1.6%	26	10.8%	324	13.1%
Black or African-American	30	1.4%	4	3.3%	16	6.7%	50	2.0%
Native Hawaiian / Pac Islander	1	0.0%	0	0.0%	0	0.0%	1	0.0%
White	494	23.5%	23	18.9%	72	30.0%	589	23.9%
Multiracial, not Hispanic	34	1.6%	1	0.8%	7	2.9%	42	1.7%
Hispanic, any race	50	2.4%	3	2.5%	5	2.1%	58	2.4%
Total Known	2,106		122		240		2,468	
Resident, ethnicity unknown	58		2		4		64	
Residency unknown	199		8		23		230	
Grand Total	2,363		132		267		2,762	

U.S. I departments (Table D5a). These changes, coupled with the changes observed in the previous paragraph, suggest that the declines in new doctoral enrollment are largely attributable to declines in students from outside North America. There are likely components of this decline due to U.S. immigration policy and components related to the COVID pandemic.

We added two questions this year to try to capture the effect of pandemic-related choices on new doctoral student enrollment. First, we asked how many students newly admitted for fall 2020 had deferred enrollment to 2021. Departments reported an average of 9 deferrals, compared to an average of 20 new doctoral students per department. We would expect some number of students to defer enrollment for a year in more usual times, but since we have no baseline on deferrals, it is hard to interpret this reported number except to say that it seems high as a percentage of the average number of new students.

Second, there was concern that international students might change their plans at the last moment due to some combination of the pandemic and/or visa issues. We therefore asked for a number of international students who were expected in the fall but did not arrive. Departments reported 690 international CS students who did not arrive, compared to 1,479 international CS students newly enrolled Perhaps some of these students who did not arrive still could be enrolled as new students, but we did not ask that question. In any case, it is clear but not surprising that the plans of a large fraction of the new international students were affected by the pandemic.

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

2020 Taulbee Survey *(continued)*

Table DI3. New PhD Enrollment by Gender and Ethnicity, From 150 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	894	294	1	10	57.5%	55.5%	25.0%	69	18	0	2	70.4%	85.7%		49	41	0	24	47.6%	38.7%		1,402	56.8%
Amer Indian or Alaska Native	2	0	0	0	0.1%	0.0%	0.0%	0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%		2	0.1%
Asian	190	101	1	4	12.2%	19.1%	25.0%	2	0	0	0	2.0%	0.0%		12	14	0	0	11.7%	13.2%		324	13.1%
Black or African-American	20	10	0	0	1.3%	1.9%	0.0%	4	0	0	0	4.1%	0.0%		5	9	0	2	4.9%	8.5%		50	2.0%
Native Hawaiian/ Pac Islander	1	0	0	0	0.1%	0.0%	0.0%	0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%		1	0.0%
White	384	104	2	4	24.7%	19.6%	50.%	20	3	0	0	20.4%	14.3%		33	34	0	5	32.0%	32.1%		589	23.9%
Multiracial, not Hispanic	24	10	0	0	1.5%	1.9%	0.0%	0	0	0	1	0.0%	0.0%		3	4	0	0	2.9%	3.8%		42	1.7%
Hispanic, any race	39	11	0	0	2.5%	2.1%	0.0%	3	0	0	0	3.1%	0.0%		1	4	0	0	1.0%	3.8%		58	2.4%
Total Res & Ethnicity Known	1,554	530	4	18				98	21	0	3				103	106	0	31				2,468	
Resident, ethnicity unknown	42	14	0	2				2	0	0	0				0	3	0	1				64	
Not Reported (N/R)	116	32	1	50				3	1	0	4				0	1	0	22				230	
Gender Totals	1,712	576	5	70				103	22	0	7				103	110	0	54				2,762	
%	74.7%	25.1%	0.2%					82.4%	17.6%	0.0%					48.4%	51.6%	0.0%						

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

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 predicts continued growth in Ph.D. production next year, and departments are forecasting an increase in production during 2020-21 (Table D1). Based on past experience, the amount of the increase tends to be less than departments estimate.

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 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 56.4 percent, down slightly from the 57.0 percentage reported last year. Among those doctoral graduates who went to North American industry and for whom the type of industry position was known, about 57 percent took research positions (Table D4a), compared with 63 percent who did so last year. This year, definitive data was provided for over 93 percent of the graduates who went to North American industry, an improvement over last year's 90 percent.

The percentage of Ph.D. graduates who took North American academic jobs in 2019-20 (30.0) also was somewhat below that reported for 2018-19 (31.5). Among those graduates taking academic positions in North America, the percentage who did not go to a doctoral-granting computing department was 6.3, compared to 8.9 in 2018-19. This number has oscillated for the last several years.

Among those whose employment is known, 10.2 percent of Ph.D. graduates reported taking positions outside of North America, the highest percentage in nearly a decade. A smaller percentage of these graduates went to an industry position than did so last year, while a larger percentage went to some kind a tenure-track or research position in a doctoral-granting institution. Definitive data was provided for 86 percent of the graduates who went to non-North American industry positions, a drop from the 93 percent reported last year.

When academic and industry postdocs are combined, the result is that 13.2 percent of 2019-20 doctoral graduates whose employment was known took some type of postdoctoral position. Last year, the reported percentage was 15.0. Approximately eight percent of these were industry postdocs, as was the case last year.

Of those doctoral graduates for whom employment information was known, six reported as unemployed. However, 31.5 percent of new Ph.D.s' employment status was unknown, higher than the 26.8 percent reported last year. The lack of information about the employment of more than 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 continues to be by far the most popular area, comprising nearly 19 percent of all doctoral degrees awarded for which the area was known. However, this year, software engineering, security/information assurance, theory/algorithms, and human-computer interaction followed, in that order. Human-computer interaction replaced robotics/vision in the top five this year. Slightly more than one in five of the Ph.D.s are categorized into the area "unknown", a similar fraction as last year.

Figure D1. PhD Production

CRA Taulbee Survey 2020

Figure D2. Nonresident Aliens as Fraction of PhD Enrollments

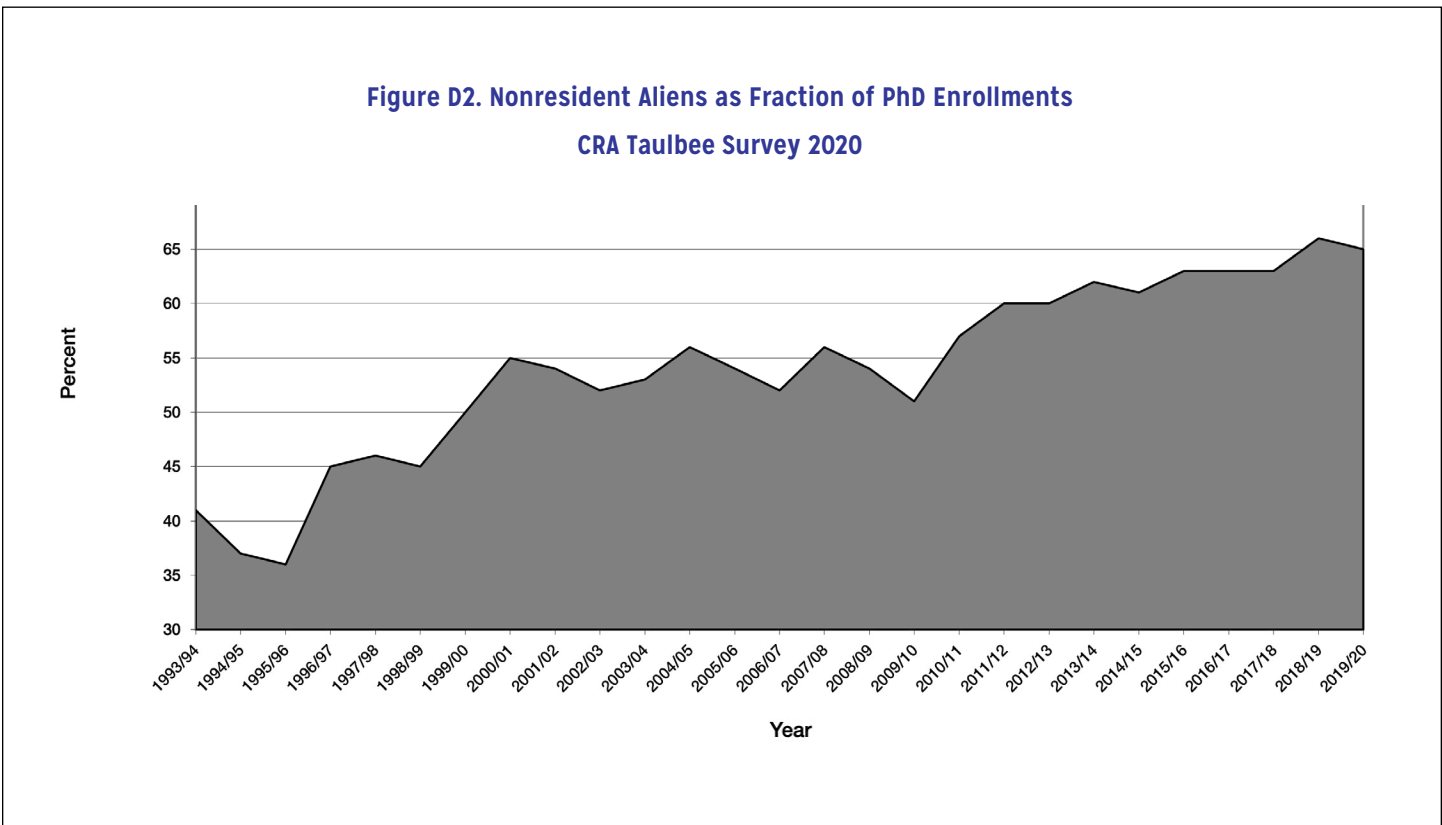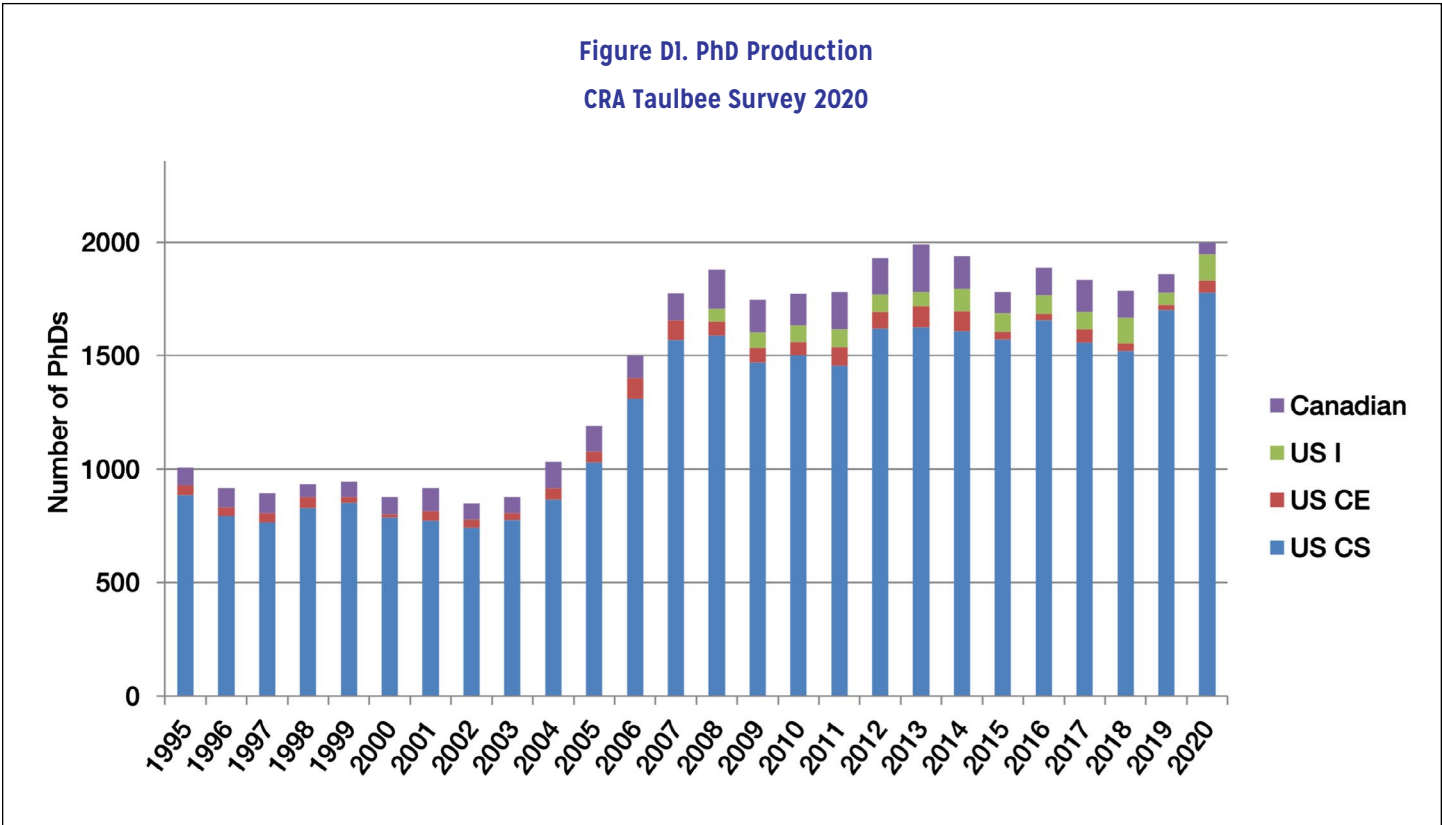**CRA Taulbee Survey 2020**

Figure D3. PhD Degrees Granted by Tenure-Track Size
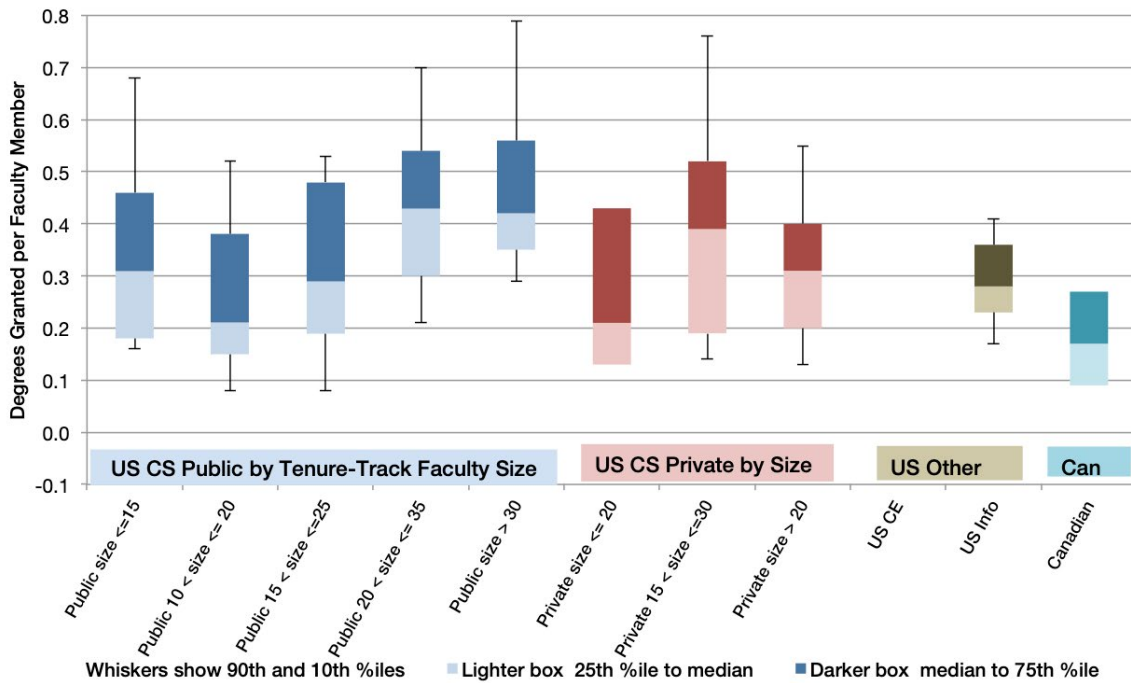CRA Taulbee Survey 2020

Figure D4. PhD Enrollment Normalized by Tenure-Track Size
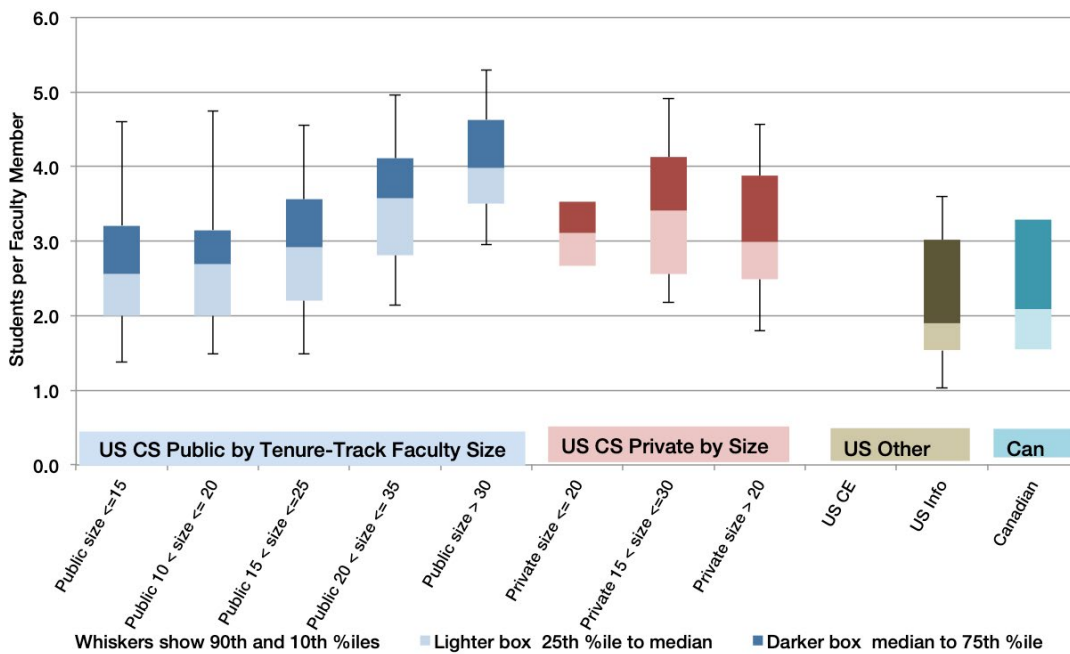CRA Taulbee Survey 2020
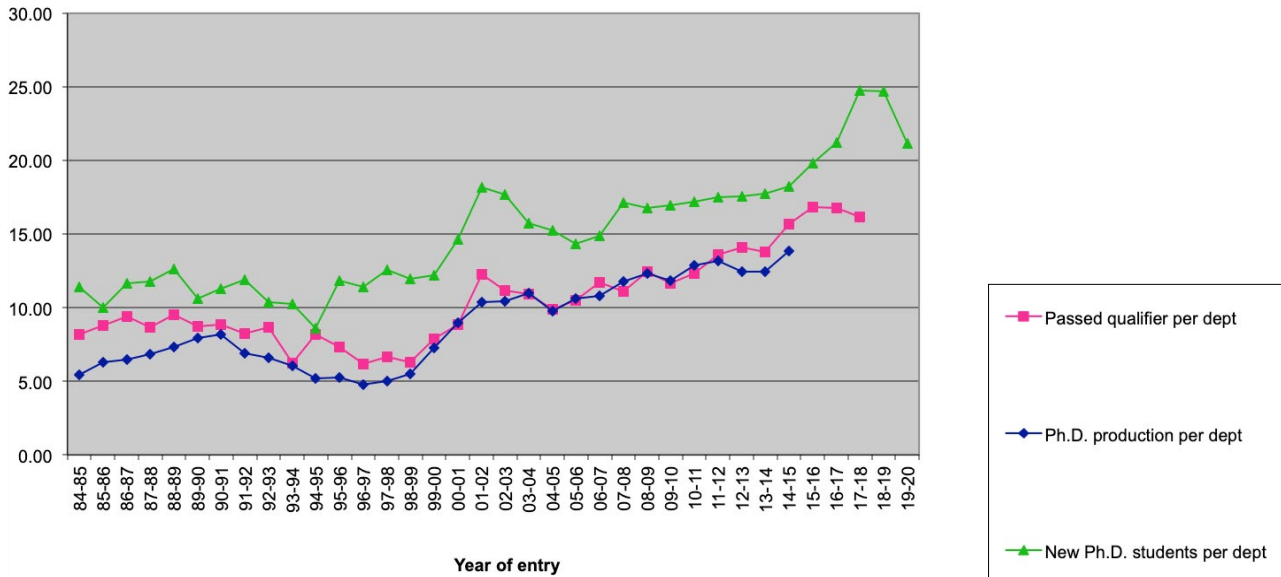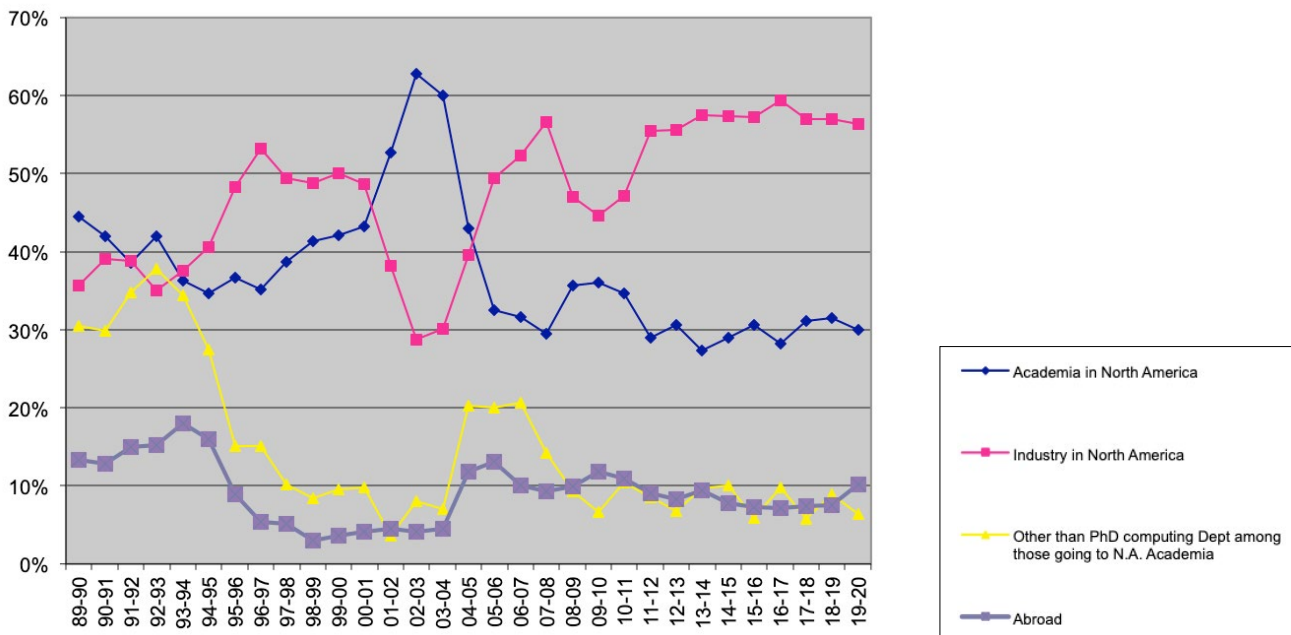
Figure D5. CS Pipeline corrected for year of entry

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

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, 2019-20 CS master's degree production in U.S. CS departments rose by 3.3 percent compared with 2018-19. The production at public institutions rose 8.9 percent, while that at private institutions declined by 2.7 percent. Each of these comparisons is in the same direction of the year-to-year comparison reported in last year's survey, although the absolute values of each comparison are smaller than those reported last year.

