Case study of the gender earnings gap: a longitudinal analysis of cohort data of same-department graduates at a small liberal arts college

Gail R. Eisenberg and Samuel M. Laposata

Consistent with similarly conducted studies, the authors found that within a fixed group of men and women, women's salaries fell behind those of men sometime in the later years of their careers. The data and analysis show that the gender-based wages of the participants in this study diverged quickly after graduation from college, suggesting that men and women make career decisions early, well before children appear in their lives. Those decisions are affected by both labor market discrimination and gender socialization among the participants in this study.

In the late 1990s, one of the authors conducted a study of alumni and found that, 10 years after graduation, male graduates were earning substantially more than female graduates of the same class year, even though their starting salaries were similar. As a result of this brief study, a time-series research design was developed to gather data from the accounting, business, and economics graduates of the class of 2000, all from the same small liberal arts college. A survey, described later in this article, was sent to these alumni in 2001, 2002, 2004, and 2005. This study was a cohort study, and, though exploratory in nature, it was designed to ascertain the factors that most contributed to the gender salary differences.

Other researchers have examined the trend of gender salaries in a cohort over time. For example, Blau and Kahn (2000) studied successive cohorts of men's and women's wages (1979, 1989, and 1999) from the Annual Demographic Files of the Current Population Survey. Although these cohorts were not limited to the same subjects in each decade, the results still showed that, over time, the wages of women of a cohort tend to lag behind those of men. Blau and Kahn hypothesized that this relative deterioration of women's wages compared with men's was the result of women temporarily dropping out of the labor force for family reasons or because of greater barriers they had as workers when they attempted to advance to higher-level jobs.

To measure the progress of women's pay relative to men's pay, it is common to compute a gender salary ratio, or “gap,” by dividing average or median female
salaries by average or median male salaries. For example, a gender salary gap of 75% indicates that women’s average or median salaries are 75% of those of men’s average or median salaries.

The original purpose of this study was two-fold. First, we conducted a within-cohort comparison by following a fixed cohort of men and women over several years to determine if a wage gap would set in, as Blau and Kahn (2000) had observed, and also when it would set in. Second, we attempted to identify contributing factors to the gender wage gap by measuring variables related to job traits, human capital, attitudes, demographics, and job salaries. Examining these variables within a fixed cohort of men and women allows a microanalysis not available in broad cohort studies that infer year-by-year changes from large sets of annual data, as the Blau and Kahn study did.

In this article, we discuss the inherent difficulties in assessing the contribution of labor market discrimination to the gender earnings gap. The notion of women making free choices versus constrained choices about their work behaviors is introduced as a tool to understand the role of discrimination in the gender earnings gap.

**METHOD**

**Participants**

The population for this study was the accounting, business administration, and economics (ABE) graduates of the class of 2000, from a small liberal arts college in Pennsylvania. There were 85 eligible, traditional-aged ABE graduates who were contacted each spring and asked to complete the 40-question survey. Each year, from 55% to 75% of the population completed and returned the survey. Fieldwork was conducted in 2001, 2002, 2004, and 2005.

This study is a census design, not a random sample. Therefore, we limited our analysis to calculating parameters, not generating sample statistics and then conducting statistical inference. By studying a small homogeneous cohort, we controlled for many factors traditionally used to explain salary differences, such as age, work experience, education, race, and socioeconomic background. All 85 members of the cohort were traditionally aged college students with no previous full-time, professional work experience. All participants graduated from the same college with degrees in similar majors (ABE). Most of the cohort were White and from middle- to upper-socioeconomic-class backgrounds. This relative homogeneity allowed us to focus on other less commonly discussed variables to explain salary differences.

**Questionnaire**

Most of the 40 questions on the questionnaire measured concrete data and used a restricted-choice-style format. The questionnaire was tested for clarity and face validity and covered the following topical areas:
• **Job status.** Employment status, job title and description, annual salary, and number of hours worked per week.

• **Company information.** Type of firm (business, government, nonprofit, or education); location of firm; and number of employees at firm.

• **Job environment.** Amount of travel, frequency of relocation, presence and helpfulness of a mentor, and gender of boss and mentor.

• **Skills enhancement.** Access to formal on-the-job training and graduate school attendance.

