FEDERAL RESERVE BANK *of* ATLANTA

Does Science Discriminate against Women?
Evidence from Academia, 1973–97

Donna K. Ginther

Working Paper 2001-02
February 2001

Working Paper Series

Does Science Discriminate against Women? Evidence from Academia, 1973–97

Donna K. Ginther

Federal Reserve Bank of Atlanta
Working Paper 2001-02
February 2001

Abstract: This study uses data from the Survey of Doctorate Recipients to evaluate differences in employment outcomes for academic scientists by gender. A decomposition of estimated salary differences shows that over time, gender salary differences can partly be explained by differences in observable characteristics for faculty at the assistant and associate ranks. Substantial gender salary differences for full professors are not explained by observable characteristics. Probit and duration model estimates indicate gender differences in the probability of promotion, making it less likely for women to be promoted to tenure. Between 1973 and 1997, very little changed in terms of gender salary and promotion differences for academics in science. After evaluating potential explanations, the author concludes that gender discrimination similar to that observed at the Massachusetts Institute of Technology accounts for unexplained gender disparities.

JEL classification: J4, J71

Key words: science, gender discrimination, salary, promotion

The author gratefully acknowledges Rodger Erickson, Robert Pollak, Paula Stephan, and Madeline Zavodny for helpful comments. She also thanks the National Science Foundation for granting a site license to use the data and Kelly Kang of the NSF for providing technical documentation. Seminar participants at the Claiming the Past Conference on Women in Science and Southern Economic Association Meetings provided valuable comments on the research. The views expressed here are the author's and not necessarily those of the Federal Reserve Bank of Atlanta or the Federal Reserve System. Any remaining errors are the author's responsibility.

Please address questions regarding content to Donna K. Ginther, Research Department, Federal Reserve Bank of Atlanta, 104 Marietta Street, N.W., Atlanta, Georgia 30303-2713, 404-614-7009, Donna.Ginther@atl.frb.org.

Does Science Discriminate Against Women? Evidence from Academia, 1973-1997

In March 1999, the Massachusetts Institute of Technology (MIT) shocked the academic world by admitting that female faculty “suffer from pervasive, if unintentional discrimination.” (Goldberg 1999) The MIT admission pinpointed the problem as it existed for senior faculty: “many tenured women faculty feel marginalized and excluded from a significant role in their departments. Marginalization increases as women progress through their careers at MIT.” (MIT Faculty Newsletter, 1999 p.2) Marginalization at MIT took the form of differences in salaries, resources, and differential treatment “despite [women having] professional accomplishments equal to those of their male colleagues” (MIT Faculty Newsletter, 1999 p.3). Following up on this report, nine elite universities agreed to share data on gender inequities in salaries and in the distribution of resources among faculty in the sciences and engineering and to compare methods for addressing these gender inequities (Zernike 2001). Although the MIT report and its aftermath gained headlines, the question remains as to how pervasive ‘unintentional discrimination’ is for academic women in science. This study will evaluate gender differences in employment outcomes in the sciences in order to answer the question: does science discriminate against women?

Substantial gender differences in employment outcomes have been documented. Since 1982 the National Science Foundation (NSF) has had a congressional mandate to report biennially on the status of women and minorities in science. The latest report shows that since 1982 women are less likely to be tenured or be full professors than men (NSF 2000). However, the report does not explore why these differences persist. In addition, Congress has established its own committee, the Congressional Committee on the Advancement of Women and Minorities in Science, Engineering and Technological Developments (CAWMSET), to review the status of women in science. CAWMSET also found that women are under-represented in the sciences, making up only 23 percent of academics in the sciences, and are less likely to be tenured (CAWMSET 2000). The CAWMSET report makes specific recommendations on how to address the gender gap in science without fully exploring the reasons for such discrepancies.

Even though women are under-represented in science, one cannot conclude from the NSF and CAWMSET reports that gender discrimination is the underlying cause of the gender gap. First, it is unclear whether the differences in employment outcomes in science observed in these reports result from discriminatory practices or from the preferences of women scientists. For example, women in science are more likely to be employed at teaching colleges. Women might choose to work at four-year colleges because such jobs are more compatible with work and family trade-offs, as suggested in a recent *Chronicle of Higher Education* article (Schneider 2000). On the other hand, women may be more likely to work at teaching colleges because of discriminatory hiring practices on the part of universities. Teaching colleges tend to pay less than research universities. Thus, simply comparing salaries of male and female academic scientists without controlling for the type of academic appointment could overstate the gender salary gap. In addition, gender discrimination can operate through many mechanisms such as hiring, salaries, distribution of resources, and promotion. These mechanisms are inter-related, making it important to evaluate gender differences in multiple outcomes. Finally, empirical evidence supporting discrimination must be qualified by assuming that in the absence of discrimination men and women on average would be paid (or promoted) the same, and the estimated models are correctly specified. Close and careful examination of data is needed in order to conclude that discrimination is evident.

In order to conclude that discrimination was a problem, MIT collected data and conducted interviews of senior women faculty. Data were collected on “salary, space, resources for research, named chairs, prizes, awards” (MIT Faculty Newsletter, 1999 p. 5). The data were then compared for men and women in the sciences; the comparisons have not been released to the public. Given the small number of senior women faculty in the sciences at MIT (15 out of 194), statistical tests of mean differences by gender would likely have proven inconclusive.[1] The inequities observed in salaries, space, 9-month salary paid by grants, and awards and distinctions (MIT Faculty Newsletter, 1999 p. 6) were based on the institutional knowledge and judgment of the committee evaluating gender differences. Personal interviews of senior women faculty revealed that women had little voice in their departments. This combination of quantitative and qualitative data led MIT to admit discrimination.

In contrast to MIT’s evaluation of the status of women faculty, most previous studies of gender differences in academic employment outcomes use regression analysis to compare salaries for all academics combined. In a recent survey of that literature, Ransom and Megdal (1993) find that the pre-1972 gender salary gap for all academics ranges from 12 to 17 percent. The post-1972 gap is narrower, 5 to 12 percent for all academics. Levin and Stephan (1998) address gender salary differences in the sciences. They find no gender difference in the rewards to publishing while showing persistent male-female salary differences after controlling for productivity.

[1] The regression analysis used in this study would also have proven problematic.

The literature contains far fewer studies of gender differences in academic promotion. Long, Allison, and McGinnis (1993) examine the promotion of biochemistry doctorates working in academia who received their Ph.D. between 1956 and 1967. Using a discrete time proportional hazards model, they find that women are 10 percent less likely to be promoted than men. Kahn (1993, 1997) uses the Survey of Doctorate Recipients to compare promotion of academic economists by gender, finding that women take longer to be promoted than men. Ginther and Hayes (1999, 2001) evaluate the career paths of academics in the humanities, showing the majority of the gender salary differentials in the humanities can be explained by academic rank. Their analysis also shows significant differences in the duration to promotion to tenure by gender. Finally, researchers have also documented significant differences in the probability of exiting science occupations. Preston (1994) finds that women are twice as likely as men to leave science occupations. These gender differences are not explained marriage and fertility choices. Preston attributes this discrepancy to gender differences in occupation match quality or discriminatory behavior in science.

This study uses data from the Survey of Doctorate Recipients (SDR) in order to evaluate gender differences in salaries and promotion probabilities over time. There are several advantages to using these data. The SDR is a nationally representative sample of Ph.D. scientists in the United States, and it is used by the NSF to monitor the scientific workforce and to fulfill its congressional mandate to monitor the status of women in science. It is the best data available to examine whether discrimination is a factor in the science gender gap. It is a large sample that follows individuals over time, allowing the researcher to observe both salary and promotion outcomes. However, the data lack information on some quantitative measures, such as laboratory space, and the qualitative information available to those conducting internal reviews similar to that at MIT. On balance, the information available in the SDR allows the researcher to control for detailed individual and employer characteristics while evaluating salaries and promotion.

The study finds significant gender differences in salary and promotion outcomes for academics in the sciences. Over time, a substantial percentage of gender salary differences can be explained by academic rank. However, large gender salary differences for full professors are not explained by observable characteristics. In addition, gender differences in promotion to tenure exist after controlling for productivity and demographic characteristics. Women are between six to eight percent less likely to be promoted than men, and most of this difference cannot be explained by observable characteristics. Between 1973 and 1997, very little has changed in terms of gender salary and promotion differences for academics in science. After evaluating potential explanations, I conclude that gender discrimination similar to that observed at MIT accounts for the unexplained gender disparities.

The remainder of the paper is organized as follows: section one describes the data, section two details the empirical methodology, section three evaluates the empirical results, and section four concludes.

I. The Data

This study uses data from the 1973-1997 waves of the Survey of Doctorate Recipients (SDR). The SDR is a biennial, longitudinal survey of doctorate recipients from U.S. institutions conducted by the National Research Council. The SDR collects detailed information on doctorate recipients including demographic characteristics, educational background, employer characteristics, academic rank, government support, primary work activity, productivity, and salary. The SDR has undergone substantial changes in the sampling frame and survey content between the 1973 and 1993 waves (Mitchell, Moonesinge, and Cox 1998). Technical reports provided by the National Science Foundation have allowed me to construct a longitudinal data set with consistent variable definitions over time.[2]

I have selected two samples of doctorates in the sciences in order to examine salary and promotion differentials by gender. The first data I analyze, the Cross Sectional Samples, are repeated cross sections of tenured individuals or those on the tenure track for each survey year from 1973 to 1997. To qualify as being tenured or on the tenure track, individuals in this sample must report a rank of assistant, associate, or full professor and report having tenure or a tenure track job.[3] In addition, these individuals must be employed at an institution in the United States classified as research, doctorate granting, comprehensive, or liberal arts by the Carnegie Foundation for the Advancement of Teaching. I also select individuals working full-time with salaries greater than $10,000.

The second data set, the Longitudinal Sample, follows individuals who receive their Ph.D. between the years of 1972 and 1989 as long as they remain in the survey and meet additional restrictions. This sample is restricted to individuals who at some point are observed to be on the tenure track while also being in the survey at least eight years

[2] An evaluation of the impact of sample frame changes along with a detailed discussion of variable definitions appears in Appendix 1.
[3] For the 1973-1977 surveys tenure track is imputed as those reporting a rank of assistant, associate, or full professor.

after receiving their degree. Individuals are excluded from the sample if they are not observed more than once or if they skip more than three surveys and do not report the year they received tenure. This sample is used to evaluate the probability and duration of promotion to tenure.

Ideally, when using the Longitudinal sample I would estimate the duration of time to promotion to tenure conditioning on starting on the tenure track using time-varying covariates in the analysis. However, this is not possible given the biennial design, changes in the survey questionnaire, sampling frame changes that eliminate individuals from the survey, and the numerous individuals who skip survey years. I must modify the data and analytical approach in order to account for these problems.

Since I do not observe the exact year an individual enters the tenure track, I estimate the duration to promotion to tenure after receiving the doctorate. Using the 1973 through 1991 surveys, I observe the exact tenure year. After 1991, I impute tenure year when people in the subsequent surveys report being tenured. Even though I have to impute tenure year for the later surveys, this is a better measure of promotion than changes in rank because I can only observe rank changes every other year. Time-varying covariates such as employer characteristics, marital status, and primary work activities are measured as the proportion of time an individual is observed in the sample meeting a given condition. For example, the variable proportion of time employed at a top college is defined as the number of times I observe an individual working at a top-tier Carnegie ranked four year or liberal-arts college divided by the total years this person is observed in the survey.

Measures of academic productivity are almost entirely missing from the SDR data. Productivity can be approximated by primary work activity and government research support. In addition, the SDR asks questions about publications in the 1983 and 1995 surveys. I impute average productivity measures using these two surveys. If data are present in 1995 then the productivity measure is divided by experience in 1995 and assigned as average productivity. If 1995 data is not present, the 1983 data is used instead. These average productivity measures assume that an individual's productivity is roughly constant over their career. Clearly productivity and time-varying characteristics are measured with error in the sample and will potentially bias estimates of salaries and promotion. However, omitting these variables may introduce additional biases; thus, I include the mismeasured variables in this analysis as proxies for actual productivity.

Table 1 lists the descriptive statistics for the variables used in the Cross Sectional Samples pooled across survey years. Comparing the natural logarithm of real salaries across genders, men have a 17 percent average wage premium compared to women.[4] Women are less likely to be married, have fewer children, and have fewer years of experience. They are also less likely to receive their Ph.D. from a top research institution and are more concentrated in the lower ranks. Employment characteristics also vary by gender. Women are more likely to work at private institutions and top four-year colleges or liberal-arts schools while men are more likely to work at top universities. Men receive more government support and teach less than women in the sample. The distribution of women and men across science fields is markedly different: over half of women in this sample specialize in biology or the life sciences, and more than eighty percent are in

[4] Nominal salaries are deflated using the Personal Consumption Expenditure implicit price deflator with 1992 as the base year.

chemistry, biology or life sciences, and computer science or math. Biology or life sciences, computer science or math, and engineering are the top fields for men.