Overall master's degree production per department in 2019-20 rose 6.5 percent aggregated over all departments, 3.5 percent at

U.S. CS departments and 6.5 percent at Information departments. Canadian production per department showed a large decrease following a large increase reported last year, but a small number of Canadian departments reported, and this comparison may well be skewed by the difference in departments reporting in the two respective years. No comparison is made for the CE area due to the even smaller number of departments reporting (Table M1).

The proportion of female graduates among CS master's degree recipients declined from 27.2 percent to 26.6 percent. Among CE graduates, 29.9 percent were female, up from 24.6 percent, and the I area again had more female than male graduates among those whose gender was reported (50.7 percent, though down from 53.9 percent in last year's report). Aggregating all areas, the percentage of master's degree graduates who were female increased from 31.2 to 31.4 percent (Table M2).

In CS, 66.8 percent of master's degrees went to Non-resident Aliens compared with 68.9 percent in 2018-19. The percentage of Non-resident Aliens also dropped in the I area, from 43.3 percent to 41.0 percent. The CE area statistics can be volatile due to the smaller number of units reporting; however, the percentage of CE degrees going to Non-resident Aliens changed only slightly, from 79.8 to 78.4 percent. The aggregate percentage over all three areas fell from 64.9 to 62.3 percent. The percentage of CS

Table M1. Master's Degrees Awarded by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	103	9,674	65.1%	370	41.0%	734	19.7%	10,778	55.3%
US CS Private	32	4,528	30.5%	17	1.9%	523	14.0%	5,068	26.0%
Total US CS	135	14,202	95.6%	387	42.9%	1,257	33.7%	15,846	81.3%
US CE	3	0	0.0%	513	56.8%	0	0.0%	513	2.6%
US Info	14	58	0.4%	8	0.0%	2,476	66.3%	2,534	13.0%
Canadian	8	593	4.0%	3	0.3%	0	0.0%	596	3.1%
Grand Total	160	14,853		903		3,733		19,489	

Table M2. Master's Degrees Awarded by Gender

	CS		CE		I		Total	
Male	10,797	73.4%	633	70.1%	1,823	49.2%	13,253	68.6%
Female	3,918	26.6%	270	29.9%	1,876	50.7%	6,064	31.4%
Nonbinary/Other	2	0.0%	0	0.0%	3	0.1%	5	0.0%
Total Known Gender	14,717		903		3,702		19,322	
Gender Unknown	136		0		31		167	
Grand Total	14,853		903		3,733		19,489	

Table M3. Master's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	9,272	66.8%	681	78.4%	1,468	41.0%	11,421	62.3%
Amer Indian or Alaska Native	32	0.2%	0	0.0%	6	0.2%	38	0.2%
Asian	1,618	11.7%	69	7.9%	495	13.8%	2,182	11.9%
Black or African-American	157	1.1%	17	2.0%	174	4.9%	348	1.9%
Native Hawaiian/Pac Island	4	0.0%	0	0.0%	1	0.0%	5	0.0%
White	2,279	16.4%	71	8.2%	1,208	33.7%	3,558	19.4%
Multiracial, not Hispanic	130	0.9%	8	0.9%	84	2.3%	222	1.2%
Hispanic, any race	385	2.8%	23	2.6%	148	4.1%	556	3.0%
Total Residency & Ethnicity Known	13,877		869		3,584		18,330	
Resident, ethnicity unknown	309		31		137		477	
Residency unknown	667		3		12		682	
Grand Total	14,853		903		3,733		19,489	

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

Department Type	# Depts	CS		CE		I		Total	
US CS Public	97	8,849	68.8%	229	51.9%	322	9.9%	9,400	56.8%
US CS Private	29	3,553	27.6%	46	10.4%	518	15.9%	4,117	24.9%
Total US CS	126	12,402	96.4%	275	62.4%	840	25.8%	13,517	81.6%
US CE	2	0	0.0%	158	35.8%	0	0.0%	158	1.0%
US Info	15	138	1.1%	0	0.0%	2,416	74.2%	2,554	15.4%
Canadian	7	322	2.5%	8	1.8%	0	0.0%	330	2.0%
Grand Total	150	12,862		441		3,256		16,559	

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.	# Depts	%
US CS Public	8,286	99	83.7	195	21	9.3	558	11	50.7	9,039	101	89.5	3,590	39.7%
US CS Private	3,877	32	121.2	20	3	6.7	304	6	50.7	4,201	32	131.3	2,324	55.3%
Total US CS	12,163	131	92.8	215	24	9.0	862	17	50.7	13,240	133	99.5	5,914	44.7%
US CE	0	0	0	145	2	72.5	0	0	0	145	2	72.5	127	87.6%
US Information	42	2	21.0	0	0	0	1,981	15	132.1	2,023	15	134.9	522	25.8%
Canadian	438	8	54.8	13	1	13.0	0	0	0	451	8	56.4	138	30.6%
Grand Total	12,643	141	89.7	373	27	13.8	2,843	32	88.8	15,859	158	100.4	6,701	42.3%

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	27,449	101	271.8	868	22	39.5	2,029	15	135.3	30,346	102	297.5
US CS Private	11,052	32	345.4	72	3	24.0	1,420	5	284.0	12,544	32	392.0
Total US CS	38,501	133	289.5	940	25	37.6	3,449	20	172.5	42,890	134	320.1
US CE	0	0	0	812	3	270.7	0	0	0	812	3	270.7
US Information	159	2	79.5	0	0	0	5,761	15	384.1	5,920	15	394.7
Canadian	1,625	8	203.1	31	1	31.0	0	0	0	1,656	8	207.0
Grand Total	40,285	143	281.7	1,783	29	61.5	9,210	35	263.1	51,278	160	320.5

master's recipients among the combined American Indian/Alaska Native, Black/African-American, Native Hawaiian/Pacific Islander, Hispanic, and Multiracial categories rose to 5.0 percent in 2019-20 from 3.9 percent in 2018-19 (Table M3).

Non-resident Aliens again comprised a much larger proportion of female CS and CE degree recipients than male CS and CE degree recipients, while larger percentage of male CS and CE degree recipients than female CS and CE degree recipients were White (Table M7). In the I area, Non-resident Aliens again comprised a larger percentage of male master's graduates than female master's graduates, while a smaller percentage of male master's graduates than female master's graduates were White. These relationships have existed for several years, and are 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 fell substantially, from 118.1 to 99.5. The decline is in departments at both public and private institutions (Table M5). This decline appears to be almost entirely due to students who are from outside North America. The fraction of new master's students in U.S. CS departments that is reported to be from outside North America in 2020-21 was 44.7 percent, compared with 63.1 percent in 2018-19 (Table M5).

U.S. Information departments and Canadian departments also experienced a sizeable decline in the fraction of new master's students from outside North America. in U.S. I departments,

the percentage dropped from 43.4 to 25.8, while in Canadian departments, it dropped from 66.5 to 30.6

Comparable to the questions about new doctoral students, we added two questions this year to try to capture the effect of the pandemic on new master's student enrollment. First, we asked how many students newly admitted for fall 2020 deferred enrollment to 2021. Departments reported an average of 72 deferrals among newly admitted CS master's students, compared to an average of 90 new CS masters students per department. As was the case with new doctoral students, the deferrals seem high as a percentage of the average number of new students.

We also asked for a number of international students who were expected in the fall but did not arrive. Departments reported 4,429 international master's students who did not arrive, compared to 6,701 international CS students newly enrolled. Clearly, the COVID situation affected plans of a large fraction of international master's students, as it did for the international doctoral students.

It is worth observing that CS declines in new student enrollment were present at both the master's and doctoral levels, while I departments and Canadian departments experienced declines only at the master's level. It will be interesting to see what kind of rebound occurs to the international graduate student population once the COVID pandemic's influence on foreign travel abates. Changes to U.S. immigration policy also will have an impact on any such rebound.

Table M7. Master's Degrees Awarded by Gender and Ethnicity, From 160 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	6,551	2,716	0	5	64.2%	74.1%	0.0%	458	223	0	0	75.1%	86.1%	0.0%	745	711	0	12	42.7%	39.1%	0.0%	11,421	62.3%
Amer Indian or Alaska Native	27	5	0	0	0.3%	0.1%	0.0%	0	0	0	0	0.0%	0.0%	0.0%	3	3	0	0	0.2%	0.2%	0.0%	38	0.2%
Asian	1,162	456	0	0	11.4%	12.4%	0.0%	54	15	0	0	8.9%	5.8%	0.0%	251	243	0	1	14.4%	13.4%	0.0%	2,182	11.9%
Black or African-American	114	43	0	0	1.1%	1.2%	0.0%	14	3	0	0	2.3%	1.2%	0.0%	83	90	0	1	4.8%	5.0%	0.0%	348	1.9%
Native Hawaiian/ Pac Islander	3	1	0	0	0.0%	0.0%	0.0%	0	0	0	0	0.0%	0.0%	0.0%	1	0	0	0	0.1%	0.0%	0.0%	5	0.0%
White	1,928	345	2	4	18.9%	9.4%	100.0%	60	11	0	0	9.8%	4.2%	0.0%	550	651	1	6	31.6%	35.8%	33.3%	3,558	19.4%
Multiracial, not Hispanic	98	31	0	1	1.0%	0.8%	0.0%	6	2	0	0	1.0%	0.8%	0.0%	44	40	0	0	2.5%	2.2%	0.0%	222	1.2%
Hispanic, any race	318	67	0	0	3.1%	1.8%	0.0%	18	5	0	0	3.0%	1.9%	0.0%	66	79	2	1	3.8%	4.3%	66.7%	556	3.0%
Total Res & Ethnicity Known	10,201	3,664	2	10				610	259	0	0				1,743	1,817	3	21				18,330	
Resident, ethnicity unknown	231	78	0	0				20	11	0	0				77	59	0	1				477	
Not Reported (N/R)	365	176	0	126				3	0	0	0				3	0	0	9				682	
Gender Totals	10,797	3,918	2	136				633	270	0	0				1,823	1,876	3	31				19,489	
%	73.4%	26.6%	0.0%					70.1%	29.9%	0.0%					49.2%	50.7%	0.1%						

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

CRA Computing Research Association

Table M8. Master's Enrollment by Gender and Ethnicity, From 160 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	14,472	5,911	1	14	53%	67%	33%	909	381	0	0	71%	85%	0.0%	1,716	1,466	0	24	40%	34%	0%	24,894	54%
Amer Indian or Alaska Native	24	7	0	0	0%	0%	0%	0	1	0	0	0%	0%	0.0%	12	8	0	0	0%	0%	0%	52	0%
Asian	3,579	1,248	0	5	13%	14%	0%	111	31	0	0	9%	7%	0.0%	524	552	3	3	12%	13%	15%	6,056	13%
Black or African-American	581	208	0	0	2%	2%	0%	25	5	0	0	2%	1%	0.0%	239	271	0	1	6%	6%	0%	1,330	3%
Native Hawaiian/ Pac Islander	16	2	0	0	0%	0%	0%	1	0	0	0	0%	0%	0.0%	5	5	0	0	0%	0%	0%	29	0%
White	6,891	1,119	2	14	25%	13%	67%	175	22	0	0	14%	5%	0.0%	1,494	1,748	14	8	35%	40%	70%	11,487	25%
Multiracial, not Hispanic	366	107	0	2	1%	1%	0%	16	3	0	0	1%	1%	0.0%	51	62	0	0	1%	1%	0%	607	1%
Hispanic, any race	1,173	228	0	2	4%	3%	0%	41	7	0	0	3%	2%	0.0%	212	237	3	2	5%	5%	15%	1,905	4%
Total Res & Ethnicity Known	10,201	3,664	2	10				610	259	0	0				1,743	1,817	3	21				46,360	
Resident, ethnicity unknown	886	216	0	4				20	4	0	0				163	131	0	0				1,424	
Not Reported (N/R)	1,946	808	0	453				23	8	0	0				4	3	0	249				3,494	
Gender Totals	29,934	9,854	3	494				1,321	462	0	0				4,420	4,483	20	287				51,278	
%	75.2%	24.8%	0.0%					74.1%	25.9%	0.0%					49.5%	50.2%	0.2%						

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

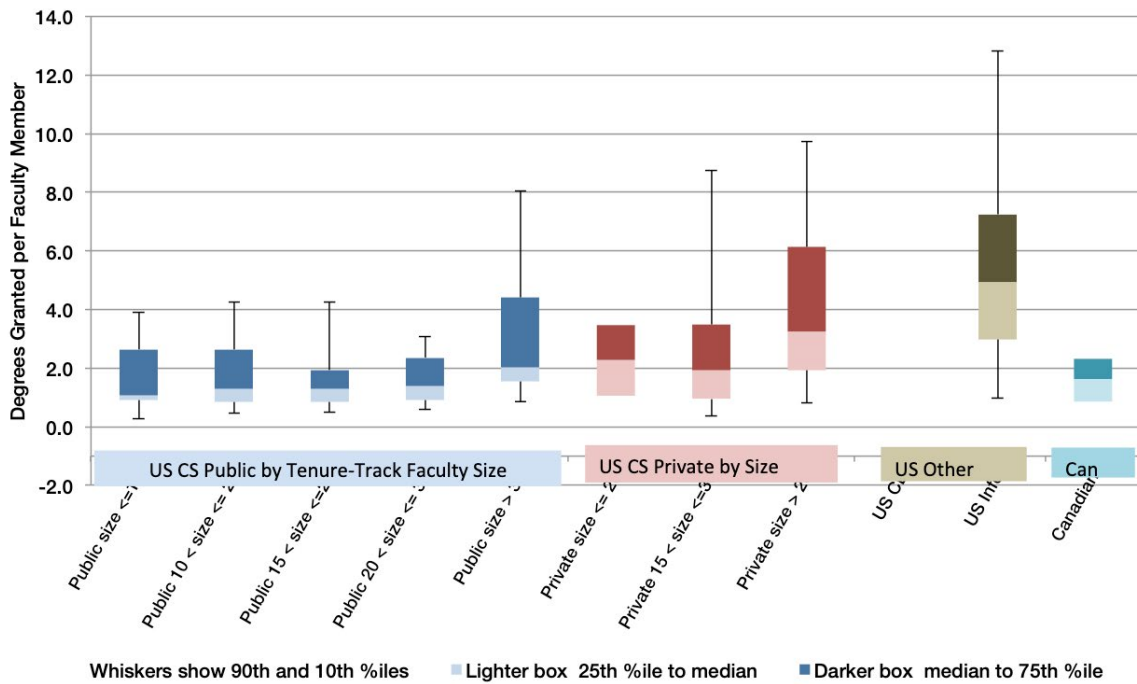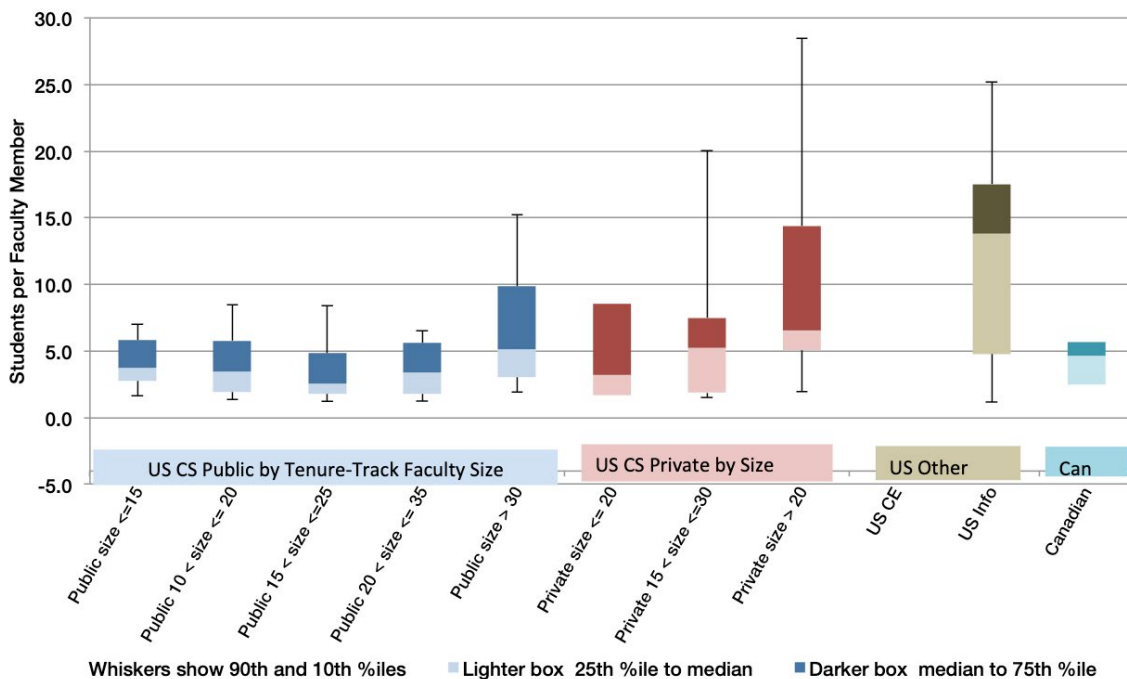## Figure M1 . Master's Degrees Granted by Tenure-Track Size
CRA Taulbee Survey 2020

Whiskers show 90th and 10th %iles   Lighter box 25th %ile to median   Darker box median to 75th %ile

Figure M2. Master's Enrollment Normalized by Tenure-Track Size
CRA Taulbee Survey 2020

Whiskers show 90th and 10th %iles   Lighter box 25th %ile to median   Darker box median to 75th %ile

Bachelor's
(Tables 1, B1-B8; Figures B1-B4)

Growth in bachelor's degree production was at double-digit percentage levels for the sixth straight year, Total degrees produced across all three areas of computing was 13.0 percent higher among this year's reporting departments compared with last year's reporting departments. The increase in CS degrees produced was 15.7 percent. On a per-department basis, total degree production rose overall by 18.2 percent across all department types and 19.2 percent in U.S. CS departments. Total computer science degree production in U.S. CS departments rose 16.6 percent, and 20.2 percent per department. When considering only those departments that reported both years, the increase in total degree production across the CS, CE and I areas was 12.7 percent among all departments and 13.1 percent among U.S. CS departments (Tables 1 and B1).

Table B1. Bachelor's Degrees Awarded by Department Type

Department Type	# Depts	CS		CE		I		Total	
US CS Public	99	23,533	73.9%	1,967	73.7%	1,915	35.7%	27,415	68.8%
US CS Private	31	5,863	18.4%	109	4.1%	597	11.1%	6,569	16.5%
Total US CS	130	29,396	92.3%	2,076	77.8%	2,512	46.8%	33,984	85.2%
US CE	3	0	0.0%	541	20.3%	0	0.0%	541	1.4%
US Info	13	361	1.1%	0	0.0%	2,851	53.1%	3,212	8.1%
Canadian	6	2,078	6.5%	53	2.0%	2	0.0%	2,133	5.3%
Grand Total	152	31,835		2,670		5,365		39,870	

Table B2. Bachelor's Degrees Awarded by Gender

	CS		CE		I		Total	
Male	23,390	79.4%	2,169	83.4%	3,747	70.6%	29,306	78.4%
Female	6,065	20.6%	431	16.6%	1,560	29.4%	8,056	21.5%
Nonbinary/Other	22	0.1%	1	0.0%	0	0.0%	23	0.1%
Total Known Gender	29,477		2,601		5,307		37,385	
Gender Unknown	2,358		69		58		2,485	
Grand Total	31,835		2,670		5,365		39,870	

Table B3. Bachelor's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	4,107	15.2%	296	14.6%	523	10.2%	4,926	14.4%
Amer Indian or Alaska Native	46	0.2%	0	0.0%	12	0.2%	58	0.2%
Asian	7,786	28.8%	410	20.2%	1,097	21.3%	9,293	27.1%
Black or African-American	843	3.1%	87	4.3%	419	8.2%	1,349	3.9%
Native Hawaiian/Pac Islander	28	0.1%	3	0.1%	9	0.2%	40	0.1%
White	11,023	40.7%	962	47.3%	2,302	44.8%	14,287	41.7%
Multiracial, not Hispanic	936	3.5%	76	3.7%	237	4.6%	1,249	3.6%
Hispanic, any race	2,290	8.5%	199	9.8%	542	10.5%	3,031	8.9%
Total Residency & Ethnicity Known	27,059		2,033		5,141		34,233	
Resident, ethnicity unknown	932		82		125		1,139	
Residency unknown	3,844		555		99		4,498	
Grand Total	31,835		2,670		5,365		39,870	

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

Department Type	# Depts	CS		CE		I		Total	
US CS Public	91	22,105	69.1%	2,020	74.0%	1,513	33.8%	25,638	65.4%
US CS Private	27	5,687	17.8%	136	5.0%	286	6.4%	6,109	15.6%
Total US CS	118	27,792	86.9%	2,156	79.0%	1,799	40.2%	31,747	81.0%
US CE	3	0	0.0%	461	16.9%	0	0.0%	461	1.2%
US Info	13	315	1.0%	0	0.0%	2,680	59.8%	2,995	7.6%
Canadian	7	3,889	12.2%	111	4.1%	0	0.0%	4,000	10.2%
Grand Total	141	31,996		2,728		4,479		39,203	

Table B5. New Bachelor's Students by Department Type

Department Type	CS				CE				I				Total	
	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	22,628	10,682	88	257.1	1,850	1,038	30	61.7	1,153	323	21	54.9	25,631	288.0
US CS Private	5,954	1,921	25	238.2	114	18	6	19.0	481	27	5	96.2	6,549	262.0
Total US CS	28,582	12,603	113	252.9	1,964	1,056	36	54.6	1,634	350	26	62.8	32,180	282.3
US CE	0	0	0	0	227	13	2	113.5	0	0	0	0	227	113.5
US Information	298	215	2	149.0	0	0	0	0	1,854	388	13	142.6	2,152	165.5
Canadian	5,510	664	7	787.1	34	0	2	17.0	0	0	0	0	5,544	792.0
Grand Total	34,390	13,482	122	281.9	2,225	1,069	40	55.6	3,488	738	39	89.4	40,103	294.9

Table B6. Total Bachelor's Enrollment by Department Type

Department Type	CS				CE				I				Total	
	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	105,808	21,475	96	1,102.2	9,351	2,634	32	292.2	8,959	1,211	22	407.2	124,118	1,279.6
US CS Private	23,226	3,293	31	749.2	473	37	6	78.8	2,514	28	6	419.0	26,213	845.6
Total US CS	129,034	24,768	127	1,016.0	9,824	2,671	38	258.5	11,473	1,239	28	409.8	150,331	1,174.5
US CE	0	0	0	0	1,782	0	3	594.0	0	0	0	0	1,782	594.0
US Information	1,480	530	2	740.0	0	0	0	0	10,078	922	13	775.2	11,558	889.1
Canadian	13,157	910	7	1,879.6	462	0	2	231.0	0	0	0	0	13,619	1,945.6
Grand Total	143,671	26,208	136	1,056.4	12,068	2,671	43	280.7	21,551	2,161	41	525.6	177,290	1,174.1

Figure B1 shows the trend in total CS and CE bachelor's degree production since 1995 for all departments reporting to the Taulbee Survey. Based on current and recent enrollments, CS bachelor's degree production seems likely to continue its upward trend next year, although based on department forecasts this growth should be modest (Table B4). However, it should be noted that actual bachelor's degree production far exceeded last year's departmental projections.