• **Attitudes.** Attitudes regarding the importance of earning a high salary; the importance of balancing leisure and work; and the perceived level of household responsibilities and chores. (Factor analysis was used to develop the attitude questions; these questions used a 5-point, Likert-type response scale.)

• **Personal information.** Gender, marital status, child status, race and ethnicity, and college grade point average (GPA, which was collected from the college’s registrar).

**Data Analysis**

We limited data analysis to the 45 respondents who participated in the study for at least 3 of the 4 years of field work, including the 1st and last year of the study. That way, year-to-year changes in variables were the result of changes only in the item being measured rather than changes in the respondent pool. By restricting the data this way, we increased the internal validity of the study. This subgroup of 45 respondents was vetted by comparing the subgroups’ GPA to the cohort’s (the 85 eligible population members) GPA, and the numbers were extremely close.

**RESULTS**

**Salary Data**

Table 1 presents reported salary data for 2001, 2002, 2004, and 2005. Note that women’s median salaries were roughly equal to men’s median salaries in 2001 (95% of men’s salaries), but the ratio immediately started to decline and continued to decline each year. The gender salary gap was 62% in 2005. The immediate and continuous decline of the gender salary gap is a unique result of this study.

<table>
<thead>
<tr>
<th>Year</th>
<th>Women’s Salary (in Dollars)</th>
<th>Men’s Salary (in Dollars)</th>
<th>Median</th>
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<tr>
<td>2001</td>
<td>37,857</td>
<td>8,452</td>
<td>36,818</td>
<td>14,451</td>
<td>38,571</td>
<td>95</td>
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<tr>
<td>2002</td>
<td>37,857</td>
<td>9,562</td>
<td>37,857</td>
<td>17,226</td>
<td>44,444</td>
<td>84</td>
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<tr>
<td>2004</td>
<td>49,167</td>
<td>15,050</td>
<td>46,667</td>
<td>23,214</td>
<td>67,778</td>
<td>72</td>
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<tr>
<td>2005</td>
<td>51,875</td>
<td>17,017</td>
<td>48,000</td>
<td>32,359</td>
<td>84,500</td>
<td>62</td>
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**TABLE 1**

Reported Salary Data by Year
In addition to having a lower median salary than that of their male counterparts, females’ salaries tended to cluster more around their mean and have less spread (thus, smaller standard deviations). These differences resulted in real (inflation-adjusted) disparities in men’s and women’s average earning power. From 2001 to 2005, the Consumer Price Index increased by approximately 10%. In our findings, women’s median salary increased considerably more—approximately 30%—resulting in a 20% real increase.

Interestingly, the declining salary ratio within the cohort occurred even though no women in the study had children. Thus, the main cause of the decline in the gender salary ratio in this cohort was not women stepping out of the labor force to care for children, as suggested by other studies discussed later in this report. It appears, though, that women’s preferences about work and family may have affected their careers in more nuanced ways, perhaps with women making early career decisions in anticipation of family-friendly careers sometime in the future. Those decisions may have negatively affected their salaries in this study period. As will be discussed later, labor market discrimination also may be a factor in these decisions.

In addition to men’s and women’s median salaries, the following sections discuss women’s and men’s reporting about the number of hours they worked; the occupations they had; the locations of their jobs; and whether they worked at a business, nonprofit, or government organization.

Hours of Work

Table 2 presents data on hours worked per week. Men reported working more hours than women each year of the study, and that difference expanded over the survey’s years. The number of hours worked per week is most likely a combination of individual choice and the requirements of the job. Given that these women were not married and did not have children, their fewer work hours were most likely not the result of family requirements at home.

Table 3 summarizes data from three selected variables: occupation, job location, and type of organization. Each variable is discussed below.

Occupation

The men in our study tended to concentrate in the finance jobs and stayed there; whereas some women reported working at finance jobs in the 1st year, most women had left the finance industry by the 5th year. This is important to note because

<table>
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<th>Year</th>
<th>Women</th>
<th>Men</th>
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<tr>
<td>2001</td>
<td>47</td>
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<td>2002</td>
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<td>2004</td>
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<td>2005</td>
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finance professionals earn high salaries. However, finance careers also demand a tremendous amount of time and commitment—making a finance job less friendly to those who wish to balance work and family.