Table 2 contains descriptive statistics by gender for the Longitudinal Sample. The probability of promotion differs significantly by gender: men in the sample have a seven percent higher probability of being promoted. However, those women who are promoted took fewer years to receive tenure. Similar to the cross sectional sample, men are more likely to be married and have children. Women are more likely to spend a proportion of their career working at private institutions and teaching, and are less likely to do research or receive government support. Women are also more likely to have academic jobs without rank and to spend some proportion of their career being unemployed. As mentioned previously, productivity is averaged over the individual's career. I find a gender gap in average productivity consistent with that found by other researchers (Zukerman, Cole, and Bruer, 1991).

II. Empirical Methodology

The study begins with an evaluation of the gender wage structure. Wage regressions are estimated as a function of demographic characteristics, academic background, employer characteristics, and academic productivity. The analysis continues by evaluating salary differentials over time using a wage decomposition developed by Oaxaca (1973) where the salary gap can be characterized as follows:

(1) $$\ln(\overline{w}_m) - \ln(\overline{w}_f) = \Delta\overline{X}'\boldsymbol{b}_m + \overline{X}_f'\Delta\boldsymbol{b}$$

Let $\Delta\overline{X} = \overline{X}_m - \overline{X}_f$ be the difference in average endowments, and $\Delta\beta = \beta_m - \beta_f$ be the differences in estimated coefficients (salary structure), the term that accounts for the effect of discrimination. In order to interpret coefficient differences as discrimination, the model must contain all relevant explanatory variables and the researcher assumes that in the absence of discrimination the coefficients would be the same for men and women. In equation (1), I implicitly assume that the male coefficients are representative of the underlying salary structure.[5]

The study continues by evaluating gender differences in promotion using the Longitudinal Sample and two empirical methods. First, I estimate probit models in order to determine whether significant differences exist in the probability of promotion by gender. Second, duration models are used to estimate the conditional probability of promotion to tenure given the individual has survived untenured.

Duration to tenure is modeled using the proportional hazards model:

(2) $$h_i(t) = \lambda_o(t)\exp\left[\beta_1 x_{i1} + \ldots + \beta_k x_{ik}\right]$$

where the hazard of promotion $h_i(t)$ is a function of the baseline hazard $\lambda_o(t)$ and covariates, x in equation (2). The covariates in equation (2) influence the scale of the hazard rate and are not a function of time. In addition, the hazard for any one individual is a fixed proportion to the hazard for any other person in the sample, allowing me to

[5] The researcher may also assume that the female coefficients or a weighted average of male and female characteristics (as in Neumark (1988) and Oaxaca and Ransom (1994)) represent the underlying salary structure.

estimate the hazard of promotion stratified by field of doctorate.[6] Additional covariates used in this analysis include demographic variables, employer characteristics, employment background, primary work activity, and productivity. These covariates are suggested by previous studies of academic promotion (Long, Allison, and McGinnis 1993).

III. Empirical Results

A. Estimates of the Gender Salary Structure in the Sciences

The analysis begins by estimating the underlying gender salary structure in the sciences using the Cross Sectional Samples. I do this in order to evaluate the characteristics contributing to the earnings of doctorates in the sciences and to determine whether gender differences exist in the coefficient estimates. Differences in coefficient estimates by gender indicate significant earnings differentials potentially resulting from discrimination. The data for each year of the Cross Sectional Samples are pooled in order to evaluate the effect of demographic and employer characteristics on salaries. Three specifications are estimated separately by gender and the parameters of interest are reported in Table 3.[7] Model 1 in Table 3 investigates the effect of demographic characteristics on salaries in the sciences. Model 2 includes additional controls for the Carnegie ranking of the doctoral granting institution and academic rank. Model 3

[6] When stratifying the hazard of promotion by field of doctorate a separate baseline hazard, $l_0(t)$, exists for each field.

[7] All specifications include dummy variables for Ph.D. cohort, survey year, and scientific field. In Model 1 the natural logarithm of real wages is regressed on a constant, age in the survey year, dummies for African American, other race, and a quadratic in work experience since Ph.D. Model 2 includes all the variables in Model 1 with the addition of rank, and doctorate quality. Model 3 includes all of the variables in Model 2 with the addition of employer quality, employer type, government support, and primary work activity. Standard errors are clustered on individual because the data contains multiple observations on some individuals.

examines the effects of employer characteristics, government support, and primary work activity on the gender salary structure.

I will compare the coefficient estimates across specifications in Table 3 to highlight gender differences in the salary structure. In all specifications, age has a positive and significant effect on the salaries of women while age has a negative and significant effect on the salaries of men. Foreign born men earn a larger and statistically significant wage premium while the coefficient is not significantly different from zero for women. The return to work experience is similar for men and women when covariates for rank and employer characteristics are added to the model.

When characteristics of Ph.D. institution and academic rank are included in the models, we continue to observe gender differences in the salary structure. Women earn over twice the salary premium for receiving their degree from a top research institution compared to their male counterparts. In addition, being an assistant or associate professor has a larger negative impact on salaries for men than for women. The coefficient on receiving tenure is positive and statistically significant for women in Model 3 while not being significantly different from zero for men. These differences are most likely the result of differences in sample composition. 76 percent of men have tenure in the sample compared to 58 percent of the women.

The coefficients on the male and female estimates in Model 3 continue to differ as employer characteristics, government support, and primary work activity are added to the specification. Working at a top ranked four-year or liberal-arts college increases the salaries earned by women while decreasing the salaries earned by men. Working at a private institution reduces women's salaries by almost five percent compared to a one percent decrease for men. Both men and women earn a large salary premium for working in a medical school, however the male premium is larger at 18 percent compared to the 14 percent premium for women. Government support of research and primarily working as a teacher have similar impacts for both men and women while men receive a premium for management and other primary work activities. In all specifications, the R-squared is larger for men, indicating that almost 5 percent more of the variation in male salaries is explained by the model than for females. These results in Table 3 indicate large and significant differences in the salary structure for men and women. However, these estimates could be biased because I do not include measures of marital status, fertility, and productivity in the specifications.[8]

Table 4 presents Model 3 with additional covariates for marital status, fertility, and productivity using the 1979-1997 Pooled Cross Sectional Samples, the 1983 SDR, and the 1995 SDR.[9] In all specifications, marriage has a positive and significant effect on the salaries of men while having an insignificant effect on the salaries of women. Presence of children has a positive effect on the salaries of both men and women increasing salaries by about one percent, but this coefficient is only statistically significant for men. Coefficients on the indicator of having young children are not significantly different from zero for both men and women. Hence the fertility choices of women do not explain salary differences. Productivity (measured by number of publications and number of papers presented) is positive and significant in the models,

[8] These variables are not included in the specifications in Table 3 because they are not available for all survey years.

[9] The Pooled Cross Sectional Sample includes the years 1979-1981 and 1985-1997. 1983 is not included in the sample because it does not ask fertility questions.

and the coefficients have a one half of one percent positive effect on salaries for both men and women.

The 1995 SDR also includes measures of patents, patents that become commercial products, professional society memberships, years spent in post-doctoral appointments, and post-doctoral prizes. Patents increase male salaries--the patent coefficient is of a similar magnitude for women but not statistically significant. Both men and women benefit from professional society memberships. Years spent in post-doctoral appointments have a negative and significant impact on salaries for both men and women. These variables are correlated with the quality of the scientist. Better scientists are more likely to be active in professional societies and less likely to spend additional years in post-doctoral appointments. In both the 1995 and 1983 estimates, the coefficient on experience is larger for men than for women compared to the pooled sample estimates.

With the exception of the coefficients on experience, the size and sign of parameter estimates in Table 4 do not appreciably change when marriage, fertility, and productivity are included in the specifications. In fact, the coefficient estimates on productivity are small in magnitude, indicating that productivity does not explain much of the observed gender salary difference. Similar to Table 3 the R-squares indicate that the models explain more of the variation in male salaries than female salaries.

B. Estimates of the Changes in the Gender Salary Gap over Time

Previous research shows significant changes in the gender earnings differential in academia over time (Ransom and Megdal 1993, Ginther and Hayes 2001). I examine these salary differentials by estimating separate models for each survey year using the salary decomposition in equation (1) to examine trends in the salary differential over time.[10] The average salary gap, along with the salary decomposition weighted by male and female coefficients and standard errors are reported in Table A.4 in Appendix 2. In order to examine the changes in the average gender salary differential over time, estimates for each survey year are plotted in Figures 1A through 1H.

The top graphs in Figure 1 plot the average gender salary differential over time. The bottom graphs plot the corresponding salary decomposition weighted by the male coefficients. The underlying models for Figures 1A and 1B include dummy variables for academic rank. In 1973 men employed with tenure or on the tenure track earned 17 percent more on average than similarly employed women. This salary differential remains roughly constant through 1997. Figure 1B shows the salary decomposition as a function of endowments (differences in average characteristics) and coefficients (often interpreted as discrimination). Between 1973 and 1997 most of the gender salary gap can be explained by differences in endowments, and the proportion of the gap due to coefficients falls to three percent.

Previous research by Ginther and Hayes (1999, 2001) shows that the majority of the gender salary gap in the humanities disappears when separate salary regressions are estimated for each academic rank. I estimate salary differences for each year in the Cross Sectional Samples in order to examine whether the gender salary gap may be explained

[10] The specification used is similar to Model 3 in Table 3. The natural logarithm of real wages is regressed on a constant, age in the survey year, dummies for African American, other race, a quadratic in work experience since Ph.D, rank, doctorate quality, employer quality, employer type, government support, and primary work activity. All specifications include dummy variables for field of study. The text indicates whether rank is controlled for using dummy variables or whether models have been estimated separately by rank. Even though productivity has a different impact by gender, it is not included because the data are not available for all of the survey years. These estimates are available from the author upon request.

by differences in endowments captured by rank. These results are presented in Figures 1C through 1H and in Appendix Table A.4. Figures 1C and 1D show the gender salary gap and corresponding salary decomposition for assistant professors. The salary gap decreased from more than 17 percent in 1973 for the estimates that pool rank in Figure 1A to a high of nine percent for assistant professors in Figure 1C. The gender salary gap falls to five percent by 1997. The salary decomposition in Figure 1D, shows a change in the proportion of the gap explained by endowments and coefficients. Prior to 1985, differences in coefficients underlie the majority of the gap. Afterwards, differences in endowments explain the gender salary differential.

Similar results are apparent for associate professors in Figures 1E and 1F. In 1973, male associate professors earned seven percent more in salary than their female counterparts. Again, this earnings differential persists through 1997. Prior to 1985, differences in coefficients favoring male associate professors explain a significant portion of the gender gap. After 1985, the gender salary gap between male and female associate professors is explained by differences in endowments.

The marked decrease in the gender salary gap observed for assistant and associate professors is not apparent for full professors. Figures 1G and 1H show this different story. The salary gap for full professors is larger over time than for the lower academic ranks. In 1973, male full professors earned a 20 percent salary premium over female full professors. By 1997 this gap fell to 15 percent. The decomposed salary differential in Figure 1H shows a decreasing effect of coefficients on the gender salary differential over time. However, if one weights the salary decomposition with female coefficients instead, almost ten percent of the salary gap remains unexplained for full professors—a result significant at the one percent level. This result suggests that the differential treatment of male and female full professors of science is not a phenomena isolated to MIT.

C. Explanations for the Full Professor Gender Salary Gap

Gender salary differences for full professors remain large and significantly different from zero between 1973 and 1997. In order to determine those factors contributing the most to the explained and unexplained gender salary differential, I estimated gender salary differences for several sub-samples of the data, and I examined the coefficient estimates using the 1995 SDR specification in Table 4 for full professors.

In 1997 the estimated gender salary gap for full professors shown in Figure 1G was 15 percent. I divided the data into several sub-samples in order to evaluate whether this finding was robust across different groups in the data on the chance that the results for full professors could be driven by large discrepancies in certain scientific fields or employer types. I began the sub-sample analysis by estimating the gender salary gap for full professors in biology and life scientists. Over half of the women scientists in the SDR sample are in biology and life sciences, and sociologists have argued that once women obtain a critical mass in a field gender discrepancies are likely to dissipate (Etzkowitz et. al. 1994). Male full professors in biology and life sciences earn 19 percent more on average than their female colleagues in 1997. This salary gap is four percent higher than that reported for all scientists in Figure 1G. Next, I estimated the gender salary gap for all other scientific fields excluding biology and life sciences. In 1997 that salary gap for non-life science full professors was 16 percent. Given the significant gender difference in the magnitude of the coefficient on medical schools in Tables 3 and

4, I estimated the gender salary gap for that sub-sample. The 1997 gender salary gap for full professors at medical schools was 23 percent. I then examined the salary gap for all non-medical school full professors of science. This gap stood at 14 percent in 1997. Finally, I considered whether the gender salary gap for full professors was isolated at top research universities. Again, I found a gender salary gap of 15 percent.[11] These results suggest that salary disparities for full professors are widespread across scientific disciplines and employer types.

Next I evaluated the coefficient estimates for full professors using the 1995 SDR. I use the 1995 data for this evaluation because it contains measures of productivity and post-doctoral appointments. Table 5 contains the coefficient estimates and the percentage change in salaries for those variables contributing the most to the explained and unexplained salary differences for full professors in 1995.[12] The three variables contributing the most to the explained gender salary difference are experience, top university, and number of publications. The three variables contributing the most to the unexplained gender salary difference are experience, age, and medical schools.