Gender diversity among bachelor's graduates remained the same when aggregated over all three disciplines, and declined slightly in CS. Among all graduates whose gender was known, 21.5 percent were female in both 2018-19 and 2019-20. Among CS graduates whose gender was known, the percentages were 21.0 percent in 2018-19 and 20.6 percent in 2019-20. The percentage of I graduates who were female increased, from 27.8 percent to 29.4 percent, and the percentage of CE bachelor's graduates who were female increased from 14.6 percent to 16.6 percent.

Both the CS and I areas had a larger number of graduates whose gender is unknown than was the case last year (Table B2).

The percentage of CS bachelor's graduates who are White continued to decline, from 43.7 percent in 2018-19 to 40.7 percent in 2019-20. The percentage awarded to Asians and Non-resident Aliens again rose, from 27.0 percent to 28.8 percent for Asians and from 14.5 percent to 15.2 percent for Non-resident Aliens. All other ethnicities combined comprise 15.4 percent of those for whom ethnicity is known, up from 14.9 percent last year. Hispanics make up the largest share of these other ethnicities at 8.5 percent. In aggregate across the three areas of computing, 41.7 percent of the graduates were White, 27.1 percent Asian, 14.4 percent Non-resident Aliens, and 16.7 percent all other ethnicity categories combined. However, in I programs, the other ethnicity categories accounted for approximately 24 percent of the graduates, down from 25 percent last year (Table B3).

The total reported count of new undergraduate computing majors across the three disciplines increased 2.2 percent in 2020-21, and overall new majors per department increased by 6.8 percent. In U.S. CS departments, the overall count of majors across the three disciplines decreased by 3.0 percent as fewer departments reported this year. On a per department basis, new majors increased by 3.0 percent at U.S. CS departments.

In CS, the overall count of new majors across all department types declined by 4.7 percent, while new majors per department rose by 8.2 percent across all department types, and rose by 2.1 percent at U.S. CS departments. By contrast, in the I area, the overall count of new majors across all department types increased 42.3 percent, and the majors per department increased 27.7 percent (Table B5).

When only departments reporting both this year and last year are considered, the count of new majors decreased by 5.5 percent across all departments, and decreased 7.9 percent at U.S. CS departments. This is the second straight year of such decreases among departments reporting in consecutive years (Table 1). Figure B2 illustrates the trend in the total number of newly declared computing undergraduate majors as reported in the Taulbee Survey.

Total enrollment in the major continued to grow. At U.S. CS departments, the total number of majors in CS, CE, and I combined increased 4.8 percent, while among all departments

it increased 2.9 percent. However, when normalized for the number of departments reporting, enrollment rose 10.5 percent at U.S. CS departments and 9.0 percent among all departments. U.S. CS department enrollments grew at both public and private institutions, but the growth was much stronger at public institutions. When only departments reporting both years are considered, the enrollment increases are 6.8 when all departments are considered, and 6.6 percent when only U.S. CS departments are considered (Table 1).

Looking only at CS enrollment, the increase in majors per department reporting is 6.9 percent for all departments combined, and 9.0 percent for U.S. CS departments. The U.S. CS growth is at departments in public institutions, while private institutions show a relatively flat average enrollment (Table B6).

Per-department averages smooth out comparisons from year to year when there are differences in the number of reporting departments, but these 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. Neither public nor private institutions show a clear relationship between faculty size and either degree production per tenure-track faculty member or enrollment per tenure-track faculty member.

Figure B5 shows the enrollment trend from Taulbee Survey data since this surge began. It illustrates both the relatively flat number of average new majors per department since 2018 and the thirteen consecutive years of growth in average total majors per department through academic year 2019-20. The average enrollment per U.S. CS department increased over 400 percent during that period; that is more than a quintupling from its level in fall 2006. For the past seven years, it has exceeded the previous peak reached during the dot-com enrollment surge, and Is now more than two and a half times that peak.

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

Table B7. Bachelor's Degrees Awarded by Gender and Ethnicity, From 152 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	2,956	1,003	0	148	14%	19%	0%	242	51	0	3	15%	15%	0%	343	180	0	0	9%	12%	0%	4,926	14%
Amer Indian or Alaska Native	31	14	0	1	0%	0%	0%	0	0	0	0	0%	0%	0%	11	1	0	0	0%	0%	0%	58	0%
Asian	5,473	1,924	1	388	27%	36%	13%	313	97	0	0	19%	28%	0%	728	369	0	0	20%	25%	0%	9,293	27%
Black or African-American	612	165	1	65	3%	3%	13%	75	12	0	0	5%	4%	0%	283	136	0	0	8%	9%	0%	1,349	4%
Native Hawaiian/Pac Islander	22	4	0	2	0%	0%	0%	3	0	0	0	0%	0%	0%	6	3	0	0	0%	0%	0%	40	0%
White	8,944	1,625	4	450	44%	30%	50%	798	135	0	29	48%	39%	0%	1,726	576	0	0	48%	38%	0%	14,287	42%
Multiracial, not Hispanic	667	216	0	53	3%	4%	0%	65	10	1	0	4%	3%	100%	133	104	0	0	4%	7%	0%	1,249	4%
Hispanic, any race	1,803	392	2	93	9%	7%	25%	159	40	0	0	10%	12%	0%	406	136	0	0	11%	9%	0%	3,031	9%
Total Res & Ethnicity Known	20,508	5,343	8	1,200				1,655	345	1	32				3,636	1,505	0	0				34,233	
Resident, ethnicity unknown	630	189	11	102				59	14	0	9				80	44	0	1				1,139	
Not Reported (N/R)	2,252	533	3	1,056				455	72	0	28				31	11	0	57				4498	
Gender Totals	23,390	6,065	22	2,358				2,169	431	1	69				3,747	1,560	0	58				39,870	
%	79.4%	20.6%	0.1%					83.4%	16.6%	0.0%					70.6%	29.4%	0.0%						

* % 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. Bachelor's Enrollment by Gender and Ethnicity, From 151 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	11,494	3,758	2	151	13%	16%	14%	1,115	261	0	23	13%	15%	0%	1,239	615	0	0	8%	12%	0%	18,658	13%
Amer Indian or Alaska Native	212	43	0	1	0%	0%	0%	15	2	0	0	0%	0%	0%	55	15	0	0	0%	0%	0%	343	0%
Asian	22,418	7,979	3	275	25%	34%	21%	2,034	547	0	1	23%	31%	0%	2,426	1,253	1	0	16%	24%	100%	36,937	25%
Black or African-American	4,362	1,409	0	91	5%	6%	0%	451	97	0	0	5%	6%	0%	1,415	556	0	0	9%	10%	0%	8,381	6%
Native Hawaiian/Pac Islander	91	19	2	0	0%	0%	14%	9	3	0	0	0%	0%	0%	25	9	0	0	0%	0%	0%	158	0%
White	38,203	6,931	5	1274	42%	29%	36%	3,848	624	3	168	44%	35%	75%	7,248	1,967	0	1	47%	37%	0%	60,272	40%
Multiracial, not Hispanic	3,226	978	0	75	4%	4%	0%	281	64	0	2	3%	4%	0%	556	267	0	1	4%	5%	0%	5,450	4%
Hispanic, any race	11,438	2,545	2	541	13%	11%	14%	1,006	181	1	0	12%	10%	25%	2,521	651	0	0	16%	12%	0%	18,886	13%
Total Res & Ethnicity Known	91,444	23662	14	2408				8,759	1,779	4	194				15,485	5,333	1	2				149,085	
Resident, ethnicity unknown	2,836	887	1	660				219	50	0	73				329	152	0	0				5,207	
Not Reported (N/R)	11,824	3,454	35	6446				725	123	4	138				103	29	2	115				22,998	
Gender Totals	106,104	28,003	50	9514				9,703	1,952	8	405				15,917	5,514	3	117				177,290	
%	79.1%	20.9%	0.0%					83.2%	16.7%	0.1%					74.3%	25.7%	0.0%						

* % 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. Undergrad Representative Course Enroll 2016-2019, Department-Level Percentiles

Number of Students Reported					% Who Are Majors					% Who Are Women					% BHN* at Non-MSI				
Intro-Level for Non Majors																			
(N=56)	2017	2018	2019	2020	(N=38)	2017	2018	2019	2020	(N=33)	2017	2018	2019	2020	(N=25)	2017	2018	2019	2020
25.0	71.3	80.3	76.5	74.3	25.0	0.4	0.3	0.3	0.0	25.0	23.9	24.8	24.8	27.4	25	13.8	11.1	13.9	11.3
50.0	202.0	200.0	172.0	169.0	50.0	3.0	3.7	4.0	3.0	50.0	37.9	38.1	37.5	39.9	50	23.7	20.2	17.9	17.5
75.0	400.5	455.5	401.5	460.3	75.0	20.8	16.1	15.9	20.4	75.0	44.8	48.8	46.5	46.8	75	35.7	31.1	37.3	35.0
Intro for Majors																			
(N=62)	2017	2018	2019	2020	(N=48)	2017	2018	2019	2020	(N=41)	2017	2018	2019	2020	(N=31)	2017	2018	2019	2020
25.0	181.5	164.3	196.5	200.8	25.0	22.1	21.5	19.4	27.5	25.0	17.7	18.2	19.3	19.4	25.0	10.6	10.3	13.4	9.6
50.0	294.0	340.0	337.0	315.5	50.0	46.5	48.4	45.9	51.1	50.0	23.1	21.5	24.2	22.6	50.0	23.2	15.5	19.3	21.3
75.0	478.5	549.5	574.5	568.8	75.0	74.3	73.0	63.4	71.1	75.0	31.7	33.0	31.3	34.5	75.0	29.5	30.8	32.2	28.7
Mid-Level																			
(N=63)	2017	2018	2019	2020	(N=48)	2017	2018	2019	2020	(N=39)	2017	2018	2019	2020	(N=28)	2017	2018	2019	2020
25.0	109.0	127.0	123.0	140.0	25.0	45.9	51.9	51.1	53.3	25.0	14.2	16.8	18.0	17.4	25.0	9.3	8.4	10.3	8.7
50.0	162.0	185.0	204.0	191.0	50.0	71.0	77.2	70.4	74.2	50.0	19.7	22.9	21.6	22.8	50.0	18.4	12.9	14.6	16.6
75.0	278.0	312.0	323.0	360.0	75.0	86.9	91.6	89.2	91.7	75.0	29.7	27.8	30.1	31.0	75.0	30.7	28.4	23.9	25.9
Upper-Level																			
(N=64)	2017	2018	2019	2020	(N=50)	2017	2018	2019	2020	(N=39)	2017	2018	2019	2020	(N=29)	2017	2018	2019	2020
25.0	66.0	75.3	68.8	69.3	25.0	68.0	68.6	71.9	70.3	25.0	12.5	13.4	13.9	16.0	25.0	7.5	6.1	8.3	7.4
50.0	108.0	117.5	111.0	134.5	50.0	87.4	89.6	88.0	87	50.0	17.9	18.4	19.8	21.1	50.0	14.5	12.3	13.2	15.5
75.0	163.0	182.5	213.3	255.8	75.0	97.6	97.8	97.7	97.5	75.0	25.0	27.6	25.9	27.6	75.0	27.8	30.7	29.2	25.8

* BHN = Black or African-American, Hispanic/Latinx, or Native American/Indigenous

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 2017-20. None of the courses show a steadily increasing median over the four-year period and only the upper-level course shows an increased median enrollment for 2020 compared with 2019. The table further shows that, with respect to the course for majors at the introductory, mid and upper levels, the median percent of majors in the course was higher in 2020 than in 2019 at the introductory and mid-level, but slightly lower at the upper-level. For the introductory course for majors, the median percentage of students who are majors is at its highest level In 2020 for the four-year period. The median representation of women in the introductory courses for majors is lower than in 2019, but the representation is higher than in 2019 in the other three courses. The median representation of students

from domestic Black, Hispanic/Latinx, and Native American/Indigenous race/ethnicity classes is higher in 2020 compared with 2019 in all three courses for majors, and slightly lower in the Introductory course for non-majors.

Gender distributions of enrolled students suggest that a similar fraction of the total CS enrollment in 2020-21 is female as compared with 2019-20 (20.9 percent vs 20.8 percent). With respect to racial/ethnic diversity, the fraction of total enrollment aggregated across all three computing areas, among races/ethnicities other than Non-resident Alien, Asian and White, is 22.3 percent. Last year it was 20.2 percent. In CS, these other races/ethnicities comprised 21.3 percent of total enrollment, up from 19.3 percent last year (Table B8).

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

Figure B1. BS Production (CS & CE)
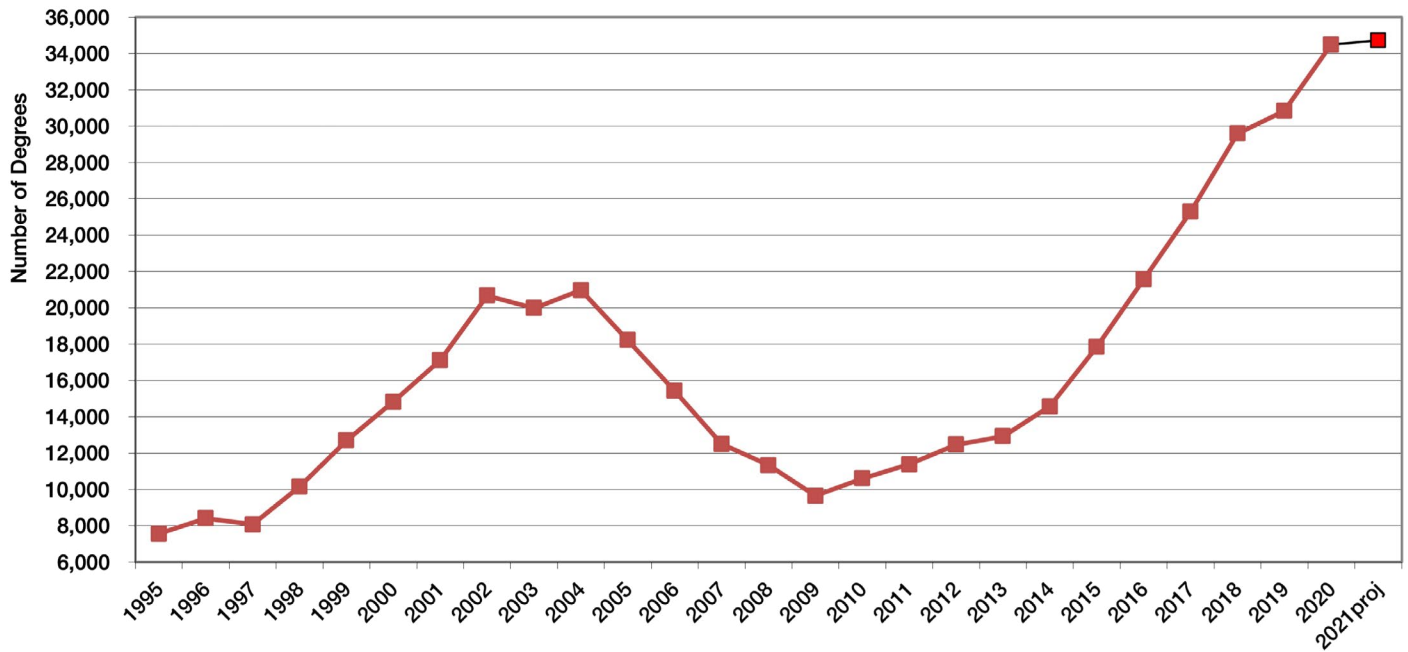**CRA Taulbee Survey 2020**

Figure B2. Newly Declared Undergraduate Majors: CS, CE, and I (beginning in 2008)
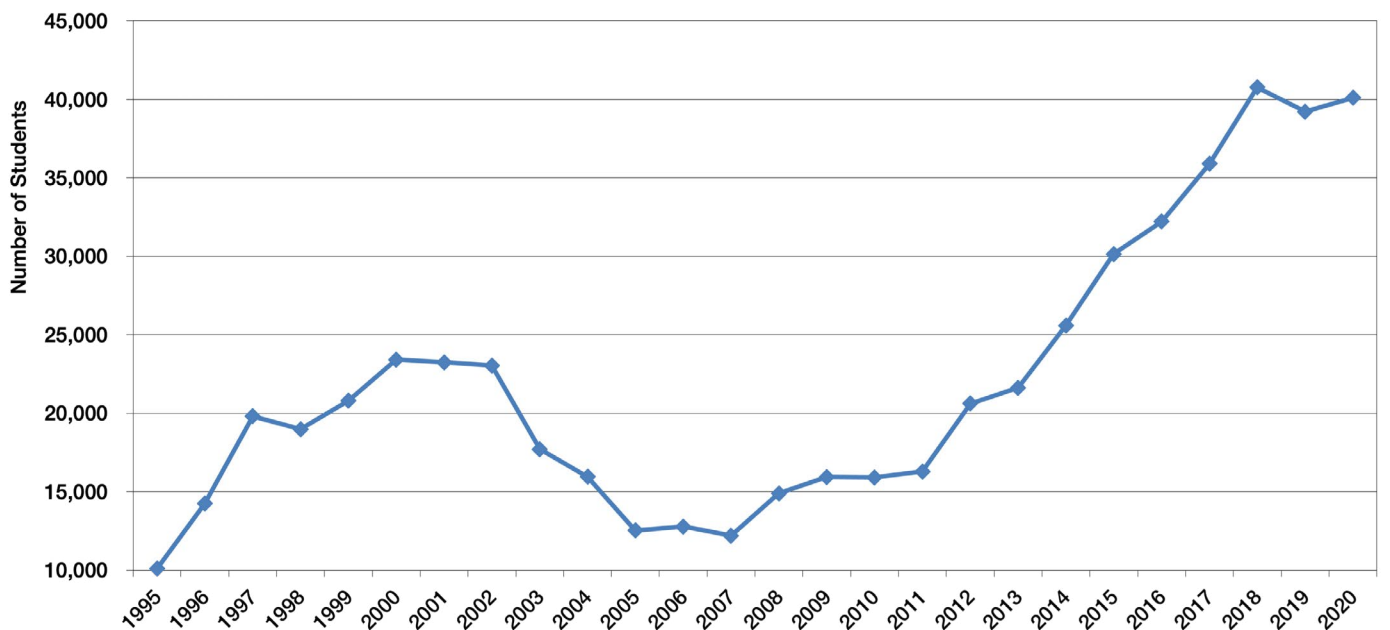**CRA Taulbee Survey 2020**