Women tended to concentrate in marketing, advertising, and sales—jobs with good salaries, but not as high as those of the finance industry in New York City, for example. Additionally, some women migrated to the education industry, perhaps in search of a more family-friendly environment, even though, during the time period of the study, none of the respondents had children.

In short, even with similar degrees from the same college, men and women were in different occupations.

**Job Location**

The location of one’s job may affect how much one will be paid. People who work in the New York metropolitan area make higher salaries than those in Pennsylvania, but the cost of living is higher in the New York area, and the pace of life is much faster. The data show that a high percentage of men in our cohort worked in the New York/New Jersey area, whereas the women gravitated to the slower paced and lower paid Pennsylvania.

**Type of Organization**

In every year of the survey, a higher percentage of men than women worked at businesses. Women were branching out beyond businesses and working at government, education, and nonprofit organizations. Because, on average, businesses pay

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<td>Education</td>
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<td>11</td>
<td>0</td>
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<tr>
<td>Marketing, advertising, and sales</td>
<td>32</td>
<td>12</td>
<td>37</td>
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<td>11</td>
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<td>New York/New Jersey</td>
<td>48</td>
<td>61</td>
<td>52</td>
<td>72</td>
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<td>72</td>
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<td>Pennsylvania</td>
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*Note.* The list of occupations is a subset of all reported occupations.
higher salaries than the other organizations, this factor is consistent with higher salaries for men.

DISCUSSION

Recently Published Related Research

As discussed earlier, an important study by Blau and Kahn (2000) used a large data set from the Current Population Survey (CPS) for the years 1978, 1988, and 1998 to examine the gender wage gap for successive age groups of women. Because this data was not from a fixed cohort, they were only able to infer cohorts of men and women from the CPS data. For example, the cohort of men and women who were ages 18 to 24 in 1978 would likely be some of the same people who were 24 to 34 years old in 1988 and 35 to 44 years in 1998.

Blau and Kahn (2000) reasoned that “The relatively high wage ratios [female average wages over male average wages] of younger women tend to decline as they age, likely reflecting the greater tendency of women to drop out of the labor force for family reasons and also perhaps the greater barriers to their advancement at higher levels of the job hierarchy . . .” (p. 78). However, the data from the cohort studied in this report do not support either of those conclusions. The men and women had no families and therefore no incentive to drop out of the labor force for family reasons, and the participants in this study were in the early years of their work lives and most likely not facing barriers to their advancement to higher level jobs.

An important study by Bertrand, Goldin, and Katz (2009) used data from a web-based survey of the University of Chicago Master of Business Administration (MBA) class of 1990 and each succeeding year until 2006. They also found a widening gender earnings gap over time. Though the men’s incomes were nearly identical to women’s incomes at the start of their careers, men’s incomes eventually became substantially higher than women’s incomes, a finding consistent with what was observed in this study. Bertrand, Goldin, and Katz used an econometric analysis to analyze the reasons behind this growing gender wage gap among the cohorts of Chicago MBAs.

The main result of the Bertrand, Goldin, and Katz (2009) study was that the bulk of the gender wage differences as the cohort aged can be explained by three factors: differences in the type of classes taken during the MBA program, differences in career interruptions, and differences in weekly hours. Their analysis indicated that “Deviations from the male norm of high hours and continuous labor market attachment are greatly penalized in the corporate and financial sector” (p. 3). They found that men who take a career interruption are penalized as heavily as women who have similar pauses in their work lives. Moreover, women took fewer finance and accounting courses but more marketing courses during their MBA program than the men in the cohorts. Consistent with the study of this report, women worked fewer hours than men as the cohort aged.

The Bertrand, Goldin, and Katz (2009) econometric analysis explained almost the entire gender wage gap. However, the amount of labor market discrimination
was still left unanswered because the researchers did not know why the women took more marketing classes and fewer finance classes. For example, did women choose this path because of their desire to be the main family caretaker? In this case, these women made choices that maximized their happiness, and there was no labor market discrimination. Or did women avoid finance because they have reasonable knowledge that finance firms are inhospitable to women? In this case, the women’s choice is not free (it is constrained), and indirect discrimination is present.

Other researchers have also hypothesized reasons for the decline in women’s relative wages over time. Kolesnikova and Liu (2011) suggested that “Women are likely to leave their careers temporarily for childbirth and raising children. Such leaves may be associated with a decrease in human capital and with temporary delays in training and promotion, which consequently lead to lower wages.”