The results in Table 5 are striking. Using either the male or female weighted salary decomposition, experience contributes the lion's share to both the explained and unexplained salary differential. To put this in perspective, the 4.4 additional years of experience for men leads to between four and five percent of the explained salary gap. The 0.008 difference in the male and female experience coefficient leads to between 10

[11] In results not reported here, I found the same general trends for assistant and associate professors in these sub-samples as I did for all scientists combined. The salary gap for assistant and associate professors is smaller than for full professors.

[12] Explained differences (given by the first term in equation (1)) are mean differences in observable characteristics weighted by the male (female) coefficients. Unexplained differences (given by the second term in equation (1)) are differences in the parameters weighted by female (male) observable characteristics.

and 11 percent of the unexplained gap. Age is also an important factor contributing to the unexplained differential. Both age and to a lesser extent, experience, cannot be attributed to women's preferences. These coefficient differences are likely the result of differential treatment.

On the other hand, measures that reveal women's preferences such as productivity and fertility have a much smaller impact on the gender salary gap. The impact of productivity differences can be measured by summing publications and papers in Table 5. Differences in productivity contribute at most 1.5 percent to the explained earnings difference in 1995—small when compared to the experience penalty. The impact of children can be measured by summing the effect of number of children and young children on salary differences. Children contribute at most 1.7 percent to the unexplained salary difference, again a small effect when compared with the effects of age and experience. Finally, between 4.7 and 5.2 percent of the unexplained salary penalty can be attributed to coefficient differences for top universities and medical schools combined.

The bottom panel of Table 5 compares the experience coefficients for men and women by rank using the 1995 data. Female assistant professors receive a small experience premium when compared to their male colleagues, a result significant at the one percent level. However, the coefficient for female associate and full professors is smaller than that for males, and in fact not significantly different from zero. These small gender differences in the experience coefficients lead to greater salary differences over time, contributing to much of the unexplained salary differences observed for full professors. These estimates are consistent with the subtle marginalization of senior women faculty observed at MIT.

D. Estimates of the Probability of Promotion to Tenure

The importance of rank in explaining the gender salary gap leads me to consider whether differences in the probability and duration of promotion exist by gender. I begin by estimating probit models of the probability of being promoted to tenure using the full Longitudinal Sample. The probit model is specified similar to the wage model and includes measures of demographic characteristics, employer characteristics, primary work activity, government support, and employment history. The second specification in the table includes measures of average number of publications and papers presented.[13] The standardized probit coefficients for the full sample are presented in the first two columns of Table 6. The remaining columns of Table 6 show how the probability of promotion changes for cohorts of individuals receiving their Ph.D.s in 1972-1979 and 1980-1989. In all specifications, women are less likely to be promoted than men even when productivity is included in the model. Using the full sample, women are nine percent less likely to be promoted; the coefficient drops one percent after including productivity and remains statistically significant. The female coefficient drops almost two percentage points after including productivity in the 1980s cohort specification. In Table 6 variables increasing the probability of promotion include age, marriage, children, work experience, working at a top college, university, or medical school, primary work as a teacher, government support, and productivity. Variables besides gender that decrease

[13] I regress an indicator for promotion on a constant, age in 1997, dummies for female, African-American, other race, foreign born, and children present, years of experience and its square, years in a post-doctoral appointment, and number of employers. The remaining variables measure the proportion of years an individual is observed as: married, having children under the age of 6; working at a top college, top university, private institution, or medical school; primarily working in teaching, management or other activities; receiving government support; time spent unranked or unemployed. All specifications include additional controls for field of study. The first two specifications include controls for cohort. These models omit Ph.D. institution characteristics because these variables are not significant in any of the specifications.

the probability of promotion include: having young children, years in post-doctoral appointments, working at a private institution, first jobs at medical schools or top ranked institutions, other work activities, number of employers, being unranked, and unemployed. In separate estimates by gender not reported here, the coefficient on children is positive and significant and of the same magnitude for men and women. Young children have a negative and significant impact (at the one percent level) on the promotion probability for women. The coefficient is negative, smaller and significant at the ten percent level for men. In the remaining columns of Table 6, the signs on these variables are similar and the coefficients are statistically significant across cohorts.

Table 7 reports differences in the estimated probability of promotion by gender. The first column of Table 7 reports the difference in the predicted promotion probability between males and females in the full sample and by cohort, using the probit estimates. The promotion gap is 6.9 percent in favor of men in the full sample; including productivity decreases the gap to 6.6 percent. This gap is as high as 8.1 percent in favor of men in the 1980-89 sample. The second column in Table 7 reports the linear probability estimates using the same empirical specification given in Table 5. These estimates are quite similar to the probit estimates and can be decomposed using the decomposition given in equation (1). These results appear in the remaining columns of Table 7. Using the male promotion structure, differences in coefficients explain all but one percent of the gender promotion gap. These results provide some evidence that gender discrimination in the sciences may also be operating through the mechanism of promotion.

E. Estimates of the Hazard Rate of Promotion to Tenure

Given the relevance of promotion as a mechanism for unequal treatment, I now consider whether differences in the hazard rate of promotion exist by gender. I continue to use the full Longitudinal Sample and two cohorts for the duration analysis. In Table 8 I take an initial look at gender differences in the hazard of promotion using two hypothesis tests. The analysis begins with an estimate of the empirical survival functions for men and women working full-time in academia. The first row of Table 8 presents the test statistics for the log-rank test on the Kaplan-Meier survival curve estimate. I reject the null hypothesis that the survival functions are the same for men and women at less than a one percent level of significance for the full sample and both cohorts. Thus, without controlling for covariates, the hazard of not being promoted differs by gender.

As a second test of differences in promotion, I estimate a proportional hazards model of promotion regressed on a dummy variable for gender. I can interpret the risk ratios in the second row of Table 8 as the effect of being female on the hazard of promotion relative to being male. The risk ratio on gender is less than one and significant using the full sample, indicating that the likelihood in any given year of female promotion is 88 percent of their male counterparts. The disadvantage for women is largest in the most recent cohort; the female hazard falls to 85 percent of the male hazard--an estimate significant at the one percent level.

The above estimates do not account for differences in academic field, demographic and employer characteristics, primary work activity, and productivity. I include these variables to examine the differences between men and women in promotion to tenure in Table 9. The first two columns of Table 9 pool both genders and include controls for demographic characteristics, marital status, number of children, employer characteristics, and primary work activity. Model two includes measures of average productivity. Each model is stratified by field of doctorate, resulting in a separate baseline hazard for each field. In the first pooled model, being African-American or other race, years in post-doctoral appointments, working at a private institution, first jobs at medical schools and top ranked institutions, primary work in other activities, number of employers, time spent in an unranked job or unemployed all have negative and significant effects on the hazard of promotion. The risk ratio on gender is less than one and significant, indicating that in any given year the female chance of promotion is 12 percent lower than that of their male colleagues after controlling for these characteristics. Although productivity has a positive and significant effect on the hazard of promotion, including it in the model only reduces the gender difference in promotion by two percent.

The last two columns in Table 9 estimate the hazard model separately for men and women. The coefficient estimates are remarkably similar across the genders and the pooled estimates, with the only apparent difference for African-Americans. African-American men are much less likely to be promoted than African-American women. The similarity of coefficients indicates that most of the difference in the hazard of promotion can be explained by differences in observable characteristics.

To understand how these different estimates affect the hazard function of being promoted, I estimate a smoothed version of the baseline hazard function for men and women separately. These results are presented in Figure 2. The hazard of promotion is regressed on the covariates in Table 9 with the addition of covariates for field of doctorate. Each baseline hazard is evaluated at the average characteristics of men and women in the sample. The estimated hazard function is then smoothed using a nonparametric kernel density estimator described in Allison (1995).

In Figure 2 the female hazard lies everywhere below the male hazard function, with the female hazard shifting down more over time. The peak of the male hazard function occurs around 10 years after the completion of the doctorate, where men have a 0.12 hazard of being promoted. The peak of the female hazard function occurs at the same time, where women have less than a 0.10 hazard of being promoted.

Finally, I consider whether the same differences in the hazard of promotion are evident for the two cohorts. I can examine the effect of gender after controlling for covariates in each cohort by returning to the bottom row of Table 8. In the 1972-79 cohort the female hazard is 87 percent of the male hazard—a result that is significant at the one percent level. Controlling for covariates increases the female hazard of promotion by 1 percent. In the 1980-89 cohort, women's hazard of promotion relative to men improves after controlling for covariates to 94 percent and is not statistically significant at conventional levels.

F. Putting Gender Differences in Career Attainments into Perspective

The estimated gender salary and promotion differences presented in the previous sections are not new and have been observed by other researchers (Zukerman, 1987). The most striking aspect of these findings is that very little has changed for women in science in terms of salary and promotion probabilities over the past 24 years. Using a duration model on data from the 1970s, Long, Allison, and McGinnis (1993) find that women in biochemistry are ten percent less likely to be promoted; this study finds a twelve percent difference for all scientists. In her 1987 review of the careers of men and women scientists, Harriet Zukerman asked: "Why do these disparities [in career attainments] grow as men and women get older?" My results show we are still confronted with the same question. I now consider the implications of my results and attempt to put them in perspective when compared to the careers of non-science academics.

This paper has shown that the gender salary difference for full professors is large, and a substantial proportion of the gap remains unexplained by observable characteristics. These results contrast sharply with findings by Ginther and Hayes (1999, 2001) for faculty in the humanities. Using the 1977-1995 waves of the SDR and performing similar estimates by rank, Ginther and Hayes find salary gaps for assistant, associate, and full professors in the humanities similar to those in the sciences in the 1970s. However, by 1995 the average salary gap is not significantly different from zero for all ranks in the humanities.

Compared to the humanities, the average gender salary gap in the sciences remained roughly stable and persistently high. Even though the gap changed little over time, a larger proportion of the science salary gap is explained by observable characteristics between 1981 and 1997. However, some of these observable characteristics may be influenced by discrimination against women. For example, women may be less likely to obtain positions at top universities and medical schools or more likely to work at four year colleges because of discrimination in hiring. It could also be the case that women prefer teaching to research and self-select teaching colleges as a result. These different job placements significantly affect salary. Even when women do have higher paying positions, the coefficient differences for experience, age, top universities, and medical schools given in Table 5 indicate that women are paid somewhat less in these higher paying jobs. The salary decompositions indicate that disparities in the return to experience aggregate over time and account for most of the unexplained salary differential.

Potential explanations for gender differences in career attainments abound. First, researchers have argued that average career attainments differ by gender because of women's preferences. Women choose to have children and these choices affect their career placements and productivity. In addition, women are less productive than men and this could explain the observed pay and promotion differences. Second, economic models of monopsony in academic labor markets and job match quality could also explain different employment outcomes for women in science. Finally, gender discrimination may play a role in the observed differences in salary and promotion. I now consider the implications of my empirical results for different explanations.

Women's preferences for children and productivity provide a first explanation for gender differences in career attainments. Women are often the primary care givers to children, leaving them less time to devote to research and academic publishing. The presence of children could potentially explain the observed gender salary and promotion differences. However, the results show that the effect of children on the employment outcomes of women is small at best. First, descriptive statistics show that women are less likely to have children and have fewer children than their male colleagues; in 1995 only 38 percent of women full professors have children. Second, Table 5 reveals that children contribute at most 1.7 percent to the unexplained salary difference for full professors.

Third, presence of children has a positive effect on the promotion probability and hazard of promotion for both genders. Presence of young children has a larger negative impact for women than for men. However, this effect is tempered by the fact that women are less likely to have children. Overall, I cannot attribute the gender salary and promotion gaps to women's preferences for children.

Productivity obviously matters in the career attainments of scientists, but the question is by how much. In 1983, male full professors published 2.1 more articles and books than their female colleagues. By 1995, this gap increased to 3.4 additional publications for men. The estimates in Table 5 suggest that productivity explains around 1.5 percent of the salary gap in 1995. Estimates in Table 6 indicate that publications have a large effect (between three and five percent) on the probability of promotion. The productivity gap does partly explain why we do not observe more women in the senior ranks. However, it does not fully account for the persistent salary gap observed for full professors.

Monopsonistic models of academic labor markets offer a second explanation for gender differences in career attainments. Ransom (1993) develops a model of monopsonistic salary discrimination by universities. In this model, senior faculty—presumably with tenure—have higher moving costs and receive lower salary offers. It is possible that tenured women faculty in the sciences have higher moving costs than their male colleagues. However, one would also expect to see these differences for senior faculty in the humanities, and that is not the case. In fact, monopsony would be more likely for faculty in the humanities because of limited non-academic employment opportunities.

The job matching model provides a third explanation for the observed gender differences in salaries and promotion. In the matching model, when individuals are well-suited to the job (employer) they are more productive and earn higher salaries. Thus, if match quality mattered, we would expect to see larger salary differences in the lower ranks because women who are poor matches would earn less than their male counterparts. Furthermore, women with poor match quality would not be promoted to full professor. Thus, match quality might explain why women leave science careers (as in Preston 1994), but it would not necessarily explain why female full professors earn less than male ones.