Figure B3. Bachelor's Degrees Granted by Tenure-Track Size
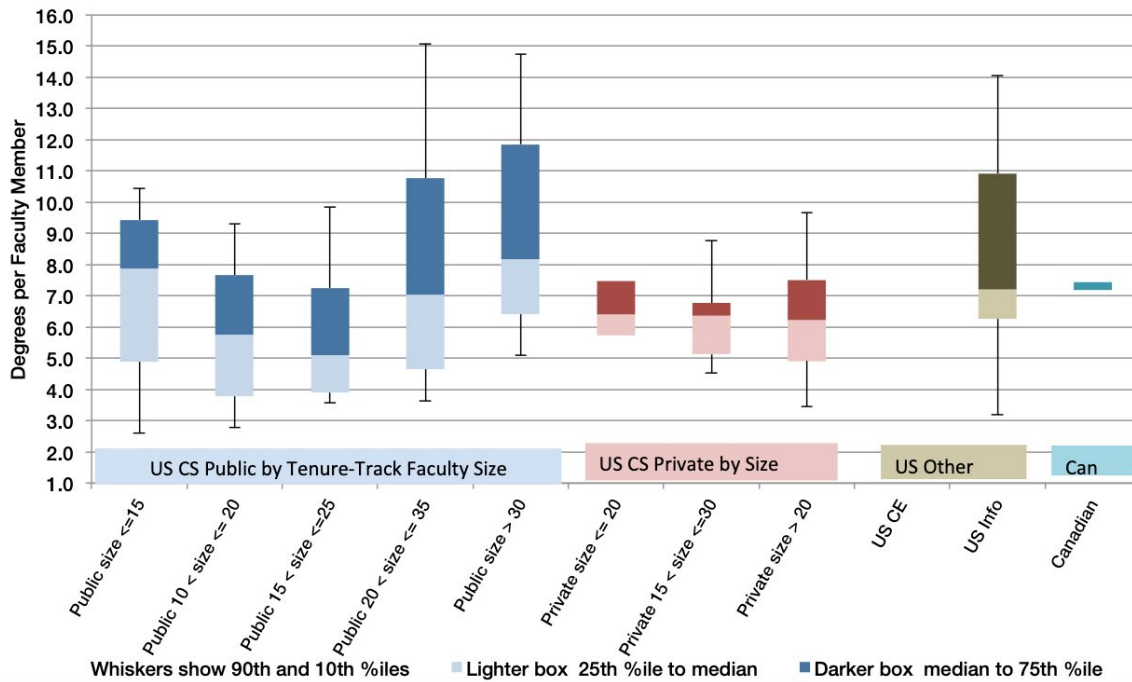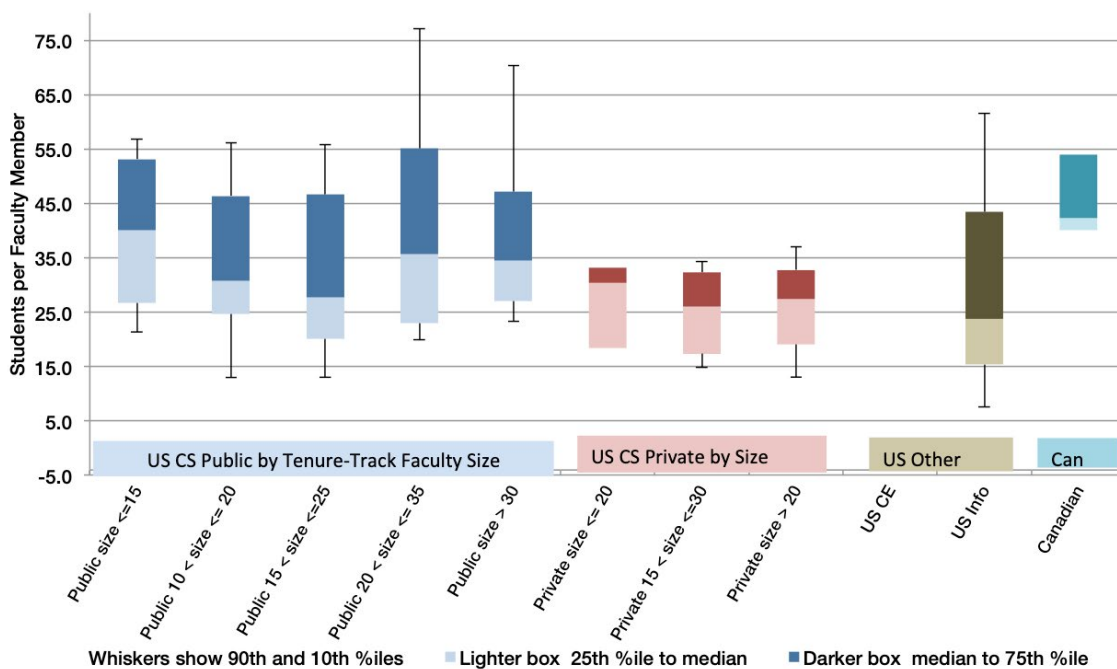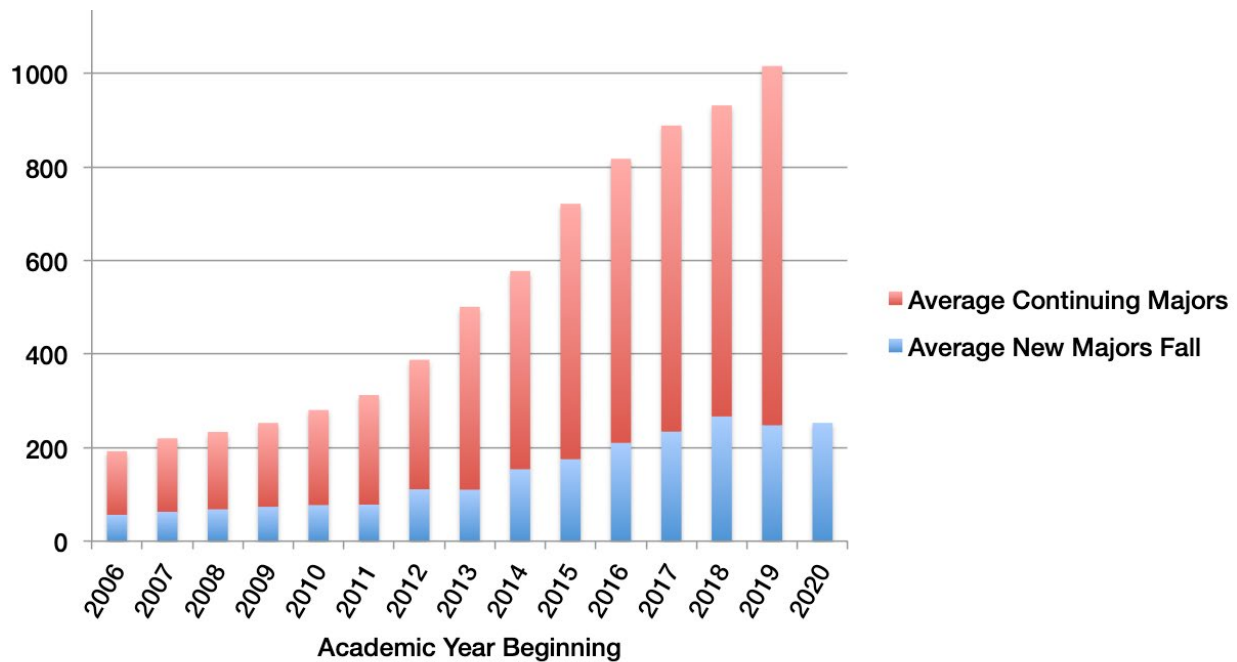
CRA Taulbee Survey 2020

Figure B4. Bachelor's Enrollment Normalized by Tenure-Track Size

CRA Taulbee Survey 2020

Figure B5. Average New and Continuing CS Majors per Academic Unit (U.S. CS Programs Only)
CRA Taulbee Survey 2020

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

Table F1 shows the current (2020-21) and anticipated sizes, in FTE, for tenure-track, teaching, and research faculty, and postdocs. Teaching faculty are separately reported in subcategories called "Teaching Professors" and "Other Instructors". "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 other than typical course stipends; see the section on faculty salaries).

The total tenure-track faculty count in U.S. CS departments increased by 1.8 percent over last year, and the average tenure-track faculty size increased by 4 percent. In U.S. CS departments, the total teaching faculty count increased by 25.2 percent, the third straight year of double-digit percent increase and the largest among the three years. The average increase per department was even greater. The increases were greater in the Teaching Professors category than in the Other Instructor category of teaching faculty.

U.S. CS departments in both public and private institutions now have decidedly more Teaching Professors than Other Instructors. Historically, this has been true at private institutions while public institutions had a more even split. U.S. CE, U.S. I, and Canadian departments also reported a preference for the Teaching Professor category of teaching faculty.

Research faculty and postdocs each experienced sizeable reduction in 2020-21. The average number of research faculty reported at U.S. CS departments dropped from 2.8 to 2.0, while the total number of postdocs dropped from 3.7 to 3.1. Only about one-third of the U.S. CS departments providing faculty data to this year's survey reported having any research faculty; departments at private universities were more likely than those at public universities to have research faculty (40 percent vs 30 percent). About 41 percent of public and 50% of private U.S. CS departments reported having any postdocs.

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

	Actual		Projected				Expected 2-Yr Growth		# Depts
	2020-21		2021-22		2022-23				
US CS Public	Total	Average	Total	Average	Total	Average	#	%	
TenureTrack	3,327	32.0	3,475	33.4	3,584	34.5	257	7.7%	104
Teaching Prof	714	6.9	730	7.0	796	7.7	82	11.5%	81
Other Instruc	488	4.7	545	5.2	563	5.4	75	15.4%	69
Research	181	1.7	237	2.3	246	2.4	65	35.9%	32
Postdoc	226	2.2	273	2.6	288	2.8	62	27.4%	43
Total	4,935	47.5	5,259	50.6	5,477	52.7	542	11.0%	
US CS Private									
TenureTrack	1,063	33.2	1,113	33.7	1,135	34.4	72	6.8%	32
Teaching Prof	232	7.2	250	7.6	259	7.9	27	11.6%	29
Other Instruc	131	4.1	140	4.2	146	4.4	15	11.5%	19
Research	95	3.0	119	3.6	119	3.6	24	25.3%	13
Postdoc	198	6.2	227	6.9	227	6.9	29	14.6%	16
Total	1,718	53.7	1,848	56.0	1,886	57.1	168	9.8%	
All US CS									
TenureTrack	4,390	32.3	4,588	33.5	4,719	34.4	329	7.5%	136
Teaching Prof	946	7.0	979	7.1	1,055	7.7	109	11.5%	110
Other Instruc	618	4.5	684	5.0	708	5.2	90	14.6%	88
Research	276	2.0	356	2.6	365	2.7	89	32.2%	45
Postdoc	424	3.1	500	3.6	515	3.8	91	21.5%	59
Total	6,653	48.9	7,107	51.9	7,363	53.7	710	10.7%	
US CE									
TenureTrack	89	29.5	85	28.3	88	29.3	-1	-1.1%	3
Teaching Prof	12	3.8	12	4.0	14	4.7	2	16.7%	3
Other Instruc	6	2.0	6	2.0	3	1.0	-3	-50.0%	1
Research	7	2.3	5	1.7	6	2.0	-1	-14.3%	1
Postdoc	25	8.3	27	9.0	28	9.3	3	12.0%	1
Total	138	46.0	135	45.0	139	46.3	1	0.7%	
US I									
TenureTrack	418	27.9	442	29.5	458	30.6	40	9.6%	15
Teaching Prof	170	11.3	177	11.8	201	13.4	31	18.2%	14
Other Instruc	77	5.1	92	6.1	92	6.1	15	19.5%	8
Research	9	0.6	9	0.6	10	0.7	1	11.1%	6
Postdoc	33	2.2	38	2.5	37	2.4	4	12.1%	10
Total	706	47.1	757	50.5	797	53.2	91	12.9%	
Canadian									
TenureTrack	334	41.8	347	43.4	354	44.3	20	6.0%	8
Teaching Prof	56	7.0	66	8.3	68	8.5	12	21.4%	5
Other Instruc	35	4.4	35	4.4	35	4.4	0	0.0%	4
Research	4	0.5	4	0.5	4	0.5	0	0.0%	1
Postdoc	49	6.1	54	6.8	54	6.8	5	10.2%	2
Total	478	59.8	506	63.3	515	64.4	37	7.7%	
Grand Total									
TenureTrack	5,231	32.3	5,462	33.5	5,620	34.5	389	7.4%	162
Teaching Prof	1,183	7.3	1,234	7.6	1,338	8.2	155	13.1%	132
Other Instruc	736	4.5	817	5.0	838	5.1	102	13.9%	101
Research	296	1.8	374	2.3	385	2.4	89	30.1%	53
Postdoc	530	3.3	619	3.8	634	3.9	104	19.6%	72
Total	7,976	49.2	8,505	52.2	8,814	54.1	838	10.5%	

Departments seem to be balancing two opposing influences on faculty size. There is still a need in many departments for more faculty to support continuing undergraduate enrollment growth, but on the other hand the impact of COVID-19 on budgets has created some hiring freezes. Although departments still anticipate faculty growth, the projected two-year growth in tenure-track size overall, which has been between 10 and 11 percent since 2016, was projected to be 7.5% this year. The projected two-year growth in Teaching Professors, which was between 19 and 20 percent in 2018 and 2019, dropped to 11.5%. On the other hand, the projected two-year growth in Other Instructors increased from 11.0% in 2019 to 14.6% in 2020. Projected two-year growth in Non-tenure-track Research Faculty jumped from 12.9% in 2019 to 30.1% in 2020, perhaps compensating for the reduction in research faculty size this year.

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. The graph shows that teaching faculty increases for the past three years have kept pace with and this year outpaced the rate of growth in the number of majors. However, since the enrollment surge began, the cumulative growth in teaching faculty is only about half that of the growth in majors. During the same period, tenure-track faculty size has increased by only about 40 percent.

Canadian departments, on average, are larger than U.S. CS departments, in terms of both tenure-track and total faculty. Among U.S. CS departments, those at private universities are on average larger than those at public universities in both tenure-track and total faculty size. These relationships have been observed consistently for many years.

This year's reporting U.S. departments have, on average, similar total sizes to the average size reported last year; the CE totals are most heavily influenced by the small number of and specific departments reporting. 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.

Table F2. Vacant Positions 2019-2020 by Position and Department Type

	Tried to fill	Filled
US CS Public		
TenureTrack	313	247
Teaching Prof	96	75
Other Instruc	73	68
Research	26	26
Postdoc	82	94
Total	590	510
US CS Private		
TenureTrack	99	69
Teaching Prof	32	24
Other Instruc	11	5
Research	15	7
Postdoc	38	39
Total	195	144
All US CS		
TenureTrack	412	316
Teaching Prof	128	99
Other Instruc	84	73
Research	41	33
Postdoc	120	133
Total	785	654
US CE		
TenureTrack	3	1
Teaching Prof	2	0
Other Instruc	0	0
Research	1	1
Postdoc	0	0
Total	6	2
US I		
TenureTrack	48	33
Teaching Prof	36	35
Other Instruc	5	5
Research	1	0
Postdoc	17	15
Total	107	88
Canadian		
TenureTrack	38	21
Teaching Prof	8	4
Other Instruc	2	2
Research	0	1
Postdoc	0	30
Total	48	58
Grand Total		
TenureTrack	501	371
Teaching Prof	174	138
Other Instruc	91	80
Research	43	35
Postdoc	137	178
Total	946	801

Table F2 summarizes faculty hiring this past year. The success rate for hiring tenure-track faculty at this year's reporting U.S. CS departments was 76.7 percent, a considerable increase from last year's reported 70.7 percent and more comparable to the 77.5 percent rate reported two years ago. The success rate among departments at public universities was again higher than that at private universities (78.9 percent vs 69.7 percent), but both types of departments enjoyed an improved success rate. Canadian departments once again collectively had a lower success rate than U.S.CS departments. U.S. I departments' success rate was in between those of U.S. CS and Canadian departments. In aggregate across all types of departments, the tenure-track hiring success rate was 74.1 percent, compared to 70.4 percent in last year's report. The distribution of the reasons for lack of

Table F2a. Reasons Positions Left Unfilled

Reason	# Reported	% of Reasons
Didn't find a person who met our hiring goals*	12	8.1%
Offers turned down	65	43.9%
Technically vacant, not filled for admin reasons	18	12.2%
Hiring in progress	26	17.6%
Other	27	18.2%
Total Reasons Provided	148	
*What hiring goals could not be met?	# Given	
Specific specialty area not found (cybersecurity and others)	6	
Didn't meet criteria, weak candidates, too few candidates	6	

Table F3. Gender of Newly Hired Faculty

	Tenure-Track		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Male	271	73.6%	81	68.1%	62	70.5%	27	77.1%	101	68.2%	542	71.5%
Female	97	26.4%	38	31.9%	26	29.5%	8	22.9%	47	31.8%	216	28.5%
Nonbinary	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Unknown	6		1		0		0		0		7	
Total	374		120		88		35		148		765	

Table F4. Ethnicity of Newly Hired Faculty

	Tenure-Track		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Nonresident Alien	45	13.3%	17	15.5%	4	4.8%	4	12.1%	30	23.6%	100	14.5%
American Indian / Alaska Native	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Asian	114	33.6%	14	12.7%	8	9.6%	10	30.3%	40	31.5%	186	26.9%
Black or African-American	6	1.8%	5	4.5%	8	9.6%	0	0.0%	3	2.4%	22	3.2%
Native Hawaiian/ Pacific Islander	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
White	144	42.5%	58	52.7%	49	59.0%	17	51.5%	38	29.9%	306	44.2%
Multiracial, not Hispanic	2	0.6%	0	0.0%	2	2.4%	0	0.0%	4	3.1%	8	1.2%
Hispanic, any race	7	2.1%	4	3.6%	5	6.0%	1	3.0%	2	1.6%	19	2.7%
Resident, race/ethnic unknown	21	6.2%	12	10.9%	7	8.4%	1	3.0%	10	7.9%	51	7.4%
Total known residency	339		110		83		33		127		692	
Residency Unknown	35		10		5		2		21		73	
Total	374		120		88		35		148		765	

hiring success had some noticeable differences from last year. More instances of a position being "technically vacant and not filled for administrative reasons" were reported (12.2 percent of all cases vs 4.8 percent last year). This can happen, for example, when a position was supposed to be filled but approval to make an offer would not be given. Considerably more cases were classified by respondents as "other" (18.2 percent vs 2.8 percent last year) and among these, most of the reasons given were COVID related. Suffice it to say that the uncertainties related to COVID (financial and otherwise) impacted faculty hiring for the 2021 academic year (Table F2a).

Although the success rate for hiring tenure-track faculty improved from last year, the total number of new tenure-track hires in all reporting departments, which had been steadily increasing since at least 2016, decreased from 422 in 2019 to 374 in 2020. As part of our COVID impact questions, we asked departments how many new hires deferred arrival; they reported that 37 deferred to January 2021 and 44 deferred to fall 2021. While some new hires will defer arrival under normal circumstances, we expect this is higher than usual, and these

Table F5. Faculty Losses

Died	9
Retired	91
Took Academic Position Elsewhere	113
Took Nonacademic Position	33
Remained, but Changed to Part Time	10
Other	37
Unknown	19
Total	312

Table F6. Gender of Current Faculty

	Full		Associate		Assistant		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Male	1,837	83.8%	930	75.7%	1,048	73.5%	704	70.0%	549	73.9%	261	76.1%	445	75.6%	5,774	76.7%
Female	354	16.2%	298	24.3%	377	26.4%	301	29.9%	194	26.1%	82	23.9%	143	24.3%	1,749	23.2%
Nonbinary	0	0.0%	0	0.0%	1	0.1%	1	0.1%	0	0.0%	0	0.0%	1	0.2%	3	0.0%
Unknown	70		27		43		13		25		6		41		225	
Total	2,261		1,255		1,469		1,019		768		349		630		7,751	

Table F7. Ethnicity of Current Faculty

	Full		Associate		Assistant		Teaching Professors		Other Instructors		Research		Postdoc		Total	
Nonresident Alien	12	0.6%	16	1.5%	199	15.5%	61	6.6%	11	1.6%	24	7.6%	139	27.4%	462	6.7%
American Indian / Alaska Native	2	0.1%	2	0.2%	1	0.1%	3	0.3%	3	0.4%	0	0.0%	2	0.4%	13	0.2%
Asian	629	31.2%	381	34.8%	452	35.1%	122	13.2%	67	9.5%	67	21.3%	144	28.3%	1,862	27.2%
Black or African-American	18	0.9%	25	2.3%	40	3.1%	25	2.7%	35	5.0%	6	1.9%	7	1.4%	156	2.3%
Native Hawaiian/ Pacific Islander	0	0.0%	0	0.0%	1	0.1%	1	0.1%	0	0.0%	0	0.0%	0	0.0%	2	0.0%
White	1,226	60.8%	596	54.5%	505	39.2%	635	68.6%	512	72.8%	199	63.2%	181	35.6%	3,854	56.3%
Multiracial, not Hispanic	9	0.4%	9	0.8%	7	0.5%	4	0.4%	6	0.9%	1	0.3%	6	1.2%	42	0.6%
Hispanic, any race	48	2.4%	32	2.9%	32	2.5%	39	4.2%	24	3.4%	8	2.5%	10	2.0%	193	2.8%
Resident, race/ethnic unknown	72	3.6%	33	3.0%	51	4.0%	35	3.8%	45	6.4%	10	3.2%	19	3.7%	265	3.9%
Total known residency	2,016		1,094		1,288		925		703		315		508		6,849	
Residency Unknown	245		161		181		94		65		34		122		902	
Total	2,261		1,255		1,469		1,019		768		349		630		7,751	

Table F8. Current Tenured and Tenure-Track Faculty by Gender and Ethnicity, From 150 Departments

	CS							CE							I							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N	Total	%
Nonresident Alien	10	2	0	0	0.6%	0.6%		14	2	0	0	1.8%	0.8%		158	40	0	1	17.4%	12.6%	0.0%	227	5.4%
Amer Indian or Alaska Native	1	1	0	0	0.1%	0.3%		1	1	0	0	0.1%	0.4%		0	1	0	0	0.0%	0.3%	0.0%	5	0.1%
Asian	540	87	0	2	33.2%	28.0%		271	106	0	4	34.3%	40.2%		338	110	0	4	37.2%	34.6%	0.0%	1,462	34.5%
Black or African-American	14	4	0	0	0.9%	1.3%		14	11	0	0	1.8%	4.2%		22	18	0	0	2.4%	5.7%	0.0%	83	2.0%
Native Hawaiian/Pac Islander	0	0	0	0	0.0%	0.0%		0	0	0	0	0.0%	0.0%		0	1	0	0	0.0%	0.3%	0.0%	1	0.0%
White	1,018	203	0	5	62.6%	65.3%		462	130	0	4	58.6%	49.2%		358	143	1	4	39.4%	45.0%	100.0%	2,327	54.9%
Multiracial, not Hispanic	8	1	0	0	0.5%	0.3%		4	5	0	0	0.5%	1.9%		7	0	0	0	0.8%	0.0%	0.0%	25	0.6%
Hispanic, any race	35	13	0	0	2.2%	4.2%		23	9	0	0	2.9%	3.4%		26	5	0	1	2.9%	1.6%	0.0%	112	2.6%
Total Res & Ethnicity Known	1,626	311	0	7				789	264	0	8				909	318	1	10				4,242	
Resident, ethnicity unknown	42	12	0	18				21	9	0	3				33	14	0	4				156	
Not Reported (N/R)	169	31	0	45				120	25	0	16				106	45	0	29				586	
Gender Totals	1,837	354	0	70				930	298	0	27				1,048	377	1	43				4,984	
%	83.8%	16.2%	0.0%					75.7%	24.3%	0.0%					73.5%	26.4%	0.1%						

* % 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 F9a. Current Non-Tenure-Track Faculty by Gender and Ethnicity, From 147 Departments

	Teaching Professors							Other Instructors							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Total	%
Nonresident Alien	53	8	1	0	9%	3%	100%	8	3	0	0	2%	2%	0%	72	5%
Amer Indian or Alaska Native	2	1	0	0	0%	0%	0%	3	0	0	0	1%	0%	0%	6	0%
Asian	72	48	0	2	12%	18%	0%	44	23	0	0	9%	14%	0%	189	12%
Black or African-American	16	9	0	0	3%	3%	0%	20	15	0	0	4%	9%	0%	60	4%
Native Hawaiian/Pac Islander	1	0	0	0	0%	0%	0%	0	0	0	0	0%	0%	0%	1	0%
White	440	188	0	7	72%	70%	0%	388	123	0	1	79%	74%	0%	1,147	74%
Multiracial, not Hispanic	2	2	0	0	0%	1%	0%	6	0	0	0	1%	0%	0%	10	1%
Hispanic, any race	26	12	0	1	4%	5%	0%	22	2	0	0	5%	1%	0%	63	4%
Total Res & Ethnicity Known	612	268	1	10				491	166	0	1				1,548	
Resident, ethnicity unknown	20	14	0	1				31	14	0	0				80	
Not Reported (N/R)	72	19	0	2				27	14	0	24				158	
Gender Totals	704	301	1	13				549	194	0	25				1,786	
%	70.0%	29.9%	0.1%					73.9%	26.1%	0.0%						

* % 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 F9b. Current Non-Tenure

	Non-Tenure-Track Research							Postdoctorates							Ethnicity Totals	
	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Male	Fem	Nonb	N/R	% of M*	% of F*	% of N*	Total	%
Nonresident Alien	15	3	0	6	7%	4%	0%	95	27	0	17	27%	23%	0%	163	21%
Amer Indian or Alaska Native	0	0	0	0	0%	0%	0%	1	1	0	0	0%	1%	0%	2	0%
Asian	50	17	0	0	22%	23%	0%	114	29	0	1	32%	25%	0%	211	27%
Black or African-American	4	2	0	0	2%	3%	0%	5	2	0	0	1%	2%	0%	13	2%
Native Hawaiian/Pac Islander	0	0	0	0	0%	0%	0%	0	0	0	0	0%	0%	0%	0	0%
White	150	49	0	0	66%	67%	0%	130	51	0	0	37%	44%	0%	380	48%
Multiracial, not Hispanic	0	1	0	0	0%	1%	0%	4	2	1	0	1%	2%	100%	7	1%
Hispanic, any race	7	1	0	0	3%	1%	0%	6	4	0	0	2%	3%	0%	18	2%
Total Res & Ethnicity Known	226	73	0	6				355	116	1	18				794	
Resident, ethnicity unknown	7	3	0	0				12	5	0	2				29	
Not Reported (N/R)	28	6	0	0				78	22	0	21				155	
Gender Totals	261	82	0	6				445	143	1	41				978	
%	76.1%	23.9%	0.0%					75.6%	24.3%	0.2%						

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

deferrals represent successful searches without newly hired faculty being in place in fall 2020.

