Earnings of Women with Computer Science or Engineering College Majors

Catherine J. Weinberger
University of California Santa Barbara, USA

INTRODUCTION

This short article documents that women with college majors in computer science or engineering earn far more than other female college graduates[1]. This relationship is rarely discussed, as far more emphasis is usually placed on the difference in earnings between women and similarly educated men. While the existence of within-field gender pay gaps is important to monitor, these gaps do not necessarily deter women from entering a field. In fact, previous research finds that gender pay gaps tend to be relatively small among young college graduates with computer science or engineering majors, compared to the gender pay gaps in other fields (Weinberger, 1999, 2005; Weinberger & Joy, 2006). The combination of high average pay and low gender gaps in technical fields translates to particularly strong financial incentives for young women to enter these fields.

The statistics presented here are computed from nationally representative studies of United States (U.S.) college graduates. The first study is based on a sub-sample of 1990 U.S. Census respondents who also completed a detailed survey about their educational attainment in 1993, and were surveyed again in 1999. The second study is based on a representative group of 1992 U.S. high school seniors who were resurveyed in 1999, after most had completed their education. This study includes detailed information about each student, including 12th-grade standardized math test scores. Overall, the estimates presented here suggest that women with computer science or engineering college majors earn 30%-50% more than otherwise similar female college graduates.

BACKGROUND

High pay has been a consistent feature of the labor market for college graduates with majors in computer science or engineering. One government report describes the median salary of new college graduates in different fields for the years 1977, 1980, 1984, 1986, 1990 and 1993. In each of these years, computer science and engineering majors (combined) earned at least 35% more than the typical college graduate (NCES, 1998).

Most studies of gender, pay and college major focus on the fact that few women choose these remunerative college majors. The small proportion of women in mathematical college majors "explains" part of the gender differential in pay among college graduates (Brown & Corcoran, 1997; Weinberger 1998, 1999, 2001, 2005; Weinberger & Joy, 2006). However, a thorough analysis finds that, at age 32, only 20% of the overall gender pay gap is related to gender differences in either pre-college mathematics preparation or college major choices (Weinberger, 2001). Among college graduates, gender differences in college major explain a larger proportion—about one-fourth to one-half of the gender pay gap—with the proportion largest among young, recent labor market entrants (Weinberger 1998, 2005). The proportion of the gender pay gap attributable to differences in college major is larger in 1999 than it was for women the same age in 1989, probably because other factors contributing to the gender pay gap have diminished much more quickly (Weinberger, 2005).

WOMEN WITH COMPUTER SCIENCE OR ENGINEERING MAJORS

Statistics provided in Table 1 show that, at mid-life, women with computer science or engineering majors earn 30%-50% more than the average female college graduate.[2] This is true for representative samples of female college graduates aged 33-52 in either 1989 (Columns 1 and 2) or 1999 (Column 3).

Table 1. Average annual earnings by educational attainment, 1989 and 1999

	1989 Average Annual Earnings College Graduates Ages 33-52	1989 Average Annual Earnings Bachelors Level College Graduates Ages 33-52	1999 Average Annual Earnings Bachelors Level College Graduates Ages 33-52
Women Computer Science Majors	**$44,000**	**$43,000**	**$67,000**
(standard deviation)	(13,000)	(13,000)	(31,000)
Sample size	79	65	118
Women Engineering Majors	**$52,000**	**$48,000**	**$65,000**
(standard deviation)	(23,000)	(14,000)	(30,000)
Sample size	87	63	203
All Women College Graduates	**$34,000**	**$31,000**	**$48,000**
(standard deviation)	(19,000)	(17,000)	(28,000)
Sample size	22066	13293	23931

All samples restricted to white women working at least 35 hours per week and at least 50 weeks per year.
"All Women" statistics computed from 1990 and 2000 Census 1% samples.
1989 statistics by college major computed from the 1993 NSF Survey of College Graduates, merged with 1990 Census responses.
1999 statistics by college major computed from the 1999 NSF SESTAT Survey, matched with the 1993 Survey of College Graduates.

Table 2. Annual 1999 earnings of women with computer science or engineering majors, relative to other female college graduates (ordinary least squares earnings regressions)

	(1)	(2)	(3)
Computer Science or Engineering Major	0.393	0.344	0.347
	(0.091)**	(0.095)**	(0.106)**
Worked 35-39 Hours Per Week			-0.104
			(0.056)
Worked 41-48 Hours Per Week			0.119
			(0.051)*
Worked at Least 49 Hours Per Week			0.158
			(0.040)**
Master's Degree			0.072
			(0.038)
Ph.D. or Professional Degree			0.577
			(0.179)**
12th Grade Math Score (1992)		0.007	0.005
		(0.002)**	(0.002)**
Parent Education Controls?	No	No	Yes
Observations	1100	1100	1100
R-Aquared	0.02	0.03	0.12

These data are from the National Center for Education Statistics National Education Longitudinal Study of 1988 eighth graders.
Sample restricted to white women college graduates working at least 35 hours per week, and at least 50 weeks per year in 1999.

Additional analysis finds that younger women (age 23-32) enjoy a similar advantage, with 1989 earnings $37,000 for computer science/engineering majors (n=804) compared to $28,000 for the typical college graduate.[3]

The longitudinal study of 1992 high school graduates provides an opportunity to make a more careful comparison between otherwise similar women. The results of ordinary least squares regressions displayed in Table 2 show that the large earnings advantage enjoyed by women with computer science or engineering degrees is robust to including controls for other observable variables. In this sample, women who majored in computer science or engi-