None of the above explanations are entirely consistent with the empirical results presented in this paper, leading me to consider whether gender discrimination is responsible for the observed salary and promotion differentials. Gender discrimination can operate through a variety of mechanisms. Perhaps the observed salary differences for full professors in 1997 are the result of long-standing discrimination that has followed the cohort over time. However, the evidence does not support this conjecture. Full professors in 1997 have an average of 17 years of experience, indicating that these individuals started as assistant professors between 1980 and 1983. Salary differences for assistant professors at that time were approximately five percent. Thus, the salary gap observed for female full professors is not readily explained by past discrimination.

More likely, discrimination may operate through a subtle and pervasive mechanism such as the cumulative advantage model described by Zukerman (1987). In this model, some groups receive greater opportunities than others. Recipients are enriched and non-recipients are impoverished. This was apparently the case at MIT where, “Often it is difficult to establish discrimination as a factor because any one case, no matter how disturbing or aberrant, can usually be ascribed to its special circumstances. . .” (MIT Faculty Newsletter, 1999 p. 4). Although presence of children, productivity differences, monopsony, and job matching models do not entirely fit the observed empirical results, gender discrimination that accumulates throughout the career is the more likely explanation.

IV. Conclusion

This study has evaluated gender differences in salary and promotion in the sciences using the 1973-1997 Survey of Doctorate Recipients. The data show a persistent salary gap between male and female sciences academics over time. Although academic rank reduces the gender salary gap, it does not entirely explain the difference. Between 1973 and 1997 the average gender salary difference remained at roughly six percent for tenure-track assistant and associate professors, with under half of that difference attributable to unobservables. Salary differences for full professors are persistently high, averaging 15 percent throughout the sample time frame, with over six percent of the salary difference remaining unexplained by observable characteristics. These results suggest that discrimination against female full professors may not be isolated to MIT.

The analysis continued with an evaluation of promotion to tenure using binary choice models and duration analysis. I find significant differences in the probability and hazard of promotion by gender for academics in the sciences. Differences in the probability of promotion persist even in later cohorts and remain unexplained by observable characteristics.

Differences in the duration of promotion are almost entirely explained by observable characteristics. However, these characteristics might be the result of systematic differences in treatment over time. For example, women are more likely to work at private institutions. At the same time, appointments at private institutions reduce the likelihood that individuals receive tenure.

Viewing the gender salary and promotion gap in the sciences in isolation suggests several potential explanations for observed differences in career attainment. However, when fertility preferences, productivity differences, monopsony, and job matching explanations are evaluated in light of similar estimates for academics in the humanities by Ginther and Hayes, it is clear that the 'pervasive, if unintentional discrimination' found at MIT is playing a role.

So why is it that average female academic scientist continued to fare worse relative to her male colleagues when compared to the women in the humanities across campus? I suggest that up until the MIT report, women in science have not been willing to embrace the possibility of gender discrimination in career outcomes. Etzkowitz et. al. (1994) found in interviews of female faculty that, "Fear of stigmatization led some women. . . to deny the existence of gender related obstacles." In fact, before 1994 the women faculty at MIT had never discussed whether gender mattered in their professional lives (MIT Faculty Newsletter, 1999). This contrasts sharply with the humanities, where feminism is a mainstream field of intellectual inquiry, and the concept of equal pay for equal work is sacrosanct.

These results suggest that other colleges and universities undertake an evaluation of the status of women in science similar to the one at MIT. At this time eight other institutions have agreed to join MIT in doing so (Zernike, 2001). Raising awareness among faculty and administrators is the first step in addressing gender disparities. In addition, the National Science Foundation should consider asking respondents to the SDR detailed questions about resource allocation such as lab space and funding at academic institutions. Data on such questions would allow researchers to quantify whether gender disparities in treatment exist along other margins.

APPENDIX 1:
Evaluating the Impact of Changes in the Design of the Survey of Doctorate Recipients on Estimates and a Description of Variable Definitions

The Survey of Doctorate Recipients (SDR) is a biennial, longitudinal survey of doctorate recipients from U.S. institutions conducted by the National Research Council and sponsored by the National Science Foundation, the National Institutes of Health, the Department of Energy, and the National Endowment for Humanities. The survey collects detailed information on doctorate recipients including demographic characteristics, educational background, time use, employer characteristics, and salary. Since its inception, the SDR has undergone significant changes that may potentially affect time series analysis of the data (Mitchell, Moonesinge, and Cox 1998). Using technical reports provided by the National Science Foundation I have constructed longitudinal and cross sectional data sets with consistent variable definitions over time. This appendix describes the changes to the SDR and evaluates their impact on the research presented in this paper.

A. Changes in the Sampling Frame

The SDR is a stratified random sample of the Doctorates Records File (DRF) a census of earned doctoral degrees granted by U.S. academic institutions since 1920. Over time, the SDR survey instrument was redesigned to gain additional information on doctorates in the sciences and humanities. The SDR sampling frame creates challenges in estimating gender differences in salaries and promotion probabilities. The SDR is a biennial survey, thus I only observe an individual’s characteristics every other year. This sampling frame poses problems for using time-varying covariates and estimating the duration of promotion. For example, I observe the year an individual received their doctorate and the year they were promoted to associate professor. Since I do not observe the exact year an individual enters the tenure track, I can only estimate the duration until promotion conditional on working full-time in academia after receiving the doctorate.

In 1991, the SDR sampling frame was redesigned because of changing policy interests, advances in survey methodology, and changes in funding for the survey (Mitchell, Moonesinghe and Cox, 1998). The sampling frame was redefined to include fewer strata and to impose similar sampling rates across the strata (Brown, Pasquini, and Mitchell, 1997). The sample size was cut in half in 1991 and resources from this reduction were reallocated towards increased response rates. As a result, survey response rates increased from 55 percent in 1989 to 80 percent in 1991 (Brown, Pasquini, and Mitchell, 1997). Given the significant changes in the 1991 sampling frame: "Analysts are therefore cautioned against forming trend lines by combining 1973-1989 data with 1991 data." (Brown, Pasquini, and Mitchell, 1997, p. 8).

I take three strategies to address these changes in the sampling frame. First, for the Longitudinal Sample, I choose individuals who receive their doctorates prior to the sample redesign in 1989 and who remain in the sample through 1997. Thus, my estimates of the probability of promotion and duration until promotion are unaffected by the sample redesign. Second, the subsample I select from the 1973-1997 SDR is consistently sampled across the sample redesign. Third, for the Cross Sectional Samples, I evaluate how changes in the sample composition affect the estimates of gender salary differentials reported in this research. In developing the cross sectional samples I relied on information provided by the National Science Foundation for extracting individuals with consistent sampling probability over time.

Table A.1 shows the changes in the composition of the cross sectional samples over time. Table A.1 reflects the 1991 reduction in the sampling frame, showing a significant decrease in the sample size between 1989 and 1991. Furthermore, the composition of the sample changed. Between the 1989 and 1991 the percentage of females on the tenure track decreased from 33 percent to 18 percent of the sample. In addition the distribution of females across academic ranks changed significantly: female assistant professors increased in the sample by two percent while female full professors decreased by four percent. Even though the percentage of males in the sample increased between 1989 and 1991, the rank composition of men in the sample remained similar: assistant professors remained at 21 percent of the sample while associates increased by two percent and full professors decreased by two percent. Changes in the sampling frame had little impact on the estimated salary differentials presented in Figure 1 and Appendix Table A.3.

Next, I consider whether weighting the data are warranted given the changes in the sampling frame of the SDR. Because of the added strata and the changes in response rates pre- and post-1989, the survey samples and survey weights are not entirely consistent across time. I address this problem as follows. First, I select a subsample of US academics that have always been included in the SDR sampling frame. Second, I consider whether ignoring sample weights will bias the estimates presented in this research. Wooldridge (1999) addresses the effect of stratified sampling on linear regression and maximum likelihood M-class estimators. When stratification is based on exogenous variables (as is the case in my analysis of the SDR), "estimators that ignore stratification are consistent and asymptotically normal, and the usual variance matrix estimators are consistent (Wooldridge 1999, p. 1386). Third, a simple method that accounts for the effect of stratification on estimates is to include indicator variables for the strata. The SDR is stratified based on field of degree, sex, and demographic variables based on race, foreign-born, and disability status. I include indicator variables for all of these strata with the exception of disability status.

Finally, I examined the data to see whether weighting the data makes a difference in the estimated gender salary gap. Figure A.1 plots the unweighted mean and median gender salary gap and the weighted mean salary gap. After 1983 the unweighted mean and median gender salary differences are roughly the same. Prior to 1983 the weighted mean salary difference is slightly below the unweighted difference. After 1983, the weighted difference is slightly higher than the unweighted differences. Figure A.1 indicates that the results would not be significantly different if I were to use survey weights in the analysis. Given the changes in the weights over time and the similarity of the weighted and unweighted salary differences, I use the unweighted data for the entire analysis.

B. Variable Definitions

Survey content and questions changed significantly since the inception of the SDR. Tables A.2 and A.3 describe variable definitions and changes between the 1973 and 1997 surveys for the Cross Sectional and Longitudinal Samples. As mentioned in the text academic productivity (publications and papers) is only available in the 1983 and

1995 SDR. In order to estimate the effect of productivity on promotion, I impute average productivity measures using these two surveys. If data are present in 1995 then the productivity measure is divided by experience in 1995 and assigned as average productivity. If 1995 data is not present, the 1983 data is used instead. These average productivity measures assume that an individual's productivity is roughly constant over their career. These productivity averages are measured with error and will potentially bias estimates of the effect of productivity on promotion and salaries.

Time-varying covariates such as employer characteristics, marital status, and primary work activities are measured as the proportion of time an individual is observed in the sample meeting a given condition. For example, the variable proportion of time employed at a top college is defined as the number of times I observe an individual working at a top-tier Carnegie ranked four year or liberal-arts college divided by the total years this person is observed in the survey.

Information on marital status and children also changed during the sample time frame. These inconsistencies in the data make it difficult to control for the effects and timing of fertility on promotions and salary.

After 1991, the SDR no longer asked for the year an individual was promoted to tenure. I impute the year of promotion for the 1993 -1997 surveys when individuals report having tenure. I also impute tenure year for those individuals in the 1973-1991 survey waves when tenure year is prior to receiving Ph.D.

References

Allison, Paul D. 1995. *Survival Analysis Using the SAS System*. Cary, NC: The SAS Institute, Inc.

Brown, Prudence, Dan Pasquini, and Susan Mitchell. 1997. "Methodological Report 1991 Survey of Doctorate Recipients." Mimeo, National Research Council, Washington, DC.

Congressional Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology (CAWMSET). 2000. "Land of Plenty."

Etzkowitz, Henry, Carol Kemelgor, Michael Neuschatz, Brian Uzzi, and Joseph Alonzo, 1994. "The Paradox of Critical Mass for Women in Science." *Science* 266: October 7, 1994. 51-54.

Goldberg, Carey. 1999. "MIT Acknowledges Bias Against Female Professors." *The New York Times*. (March 23, 1999): p.1.

Ginther, Donna K. and Kathy J. Hayes. 1999. "Salary and Promotion Differentials by Gender for Faculty in the Humanities." *American Economic Review Papers and Proceedings* 89(2): 397-402.

Ginther, Donna K. and Kathy J. Hayes. 2000. "Changes In Gender Salary and Promotion Differentials 1977-1995 for Faculty in the Sciences." Mimeo, Federal Reserve Bank of Atlanta.

Kahn, Shulamit. 1993. "Gender Differences in Academic Career Paths of Economists." *American Economic Review Papers and Proceedings* 93: 52-56.

----------. 1997. "Women in the Economics Profession." *Journal of Economic Perspectives* 9(4): 193-205.

Levin, Sharon G. and Paula E. Stephan. 1998. "Gender Differences in the Rewards to Publishing in Academe: Science in the 1970s." *Sex Roles* 38(11/12): 1049-1064.

Long, J. Scott, Paul D.Allison and Robert McGinnis. 1993. "Rank Advancement in Academic Careers: Sex Differences and the Effects of Productivity." *American Sociological Review* 58(5): 703-722.

Massachusetts Institute of Technology Faculty Newsletter. 1999. March, 1999: 21(4) available on-line at http://web.mit.edu/fnl/women/women.html.

Mitchell, Susan B., Ramal Moonesinghe and Brenda G. Cox. 1998. "Using the Survey of Doctorate Recipients in Time-Series Analyses: 1989-1997." Mimeo, National Science Foundation, Washington, DC.

National Science Foundation (NSF). 2000. Women, Minorities, and Persons with Disabilities in Sciences and Engineering: 2000. NSF 00-327. Arlington, VA.

Neumark, David. 1988. "Employers' Discriminatory Behavior and the Estimation of Wage Discrimination." *The Journal of Human Resources* 23(3): 279-295.

Oaxaca, Ronald. 1973. "Male Female Wage Differentials in Urban Labor Markets." *International Economic Review* 14:3, 693-709.

Oaxaca, Ronald and Michael R. Ransom. 1994. "On Discrimination and the Decomposition of Wage Differentials." *Journal of Econometrics* 61(1): 5-21.