Gender diversity among newly hired faculty again improved in 2020-21 when all categories of academic positions (tenure-track, teaching faculty, research faculty, and postdoc) are considered collectively. This year the fraction of females among newly hired faculty is 28.5 percent vs 25.9 percent last year (Table F3). Among those newly hired into tenure-track positions, the proportion who are female improved to 26.4 percent this year from 23.6 percent last year. As has been the case for the past few years, the percentage of females among new tenure-track faculty hires and the corresponding percentage among newly hired faculty overall both are higher than the percentage of females among new Ph.D.s produced during the past year (21.7 percent).

Among new tenure-track faculty whose residency is known, White, Non-resident Alien or Asian hires collectively comprise 89.4 percent. Among newly hired teaching faculty, these three categories comprise approximately 3/4 to 4/5 of the new hires, while among research faculty it is about 94 percent and among postdocs it is about 85 percent (Table F4).

Table F10 shows the sources of new faculty of each type. For newly hired assistant professors, the fraction who had been postdocs in the previous year was about 28 percent, the same as was reported last year. Since we began collecting such information in 2015, this percentage has ranged from 21 to 31 percent. About 30 percent of new assistant professors were new Ph.Ds, while about one-third of new assistant professors were in other academic positions the previous year. We don't know the previous academic rank of the new assistant professors who came from other academic positions; they might have been teaching faculty or research faculty as a transitional position, or they might have come from other tenure-track positions.

Among senior faculty hires, only 53 had information about their previous position reported this year; last year we had data about 90 such persons, Of this year's new senior hires, 68 percent came from other academic institutions and 17 percent from industry. Last year's data favored other academic institutions by an even wider margin. Among Teaching Professors, only 17 percent were hired without a Ph.D, while this fraction was 52 percent for Other Instructors. Last year's respective percentages were 35 and 42 percent. This year, 33 percent of new research faculty did not have a Ph.D., compared with 55 percent reported last year, but comparable to the 34 percent reported two years ago.

There were 4.6 percent fewer faculty losses reported this year as compared with last year (Table F5). While there was an increase in the number of deaths, there was a substantial decrease in those who left for academic positions elsewhere and a lesser decrease in those who retired or took nonacademic positions. The COVID-related reasons for lack of hiring success discussed earlier may be related to this decline in faculty mobility.

The proportion of tenure-track faculty who are female is higher this year than last year, at all three ranks. The proportion of research faculty who are female also is slightly higher than it was last year but the proportion of postdocs who are female is lower than it was last year (Table F6).

Table F7 shows the breakdown of race/ethnicity among current faculty in each category. The proportion of current faculty

Table F10. Source of New Faculty

| Source	Full	Associate	Assistant	Teaching Prof	Other Instruc	Research	Postdoc	Total	% Total from Source
New PhD	5	1	68	33	6	8	93	214	39%
From Postdoc	2	0	63	3	3	3	11	85	16%
From Other Academic	18	18	76	38	10	2	23	185	34%
From Industry	8	1	19	8	8	8	6	58	11%
Total With Hire Source	33	20	226	82	27	21	133	542	
Hired Without PhD	0	0	10	14	14	7	8	53	
% Hired Without PhD			4%	17%	52%	33%			

who are American Indian, Black, Native Hawaiian, Multiracial or Hispanic collectively totals between 3.8 and 6.3 percent except for the two categories of teaching faculty, where these ethnicities total 7.7 for Teaching Professors and 9.7 percent for Other Instructors.

Again this year, the vast majority of departments reported gender by race/ethnicity breakdowns of their faculty, Table F8 shows, for each race/ethnicity category within each computing area, the percentage of total male tenure-track faculty in that area represented by that category, and the percentage of total female tenure-track faculty in that area represented by that category. Tables F9a and F9b do likewise, respectively, for teaching faculty and for research faculty and postdocs. The biggest change from last year in the tenure-track faculty table is that, a larger percentage of female associate professors are Asian (40 vs 35 percent) and a smaller percentage are White (49 vs 57 percent) this year. Among teaching faculty, a greater

proportion of both male and female Other Instructors are White, and a smaller proportion of both genders are Non-resident Alien compared with last year.

U.S. CS departments anticipate an overall 4.5 percent growth in tenure-track faculty next year but a 6.3 percent growth in teaching faculty, with the growth expectations being largest in the Other Instructors category of teaching faculty (Table F1). Both the tenure-track and aggregate teaching faculty forecasts are lower than those made last year. Departments also forecast an overall 17.9 percent growth in postdocs, much higher than the forecast last year. Last year, departments considerably overestimated hiring in the tenure-track, research faculty and postdoc categories, and considerably underestimated hiring in each of the teaching faculty categories. Departments at private universities, however, came very close to actuals with regard to total teaching faculty.

Figure F1. Comparative Change in Majors and instructional Resources per Unit CRA Taulbee Survey 2020
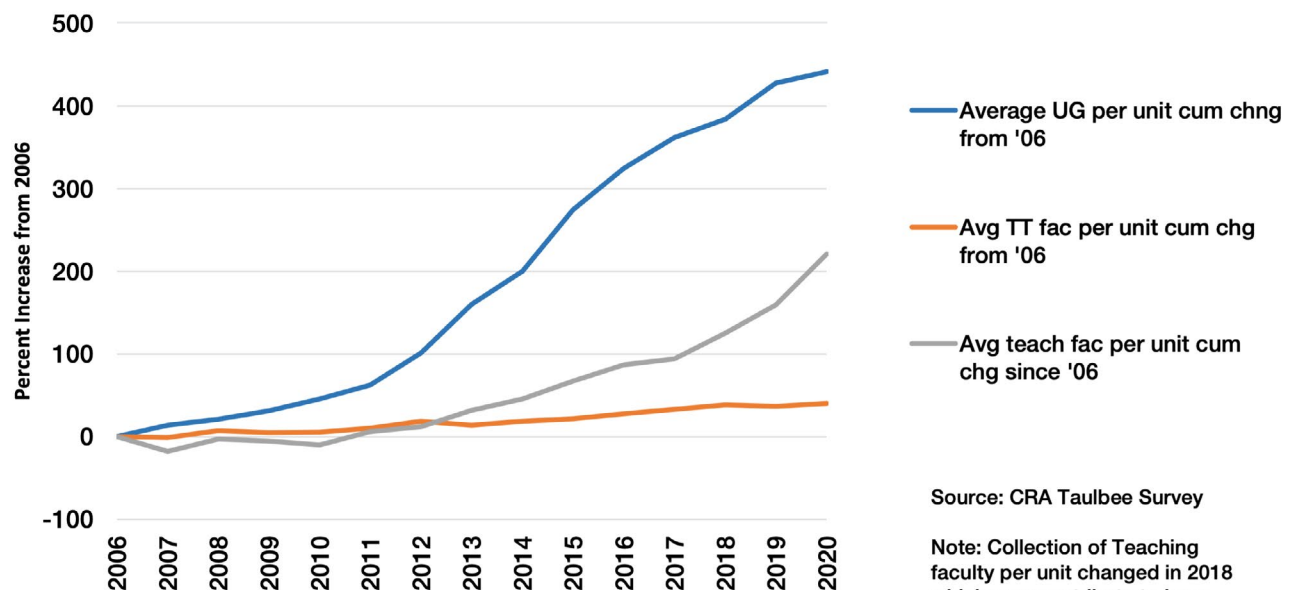
Source: CRA Taulbee Survey

Note: Collection of Teaching faculty per unit changed in 2018 which may contribute to large increase.

Table R1. Total Expenditure from External Sources for Computing Research

Department Type	# Depts	Percentile of Department Averages				
		10th	25th	50th	75th	90th
US CS Public	82	$777,743	$2,013,442	$4,638,017	$9,249,697	$16,408,079
US CS Private	26	$1,775,943	$3,219,141	$6,876,458	$14,548,606	$22,055,324
US CE	1	*	*	*	*	*
US Information	14	$2,358,563	$2,700,186	$3,210,969	$5,122,863	$6,657,735
Canadian	4	*	*	$5,387,494	*	*

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

Reported research expenditures in U.S. departments were mixed during the past year. Overall median research expenditures for 2019-20 at U.S. CS public departments decreased 1.6 percent, while they increased 11.5 percent at U.S. CS private departments and 6.1 percent at U.S. I departments. In last year's report, all categories of U.S. departments had a decrease. Canadian departments showed a 46 percent increase in median expenditure over last year, the second year in a row of a hefty increase, but the small Canadian sample size makes these comparisons a less reliable indicator of the country-wide situation.

The U.S. CS data show a tendency for larger departments to have more external funding per capita than smaller departments among both public and private institutions. This has been the trend consistently at public institutions, but not as consistently at private institutions.

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Figure R1. Research Expenditures Normalized by Tenure-Track Size
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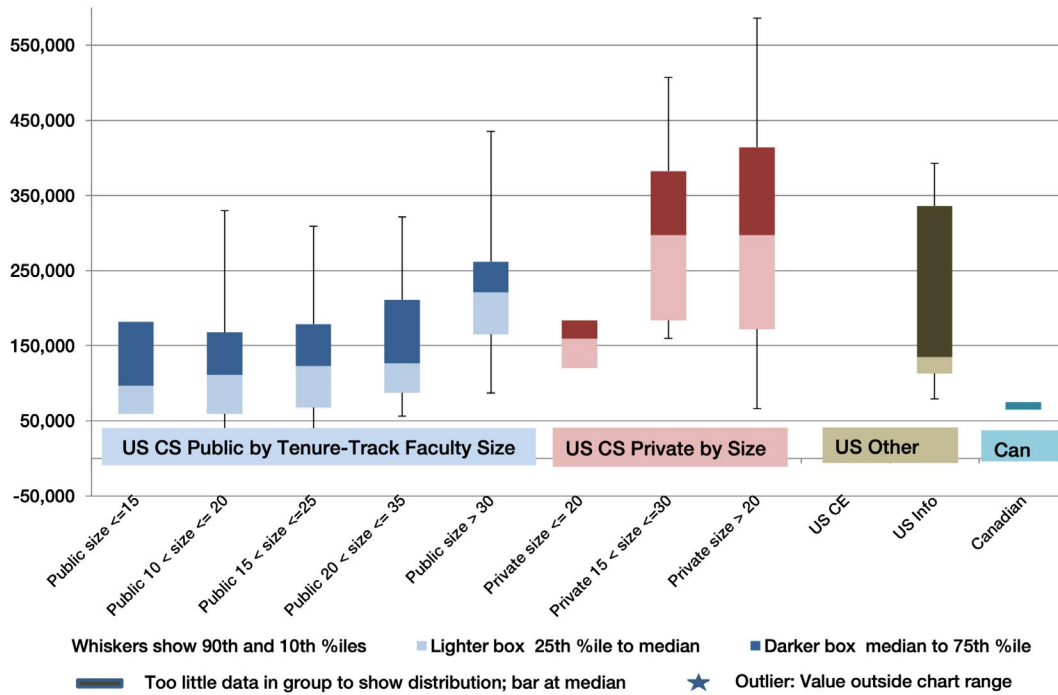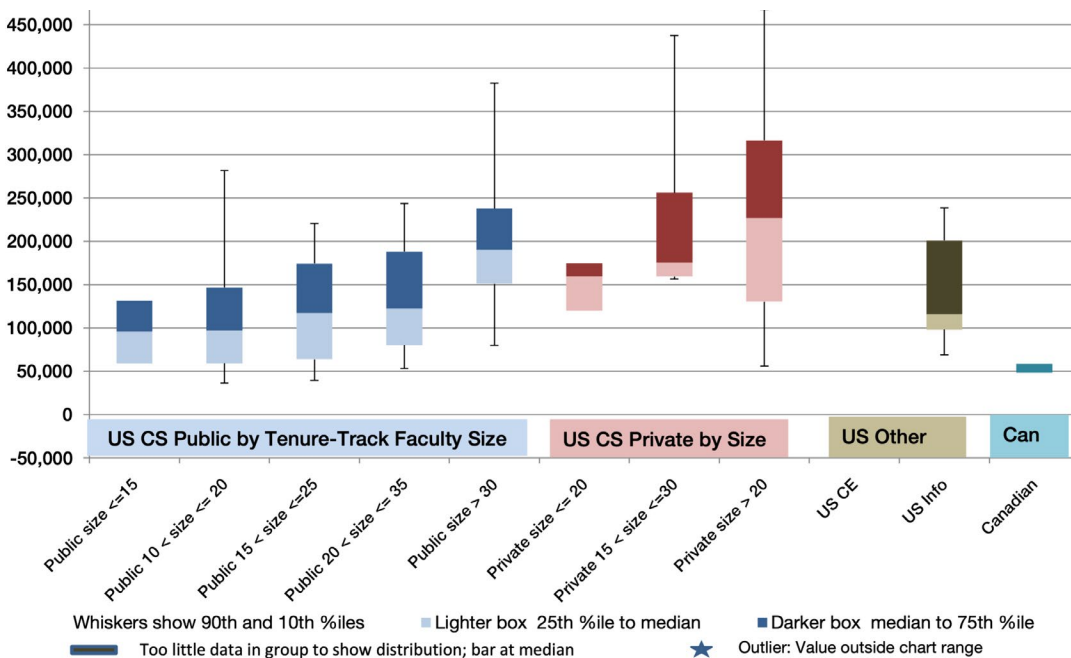

Figure R2. Research Expenditures Normalized by Tenure-Track + Research Faculty + Postdoctorates
CRA Taulbee Survey 2020

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 2020, 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 (33.5 vs 35.0 last year). Public universities reported a slight increase, and private universities reported a slight decrease. The small number of CE, I, and Canadian departments make their comparative averages subject to considerable volatility.

Among research associates, the average number per department on external funding in U.S. CS departments was similar to that

reported last year at both public and private universities, while the average number of RAs supported on institutional funds was similar at public universities but was sharply lower at private universities. The average number of full-support fellows on internal funds declined slightly in U.S. CS departments at public universities, but increased slightly at private universities. The average number of full-support fellows on external funds showed the same pattern as with internal funds.

Among master's students, 66.2 percent of support is for TAs, compared with 67.9 reported last year. Conversely, 31.3 percent of support is for RAs, compared with last year's 29.2 percent. The remaining 2.5 percent (2.9 percent last year) were full-support fellows.

Ten fewer U.S. CS departments provided master's support data than did so last year. Mainly the decrease was among departments at private institutions. Those that reported

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

| Department Type | # Dept | On Institutional Funds | | | | | | On External Funds | | | | | | Total |
		Teaching Assistants		Research Assistants		Full-Support Fellows		Teaching Assistants		Research Assistants		Full-Support Fellows		
US CS Public	92	3,482.5	38.8%	1,218.4	13.6%	344.0	3.8%	68.0	0.8%	3,636.6	40.5%	229.5	2.6%	8,979.0
US CS Private	29	569.3	18.3%	694.8	22.3%	281.0	9.0%	11.0	0.4%	1,395.5	44.9%	158.3	5.1%	3,109.9
US CS Total	121	4,051.9	33.5%	1,913.2	15.8%	625.0	5.2%	79.0	0.7%	5,032.1	41.6%	387.8	3.2%	12,088.9
US CE	1	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	1.0	100.0%	1.0
US I	15	287.2	39.2%	104.6	14.3%	43.0	5.9%	0.0	0.0%	279.3	38.1%	19.0	2.6%	733.2
Canadian	6	275.0	33.6%	230.0	28.1%	175.0	21.4%	5.0	0.6%	134.0	16.4%	0.0	0.0%	819.0
Grand Total	143	4,614.1	33.8%	2,247.8	16.5%	843.0	6.2%	84.0	0.6%	5,445.5	39.9%	407.8	3.0%	13,642.1

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

| Department Type | # Dept | On Institutional Funds | | | | | | On External Funds | | | | | | Total |
		Teaching Assistants		Research Assistants		Full-Support Fellows		Teaching Assistants		Research Assistants		Full-Support Fellows		
US CS Public	84	1,749.87	70.0%	243.85	9.8%	42	1.7%	4	0.2%	446.7	17.9%	12	0.5%	2,498.42
US CS Private	14	412	73.9%	52.33	9.4%	9	1.6%	0	0.0%	71	12.7%	13	2.3%	557.33
US CS Total	98	2,161.87	70.7%	296.18	9.7%	51	1.7%	4	0.1%	517.7	16.9%	25	0.8%	3,055.75
US CE	1	48	54.5%	0	0.0%	0	0.0%	0	0.0%	40	45.5%	0	0.0%	88
US I	12	138.58	66.2%	10.2	4.9%	28.5	13.6%	0	0.0%	32.05	15.3%	0	0.0%	209.33
Canadian	6	375.5	48.1%	251	32.2%	0	0.0%	7	0.9%	147	18.8%	0	0.0%	780.5
Grand Total	117	2,723.95	65.9%	557.38	13.5%	79.5	1.9%	11	0.3%	736.75	17.8%	25	0.6%	4,133.58

this year had an average number of TAs per department on institutional funds of 22.1, compared to the 23.2 average reported in last year's survey and 19.4 reported two years ago (Table G1a). Departments in public institutions reported a decrease in TA support, from an average of 23.2 to 20.8, while departments in private institutions had an average of 29.4 vs 23.2 last year. The specific reporting departments from private institutions may be the major cause of this phenomenon

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 2.6 percent at public institutions while remaining flat at private institutions. Nevertheless, median TA salaries at private institutions are about one-third higher than at public institutions.

Median salaries of RAs rose were flat at public institutions but rose 3.8 percent at private institutions. For full-support fellows, median salaries fell 2.0 percent at U.S. public institutions and rose 6.9 percent at U.S. private institutions. Median salaries also are higher at private institutions for RAs (38 percent) and full-support fellows (21 percent).

Median stipends for TAs and RAs at U.S. I schools fall in between those at public and private U.S. CS departments, as has been the case for many years. Median stipends for full-support fellows at I schools also are in between those for public and private U.S. CS departments. Last year the I school value was the same as that for departments at public universities.

At U.S. CS departments, larger departments tend to have higher salaries than do smaller departments for TAs, RAs, and full-support fellows. The one exception is that the smallest public departments (those of size 15 or less) have higher TA (but not RA or full-support fellow) stipends than those of size 16-25.

