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Abstract

This paper describes research-in-progress investigating gender based wage differentials in I/T professions. The existence of these differentials is undisputed, but the significance of the "gender gap" is an area of considerable debate. The applicability of organizational and behavioral research in other areas to I/T is frequently predicated on the assumption that I/T professions are similar to other specific professions or to the economy at large. This paper describes a quantitative investigation of this assumption.

Introduction

Researchers and technologists are quick to point out the impersonal and amoral nature of technology, but many vital issues in information technology (I/T) research relate to what is ultimately the most important component of any information system -- the human component. For decades, two research questions have circulated throughout the academic and practitioner literature in I/T. The first question concerns the nature of I/T professionals. Are the individuals drawn to I/T professions significantly different from those who pursue other careers? The second question concerns the professions themselves. Are I/T careers sufficiently similar to others to allow us to examine them with the tools and techniques that labor economists, sociologists and other investigators have used in studies of other fields?

There has been a relentless call for increased productivity by the I/T practitioner community. This has been answered with numerous and often technology-centric studies of productivity related issues in the I/T literature. At the same time, studies of wage productivity relationships are common throughout the economics literature. Although far from perfect, the relationship between wage levels and productivity is at the foundation of human capital theory and a frequent topic in labor economics research. Consequently, studies of wage and productivity differences should be of considerable interest to I/T researchers and labor economists alike.

The research-in-progress outlined in this paper addresses an important dimension of the I/T workplace. Simply put, it will study the nature of gender-based wage differentials in I/T occupations, commonly referred to as the "gender gap." The existence and extent of the gender gap in various occupations is itself an interesting topic. Once all but taken for granted in research in labor economics, the gender gap has come under increased scrutiny. Some studies suggest it is declining, whereas others do not. Legislative efforts, such as the Equal Pay Act, Title VII, the Civil Rights Act of 1991, and the intervention of numerous governmental agencies, have not completely solved problems related to the so-called "glass ceiling" and other gender-based inequities in the workplace.

Regardless of why it exists, some workplace gender inequality appears to be present on an economy-wide basis. The question being considered is whether the history of the gender gap for I/T-related professions is similar to that for other professions or for the economy as a whole. Should this prove to be the case, it would lend considerable weight to the argument that I/T professions and professionals are sufficiently similar to allow findings from broad-based studies to be readily applied to the I/T domain. A finding that the gender gap in I/T is significantly different could invite challenges to other studies that have used broad-based assumptions and applied them to I/T contexts.

Background

There are several on-going streams of research relevant to the question of whether or not findings from broad-based studies are applicable to I/T professions, which are often referred to in the literature as knowledge work. This research considers the nature of knowledge work itself. Although there has been a tendency to treat technological professions as distinct from others, research outside the traditional I/T domain has suggested that the processes of knowledge work may be "no different than the production of cars and corn flakes" [5]. Nevertheless, there are long held beliefs within the I/T research community that this is not necessarily the case. Support can be found for the argument that I/T professionals are a different breed [1], and the differences may be attributable to the underlying nature of their jobs [2]. It has been argued that I/T professionals posses uniquely transferable job skills, which are relevant to an individual's "internal" career path. I/T skills can be applied in a variety of industries, which pertain to one's "external" career path. The ability to perform basically identical job functions across a very broad range of organizations may be unique to I/T professionals.

Despite their relatively brief history, I/T professions have exhibited interesting and dramatic gender related changes. At the inception of the discipline (in the late 1940s and early 1950s), the I/T workplace was dominated by women. By the 1970s, there had been a decided shift to professions dominated by men. The contemporary picture appears to be one that shows less overt preference with respect to gender, and recent industry data would certainly suggest that a trend towards gender equity within the profession is more likely the norm than the exception.

For the better part of two decades, leading industry publications (e.g. Datamation, Info World, etc.) have conducted periodic surveys which suggest a diminishing and insignificant gender gap. At the very least, it is suggested that the gap within I/T is less objectionable than what is observed for the economy as a whole. However, the support for this notion may reflect a self-reporting bias [3]. There is evidence to suggest that, at least through the 1980s, there was actually a significant and persistent, rather than declining, gender gap in I/T occupations. Similarly, recent studies [4] [7] suggest that there remains a significant gender gap. These studies offer a well-defined foundation for the proposed research.

Methodology

The research-in-progress is an expansion and an extension of the investigation begun in [3]. The present research examines gender differences in wages for I/T related occupations for the period from 1975 to 1997. Rather than relying on potentially biased industry studies, data will be drawn from participants in the Current Population Survey (CPS). The CPS is an annually renewed source of information about thousands of individuals spanning a broad range of occupational, economic, and social strata. The CPS is generally regarded as a representative sample of the population for research purposes. Based on preliminary experience, the relevant sample sizes are expected to be in the range of 300 to 600 persons for each year of interest. Samples will be restricted to full-year, full-time private sector workers in I/T related occupations. Prior research suggests that it is appropriate to divide the samples into cohorts based on gender and occupational class (professional or clerical).