Preston, Anne E. 1994. "Why Have All the Women Gone? A Study of Exit from the Science and Engineering Professions." *American Economic Review* 84(5): 1446-1462.

Ransom, Michael. 1993. "Seniority and Monopsony in the Academic Labor Market." *American Economic Review* 83(1): 221-233.

Ransom, Michael. and Sharon Bernstein Megdal. 1993. "Sex Differences in the Academic Labor Market in the Affirmative Action Era." *Economics of Education Review*, 12(1): 21-43.

Schneider, Alison. 2000. "Female Scientists Turn Their Backs on Jobs at Research Universities" *The Chronicle of Higher Education* 18 August 2000.A12-A14.

Wooldridge, Jeffrey M. 1999. "Asymptotic Properties of Weighted M-Estimators for Variable Probability Samples." *Econometrica* 67(6): 1385-1406.

Zernike, Kate. 2001. "9 Universities will Address Sex Inequities." *The New York Times* 31 January 2001. A11.

Zukerman, Harriet. 1987. "The Careers of Men and Women Scientists: A Review of Current Research." Reprinted in *The Outer Circle: Women in the Scientific Community.* Zukerman, H. Cole, J.R., and Bruer, J.T. editors. New York: W.W. Norton.

Zukerman, Harriet, Jonathan R. Cole, and John T. Bruer editors. 1991. *The Outer Circle: Women in the Scientific Community.*

TABLE 1--DESCRIPTIVE STATISTICS: MEANS AND STANDARD DEVIATIONS, USING THE 1973-1997 SURVEY OF DOCTORATE RECIPIENTS POOLED CROSS SECTIONAL SAMPLES[14]

Variable	Female	Male	Variable	Female	Male
Log Salary	10.787	10.957	Employed At:		
	(0.274)	(0.312)	Top College	0.300	0.207
Age	43.710	46.160		(0.458)	(0.405)
	(9.100)	(9.732)	Top University	0.321	0.412
African American	0.052	0.025		(0.467)	(0.492)
	(0.221)	(0.156)	Private Institution	0.346	0.264
Other Race	0.082	0.073		(0.476)	(0.441)
	(0.275)	(0.260)	Medical School	0.165	0.176
Foreign Born	0.166	0.206		(0.371)	(0.381)
	(0.372)	(0.404)	Government	0.392	0.476
Married[15]	0.584	0.841	Support	(0.488)	(0.499)
	(0.493)	(0.366)	Primary Activity		
Child[16]	0.331	0.448	Research	0.266	0.325
	(0.471)	(0.497)		(0.442)	(0.468)
Young Child[c]	0.146	0.175	Teaching	0.623	0.536
	(0.354)	(0.380)		(0.485)	(0.499)
Experience	11.354	15.895	Management	0.077	0.102
	(7.732)	(9.456)		(0.267)	(0.303)
Ph.D. from Top Tier	0.683	0.746	Other	0.034	0.037
Institution	(0.465)	(0.435)		(0.180)	(0.189)
Ph.D. from Second	0.125	0.129	Field of Study		
Tier Institution	(0.331)	(0.335)	Agriculture and Food	0.045	0.083
Assistant Professor	0.384	0.207	Science	(0.208)	(0.275)
	(0.486)	(0.405)	Computer Science and	0.193	0.143
Associate Professor	0.359	0.297	Mathematics	(0.395)	(0.350)
	(0.480)	(0.457)	Biology and Life	0.506	0.425
Full Professor	0.258	0.496	Sciences	(0.500)	(0.494)
	(0.437)	(0.500)	Chemistry	0.112	0.079
Tenured	0.581	0.757		(0.315)	(0.270)
	(0.493)	(0.429)	Earth Science	0.037	0.057
				(0.188)	(0.232)
			Physics and other	0.050	0.081
			Physical Sciences	(0.218)	(0.272)
			Engineering	0.057	0.133
				(0.233)	(0.339)
			Sample Size	21019	73235

[14] The Cross Sectional Samples include all individuals working full-time, earning more than $10,000 in 1992 dollars, with tenure or on the tenure track at an institution classified as research, doctorate granting, comprehensive or liberal arts by the Carnegie Foundation for the Advancement of Teaching.

[15] 17444 female observations; 53214 male observations.

[16] 15621 female observations; 47789 male observations.

TABLE 2--DESCRIPTIVE STATISTICS, 1973-1997 SURVEY OF DOCTORATE RECIPIENTS, LONGITUDINAL SAMPLE[17]

Variable	Female	Male	Variable	Female	Male
Years to Promotion[18]	7.904	8.583	Proportion of Primary Work As:		
	(3.621)	(3.780)	Research	0.364	0.459
Tenured	0.624	0.692		(0.383)	(0.389)
	(0.485)	(0.462)	Teaching	0.462	0.378
Age in 1997	50.371	48.180		(0.381)	(0.382)
	(7.289)	(6.547)	Management	0.085	0.075
African American	0.063	0.053		(0.193)	(0.173)
	(0.242)	(0.224)	Other Activity	0.089	0.088
Other Race	0.090	0.118		(0.190)	(0.196)
	(0.287)	(0.322)	Government Support	0.441	0.511
Foreign Born	0.141	0.169	Over Career	(0.373)	(0.364)
	(0.348)	(0.375)	Number of Employers	2.176	2.229
Proportion of Years	0.575	0.767		(1.211)	(1.227)
Married	(0.416)	(0.306)	Proportion of Time Spent:		
Children	0.529	0.775	Unranked	0.093	0.077
	(0.499)	(0.417)		(0.179)	(0.160)
Proportion of Years with	0.167	0.268	Unemployed	0.021	0.010
Children < 6	(0.264)	(0.301)		(0.083)	(0.050)
Work Experience 1997	18.228	17.645	Average Papers Written	0.347	0.615
	(5.064)	(5.297)		(0.679)	(0.884)
Years spent in Post Docs	0.892	1.075	Average Publications	0.704	0.906
	(1.689)	(1.774)		(0.941)	(1.195)
Proportion of Career Working At:			Field of Degree		
Top College	0.213	0.171	Agriculture and Food	0.054	0.077
	(0.346)	(0.323)	Science	(0.227)	(0.267)
Top University	0.319	0.358	Computer Science and	0.172	0.146
	(0.377)	(0.385)	Mathematics	(0.378)	(0.353)
Private Institution	0.291	0.240	Biology and Life	0.549	0.401
	(0.389)	(0.365)	Sciences	(0.498)	(0.490)
Medical School	0.182	0.178	Chemistry	0.087	0.067
	(0.330)	(0.334)		(0.282)	(0.250)
First Job At:			Earth Science	0.038	0.066
Other Institution	0.058	0.061		(0.192)	(0.248)
	(0.233)	(0.239)	Physics and other	0.040	0.071
Liberal Arts/College	0.318	0.239	Physical Sciences	(0.195)	(0.256)
	(0.466)	(0.426)	Engineering	0.059	0.172
University	0.421	0.488		(0.236)	(0.377)
	(0.494)	(0.500)	Ph.D. 1972- 1979	0.586	0.544
Medical School	0.204	0.212		(0.493)	(0.498)
	(0.403)	(0.409)	Ph.D. 1980 - 1989	0.414	0.456
Top Institution	0.572	0.582		(0.493)	(0.498)
	(0.495)	(0.493)	Sample Size	2794	5643

[17] The Longitudinal Sample includes individuals who receive their doctorates between 1972 and 1989 who at some point report working in academia on the tenure track at an institution classified as research, doctorate granting, comprehensive or liberal arts by the Carnegie Foundation for the Advancement of Teaching.

[18] 1743 female observations; 3907 male observations.

TABLE 3--ESTIMATES OF THE GENDER WAGE STRUCTURE IN THE SCIENCES 1973-1997 SURVEY OF DOCTORATE RECIPIENTS, POOLED CROSS SECTIONAL SAMPLES[19]

	Model 1		Model 2		Model 3	
Variable	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
Constant	10.452**	10.578**	10.820**	10.981**	10.745**	10.850**
	(0.029)	(0.026)	(0.031)	(0.026)	(0.027)	(0.024)
Age	0.001	-0.003**	-0.002**	-0.004**	0.0002	-0.001**
	(0.0005)	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.0004)
African American	0.002	-0.007	-0.012	-0.017	0.004	-0.002
	(0.012)	(0.010)	(0.011)	(0.010)	(0.010)	(0.008)
Other Race	0.005	-0.004	0.004	-0.006	-0.001	-0.003
	(0.012)	(0.008)	(0.010)	(0.007)	(0.010)	(0.006)
Foreign Born	0.006	0.034**	0.01	0.033**	0.006	0.026**
	(0.010)	(0.006)	(0.009)	(0.005)	(0.008)	(0.004)
Experience	0.027**	0.032**	0.012**	0.012**	0.007**	0.007**
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Experience Squared	-0.0004**	-0.0004**	-0.0002**	-0.0001**	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Ph.D. from Top Tier			0.063**	0.036**	0.046**	0.020**
Institution			(0.008)	(0.006)	(0.007)	(0.005)
Ph.D. from Second			0.008	-0.021**	0.010	-0.015**
Tier Institution			(0.010)	(0.007)	(0.008)	(0.006)
Assistant Professor			-0.258**	-0.321**	-0.263**	-0.315**
			(0.010)	(0.007)	(0.009)	(0.006)
Associate Professor			-0.153**	-0.202**	-0.154**	-0.194**
			(0.007)	(0.004)	(0.007)	(0.004)
Tenured			0.004	-0.022**	0.022**	0.004
			(0.007)	(0.005)	(0.006)	(0.004)
Top College					0.013*	-0.019**
					(0.006)	(0.004)
Top University					0.090**	0.079**
					(0.005)	(0.003)
Private Institution					-0.050**	-0.013**
					(0.005)	(0.004)
Medical School					0.135**	0.183**
					(0.008)	(0.005)
Government					0.044**	0.052**
Support					(0.004)	(0.003)

[19] Standard errors in parentheses. p<0.05 = *****, p<0.01 = ******. Standard errors are clustered by individual.

TABLE 3—(CONTINUED)

Variable	Model 1 Female	Model 1 Male	Model 2 Female	Model 2 Male	Model 3 Female	Model 3 Male
Primary Activity						
Teaching					-0.062**	-0.048**
					(0.005)	(0.003)
Management					0.071**	0.138**
					(0.009)	(0.005)
Other					0.032*	0.112**
					(0.014)	(0.009)
Field of Degree						
Computer Science &	0.031*	0.039**	0.038**	0.043**	0.101**	0.119**
Mathematics	(0.012)	(0.008)	(0.012)	(0.007)	(0.011)	(0.006)
Biology and Life	0.040**	0.082**	0.059**	0.098**	0.054**	0.072**
Sciences	(0.011)	(0.007)	(0.011)	(0.006)	(0.010)	(0.005)
Chemistry	-0.082**	-0.025**	-0.062**	-0.014	0.000	0.053**
	(0.014)	(0.009)	(0.013)	(0.008)	(0.012)	(0.007)
Earth Science	-0.009	0.034**	-0.006	0.030**	0.032*	0.089**
	(0.017)	(0.009)	(0.016)	(0.008)	(0.015)	(0.007)
Physics and other	0.048**	0.043**	0.051**	0.049**	0.085**	0.104**
Physical Sciences	(0.017)	(0.009)	(0.016)	(0.008)	(0.015)	(0.007)
Engineering	0.216**	0.184**	0.210**	0.169**	0.237**	0.201**
	(0.013)	(0.007)	(0.012)	(0.007)	(0.012)	(0.006)
Additional Controls						
Cohort	Yes	Yes	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	21019	73235	21019	73235	21019	73235
R-squared	0.296	0.348	0.373	0.419	0.476	0.534

TABLE 4--ESTIMATES OF THE GENDER WAGE STRUCTURE IN THE SCIENCES INCLUDING PRODUCTIVITY MEASURES, SURVEY OF DOCTORATE RECIPIENTS, POOLED CROSS SECTIONAL SAMPLES[20]