Table G1b. Master's Students Eligibility for Assistantship Support

	# Depts	% of Depts
All master's students are eligible for assistantships	83	60.1%
No master's students are eligible for assistantships	19	13.8%
Students in some master's programs but not others are eligible for assistantships	19	13.8%
Other*	17	12.3%
* Other responses divided between individual student qualifications (e.g. GPA or training) and department needs or resources (research needs, funds availability)		

Table G2. Fall 2020 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	102	$14,598	$17,775	$20,000	$22,569	$25,958
US CS Private	25	$14,184	$23,625	$26,633	$30,006	$32,911
US CE	2	*	*	*	*	*
US Information	13	$17,280	$19,800	$23,666	$26,176	$27,670
Canadian	7	*	$5,750	$8,749	$15,476	*
Research Assistantships						
		Percentiles of Department Averages				
Department Type	# Depts	10th	25th	50th	75th	90th
US CS Public	102	$16,200	$18,304	$20,280	$23,742	$27,466
US CS Private	31	$22,000	$24,484	$28,036	$32,698	$35,500
US CE	2	*	*	*	*	*
US Information	13	$19,969	$21,780	$24,000	$26,000	$26,202
Canadian	6	*	*	$11,990	*	*
Full-Support Fellows						
		Percentiles of Department Averages				
Department Type	# Depts	10th	25th	50th	75th	90th
US CS Public	62	$17,378	$20,000	$24,500	$30,000	$34,000
US CS Private	30	$24,220	$25,913	$29,572	$33,813	$35,897
US CE	2	*	*	*	*	*
US Information	10	$21,180	$22,939	$25,979	$29,500	$32,589
Canadian	3	*	*	*	*	*

Figure G1. Teaching Assistantship Stipends

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Whiskers show 90th and 10th percentiles   ▪ Lighter bar shows 25th percentile to median   ▪ Darker bar shows median to 75th percentile
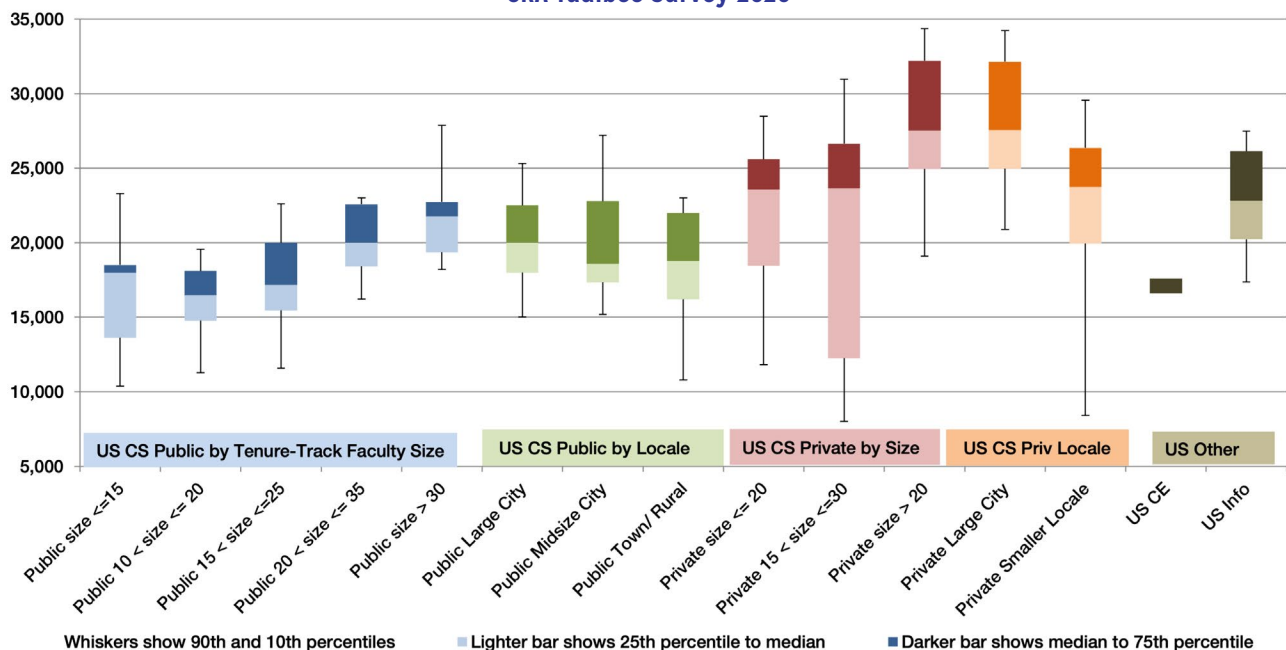
Figure G2. Research Assistantship Stipends
CRA Taulbee Survey 2020

US CS Public by Tenure-Track Faculty Size | US CS Public by Locale | US CS Private by Size | US CS Priv Locale | US Other

Public size <=15 · Public 10 < size <= 20 · Public 15 < size <=25 · Public 20 < size <= 35 · Public size > 30 · Public Large City · Public Midsize City · Public Town/ Rural · Private size <= 20 · Private 15 < size <=30 · Private size > 20 · Private Large City · Private Smaller Locale · US CE · US Info

Whiskers show 90th and 10th percentiles   ■ Lighter bar shows 25th percentile to median   ■ Darker bar shows median to 75th percentile

Figure G3. Full Support Fellows Stipends
CRA Taulbee Survey 2020

US CS Public by Tenure-Track Faculty Size | US CS Public by Locale | US CS Private by Size | US CS Priv Locale | US Other

Public size <=15 · Public 10 < size <= 20 · Public 15 < size <=25 · Public 20 < size <= 35 · Public size > 30 · Public Large City · Public Midsize City · Public Town/ Rural · Private size <= 20 · Private 15 < size <=30 · Private size > 20 · Private Large City · Private Smaller Locale · US CE · US Info

Whiskers show 90th and 10th percentiles   ■ Lighter bar shows 25th percentile to median   ■ Darker bar shows median to 75th percentile

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Faculty Salaries
(Tables S1-S22; 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, 2021 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 is reported in Tables S1-S16 and in the box and whiskers diagrams comprising Figures S1-S9. 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.

In these tables, we 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. We also disaggregate teaching faculty salaries into the two subclasses, Teaching Professors and Other Instructors. Within each subclass, there is further breakdown into persons with time in rank of less than 3 years, 3-5 years, 6-8 years, and 9 or more years. The teaching faculty salary disaggregations are in Tables S1a to S19a.

Table S1. Nine-month Salaries, 143 Responses of 193 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
Depts	123	115	123	142	105	127	140	143	126	48	49
Indiv	747	577	676	2108	382	651	1084	1319	1296	296	354
10	$131,500	$136,046	$125,927	$130,908	$101,792	$107,669	$106,718	$93,984	$63,138	$69,026	$46,665
25	$155,241	$150,467	$141,427	$150,646	$109,071	$116,781	$114,372	$99,894	$73,362	$76,788	$50,400
50	$181,833	$171,045	$154,698	$170,573	$119,250	$125,100	$123,714	$109,227	$85,936	$102,886	$58,795
75	$214,470	$198,818	$179,230	$190,234	$131,728	$138,949	$135,817	$120,869	$95,887	$127,974	$70,000
90	$240,619	$225,180	$194,601	$211,240	$141,166	$153,294	$149,533	$128,898	$118,904	$139,929	$73,105

Table S1a. Nine-month Salaries, 144 Responses of 193 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
Depts	46	39	62	61	100	37	17	34	45	80
Indiv	119	91	158	207	774	83	39	75	145	522
10	$73,456	$77,734	$72,864	$70,000	$72,294	$55,406	$64,725	$58,000	$51,620	$53,274
25	$86,604	$86,203	$78,942	$82,000	$83,011	$65,368	$72,216	$63,263	$61,500	$63,895
50	$98,456	$100,805	$89,459	$90,000	$90,383	$78,213	$81,500	$75,344	$75,500	$75,522
75	$122,620	$114,403	$102,812	$100,000	$108,824	$89,290	$96,220	$88,171	$86,791	$86,535
90	$143,660	$139,732	$127,711	$111,350	$122,303	$108,102	$112,700	$107,395	$95,147	$108,742

Those departments reporting salary data were provided a summary report earlier this year, In the salary report, those departments that provided individual salaries were additionally provided more comprehensive distributional information based on these individual salaries.

The response rates from U.S. CS, U.S. CE, U.S. Information, and Canadian departments increased over last year's rates. This year's respective response rates for those departments were 74,14,68 and 24 percent, giving an overall response rate of 61 percent. Last year's respective rates for the four department types were 73, 20, 68 and 31 percent, and the overall rate was 62 percent. As always, we urge caution in drawing conclusions from those categories with low response rates.

Of those departments reporting salary data this year, 62 percent provided salaries at the individual level. Last year, 63 percent did so.

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.

When viewed relative to faculty size, 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. It also holds for teaching faculty, research faculty and postdoc salaries, with the exception of research faculty at public institutions.

When viewed relative to type of locale, 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 the opposite pattern, except for associate professors with 0-7 years in rank and assistant professors. Teaching faculty salaries at private institutions tend to be higher in large cities than in smaller locales, while teaching

Table S2. Nine-month Salaries, 108 Responses of 141 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
Depts	89	87	95	108	81	94	106	108	96	32	34
Indiv	511	431	484	1,533	286	460	790	986	960	206	172
10	$125,705	$133,978	$121,248	$128,994	$101,458	$105,212	$104,635	$92,198	$61,938	$68,125	$46,586
25	$152,825	$145,977	$138,836	$149,291	$107,942	$115,350	$111,851	$98,906	$69,019	$74,543	$50,948
50	$175,843	$166,212	$150,789	$162,993	$116,188	$123,300	$119,942	$104,158	$82,723	$93,021	$56,900
75	$201,661	$192,185	$176,903	$181,974	$131,300	$132,488	$132,081	$116,603	$90,962	$120,055	$63,572
90	$224,003	$206,769	$189,745	$200,021	$139,107	$146,026	$144,271	$122,926	$110,082	$132,439	$71,309

Table S2a. Nine-month Salaries, 105 Responses of 139 US CS Public (All Public), Percentiles from Department Averages

Non-Tenure Track	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
Depts	31	27	44	42	73	33	15	28	37	67
Indiv	76	68	108	134	545	72	31	63	113	415
10	$72,261	$76,140	$66,740	$66,288	$70,076	$55,013	$64,367	$58,000	$52,429	$54,778
25	$76,354	$85,250	$75,460	$73,766	$79,618	$63,225	$71,108	$63,116	$60,000	$63,096
50	$91,140	$98,808	$84,050	$86,190	$88,931	$76,950	$74,325	$72,435	$73,250	$73,138
75	$104,338	$106,248	$98,866	$94,188	$98,199	$88,900	$89,702	$81,920	$83,167	$85,299
90	$126,809	$135,027	$113,610	$101,890	$118,971	$99,274	$107,135	$88,722	$90,945	$98,589

faculty salaries at public institutions exhibit less of a clear trend (Figures S1-S7).

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. Similarly, we do not disaggregate teaching faculty by years in rank in the year to year comparison, though we do distinguish teaching professors from other instructors. Table S21 shows, by type of faculty 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 127 average salaries for full professors was 1.2 percent higher in 2020-21 than was the median of the average full professor salaries in 2019-20 from these same 127 departments.

When interpreting salary 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 these figures, particularly in the non-tenure-track categories. Because of the small number of Canadian schools, Information

Table S3. Nine-month Salaries, 35 Responses of 52 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
Depts	35	29	29	35	25	34	35	35	31	16	15
Indiv	239	151	195	586	101	197	305	341	356	90	182
10	$147,551	$157,900	$140,614	$145,545	$112,702	$119,140	$118,054	$105,781	$81,182	$79,310	$46,818
25	$178,020	$175,840	$160,296	$176,235	$118,615	$126,636	$123,729	$110,548	$86,905	$99,536	$56,036
50	$204,775	$197,076	$173,350	$192,494	$125,106	$137,728	$135,755	$121,392	$102,244	$112,830	$69,998
75	$240,709	$223,950	$194,405	$212,382	$136,350	$151,850	$147,409	$129,323	$113,561	$136,080	$71,932
90	$247,325	$237,821	$206,724	$236,927	$142,045	$165,910	$157,598	$136,084	$126,175	$151,046	$74,303

Table S3a. Nine-month Salaries, 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
Depts	16	13	19	20	28	4	2	7	9	14
Indiv	48	30	52	75	245	11		14	34	111
10	$89,299	$76,156	$82,495	$85,850	$84,328					$40,027
25	$104,419	$85,905	$86,543	$89,500	$89,382			$92,617	$83,304	$70,862
50	$120,093	$107,642	$102,469	$98,953	$108,311	$98,960		$104,893	$90,000	$83,831
75	$135,253	$116,243	$118,661	$111,750	$119,733			$114,207	$96,000	$107,094
90	$143,660	$138,101	$128,257	$120,871	$124,434					$108,924

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Table S4. Nine-month Salaries, 21 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
Depts	12	10	14	21	13	14	20	21	19	3	2
Indiv	23	26	36	96	28	35	76	80	82	0	0
10	$108,072	$107,729	$108,384	$118,001	$94,806	$94,522	$95,063	$85,860	$49,337		
25	$116,154	$123,552	$117,947	$127,305	$100,661	$96,597	$100,092	$89,398	$61,987		
50	$127,341	$135,697	$127,288	$137,409	$101,926	$103,848	$104,635	$94,289	$67,850		
75	$145,303	$148,337	$132,453	$143,299	$109,071	$115,635	$111,516	$98,923	$79,219		
90	$193,946	$160,474	$169,669	$157,569	$111,786	$116,724	$118,065	$102,000	$86,301		

Table S4a. Nine-month Salaries, 20 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
Depts	4	2	6	7	11	7	1	5	7	13
Indiv	7		9	11	37	11		7	19	45
10					$62,110					$29,723
25				$66,126	$68,188	$55,713			$47,613	$55,297
50	$74,532		$77,075	$71,000	$79,270	$74,547		$71,997	$54,049	$66,728
75				$86,667	$88,735	$82,752			$71,575	$70,000
90					$90,974					$84,295

Table S5. Nine-month Salaries, 37 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
Depts	25	25	32	37	28	30	36	37	30	4	4
Indiv	45	70	89	212	79	85	175	177	148	19	6
10	$109,740	$110,025	$111,358	$117,226	$95,934	$98,033	$99,023	$88,726	$59,401		
25	$123,741	$129,247	$119,818	$128,518	$101,430	$104,411	$103,736	$92,406	$61,518		
50	$140,620	$140,930	$129,705	$141,273	$108,599	$114,441	$111,404	$98,158	$67,289	$90,842	$56,298
75	$182,160	$159,148	$147,841	$159,100	$117,274	$118,721	$117,167	$102,170	$79,293		
90	$211,722	$170,247	$179,351	$172,177	$124,461	$127,100	$127,805	$104,416	$86,821		

Table S5a. Nine-month Salaries, 36 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
Depts	7	5	10	11	17	12	3	9	12	21
Indiv	10	8	18	18	68	26		12	26	80
10			$62,420	$64,752	$66,303	$54,056			$45,703	$46,617
25	$68,821		$66,689	$68,750	$70,000	$55,554		$58,000	$53,037	$57,893
50	$75,556	$84,000	$73,854	$79,470	$85,500	$65,112		$62,819	$57,187	$63,976
75	$90,430		$89,047	$86,667	$89,849	$75,148		$72,369	$66,250	$68,753
90			$94,024	$90,000	$90,749	$80,951			$76,255	$77,810

Table S6. Nine-month Salaries, 32 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
Depts	25	25	29	32	25	28	31	32	24	4	3
Indiv	71	75	91	259	79	83	171	188	157	24	
10	$130,176	$130,915	$119,855	$128,868	$102,288	$108,775	$109,223	$94,362	$60,242		
25	$142,581	$140,930	$126,984	$148,921	$108,126	$112,234	$111,404	$98,262	$63,485		
50	$156,545	$158,300	$144,444	$157,663	$114,000	$118,279	$117,081	$101,697	$71,147	$104,069	
75	$191,799	$168,156	$149,456	$170,961	$122,153	$124,247	$126,973	$108,144	$82,648		
90	$204,467	$197,339	$178,665	$183,206	$131,794	$129,278	$130,975	$116,415	$88,636		

Table S6a. Nine-month Salaries, 34 Responses of US CS Public With 15 < Tenure-Track Faculty <=25, Percentiles from Department Averages

Non-Tenure Track	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
Depts	5	3	8	7	15	9	4	9	10	18
Indiv	5		14	15	79	21	8	15	18	78
10					$67,500				$55,450	$57,392
25			$66,199	$71,334	$71,421	$60,890		$58,000	$59,155	$62,144
50	$81,600		$78,756	$79,470	$78,656	$69,333	$73,471	$67,301	$63,500	$66,867
75			$82,879	$82,887	$89,925	$76,950		$76,950	$73,838	$77,595
90					$90,444				$76,955	$83,218

Table S7. Nine-month Salaries, 32 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
Depts	28	27	28	32	24	28	28	29	20	11	10
Indiv	124	96	120	402	87	106	197	203	125	26	28
10	$146,283	$142,847	$137,632	$150,620	$101,525	$104,542	$104,470	$93,622	$69,154	$37,923	$48,221
25	$155,250	$146,807	$142,595	$153,982	$107,808	$109,919	$110,524	$96,325	$69,662	$71,199	$49,807
50	$166,088	$166,555	$151,001	$165,126	$114,170	$117,531	$117,059	$99,868	$76,032	$88,592	$55,336
75	$200,941	$190,024	$174,141	$181,049	$121,316	$125,671	$124,224	$107,496	$82,332	$105,211	$59,340
90	$223,415	$199,469	$180,395	$188,866	$127,500	$133,703	$128,507	$113,601	$92,452	$113,712	$64,540

Table S7a. Nine-month Salaries, 24 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
Depts	8	8	14	15	25	9	5	8	12	22
Indiv	15	22	32	37	183	13	10	22	30	126
10			$69,681	$67,692	$71,462				$62,007	$54,854
25	$76,344	$79,453	$74,414	$73,007	$78,120	$66,970		$72,279	$69,517	$66,197
50	$81,572	$95,691	$79,028	$89,333	$86,400	$85,224	$74,000	$78,547	$73,892	$74,476
75	$88,891	$105,266	$97,607	$95,599	$99,882	$87,564		$82,194	$82,110	$84,434
90			$111,083	$103,240	$115,732				$85,431	$87,868

Table S8. Nine-month Salaries, 45 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
Depts	43	43	43	45	35	44	45	45	43	23	27
Indiv	384	306	307	1055	145	306	465	640	633	161	160
10	$157,091	$148,788	$142,049	$153,855	$107,147	$119,105	$116,877	$101,288	$72,663	$68,195	$46,190
25	$172,226	$165,246	$151,687	$168,960	$112,656	$123,074	$119,732	$107,658	$84,168	$74,235	$49,907
50	$186,094	$182,371	$168,641	$178,428	$125,013	$132,475	$130,600	$116,586	$90,554	$99,042	$57,448
75	$213,383	$200,458	$182,882	$195,501	$137,945	$144,162	$143,603	$122,689	$104,268	$116,117	$64,707
90	$235,229	$214,811	$192,341	$207,523	$144,726	$152,653	$151,847	$128,881	$121,833	$129,652	$72,644

Table S8a. Nine-month Salaries, 41 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
Depts	17	17	24	22	38	15	9	12	15	29
Indiv	52	46	70	92	363	38	21	36	64	270
10	$81,862	$89,903	$75,360	$81,055	$82,740	$65,354		$63,119	$58,388	$58,462
25	$91,809	$94,749	$81,708	$84,554	$87,554	$71,156	$73,035	$63,656	$62,859	$66,119
50	$102,500	$101,043	$93,025	$92,125	$97,145	$86,813	$89,279	$76,372	$80,000	$79,566
75	$123,032	$121,788	$108,371	$98,118	$108,895	$94,915	$96,220	$86,830	$88,461	$87,550
90	$148,295	$151,340	$128,240	$108,707	$126,132	$111,418		$105,306	$100,523	$109,768

Table S9. Nine-month Salaries, 11 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		Teach	Research	Postdoc
Depts	10	5	6	10	9	10	11	11	8	2	0
Indiv	44	13	13	70	30	26	56	48	39		
10	$133,310			$133,076		$117,837	$116,466	$97,583			
25	$141,577			$143,572	$116,071	$119,798	$118,147	$105,781	$79,907		
50	$176,616	$226,000	$165,684	$186,436	$118,728	$126,664	$122,025	$110,582	$85,540		
75	$232,053			$203,753	$120,365	$131,876	$129,336	$121,012	$93,339		
90	$243,335			$211,581		$137,251	$136,557	$124,650			

Table S9a. Nine-month Salaries, 11 Responses of US CS Private With <=20 Tenure-Track Faculty, Percentiles from Department Averages

Non-Tenure Track	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
Depts	5	3	5	7	8	1	0	0	0	1
Indiv	8		6	18	35					
10										
25				$83,250	$82,714					
50	$89,418		$83,900	$87,891	$85,539					
75				$91,305	$93,339					
90										

Table S10. Nine-month Salaries, 16 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
Depts	15	13	12	15	11	15	15	16	14	7	6
Indiv	69	50	48	168	30	69	99	100	93	37	53
10	$148,844	$164,975	$143,684	$158,900	$118,615	$118,634	$119,095	$105,781	$81,857		
25	$178,038	$181,691	$157,675	$182,868	$119,169	$121,456	$124,068	$110,243	$84,632	$89,757	
50	$202,066	$199,525	$170,178	$190,580	$120,500	$133,119	$133,119	$116,961	$97,488	$100,000	$66,323
75	$238,262	$227,511	$178,779	$212,788	$130,340	$143,404	$139,639	$123,050	$117,552	$112,830	
90	$246,585	$240,035	$193,117	$235,909	$141,900	$147,645	$146,252	$132,329	$130,096		

Table S10a. Nine-month Salaries, 16 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
Depts	10	4	9	11	13	3	0	4	3	6
Indiv	19	7	16	27	73			6		20
10	$87,666			$87,891	$84,320					
25	$102,105		$87,401	$89,000	$89,191					
50	$115,887	$111,571	$108,121	$94,610	$114,682			$95,426		$74,401
75	$139,842		$124,240	$112,875	$121,827					
90	$144,947			$129,506	$131,422					

Table S11. Nine-month Salaries, 25 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
Depts	25	24	23	25	16	24	24	25	23	14	15
Indiv	195	138	182	516	71	171	249	293	317	84	182
10	$170,577	$159,868	$149,144	$158,900	$115,226	$124,141	$124,685	$109,715	$84,439	$78,486	$46,818
25	$186,078	$179,289	$163,651	$182,061	$121,648	$135,076	$133,826	$115,973	$90,227	$98,607	$56,036
50	$216,923	$193,290	$175,846	$197,578	$130,477	$146,044	$143,141	$124,076	$106,708	$108,274	$69,998
75	$238,950	$221,846	$193,573	$220,320	$138,846	$156,515	$153,934	$131,600	$118,904	$136,432	$71,932
90	$252,537	$237,194	$208,522	$239,421	$148,863	$171,643	$159,857	$137,960	$132,147	$152,228	$74,303

Table S11a. Nine-month Salaries, 26 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
Depts	11	10	14	13	20	3	2	7	9	13
Indiv	40	27	46	57	210			14	34	107
10	$109,639	$84,734	$91,259	$92,376	$95,347					$36,886
25	$120,093	$103,331	$101,028	$93,788	$101,699			$92,617	$83,304	$80,153
50	$132,444	$110,474	$108,545	$107,667	$115,866			$104,893	$90,000	$84,228
75	$142,291	$116,057	$125,673	$118,614	$122,008			$114,207	$96,000	$107,640
90	$144,875	$137,579	$129,190	$127,587	$126,922					$108,954

Table S12. Nine-month Salaries, 41 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
Depts	36	37	39	41	34	38	40	41	39	13	18
Indiv	216	185	216	633	120	212	338	379	429	112	114
10	$145,849	$135,117	$126,056	$142,327	$106,077	$112,624	$109,142	$99,609	$64,128	$68,195	$49,956
25	$156,934	$140,930	$142,196	$151,541	$109,655	$116,233	$114,010	$101,224	$71,258	$73,620	$54,121
50	$176,969	$167,701	$151,149	$167,076	$123,720	$124,002	$122,471	$108,949	$82,573	$83,652	$56,900
75	$195,346	$198,083	$176,338	$183,421	$132,500	$134,936	$132,902	$116,800	$89,382	$105,079	$61,986
90	$213,095	$206,769	$190,237	$195,501	$139,053	$146,297	$145,196	$122,275	$109,056	$134,266	$72,361