Chung and Johnstone (2010) implied that family issues, either current or expected, are at the core of the gender earnings gap. They found that single women in their 20s were earning more than their male counterparts, underscoring the dynamic changes occurring in women’s salaries as more women graduate college and enter college-required jobs.

Babcock and Laschever (2003) suggested that the earnings gap is the result, in part, of gender socialization of women and men. In general, women are taught by society to be nonaggressive and therefore do not ask for higher salaries or promotion. Men instead are taught the opposite. Whereas women’s nonaggressive behavior may aid in success in the academic environment, it is detrimental in the work place and leads to lower salaries for women. Men tend to ask more often for both higher salaries and promotions.

**Labor Market Discrimination or Gender Socialization?**

To understand the deteriorating salary ratio as the cohort ages, it is important to distinguish between labor market discrimination and gender socialization, because both contribute to the deteriorating gender salary ratio as a cohort ages. Labor market discrimination occurs when two workers with identical human capital in identical jobs are paid different salaries. This is because human capital—the schooling, experience, training, and individual attitudes that a worker brings to a job—along with the characteristics of the job itself should determine the salary of the worker. When this is not so, there is labor market discrimination (Borjas, 2013). Gender socialization can be thought of as the many social influences transmitted through the family, the education system, and the mass media that cause men and women to think and behave differently regarding careers and family care taking. For example, a woman is often taught to be the primary caretaker parent. If she accepts those responsibilities, she may seek time flexibility in her job, and not higher wages, to maximize the benefits of her dual role of earner and family caretaker (Kalantari, 2012).

Labor market discrimination occurs inside the labor market and can be more easily remedied through legislation. Gender socialization, on the other hand, occurs outside the labor market and is more difficult and slower to change. Labor market
discrimination in any form reduces social and economic well-being, and governments have passed laws such as The Equal Pay Act of 1963 and Title VII of the Civil Rights Act of 1964 to eliminate labor market discrimination, even though that process is far from perfect.

Labor market discrimination sometimes exists in a more subtle form, but it is important to recognize it in any form. For the purposes of this discussion, consider two additional terms: *free choice* and *constrained choice*. Free choice refers to the choices made by a woman based completely on getting the most life happiness as defined by her gender socialization, without any barriers within the labor market. However, if a woman decides not to invest in her desired human capital or if she decides not to pursue a job because she knows of significant barriers to advancement, that choice is a subtle form of labor market discrimination. For the purposes of this article, we call this type of choice a constrained choice to differentiate it from the free choice.

To clarify with an example, consider a woman who wishes to enter a field where she has human capital talents, but knows that jobs in the industry are unfriendly to women in terms of advancement and opportunities. If she decides not to enter that field, that is a constrained choice, and a subtle form of labor market discrimination exists. On the other hand, consider a woman who chooses to take a 5-year hiatus from her job for child rearing or who chooses a more family-friendly career because she wants to spend time with her family and is willing to earn a lower salary in return. In these cases, the job and human capital choices are free choices and are not a form of labor market discrimination.

This Study

A gap in the earnings of men and women set in soon after graduation among the alumni of the class of 2000, and it expanded throughout the years of the study. Perhaps a person’s early years in the labor force are greatly affected by anticipation of future life situations, and the participants were preparing for their projected future. Or it may be that, because of social conditioning, the women did not adjust as quickly to the business environment as did the men. The work of Babcock and Laschever (2003) certainly supports this hypothesis. Regardless of the motivation, this glimpse into the earnings profile of the men and women of this cohort shows that the gender earnings gap is both very interesting and complex. We should note that the timing of our fieldwork coincided with the boom years of the finance industry, which may have somewhat hastened and exaggerated the gender wage gap of our cohort.