	Pooled 1979-1997[21]		1983 SDR		1995 SDR	
Variable	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
Constant	10.725**	10.849**	10.627**	10.699**	10.570**	10.729**
	(0.029)	(0.027)	(0.049)	(0.034)	(0.067)	(0.040)
Age	0.001	-0.002**	0.001	-0.001**	0.0004	-0.001**
	(0.0005)	(0.0005)	(0.001)	(0.001)	(0.001)	(0.001)
African American	-0.0001	0.001	-0.011	0.001	-0.009	0.023
	(0.010)	(0.009)	(0.022)	(0.018)	(0.021)	(0.015)
Other Race	0.005	-0.0004	-0.024	-0.015	0.014	0.011
	(0.011)	(0.007)	(0.023)	(0.013)	(0.020)	(0.011)
Foreign Born	0.004	0.030**	0.015	0.038**	-0.013	0.004**
	(0.009)	(0.005)	(0.019)	(0.010)	(0.019)	(0.009)
Married = 1	0.004	0.012**	-0.007	0.033**	0.006	0.027*
	(0.005)	(0.004)	(0.009)	(0.008)	(0.013)	(0.011)
Child = 1	0.011	0.012**			0.008	0.009**
	(0.006)	(0.004)			(0.014)	(0.008)
Young Child = 1	0.002	-0.004			0.005	0.006
	(0.007)	(0.004)			(0.018)	(0.009)
Experience	0.007**	0.007**	0.009**	0.011**	0.007*	0.012**
	(0.002)	(0.001)	(0.003)	(0.002)	(0.003)	(0.002)
Experience Squared	-0.0004	-0.0001	-0.0001	-0.0001	-0.0000	-0.0001
	(0.0000)	(0.00002)	(0.0001)	(0.0000)	(0.0001)	(0.0000)
Ph.D. from Top Tier	0.041**	0.020**	0.051**	0.017**	0.004**	0.005**
Institution	(0.007)	(0.006)	(0.013)	(0.009)	(0.015)	(0.010)
Ph.D. from Second	0.008	-0.016*	0.012	-0.023*	-0.002	-0.024*
Tier Institution	(0.009)	(0.007)	(0.016)	(0.010)	(0.022)	(0.013)
Assistant Professor	-0.268**	-0.324**	-0.251**	-0.290**	-0.224**	-0.286**
	(0.010)	(0.008)	(0.020)	(0.016)	(0.029)	(0.018)
Associate Professor	-0.160**	-0.203**	-0.149**	-0.185**	-0.128**	-0.189**
	(0.007)	(0.005)	(0.012)	(0.008)	(0.019)	(0.009)
Tenured	0.010	-0.012*	0.026	0.002*	-0.010	-0.039**
	(0.007)	(0.006)	(0.017)	(0.013)	(0.020)	(0.014)
Top College	0.008	-0.020**	0.017	-0.026**	-0.018	-0.033**
	(0.006)	(0.005)	(0.012)	(0.008)	(0.015)	(0.008)
Top University	0.094**	0.098**	0.081**	0.054**	0.068**	0.089**
	(0.006)	(0.004)	(0.012)	(0.007)	(0.014)	(0.008)
Private Institution	-0.040**	0.003	-0.050**	-0.004	0.009**	0.026**
	(0.006)	(0.005)	(0.010)	(0.007)	(0.012)	(0.008)
Medical School	0.135**	0.198**	0.136**	0.149**	0.168**	0.240**
	(0.008)	(0.007)	(0.018)	(0.010)	(0.016)	(0.012)
Government	0.047**	0.056**	0.028*	0.040**	0.062**	0.043**
Support	(0.005)	(0.003)	(0.011)	(0.006)	(0.013)	(0.008)

[20] Standard errors in parentheses. p<0.05 = *, p<0.01 = **.
[21] Standard errors for pooled sample are clustered by individual.

TABLE 4—(CONTINUED)

Variable	Pooled 1979-1997 Female	Pooled 1979-1997 Male	1983 SDR Female	1983 SDR Male	1995 SDR Female	1995 SDR Male
Primary Activity						
Teaching	-0.073**	-0.061**	-0.037**	-0.035**	-0.033*	-0.064**
	(0.006)	(0.004)	(0.013)	(0.007)	(0.016)	(0.008)
Management	0.070**	0.147**	0.094**	0.142**	0.176**	0.198**
	(0.010)	(0.006)	(0.021)	(0.010)	(0.025)	(0.014)
Other	0.040*	0.132**	-0.016*	0.121**	0.105*	0.163**
	(0.017)	(0.012)	(0.040)	(0.022)	(0.044)	(0.026)
Productivity						
Number of Publications			0.003**	0.002**	0.005**	0.003**
			(0.001)	(0.000)	(0.001)	(0.000)
Number of Papers			0.005*	0.000	0.001*	0.001**
			(0.002)	(0.001)	(0.001)	(0.000)
Patents = 1					0.047	0.038**
					(0.027)	(0.012)
Number of Patents Commercialized					-0.002	0.011
					(0.030)	(0.006)
Number of Professional Society Memberships					0.006*	0.013**
					(0.003)	(0.002)
Years in Post Docs					-0.004	-0.012**
					(0.004)	(0.003)
Post Doc Prizes					0.001	0.013
					(0.014)	(0.008)
Field of Degree						
Computer Science & Mathematics	0.108**	0.114**	0.069**	0.116**	0.147**	0.050**
	(0.012)	(0.007)	(0.020)	(0.010)	(0.035)	(0.013)
Biology and Life Sciences	0.057**	0.067**	0.028	0.069**	0.083**	0.013**
	(0.011)	(0.006)	(0.019)	(0.009)	(0.032)	(0.013)
Chemistry	0.003**	0.043**	-0.040	0.045**	-0.032**	-0.013**
	(0.013)	(0.009)	(0.021)	(0.013)	(0.043)	(0.016)
Earth Science	0.034*	0.089**	0.017	0.099**	-0.034*	-0.006**
	(0.016)	(0.008)	(0.030)	(0.012)	(0.048)	(0.018)
Physics and other Physical Sciences	0.098**	0.098**	0.053*	0.103**	0.097*	0.038*
	(0.015)	(0.009)	(0.027)	(0.012)	(0.043)	(0.015)
Engineering	0.249**	0.216**	0.203**	0.206**	0.221**	0.146**
	(0.012)	(0.007)	(0.023)	(0.011)	(0.036)	(0.013)
Additional Controls						
Cohort	Yes	Yes				
Survey Years	Yes	Yes				
Sample Size	15621	47789	1820	5425	1492	5663
R Squared	0.48	0.521	0.474	0.563	0.507	0.563

TABLE 5--VARIABLES CONTRIBUTING TO EXPLAINED AND UNEXPLAINED EARNINGS DIFFERENTIAL FOR FULL PROFESSORS AND COEFFICIENTS ON EXPERIENCE FOR ALL RANKS 1995 SURVEY OF DOCTORATE RECIPIENTS

			Male Coefficients		Female Coefficients	
Independent Variable	Female	Male	Explained	Unexplained	Explained	Unexplained
Age	-0.003	-0.001	0.3%	-9.9%	0.6%	-10.3%
Experience	0.018*	0.026**	-5.3%	-10.1%	-4.3%	-11.2%
Top University	0.038	0.094**	-1.1%	-2.0%	-0.4%	-2.7%
Medical School	0.091*	0.234**	0.4%	-2.7%	0.1%	-2.5%
Number of Publications	0.005**	0.003**	-1.0%	1.5%	-1.6%	2.1%
Number of Papers	-0.001	0.001**	-0.2%	-1.9%	0.1%	-2.2%
Number of Children	-0.010	0.017**	-0.3%	-1.2%	0.2%	-1.7%
Young Children	-0.010	-0.001	0.0%	0.0%	0.0%	-0.1%
Total Differential[22]			-9.5%	-5.0%	-6.5%	-8.0%

Coefficients on Experience for All Ranks, 1995

	Assistant Professors		Associate Professors		Full Professors	
	Female	Male	Female	Male	Female	Male
Experience	0.015*	0.013*	0.006	0.018*	0.018*	0.026*
	(0.007)	(0.005)	(0.005)	(0.003)	(0.008)	(0.004)

[22] These variables do not add up to the total differential explained and unexplained because they are a subset of the entire specification.

TABLE 6--PROBIT ESTIMATES OF PROBABILITY OF PROMOTION 1973-1997 SURVEY OF DOCTORATE RECIPIENTS, LONGITUDINAL SAMPLE[23]

	Full Sample		1972-1979 Cohort		1980-1989 Cohort	
Variable	**1**	**2**	**1**	**2**	**1**	**2**
Female	-0.090**	-0.081**	-0.075**	-0.065**	-0.084**	-0.066**
	(0.013)	(0.014)	(0.015)	(0.016)	(0.021)	(0.023)
Age in 97	0.002	0.004**	0.002	0.004**	0.002	0.004
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
African American	-0.019	-0.011	0.010	0.023	-0.076	-0.082
	(0.026)	(0.027)	(0.031)	(0.030)	(0.041)	(0.044)
Other Race	-0.031	-0.026	-0.032	-0.033	-0.025	-0.012
	(0.021)	(0.023)	(0.028)	(0.029)	(0.031)	(0.034)
Foreign Born	-0.001	0.009	-0.015	-0.003	-0.012	-0.007
	(0.018)	(0.019)	(0.024)	(0.024)	(0.027)	(0.030)
Proportion of Time	0.069**	0.043*	0.066**	0.035	0.071*	0.054
Married	(0.019)	(0.020)	(0.023)	(0.023)	(0.030)	(0.033)
Child Indicator	0.045**	0.040*	0.052**	0.037*	0.036	0.032
	(0.016)	(0.017)	(0.019)	(0.019)	(0.028)	(0.031)
Proportion of Time	-0.051*	-0.027	-0.070	-0.021	-0.046	-0.029
w/ Child < 6	(0.026)	(0.027)	(0.041)	(0.042)	(0.037)	(0.040)
Experience in 97	0.056**	0.079**	0.098	0.067	0.196**	0.257**
	(0.008)	(0.009)	(0.061)	(0.061)	(0.031)	(0.034)
Experience Squared	-0.001**	-0.002**	-0.002	-0.001	-0.007**	-0.009**
	(0.0002)	(0.0003)	(0.001)	(0.001)	(0.001)	(0.001)
Years in Post Doc	-0.011**	-0.011**	0.007	0.005	-0.031**	-0.031**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
Proportion of Time Employed:						
Top College	0.421**	0.397**	0.374**	0.339**	0.445**	0.409**
	(0.029)	(0.031)	(0.034)	(0.035)	(0.049)	(0.052)
Top University	0.417**	0.356**	0.491**	0.395**	0.331**	0.285**
	(0.023)	(0.024)	(0.028)	(0.028)	(0.037)	(0.039)
Private Institution	-0.106**	-0.107**	-0.082**	-0.093**	-0.142**	-0.129**
	(0.015)	(0.016)	(0.018)	(0.018)	(0.024)	(0.026)
Medical School	0.135**	0.133**	0.222**	0.221**	0.013	-0.008
	(0.032)	(0.034)	(0.038)	(0.038)	(0.054)	(0.057)
First Job At:						
Liberal Arts/College	-0.036	-0.034	0.002	-0.017	-0.090	-0.043
	(0.032)	(0.033)	(0.034)	(0.034)	(0.053)	(0.056)
University	-0.021	-0.003	-0.023	-0.023	-0.027	0.015
	(0.028)	(0.029)	(0.032)	(0.031)	(0.044)	(0.046)
Medical School	-0.213**	-0.207**	-0.233**	-0.236**	-0.164**	-0.143*
	(0.039)	(0.041)	(0.050)	(0.052)	(0.058)	(0.061)
Top Ranked	-0.191**	-0.171**	-0.157**	-0.128**	-0.199**	-0.190**
Institution	(0.015)	(0.016)	(0.018)	(0.018)	(0.026)	(0.028)

[23] Coefficients standardized to report a change in the probability for a small change in continuous and a unit change in dummy variables. Standard errors in parentheses. $p<0.05$ = *****, $p<0.01$ = ******.

TABLE 6 --(CONTINUED)

Variable	Full Sample 1	Full Sample 2	1972-1979 Cohort 1	1972-1979 Cohort 2	1980-1989 Cohort 1	1980-1989 Cohort 2
Proportion of Primary Work As:						
Teaching	0.315**	0.363**	0.379**	0.407**	0.234**	0.294**
	(0.023)	(0.024)	(0.028)	(0.029)	(0.035)	(0.038)
Management	0.070*	0.087*	0.107**	0.128**	0.090	0.111
	(0.034)	(0.036)	(0.036)	(0.036)	(0.067)	(0.074)
Other Activity	-0.279**	-0.252**	-0.193**	-0.166**	-0.328**	-0.288**
	(0.033)	(0.035)	(0.038)	(0.038)	(0.058)	(0.063)
Government Support	0.228**	0.186**	0.239**	0.181**	0.217**	0.170**
Over Career	(0.020)	(0.022)	(0.025)	(0.026)	(0.031)	(0.034)
Number of Employers	-0.047**	-0.046**	-0.039**	-0.038**	-0.048**	-0.047**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.009)	(0.010)
Proportion of Time Spent:						
Unranked	-0.536**	-0.493**	-0.510**	-0.450**	-0.525**	-0.463**
	(0.037)	(0.039)	(0.044)	(0.043)	(0.060)	(0.064)
Unemployed	-0.473**	-0.497**	-0.331**	-0.318**	-0.600**	-0.697**
	(0.104)	(0.108)	(0.103)	(0.101)	(0.234)	(0.248)
Average Papers Written		0.076**		0.118**		0.072**
		(0.012)		(0.020)		(0.015)
Average Publications		0.031**		0.048**		0.032**
		(0.007)		(0.013)		(0.010)
Field of Degree						
Computer Science &	-0.088**	-0.090**	-0.100**	-0.126**	-0.034	-0.004
Mathematics	(0.031)	(0.034)	(0.038)	(0.042)	(0.047)	(0.052)
Biology and Life	-0.069**	-0.067*	-0.034	-0.055	-0.100*	-0.076
Sciences	(0.027)	(0.029)	(0.032)	(0.034)	(0.042)	(0.046)
Chemistry	-0.124**	-0.120**	-0.114**	-0.129**	-0.107*	-0.079
	(0.035)	(0.038)	(0.045)	(0.050)	(0.054)	(0.059)
Earth Science	-0.129**	-0.115**	-0.181**	-0.170**	0.001	0.014
	(0.039)	(0.042)	(0.050)	(0.054)	(0.061)	(0.065)
Physics and other	-0.146**	-0.162**	-0.158**	-0.184**	-0.078	-0.089
Physical Sciences	(0.038)	(0.041)	(0.050)	(0.055)	(0.056)	(0.062)
Engineering	-0.080**	-0.101**	-0.123**	-0.142**	-0.066	-0.076
	(0.031)	(0.035)	(0.046)	(0.051)	(0.045)	(0.050)
Additional Controls						
Cohort	Yes	Yes				
Sample Size	8437	7560	4706	4224	3731	3316

TABLE 7--DECOMPOSITION OF PREDICTED LINEAR PROBABILITY OF PROMOTION 1973-1997 SURVEY OF DOCTORATE RECIPIENTS, LONGITUDINAL SAMPLE[24]

	Probit Estimate of Promotion Gap	Linear Probability Estimate of Promotion Gap	Male Promotion Structure	
			Endowments	Coefficients
Full sample	.0692	.0685	.0071	.0614
With Prod.	.0658			
By Cohort:				
1972-79	.0688	.0689	.0102	.0588
1980-89	.0810	.0807	.0286	.0521

[24] Probit and linear probability estimates of the promotion gap are based on the specification in Table 6.