Table S12a Nine-month Salaries, 41 Responses of US CS Public In Large City or Suburbs, Percentiles from Department Averages

Non-Tenure Track	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
Depts	13	15	17	21	31	11	6	12	13	27
Indiv	32	32	43	74	277	25	11	29	30	152
10	$78,042	$70,539	$64,758	$67,500	$70,510	$60,890		$62,843	$61,600	$57,346
25	$89,373	$81,195	$78,533	$72,667	$75,619	$65,277		$63,116	$65,000	$64,330
50	$95,306	$99,000	$89,584	$83,030	$86,563	$74,547	$81,790	$70,520	$74,451	$74,095
75	$105,681	$108,779	$95,000	$88,400	$95,900	$86,526		$77,879	$80,000	$84,243
90	$126,054	$123,302	$112,403	$97,875	$108,931	$100,304		$86,367	$91,092	$87,220

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	20	19	20	25	16	21	25	25	21	5	4
Indiv	140	124	101	410	57	95	176	244	203	48	14
10	$153,941	$146,822	$119,927	$151,288	$103,809	$108,362	$109,882	$94,843	$63,976		
25	$158,211	$160,008	$142,453	$155,292	$108,835	$115,000	$116,662	$98,938	$77,988		
50	$191,731	$167,923	$152,695	$172,038	$116,371	$124,641	$123,606	$103,457	$84,577	$129,753	$58,053
75	$217,127	$189,748	$176,442	$190,709	$123,913	$139,000	$135,052	$120,000	$90,958		
90	$230,077	$216,263	$190,349	$207,493	$140,600	$153,675	$156,693	$127,656	$133,449		

Table S13a. Nine-month Salaries, 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
Depts	6	5	10	3	15	6	3	7	8	13
Indiv	28	18	30		117	18		14	31	86
10			$75,489		$79,409					$57,708
25			$78,810		$85,451			$60,825	$55,375	$63,976
50	$99,439	$86,500	$83,467		$90,117	$70,699		$80,630	$67,825	$68,753
75			$94,012		$101,705			$87,389	$83,773	$84,577
90			$141,098		$152,670					$102,730

Table S14. Nine-month Salaries, 43 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
Depts	33	31	36	42	31	35	41	42	36	14	12
Indiv	155	122	167	490	109	153	276	363	328	46	44
10	$113,566	$122,094	$118,057	$119,187	$100,705	$96,929	$98,254	$89,229	$61,137	$66,143	$42,421
25	$130,859	$143,850	$129,657	$132,066	$103,984	$112,180	$106,629	$94,327	$68,406	$76,553	$47,158
50	$154,683	$160,569	$148,706	$151,403	$112,644	$120,000	$116,870	$101,075	$81,020	$93,131	$56,336
75	$186,094	$183,540	$176,827	$173,771	$121,182	$127,841	$125,911	$110,730	$91,653	$117,680	$66,765
90	$221,664	$200,519	$181,497	$185,524	$135,673	$136,557	$132,738	$122,318	$105,105	$123,909	$70,750

Table S14a. Nine-month Salaries, 39 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
Depts	12	7	17	18	27	16	6	9	16	27
Indiv	16	18	35	45	151	29	11	20	52	177
10	$62,740		$67,048	$65,733	$68,111	$54,394			$47,613	$51,825
25	$70,229	$94,739	$72,828	$82,880	$80,060	$61,571		$67,901	$57,667	$62,081
50	$73,714	$101,043	$81,947	$90,950	$88,931	$82,752	$73,680	$72,369	$71,575	$73,138
75	$89,500	$126,876	$102,565	$97,468	$99,622	$87,898		$80,243	$82,110	$86,299
90	$102,237		$108,957	$104,239	$111,372	$92,341			$97,713	$110,795

Table S15. Nine-month Salaries, 23 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
Depts	22	17	18	22	16	21	22	23	22	12	10
Indiv	143	90	150	383	77	140	217	243	300	80	139
10	$152,773	$161,406	$149,562	$143,203	$111,134	$123,393	$117,773	$106,737	$80,504	$98,329	$46,415
25	$181,806	$172,081	$161,974	$175,663	$115,553	$130,302	$124,671	$112,056	$86,879	$103,000	$47,566
50	$204,487	$185,958	$176,855	$189,888	$123,569	$136,557	$135,741	$121,250	$106,687	$120,907	$64,885
75	$230,585	$223,599	$195,877	$211,069	$133,521	$145,337	$143,208	$131,166	$114,297	$136,080	$72,260
90	$244,381	$236,816	$207,103	$219,455	$148,863	$159,924	$154,627	$137,184	$121,582	$152,534	$75,653

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

Non-Tenure Track	Teaching Professor					Other Instructor				
	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 v	All years	Teaching 9+ years	Teaching 6-8 years	Teaching 3-5 years	Teaching <3 years	All years
Depts	12	12	16	15	20	3	2	6	8	10
Indiv	43	29	45	58	201			13	26	99
10	$91,079	$75,176	$84,434	$87,900	$84,643					$60,995
25	$108,736	$85,429	$87,855	$93,178	$89,259				$79,419	$70,862
50	$125,849	$107,227	$105,295	$106,950	$114,516			$106,156	$91,033	$91,961
75	$135,253	$115,686	$124,718	$117,807	$119,733				$97,575	$107,094
90	$142,413	$135,378	$128,817	$125,668	$123,936					$108,742

Table S16. Nine-month Salaries, 13 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
Depts	13	12	11	13	9	13	13	13	9	4	5
Indiv	96	61	45	203	24	57	88	98	56	10	43
10	$146,533	$145,764	$129,446	$151,361		$119,015	$120,258	$105,554			
25	$174,243	$188,277	$153,286	$178,940	$119,610	$122,895	$122,858	$109,227	$87,531		
50	$213,516	$210,427	$171,291	$207,831	$129,600	$146,750	$143,530	$121,533	$91,754	$91,125	$70,217
75	$243,150	$226,378	$188,965	$230,539	$136,350	$155,379	$152,208	$127,600	$105,784		
90	$253,757	$237,692	$203,350	$239,455		$165,935	$158,434	$131,053			

Table S16a. Nine-month Salaries, 13 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
Depts	4	1	3	5	8	1	0	1	1	4
Indiv	5			17	44					12
10										
25					$95,951					
50	$106,284			$88,000	$104,014					$83,831
75					$110,603					
90										

Table S17. Nine-month Salaries, 5 Responses of 35 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
Depts	5	5	5	5	5	5	5	5	5	5	2
Indiv	37	23	22	82	16	26	42	33	21	8	
10											
25											
50	$173,609	$157,580	$152,720	$179,029	$115,586	$131,365	$126,631	$100,507	$81,973	$83,333	
75											
90											

Table S17a. Nine-month Salaries, 7 Responses of 35 US Computer Engineering 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
Depts	0	1	0	1	4	0	0	1	1	2
Indiv					14					
10										
25										
50					$93,683					
75										
90										

Table S18. Nine-month Salaries, 16 Responses of 22 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
Depts	11	14	16	16	13	16	16	16	15	7	9
Indiv	47	58	84	189	50	112	162	184	212	28	38
10	$166,789	$139,530	$125,510	$135,458	$104,065	$100,501	$102,808	$85,813	$63,193		
25	$182,328	$154,605	$136,962	$148,337	$107,638	$112,315	$112,850	$99,726	$74,987	$70,669	$46,205
50	$186,573	$164,659	$150,413	$164,737	$117,834	$126,574	$124,147	$107,389	$85,745	$73,620	$57,500
75	$207,945	$174,892	$164,691	$180,329	$124,902	$135,533	$132,663	$110,262	$95,003	$78,055	$58,191
90	$245,100	$191,780	$191,100	$190,849	$142,274	$143,091	$141,794	$123,121	$103,044		

Table S18a. Nine-month Salaries, 16 Responses of 29 US Information Departments, Percentiles from Department Averages

Non-Tenure Track	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
Depts	8	8	8	7	13	2	4	4	5	9
Indiv	24	17	29	38	147		8	8	12	65
10					$63,040					
25	$95,929	$83,211	$72,743	$79,622	$85,745					$61,500
50	$105,088	$97,638	$88,506	$86,095	$92,472		$74,881	$76,777	$71,500	$77,149
75	$112,925	$110,065	$91,897	$96,028	$99,640					$90,440
90					$113,518					

Table S19. Twelve-month Salaries, 7 Responses of 29 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
Depts	4	6	6	7	6	7	7	7	7	1	2
Indiv	35	43	53	131	40	30	70	83	66		
10											
25				$162,318		$119,545	$132,129	$110,149	$96,873		
50	$208,456	$175,232	$168,201	$172,737	$155,320	$133,480	$153,078	$115,144	$115,457		
75				$192,186		$158,159	$163,902	$139,023	$117,599		
90											

Table S19a. Twelve-month Salaries, 9 Responses of 30 Canadian Departments, Percentiles from Department Averages

Non-Tenure Track	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
Depts	4	2	4	3	6	1	1	1	1	2
Indiv	16		14		57					
10										
25										
50	$155,788		$109,438		$116,056					
75										
90										

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

	US (CS, CE, and Info Combined)						Canadian					
	Tenure-Track	Teaching Prof	Other Instructor	Non-ten Teach All	Non-ten Research	Postdoc	Tenure-Track	Teaching Prof	Other Instructor	Non-ten Teach All	Non-ten Research	Postdoc
Depts	75	22	19	39	5	30	4	1	0	1	0	2
Indiv	154	34	24	58	9	146	7					
10	$93,400	$72,831	$53,600	$65,700		$49,155						
25	$102,500	$76,074	$63,917	$70,701		$49,922						
50	$116,118	$93,500	$80,000	$85,667	$62,500	$58,333	110,000					
75	$123,000	$101,875	$90,000	$96,875		$70,650						
90	$133,400	$109,200	$107,472	$109,388		$74,004						

Table S21. Change in Salary Median for Departments that Reported in Both 2019 and 2020

	U.S. CS	U.S. CE	U.S. I	Canadian
Departments	127	4	15	6
Full Profs	1.20%	0.30%	-3.60%	-3.50%
Assoc. Profs.	1.10%	0.20%	-1.40%	-1.60%
Asst. Profs.	1.50%	3.80%	0.90%	2.60%
Teaching Prof	0.00%	-1.30%	5.20%	6.40%
Other Instructors	6.80%	-12.20%	-10.50%	-22.10%
Research faculty	-1.70%	-11.50%	8.90%	20.30%
Post doctorates	4.70%		3.90%	3.90%

Table S21a. Salary Freezes and Furloughs

Group	Group N	% Salaries Reported Include Freeze (Yes or Some)	% Faculty Furlough Second Half of AY19-20 (Yes or Some)	% Faculty Furlough During AY20-21 (Yes or Some)
US CS	142	56%	8%	14%
US CE	5	60%	0%	20%
US IN	15	80%	0%	20%
CAN	7	14%	0%	0%
US CS Pub	107	44%	9%	19%
US CS Priv	35	91%	3%	0%

schools, and Computer Engineering departments reporting, the values in those columns are considerably more volatile; this is evident in several of the entries in Table S21.

This year, salaries also were impacted by the financial effects of the COVID-19 pandemic. U.S. CS department salary changes for tenure-track were comparatively small this year. Tenure-track faculty increases were in the range of 1.1-1.5 percent depending on rank. To further illustrate the impact of the pandemic on salaries, we asked departments about salary freezes and furloughs. In Table S21a, for each department grouping, the column labeled "N" indicates how many departments in that group reported salary freeze and furlough information. The other columns show the percentage, of those who reported, who experienced a salary freeze for some or all faculty, furloughed some or all faculty during spring of academic year 2019-20, and

furloughed some or all faculty during academic year 2020-21. Salary freezes were experienced by more than half of the U.S. CS, U.S. CE, and U.S. I departments. Among U.S. CS departments, however, only 44 percent of those at public institutions reported freezes, while 91 percent of those at private institutions did so. Private institutions also differed from the other categories in that they did not experience furloughs in 2020-21, while between one in 5 and one in 7 departments of the other types did have furloughs. Only a few U.S. CS institutions reported furloughs for spring 2019-20. Only one Canadian institution reported a salary freeze for 2020-21 and none reported furloughs in either year.

For new Ph.D.s in tenure-track positions at U.S. computer science, computer engineering and I-school departments, the median of the averages was $116,118, an increase of 3.2 percent over last year (Table S20). The median of the average

12-month salaries at Canadian institutions was $110,000 CDN. However, only four institutions reported new Ph.D. salary data, so it is less clear how representative this value is across the population of Canadian doctoral granting institutions. Even fewer Canadian institutions reported new Ph.D. salaries last year, so no comparison is made between 2019 and 2020 for Canadian institutions.

Last year for the first time, we asked for the rate typically paid adjuncts for a single course, divided by whether the course was taught to undergraduate or graduate students, and whether the adjunct had a Ph.D. or a Masters degree. We repeated the question this year, and Table S22 shows the median course rate for different types of institutions. Adjunct salaries were higher at private universities than at public universities, similar to the situation for other faculty salaries. Within public universities, larger cities tended to have lower salaries than smaller or mid-sized cities. At private universities, the same comparison held for adjuncts teaching undergrad courses, whether the adjunct had a Ph.D. or master's degree. Also of note is that, at U.S. CS departments, the median of the averages among those with master's degrees was higher for those who taught undergrad courses than for those who taught grad courses, although both sets of median salaries for those with master's degrees were below the respective medians for adjuncts with Ph.D.s.

Table S22. Median value for an adjunct teaching a single course.

Group	Median PhD teaching undergrad	N PhD teaching undergrad	Median PhD teaching grad	N PhD teaching grad	Median MS teaching undergrad	N MS teaching undergrad	Median MS teaching grad	N MS teaching grad
US CS	$7,500	102	$7,500	95	$6,750	95	$6,000	75
US CE	$8,500	5	$9,297	5	--	2	--	2
US IN	$6,500	13	$6,250	10	$6,000	12	$6,000	9
Canadian	--	3	--	2	--	3	--	2
US CS Public	$6,750	80	$6,513	73	$6,000	75	$5,900	60
US CS Private	$8,848	22	$8,920	22	$8.30	20	$8,840	15
Pub large city	$5,940	37	$6,000	32	$5,550	33	$5,514	29
Pub mid city	$8,000	15	$8,000	13	$6,750	13	$6,000	7
Pub small/rurl	$7,500	28	$7,750	28	$7,000	29	$6,000	24
Priv large city	$8,695	15	$9,000	17	$8,300	16	$8,420	14
Private other	$11,000	7	$8,000	5	$10,752	4	--	1

Table S23. Adjunct rate adjustments.

Group	% Adj Time at Dept	% Adj Expertise
US CS	38%	58%
US CE	40%	50%
US IN	46%	62%
CAN	--%	--%
US CS Pub	33%	57%
US CS Priv	54%	62%

Table S23a. Other reasons for adjunct rate adjustments.

# Depts	Reason
11	Course enrollment or credit hours
5	Prior teaching experience at other institutions
5	Prior research or industry experience
3	Collective bargaining agreement
2	Set by Dean's office or based on institution guidelines
2	Promotion within ranks of adjunct
1	Course difficulty/level
1	Relationship with department outside of adjunct teaching
1	Demand vs. availability for the subject

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

CRA Taulbee Survey 2020

Whiskers show 90th and 10th percentiles   ▪ Lighter bar shows 25th percentile to median   ▪ Darker bar shows median to 75th percentile
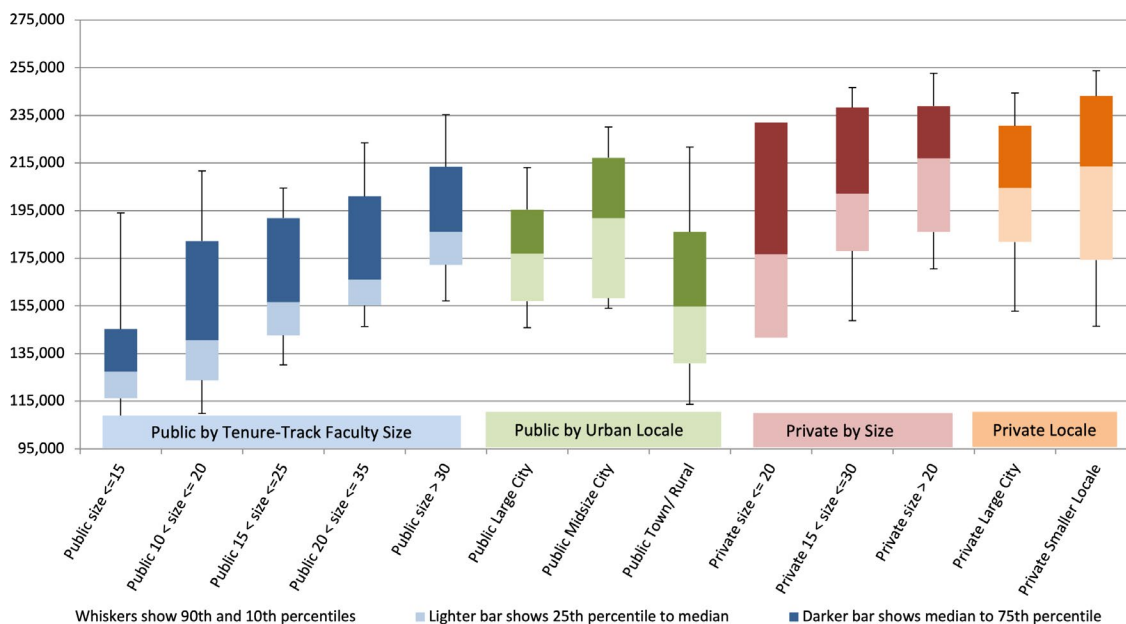
Figure S2. US CS Department Average Salary, Full Professor in Rank 8-15 Years

CRA Taulbee Survey 2020

Public by Tenure-Track Faculty Size

Public by Urban Locale

Private by Size

Private Locale

Whiskers show 90th and 10th percentiles   Lighter bar shows 25th percentile to median   Darker bar shows median to 75th percentile
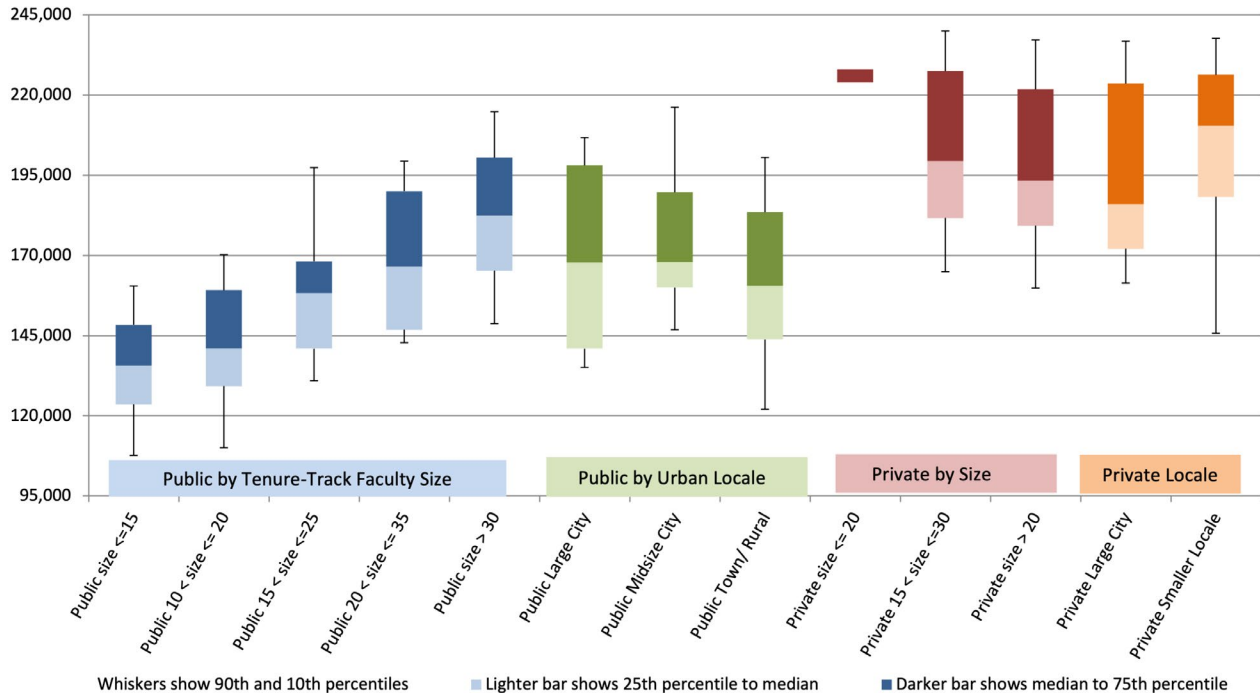
Figure S3. US CS Department Average Salary, Full Professor in Rank 0-7 Years

CRA Taulbee Survey 2020

Public by Tenure-Track Faculty Size

Public by Urban Locale

Private by Size

Private Locale

Whiskers show 90th and 10th percentiles   Lighter bar shows 25th percentile to median   Darker bar shows median to 75th percentile
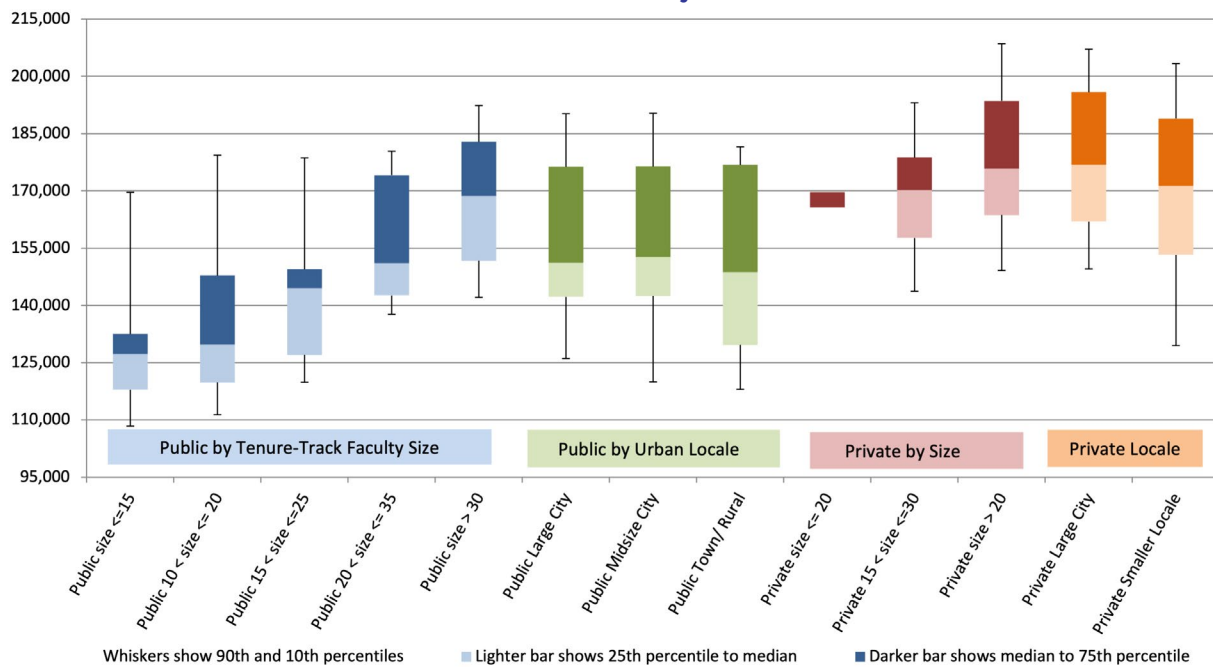
Figure S4. US CS Department Average Salary, Associate Professor in Rank 8+ Years

