An Economist's Perspective on Women in the IT Workforce[1]

Catherine J. Weinberger
University of California Santa Barbara, USA

INTRODUCTION

As a labor economist, my usual role in a discussion of women in the information technology (IT) workforce would be to establish the prevalence of gender differentials in outcomes. Elsewhere in this article, I address the question: Are women who invest time and money to acquire education and training in IT fields able to use their skills, and receive commensurate compensation, in the labor market? Because the answer to this question is simply "yes," I explore a second question in this article: Given that women with computer science and engineering college majors earn far more (on average) than other college-educated women, why do so few choose to pursue this career path? The answer to this question matters both because we continue to puzzle about why women tend to earn less than men and because (as argued so eloquently by Margolis & Fisher, 2002) the kinds of technologies that will be developed will depend on the life experiences and interests of our highly-trained IT professionals.

I approach this research by focusing on the college major choices of young women. While it is possible to enter IT careers through many different avenues, both occupational assignments and provision of on-the-job training result from complex interactions between individual workers and employers. In contrast, college major choices are typically far more unilateral, and tend to precede labor market entry. In my research, comparisons are made between women who choose to major in computer science or engineering and those who make other college major choices.

While it is true that women in computer science or engineering fields tend to earn less than men with the same college major, gender differentials in earnings are a fact of life along other career paths as well. For example, in the most recent year for which detailed information is available, the gender differential in earnings among college graduates in their 30s ranged from 15% to 20% in each of four other broad college major categories[2], compared to only 5% among both computer science and engineering majors (Weinberger & Joy, 2006).[3] The information most relevant to women making their career choices is how the earnings of women in IT careers compare to the earnings of other women. On this measure, college training in IT fields appears to be a sound investment: Women with computer science or engineering majors tend to earn 30%-50% more than otherwise similar female college graduates (Weinberger, in this volume).[4] The economic incentive for women to pursue these careers appears to be quite large. Based on this evidence, the barrier to women's entry is evidently not a lack of lucrative career opportunities.

Yet some kind of barrier clearly exists. Statistics available from the National Center for Education Statistics reveal that while the representation of women is now substantial among new college graduates in many previously male dominated fields, this is not true in either computer science or engineering fields.[5] In 1970, fewer than 10% of new bachelor's degree graduates in business, computer science, engineering or newly graduating doctors and lawyers, were women. Today, women and men are nearly equally represented among new graduates in business, law and medicine. In contrast, fewer than one-third of new computer science graduates, and an even smaller proportion of new engineers, are women. And there has been no obvious trend towards increasing representation of women in these fields in recent years. The research presented in the remainder of this article describes a survey of academically talented young women, asking questions designed to reveal what the operative barriers might be.

BACKGROUND

Opinions on the reasons for women's underrepresentation in science and engineering fields are varied. At one extreme, Gelernter (1999, pp. 11-12) opines that "The real explanation is obvious: Women are less drawn to science and engineering than men are … Women are *choosing* not to enter, presumably because they don't *want* to; presumably because (by and large) they don't like these fields or (on average) don't tend to excel in them, which is nearly the same thing." This perspective is not universal. Referring to the already highly selected population of M.I.T. science students she teaches, Hopkins (1999, p. 5) observes that "… although scientific talent and brilliance are equally distributed between the sexes, the career prospects for men and women are not equal." The contribution of social scientists to this debate is to take a step back from conclusions based on the people we happen to meet or presume to understand, and examine relationships between gender and career outcomes in randomly selected samples of well-defined populations.

Research based on representative samples of high school students followed to adulthood establish that, conditional on observable measures of academic talent and preparation, young women are only half as likely as young men to pursue science or engineering careers (Xie & Shauman, 2003).

Possible explanations for this difference abound. A growing body of evidence suggests that many women who intend to pursue higher education or careers in science, engineering or information technology fields find a less than welcoming atmosphere in both the university and the workplace (Keller, 1977; Tobias, 1978, 1990; Hall & Sandler, 1982; Gornick, 1983; Zuckerman, 1992; McIlwee & Robinson, 1992; Seymour & Hewitt, 1997; Schiebinger, 1999; Wyer, Barbercheck, Giesman, Ozturk, & Wayne, 2001). Economists tend to focus on explanations based on gender differences in the allocation of time between the labor market and childrearing, hypothesizing that women might prefer to prepare for careers in which labor force interruptions or reduced hours of work per week are less costly (Blakemore & Low, 1984; Polachek, 1978, 1981). A more recent economic analysis focuses on the possibility that women who make gender-atypical career choices might face social sanctions (Badgett & Folbre, 2003).

WHY DO WOMEN AVOID IT COLLEGE MAJORS?

Despite the proliferation of opinions and possible explanations, there is very little evidence on the actual tradeoffs considered by young women as they make their career choices. In a recent mail survey, I asked representative samples of college students at two very different institutions about their reasons for avoiding computer science, computer engineering, and electrical engineering, and other courses and careers. The format of the survey was a list of statements ("I would not choose the majors I have checked below because …" or "I would not choose the career paths I have checked below because …"), where each statement was followed by an alphabetical list of possible college majors or occupations. The results from the first institution are published elsewhere (Weinberger, 2004), while the very similar results for a group of surveyed students at the second institution are presented here, in Tables 1 and 2.

The sample of 195 women described here is representative of all female seniors at the University of Minnesota who were enrolled in a school other than the Institute of Technology and had enough credits to graduate at the time of the survey (Spring 2004).[6] While we focus here on reasons given for avoiding IT courses and careers, the survey was constructed to give no special emphasis to any particular career path. All choices were presented in a neutral way (alphabetically) and no reference was made to IT careers within the survey, cover letter or instructions.

Nonetheless, the women in this group were likely to say that they would avoid IT courses and careers for each of several reasons. The patterns of responses are very similar to those obtained in all three samples examined previously: women in majors chosen by more women than men, women with very high math SAT scores in the same set of majors, and women in the business economics major, all of whom were seniors at University of California—Santa Barbara (Weinberger, 2004). The sample described