TABLE 8--ESTIMATES COMPARING SURVIVAL AND HAZARD OF PROMOTION BY GENDER, 1973-1997 SURVEY OF DOCTORATE RECIPIENTS, LONGITUDINAL SAMPLE[25]

Test	Full Sample	1972-79 Cohort	1980-89 Cohort
Log Rank Test:	21.00**	11.41**	11.70**
Survival Curve Homogeneity	(0.0001)	(0.0007)	(0.0006)
Risk Ratio Estimate:			
Female Promotion Duration	0.876**	0.886**	0.849**
(No Covariates)	(0.0001)	(0.0009)	(0.0005)
Female Promotion Duration	0.879**	0.868**	0.940
(Demographic, Productivity Covariates)	(0.0001)	(0.0010)	(0.2627)

[25] Probability values in parentheses. p<0.05 = *****, p<0.01 = ******.

TABLE 9--DURATION OF PROMOTION TO TENURE IN THE SCIENCES 1973-1997 SURVEY OF DOCTORATE RECIPIENTS LONGITUDINAL SAMPLE[26]

Variable	Pooled 1	Pooled 2	Male	Female
Female	0.861**	0.879**		
	(0.031)	(0.033)		
Age in 1995	1.019**	1.029**	1.028**	1.030**
	(0.002)	(0.003)	(0.003)	(0.004)
African American	0.825**	0.817**	0.738**	0.968
	(0.058)	(0.061)	(0.076)	(0.105)
Other Race	0.891*	0.903	0.899	0.921
	(0.053)	(0.056)	(0.066)	(0.111)
Foreign Born	0.950	0.952	0.920	1.069
	(0.045)	(0.047)	(0.057)	(0.086)
Proportion of Years Married	1.001	0.944	0.918	0.943
	(0.046)	(0.049)	(0.069)	(0.072)
Children	1.166**	1.187**	1.152**	1.310**
	(0.038)	(0.041)	(0.054)	(0.066)
Proportion of Years with Children < 6	0.936	0.965	1.012	0.847
	(0.061)	(0.065)	(0.076)	(0.138)
Years spent in Post Docs	0.932**	0.924**	0.907**	0.955*
	(0.011)	(0.011)	(0.013)	(0.022)
Proportion of Career Working At:				
Top College	2.523**	2.418**	2.598**	2.016**
	(0.066)	(0.069)	(0.086)	(0.118)
Top University	2.734**	2.405**	2.576**	2.026**
	(0.056)	(0.059)	(0.070)	(0.112)
Private Institution	0.765**	0.758**	0.756**	0.756**
	(0.038)	(0.040)	(0.049)	(0.068)
Medical School	1.465**	1.527**	1.732**	1.332
	(0.094)	(0.098)	(0.121)	(0.177)
First Job At:				
Liberal Arts/College	1.092	1.088	1.138	1.114
	(0.070)	(0.073)	(0.090)	(0.127)
University	1.050	1.099	1.168*	1.062
	(0.061)	(0.064)	(0.077)	(0.118)
Medical School	0.582**	0.577**	0.532**	0.710*
	(0.091)	(0.093)	(0.114)	(0.168)
Top Ranked Inst.	0.627**	0.661**	0.600**	0.801**
	(0.040)	(0.042)	(0.050)	(0.077)

[26] Estimates are stratified by field of degree. Coefficients are exponentiated and reported as Risk Ratios. Standard errors in parentheses. . $p<0.05$ = *****, $p<0.01$ = ******.

TABLE 9 (CONTINUED)

Variable	Pooled 1	2	Male	Female
Proportion of Primary Work As:				
Teaching	1.825**	1.994**	1.901**	2.291**
	(0.050)	(0.054)	(0.063)	(0.107)
Management	1.250**	1.287**	0.983	2.155**
	(0.083)	(0.089)	(0.111)	(0.155)
Other Activity	0.399**	0.411**	0.377**	0.467**
	(0.106)	(0.111)	(0.130)	(0.219)
Government Support Over Career	1.527**	1.389**	1.448**	1.293**
	(0.046)	(0.049)	(0.058)	(0.094)
Number of Employers	0.837**	0.842**	0.857**	0.807**
	(0.013)	(0.014)	(0.016)	(0.026)
Proportion of Time Spent:				
Unranked	0.163**	0.177**	0.217**	0.109**
	(0.113)	(0.117)	(0.139)	(0.222)
Unemployed	0.126**	0.120**	0.165**	0.100**
	(0.354)	(0.377)	(0.554)	(0.536)
Average Papers Written		1.160**	1.167**	*1.106**
		(0.020)	(0.022)	(0.043)
Average Publications		1.077**	1.062**	1.121**
		(0.015)	(0.017)	(0.031)