CRA Taulbee Survey 2020

Whiskers show 90th and 10th percentiles   ▪ Lighter bar shows 25th percentile to median   ▪ Darker bar shows median to 75th percentile
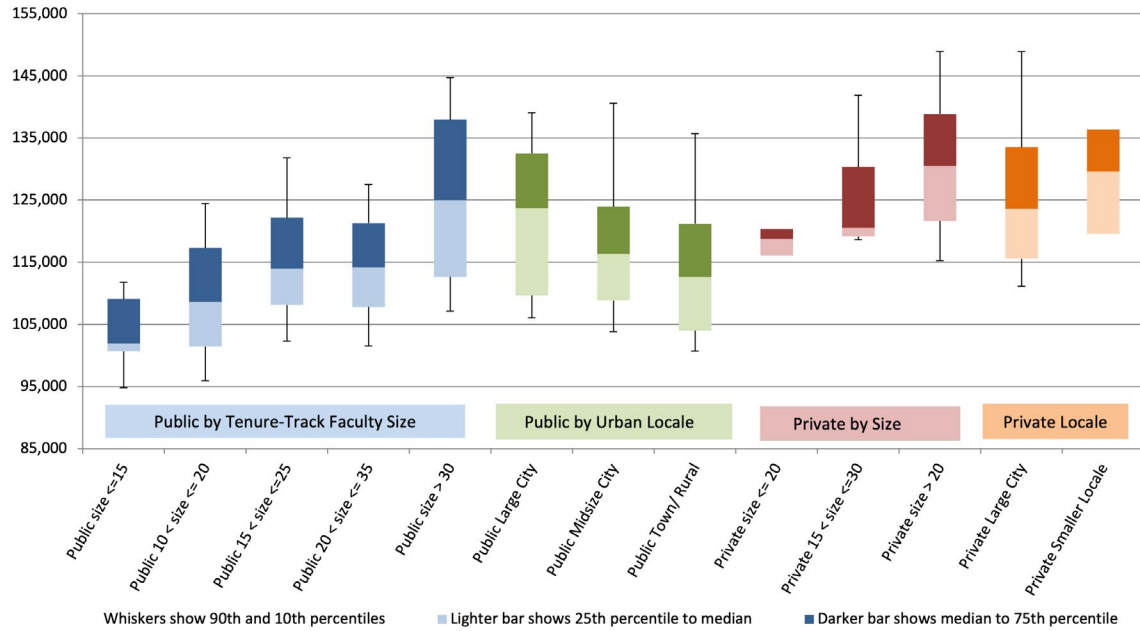
Figure S5. US CS Department Average Salary, Associate Professor in Rank 0-7 Years

CRA Taulbee Survey 2020

Whiskers show 90th and 10th percentiles   ▪ Lighter bar shows 25th percentile to median   ▪ Darker bar shows median to 75th percentile

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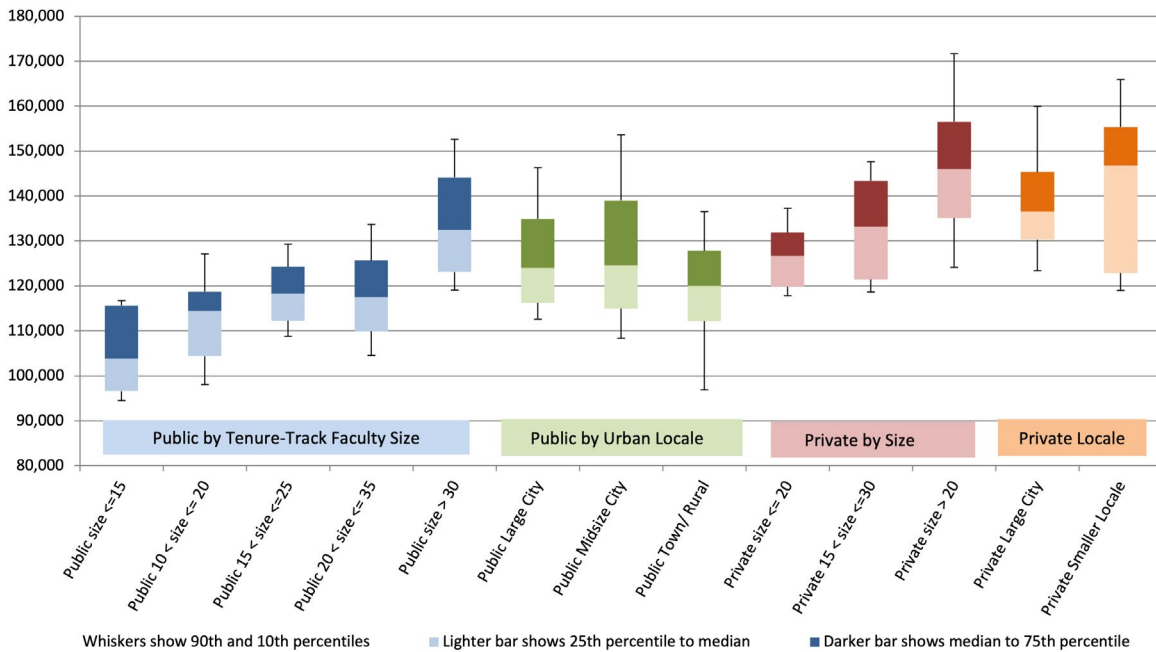
Figure S6. US CS Department Average Salary, Assistant Professor
CRA Taulbee Survey 2020

Whiskers show 90th and 10th percentiles · Lighter bar shows 25th percentile to median · Darker bar shows median to 75th percentile
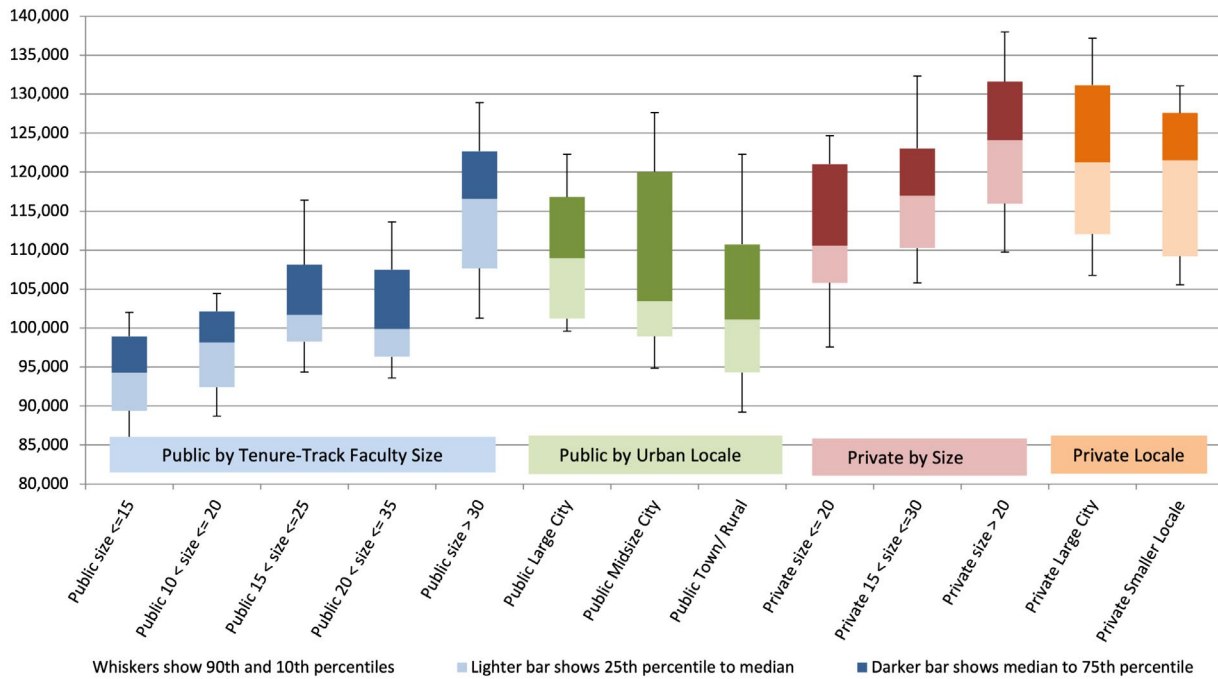
Figure S7. US CS Department Average Salary, Non-Tenure Track Teaching Faculty
CRA Taulbee Survey 2020

Whiskers show 90th and 10th percentiles · Lighter bar shows 25th percentile to median · Darker bar shows median to 75th percentile
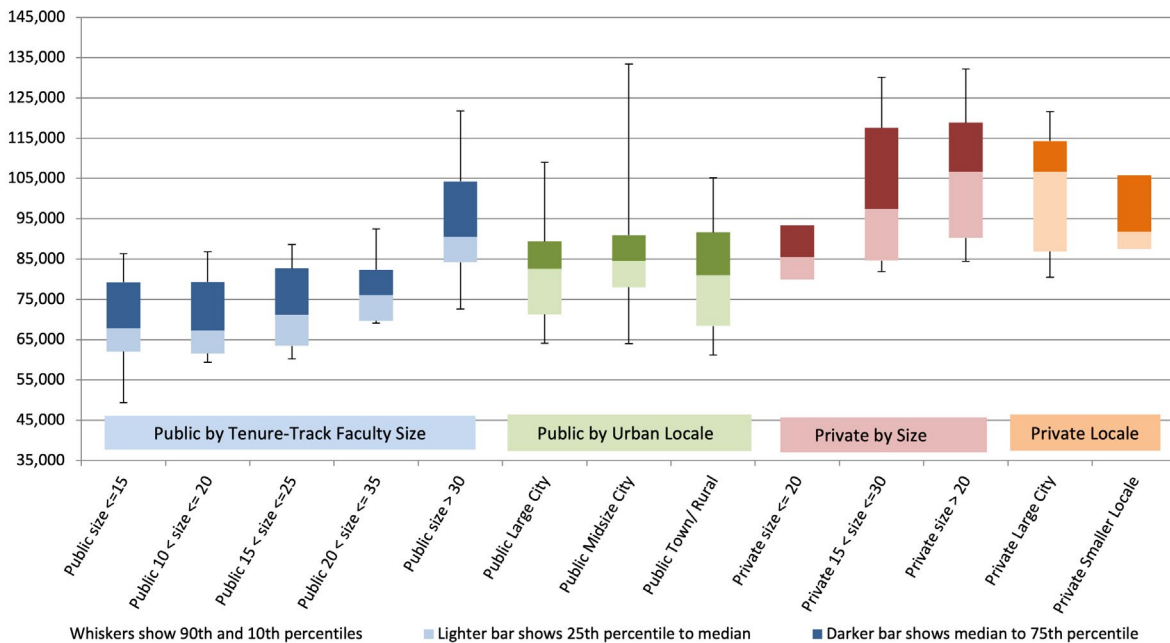
Figure S8. US CS Department Average Salary, Non-Tenure Track Research Faculty
CRA Taulbee Survey 2020
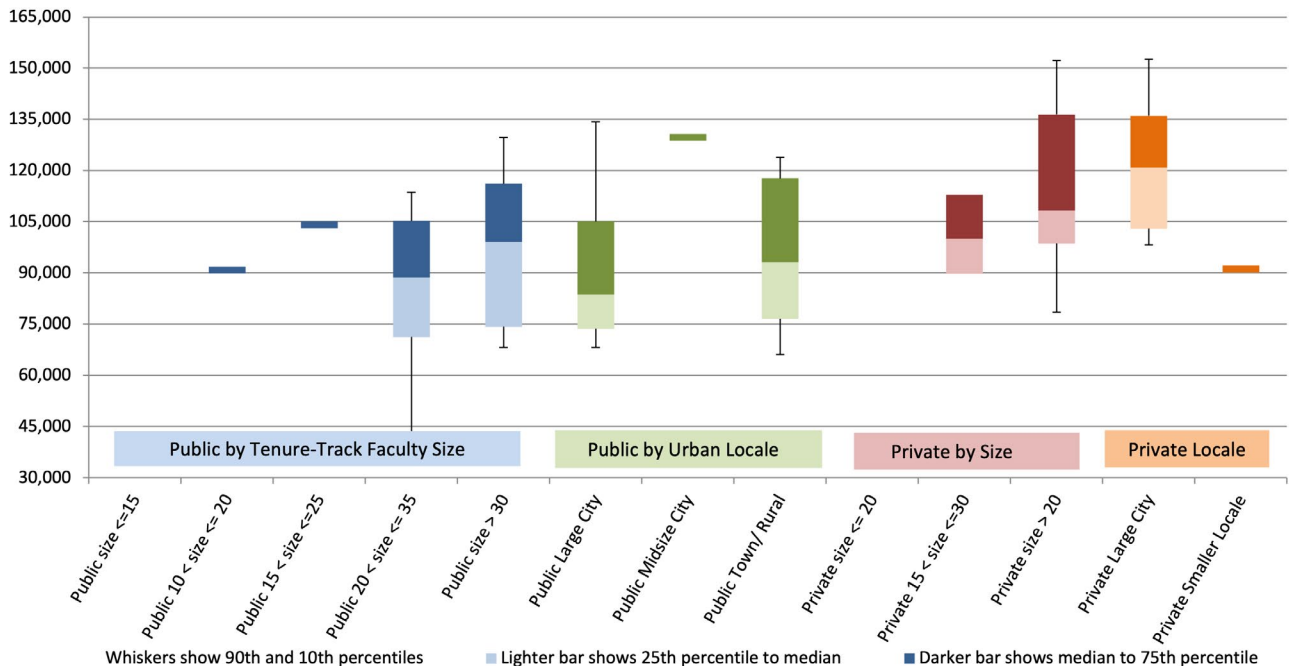
Figure S9. US CS Department Average Salary, Postdoctorates
CRA Taulbee Survey 2020
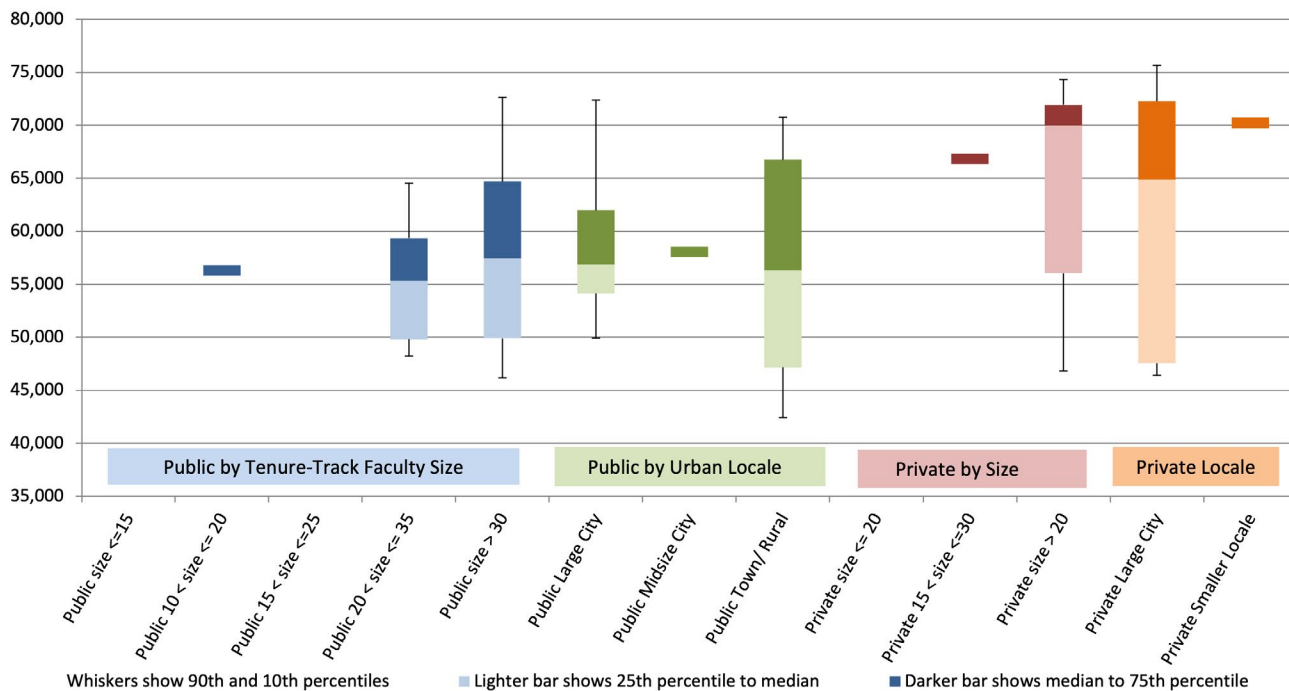
Concluding Observations

Pandemic or no pandemic, the demand for our computing programs remains high. The 2019-20 enrollment figures reported in this article are not affected by COVID, since they represent the fall of 2019, prior to the outbreak. Indeed, total enrollment per U.S. department in 2019-20 increased at all three degree levels.

The 2019-20 graduation values could have been affected by the pandemic, since students may have postponed graduation hoping a more normal/favorable employment climate would be available in 2021, or they may have been forced to postpone because of illness or issues associated with a virtual education environment. However, all three degree levels showed increases in degree production in U.S. departments.

The enrollment of new graduate students in 2020-21 reported in this article definitely appears to have been impacted by the pandemic, perhaps in combination with immigration issues that affect Nonresident Aliens. The data showed that new graduate student enrollment declined at both the master's and doctoral levels, and the big difference was among students from outside of North America. A seemingly large number of new students at both graduate levels deferred enrollment until 2021.

At the bachelor's level, which is less affected by Nonresident Alien enrollment, the situation was more nuanced. Overall bachelor's enrollment increased when aggregated across all reporting U.S. CS departments, but when looking only at those departments that reported both this year and last year, there was a decrease in enrollment.

There was small growth in tenure-track faculty size and a small decrease in supported TAs. But there was another year of double-digit percentage increase in full-time teaching faculty. Overall, the size of instructional staff seemed unaffected by the pandemic. However, COVID-related reasons certainly appeared to affect the success of faculty searches and cause some new hires to defer arrival, while salary freezes at many institutions and furloughs at some were the result of budgetary concerns related to the upheaval of the educational environment in response to COVID. Departments also were more modest In their expected faculty growth projections for the next two years.

Next year's survey will document the overall enrollment and graduation statistics during the 2020-21 academic year. With the expectation that in-person teaching returns to more normal levels in fall 2021, the survey also will document new student enrollment during a hopefully more typical teaching environment. We will be interested to see how this data compares with that reported this year. Next year's survey also will include questions asked only every three years, such as faculty teaching loads and number of support staff, that could offer a glimpse into any lingering personnel consequences of the past two years.

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 (113): 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 University Purdue University Indianapolis, Indiana*, Iowa State*, Kansas State*, Kent State*, Michigan State*, Michigan Technological University*, Mississippi State, 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)*, Temple, Tennessee Tech, Texas A&M*, Texas State, Texas Tech*, University at Buffalo*, Universities of: Alabama (Birmingham* and Tuscaloosa), Arizona*, Arkansas*, Arkansas at Little Rock*, California (Berkeley*, Davis*, Irvine*, Los Angeles, Merced, Riverside*, San Diego*, Santa Barbara*, and Santa Cruz*), Colorado (Boulder)*, Connecticut*, Delaware*, Florida*, Houston*, Idaho, Illinois (Chicago* and Urbana-Champaign*), Iowa*, Kentucky, Louisiana at Lafayette*, Maine, Maryland (College Park* and Baltimore County*), Massachusetts (Amherst*), Memphis*, Michigan, Minnesota*, Missouri (Columbia), Nebraska (Omaha and Lincoln*), Nevada (Las Vegas and Reno*), New Hampshire*, New Mexico*, North Carolina (Chapel Hill* and Charlotte*), North Texas*, Oklahoma*, Oregon*, Pittsburgh*, Rhode Island*, South Carolina*, South Florida*, Southern Mississippi, Tennessee (Knoxville)*, Texas (Arlington*, Austin*, Dallas*, El Paso*, and

San Antonio), Utah*, Vermont, Virginia*, Washington*, Wisconsin (Madison*), Utah State, Virginia Commonwealth, Virginia Tech*, Washington State*, Wayne State*, West Virginia, Western Michigan, and Wright State*.

U.S. CS Private (39): Boston University*, Brandeis*, Brown*, Carnegie Mellon*, Case Western Reserve*, Columbia, Cornell*, DePaul*, Drexel*, Duke*, Emory*, Florida Institute of Technology, George Washington, Harvard*, Illinois Institute of Technology, Johns Hopkins*, Lehigh*, MIT*, New York University*, Northeastern*, Northwestern*, NYU Tandon School*, Pace, 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*, and Southern California*, Washington in St. Louis*, Worcester Polytechnic Institute*, and Yale.

U.S. CE (6): Boston University, Carnegie Mellon, Case Western Reserve, Iowa State, Universities of: Central Florida* and Illinois (Urbana-Champaign).

U.S. Information (16): Cornell*, Drexel*, Indiana*, Penn State*, Syracuse*, Universities of: Arizona, California (Berkeley)*, Cincinnati, Colorado (Boulder)*, Illinois (Urbana-Champaign)*, Maryland (College Park ISchool* and Baltimore County*), Michigan*, North Carolina (Chapel Hill)*, Pittsburgh*, and Washington*.

Canadian (8): McGill, Simon Fraser*, Universities of: Manitoba*, New Brunswick, Toronto*, Victoria, Waterloo*, York*.