Nonetheless, the men and women in our study made different work-related choices that help to explain why the gender wage ratio deteriorated over time. However, we do not know if these choices were free choices (no labor market discrimination) or constrained choices (labor market discrimination). For example, women, on average, reported working fewer hours than men, and, over time, men increased their work hours while women reduced theirs. Time at work is an important source of job experience, and the resulting larger gain in human capital by men should clearly result in higher wages for the men in the survey. Therefore, the gender difference in hours worked should produce a gender difference in wages when all else is held constant for the moment.
However, we do not know why women were working fewer hours. Were women offered fewer hours or did they feel that they had limited opportunities even if they worked more hours? If so, then this is a constrained choice and a subtle form of labor discrimination. Or did women work fewer hours than the men because they valued nonwork time highly? If so, then this is a free choice and not labor market discrimination. It is likely that both free and constrained choices occurred, but the relative contributions were impossible to separate.

Similarly, the female respondents were more likely to work at a nonprofit or in education compared with men. Because nonprofit and educational institutions tend to pay less than jobs in the private sector, these choices by gender would support a gender earnings gap. Perhaps this indicates that women seek family-friendly careers very early on or that they value a fulfilling career more than men (free choice and no labor market discrimination). However, it could also be that women saw limited opportunities outside these sectors (constrained choice and subtle market discrimination). Regardless of women’s motivation, these choices, whether free or constrained, led to lower salaries for the women.

Once again, we observed that fewer women worked in the higher paying finance industry, and most of the women who began their career in finance left the field by the end of our study. That was not what we observed with the men. More men began their career in finance, and they persisted and remained in finance. Given the higher salaries in the finance sector, these choices supported a growing gender salary gap. This difference in behavior between men and women may be, in part, because women view the finance industry as inhospitable to them. If this is true, then this would be a constrained choice and a subtle type of labor market discrimination.

To summarize, most of the variables in the study were consistent with men’s salaries increasing more quickly than women’s salaries. Men’s attitudes toward making a high salary, hours worked, helpful mentors, job relocation, job location, occupation, and type of organization in which to work all led to higher salaries for men than for women, as implied by economic theory. On the other hand, women’s higher GPAs and more women earning advanced degrees led to higher human capital for women, but obviously not enough to offset the effects of all the other variables in the study.

Although the size of our data set was insufficient to apply any empirical analyses, the descriptive analysis suggests a strong link between the variables surveyed and the widening gender salary gap. However, the question of how much of the difference in gender work behavior was free choice (with no labor market discrimination) or constrained choice (with subtle labor market discrimination) remains.

The net result is that studies of men and women in the labor market have difficulty identifying the free choices of men and women. These free choices are maximizing men and women’s life satisfaction and, therefore, represent gains to themselves and society. However, it is possible that what looks like a free choice is, in reality, constrained by hard-to-identify, but easy-to-feel, subtle forms of labor market discrimination. In this case, these constrained choices represent a loss to the individual and to society.
Conclusion

This study makes two important contributions to the understanding of gender wage gaps. First, like other cohort studies, this study demonstrates that, at some point in the life of a fixed cohort, women’s salaries begin to fall behind those of their male counterparts. And, second, the appearance of the wage gap may precede the appearance of children. Women seem to report different work behaviors than men quite early in their careers, before they are having children.

Several variables measured in this study are consistent with a gender salary gap. The men worked more hours than the women; the men tended to work in the private business sector whereas the women were more likely to work in nonprofit organizations, government, or education; and more men than women worked in New York City. However, the women had higher GPAs than the men in the study, a factor which would have lessened the gender salary gap.

The results of our cohort study are consistent with other cohort studies, in particular, with that of Bertrand, Goldin, and Katz (2009), who looked at MBA graduates from the University of Chicago. As in our study, the women in their MBA study chose different concentrations (largely nonfinance), which empirically led to explaining part of their gender salary gap. In fact, Bertrand et al. were able to use regression analysis to explain almost the entire gender salary gap in their study. However, labor market discrimination may still have been present; the authors wrote of the complexity in understanding the reasons behind, for example, a decision to change jobs: “Of course, the evidence does not rule out [labor market] discrimination since women facing such career barriers still may give family reasons for job changes” (p. 22). That is, what appears to be free choice instead may be constrained choice and a subtle form of labor market discrimination.

Further research is needed to better untangle free choice from constrained choice because, although they both contribute to a widening gender gap as the cohort ages, they have different social and economic welfare implications to the individual and to society. A constrained choice produces a loss to the individual and to society, whereas a free choice does not. Free choices allow women who see themselves as the current (or future) primary family caretaker and earner to make different work behavior decisions from women or men who see their role differently.

REFERENCES