From these data, it is possible to use regression analysis to construct profiles of individuals in I/T related occupational classes, and compare the relative earnings of men and women in each class. It will also be possible to analyze the gender gap from a variety of perspectives. The techniques employed to perform these alternative analyses are well developed in the economics literature, and a brief description is offered below.

The Oaxaca Decomposition [6] is used to compare earnings equations for different groups. Regression analysis can estimate coefficients for various factors (age, experience, education, etc.) in predicting earnings for men and women. Standard statistical (e.g. Chow) tests can assess the significance of the differences between cohorts. Oaxaca's technique allows us to consider questions that are much more interesting, such as: "how would men have fared if they had been treated the same way as women"? An illustration follows.

The present research assumes that men and women are subject to different earnings regimes. This assumption has been frequently validated in the literature. Consider a standard regression model:

$$D = A + ax1 + bx2 + cx3 + ... + e$$

in which D is the dependent variable, the natural log of annual earnings as reported by the participants in the CPS. Although this measure may be limited, (e.g. quality of work and quality of life issues may be excluded), the analyses described here are standard throughout the economics literature. This research seeks to establish a basis for comparison between I/T professions and other occupations. The measurements chosen also provide consistent estimates across our time period, which is a primary focus of the research. A is the constant term, $x1...xn$ are the independent variables. In this research, these will include traditional factors such as age, education, gender, marital status, experience, type of job, industry grouping, geographical category, etc. Finally, e is the error term. All of the coefficient values are estimates, of course. It is well known that the coefficient estimates for male and female cohorts are often significantly different. Thus, dividing the sample into cohorts by gender yields the following two equations:

$$D_m = A_m + a_m x1_m + b_m x2_m + c_m x3_m + ... + e_m$$

$$D_f = A_f + a_f x1_f + b_f x2_f + c_f x3_f + ... + e_f$$

with the m and f subscripts referring to the male and female cohorts. The underlying assumption is that A_m is potentially different from A_f, etc. The difference $(D_m - D_f)$ provides us with one estimate of the earnings gap, but it is more interesting to see how men would have fared if they were subject to the same earnings regime as women:

$$D_{m,f} = A_f + a_f x1_m + b_f x2_m + c_f x3_m + ... + e_f$$

Similarly:

$$D_{f,m} = A_m + a_m x1_f + b_m x2_f + c_m x3_f + ... + e_m$$

suggests how women would have fared if they were subject to the male earnings regime. From this, it is possible to construct two estimates of the gender gap:

$$D_m - D_{m,f} \quad \text{or} \quad D_{f,m} - D_f$$

Other variations may include application of different regimes across time periods, allowing us to consider, for example, how individuals in 1995 would have fared if they were treated according to a 1990 regime. The primary focus of this research will be to compare the male and female, professional and clerical cohorts within each year and to examine how differences in these cohorts change over time. It is possible that comparisons across time periods per se will also be of interest, but at the time of this writing, the precise nature of these comparisons is not known. Regardless, when combined with a highly regarded data source, this research will yield valuable insights and results that are acceptable to information systems researchers, labor economists, and workplace sociologists alike.

Research Outline

CPS data are readily available, but the specific formats of data sets change periodically. The first stage of this research requires rendering the data into a common format. The definitions employed in data sets spanning the 23-year period of interest are quite diverse, and the conversion process is essentially manual. However, translation to a common format and extraction of relevant data are reasonably straightforward procedures.

In the second stage, regression analyses will produce models explaining wage levels for men and women in the professional and clerical cohorts for each year in the time frame of interest. The actual data will cover a 23-year period, and this research will examine the data for each year separately, as well as considering trends over time. A number of other tests will be performed to assure applicability of the findings across the data sets being used. See [3] for a detailed presentation of these techniques.

In the third stage, the initial results will be summarized, and additional analyses will be conducted to estimate the nature and extent of the gender gap. Our goal is to develop a detailed picture of the specific gender gap within I/T related occupations and its history over time.

Conclusion

Are I/T professionals different? Are I/T occupations unique? These questions are repeatedly raised in the literature. The research-in-progress outlined in this paper will not claim to provide a definitive answer to these questions. Rather, we seek to contribute to a much-needed exploration of the relationship between I/T and other occupational research.

For many reasons, the existence and extent of gender based wage differentials should be a topic of considerable interest to I/T researchers. When finished, this study will make a significant contribution to clarifying the nature of the gender gap in I/T professions and the relationship between I/T research and other organizational and productivity research.

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