Figure 1--Salary Decompositions: 1973-1997 SDR Science Doctorates

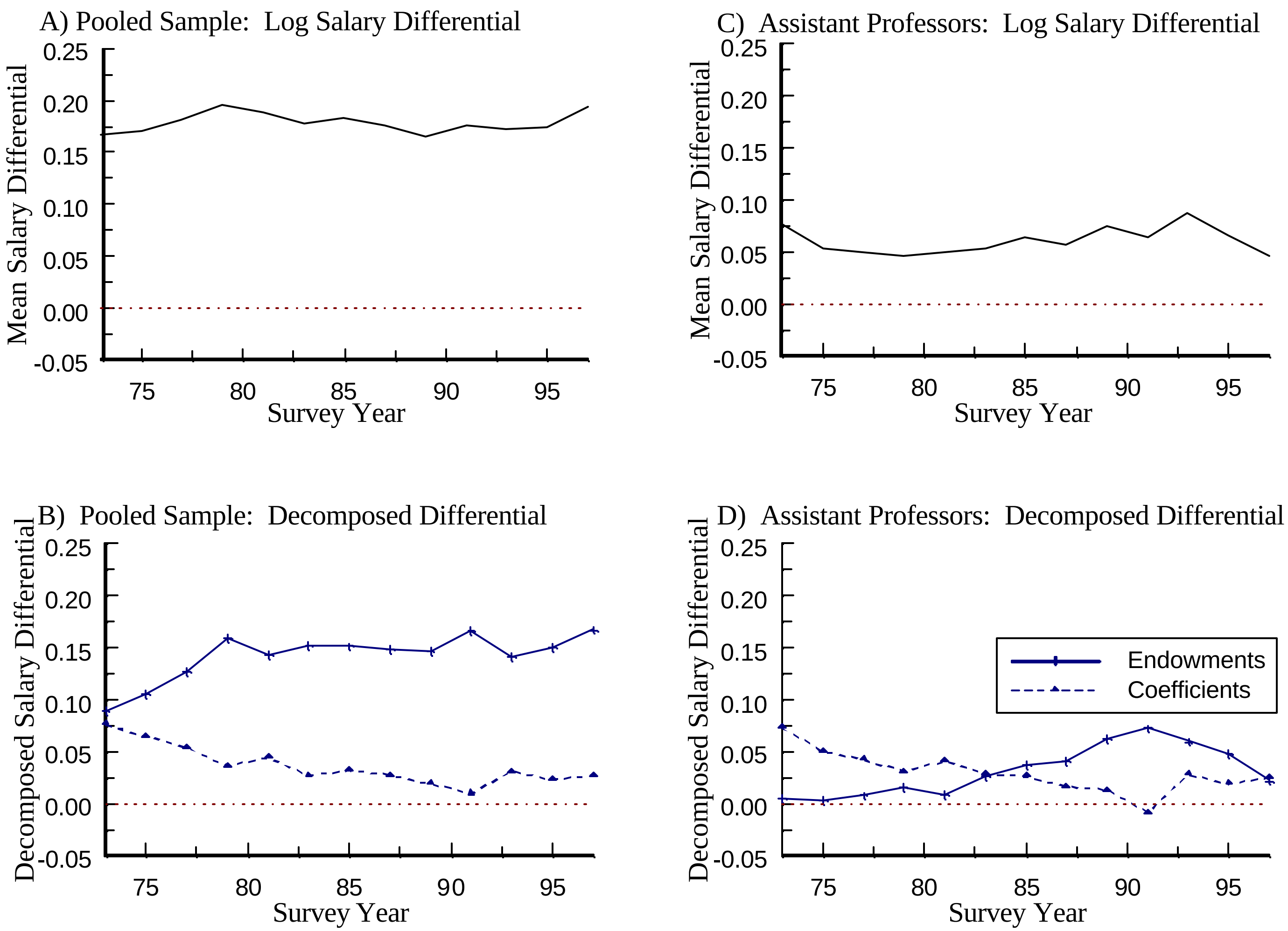


Figure 1--Salary Decompositions: 1973-1997 SDR Science Doctorates

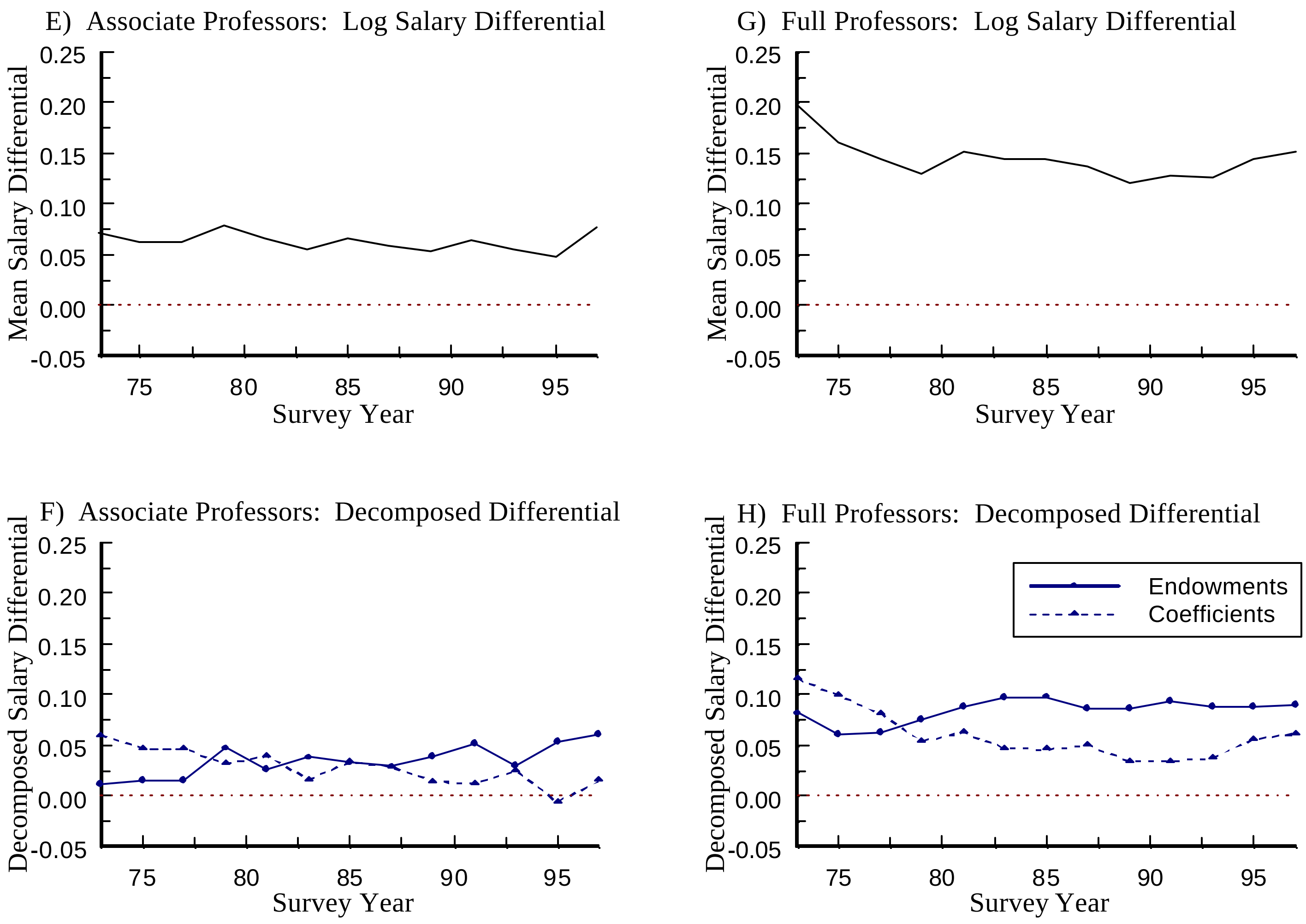
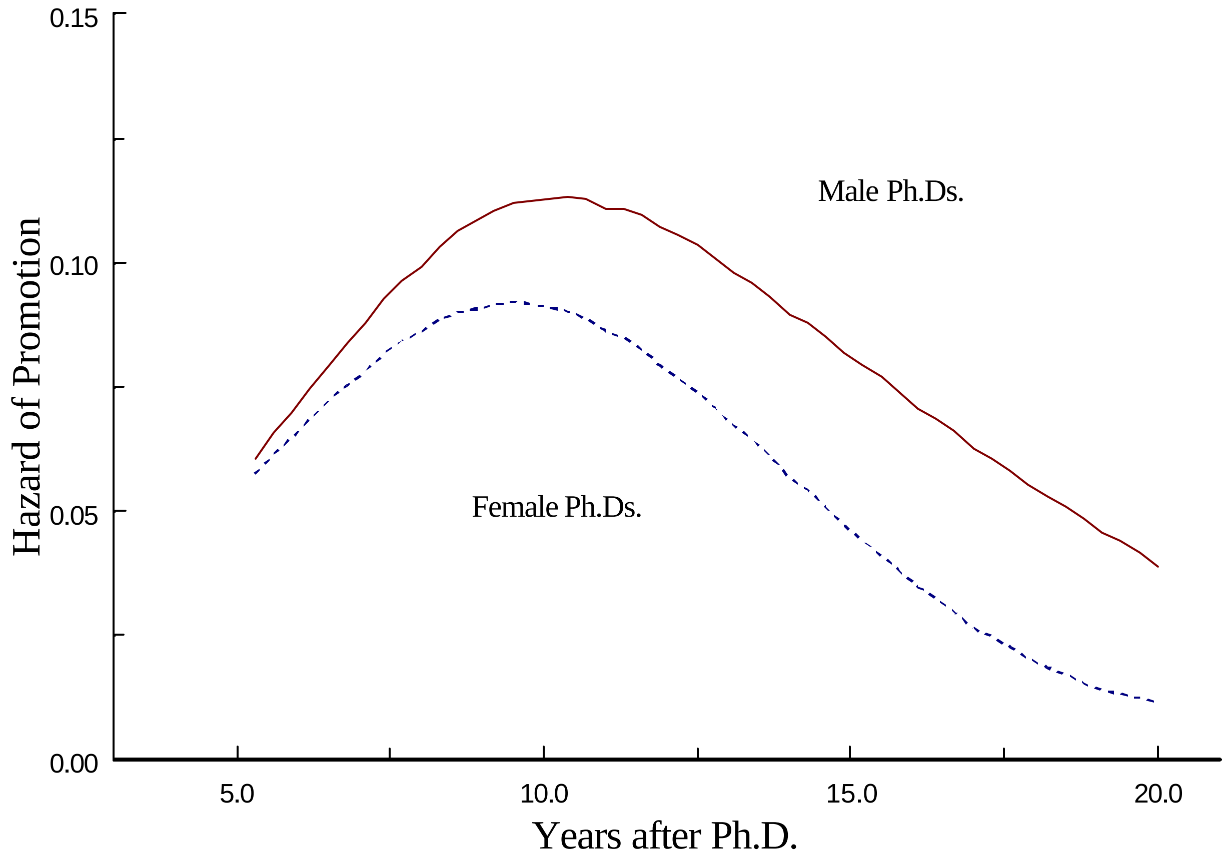


Figure 2--Hazard Rate of Promotion: Science Ph.Ds by Gender
Full Sample



Appendix 2: Supporting Tables and Figures

TABLE A.1--1973-1997 SURVEY OF DOCTORATE RECIPIENTS: DISTRIBUTION OF SCIENCE DOCTORATES ON THE TENURE TRACK

Variable	1973	1975	1977	1979	1981	1983	1985	1987	1989	1991	1993	1995	1997
Full Sample													
Females	14%	15%	16%	20%	23%	25%	29%	31%	33%	18%	20%	21%	23%
Assistant Professors	31%	26%	26%	21%	23%	20%	23%	24%	26%	24%	28%	26%	26%
Associate Professors	33%	32%	31%	31%	31%	32%	32%	31%	29%	30%	30%	30%	31%
Full Professors	37%	42%	43%	48%	46%	47%	45%	45%	45%	46%	42%	44%	44%
Tenured/Total	68%	68%	69%	77%	75%	77%	74%	73%	71%	72%	69%	71%	71%
Total Number in Sample	3352	10500	9747	5824	7125	7245	8189	7714	7878	4975	7956	7155	6594
Females													
Assistant Professors	41%	42%	45%	37%	37%	33%	35%	36%	36%	38%	41%	40%	44%
Associate Professors	36%	32%	33%	36%	37%	40%	39%	36%	35%	38%	35%	34%	32%
Full Professors	23%	25%	23%	27%	26%	28%	26%	28%	29%	24%	23%	26%	24%
Tenured/Total	58%	51%	50%	62%	61%	65%	61%	61%	61%	57%	55%	55%	53%
Total Number in Sample	484	1550	1544	1168	1631	1820	2339	2374	2603	912	1595	1492	1507
Males													
Assistant Professors	29%	23%	23%	17%	18%	16%	18%	18%	21%	21%	24%	22%	20%
Associate Professors	32%	31%	31%	29%	29%	30%	30%	28%	27%	29%	29%	29%	30%
Full Professors	39%	45%	46%	54%	52%	54%	53%	53%	53%	51%	47%	49%	49%
Tenured/Total	70%	71%	73%	81%	79%	81%	79%	78%	76%	75%	72%	75%	76%
Total Number in Sample	2868	8950	8203	4656	5494	5425	5850	5340	5275	4063	6361	5663	5087

Figure A.1--Weighted and Unweighted Gender Salary Differentials, 1973-97 SDR

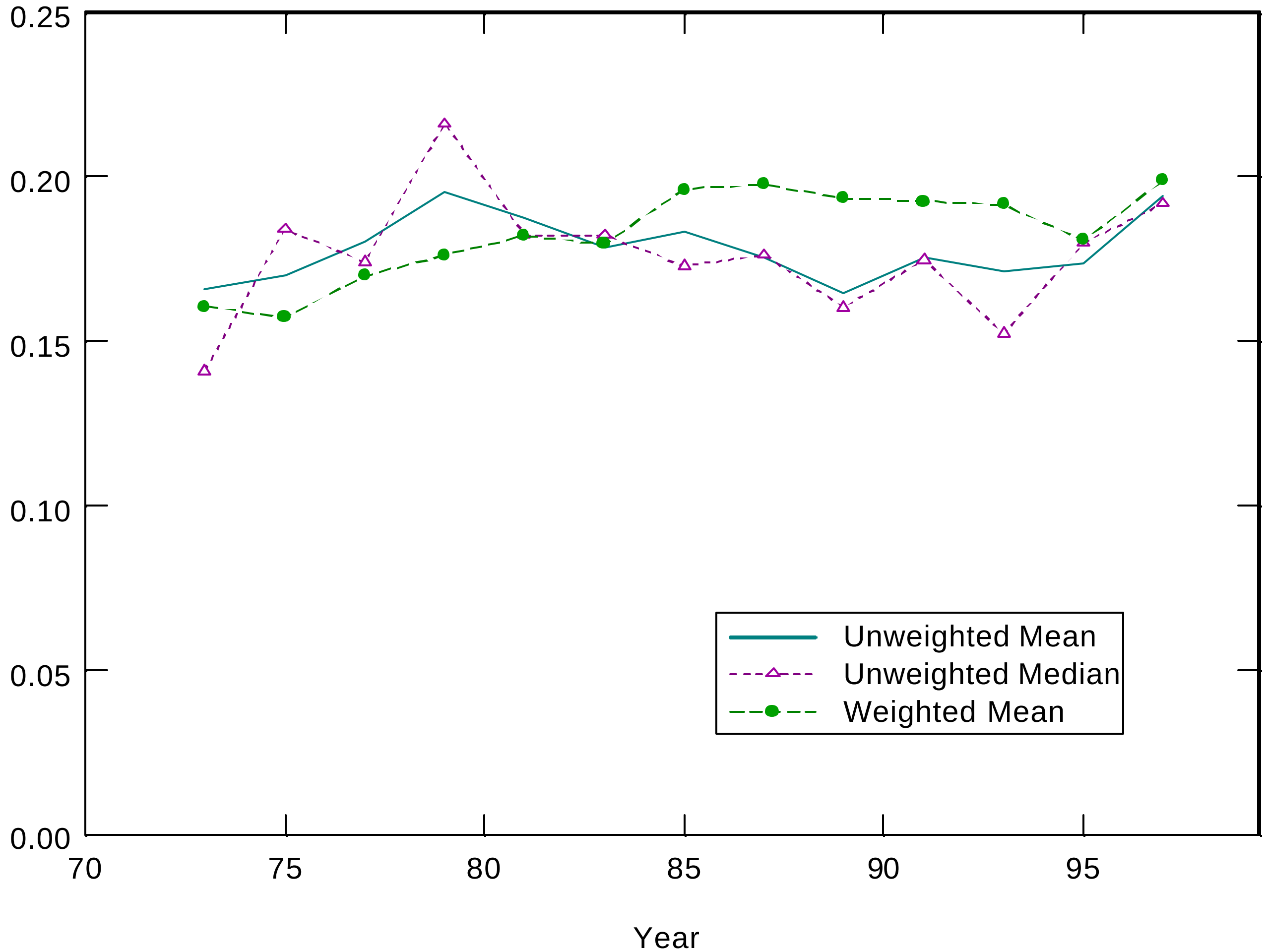


TABLE A.2--VARIABLE DEFINITIONS FOR SELECTED VARIABLES 1973-1997 SURVEY OF DOCTORATE RECIPIENTS CROSS SECTIONAL SAMPLE

Variable	Definition	Years Available
Log Salary	Annualized Salary deflated by Personal Consumption Expenditures Deflator, 1992 Base Year.	1973--1997
Age	Survey year less birth year.	1973--1997
Other Race	Indicator variable for those who report not being white or African-American.	1973--1997
Foreign Born	Prior to 1993, based on reported citizenship in longitudinal sample. 1993-1997 based on each year's reported citizenship.	1973--1997
Married = 1	Available starting in 1979. Indicator variable for being married in a given year.	1979--1997
Child = 1	Indicator variable for children under the age of 18.	1979--1981 1985--1997
Young Child = 1	Indicator variable for children under the age of 6 after 1979; under age of 7 for 1979.	1979--1981 1985--1997
Experience	Reported Years of Experience since Ph.D. used. Imputed as years since Ph.D. for the following years: 1973-79, 1983, 1993-1997	1973--1997
Ph.D. from Top Tier Institution	Top and Second Tier based on Rankings from the Carnegie Foundation for the Advancement of Teaching.	1973--1997
Ph.D. from Second Tier Institution	Top and Second Tier based on Rankings from the Carnegie Foundation for the Advancement of Teaching.	1973--1997
Employed At:		
Top College	Top and Second Tier based on Rankings from the Carnegie Foundation for the Advancement of Teaching, interacted with Carnegie ranking as Comprehensive or Liberal Arts Institutions.	1973--1997
Top University	Top and Second Tier based on Rankings from the Carnegie Foundation for the Advancement of Teaching, interacted with Carnegie Ranking as Research University or Doctoral Granting Institutions.	1973--1997
Medical School	Indicator for Employer Type as Medical School.	1973--1997
Private Institution	Indicator for employer is a private educational institution.	1973--1997
Primary Work Activity:		
Research	Primary work reported as applied or basic research, computer applications, development, or design indicator.	1973--1997
Teaching	Primary work reported as teaching indicator.	1973--1997
Management	Primary work reported as management indicator.	1973--1997
Other Activity	Years primary activity not research, teaching, or management indicator.	1973--1997
Years to Promotion	1975-1991: Actual year promoted less year of Ph.D. Imputed as first year observed with tenure less year of Ph.D. for 1973, 1993--1997 SDR. Also imputed for individuals who report tenure year prior to Ph.D..	1973--1997
Tenured	Indicator for tenure reported.	1973--1997

TABLE A.3--VARIABLE DEFINITIONS FOR SELECTED VARIABLES 1973-1997 SURVEY OF DOCTORATE RECIPIENTS LONGITUDINAL SAMPLE

Variable	Definition
Proportion of Years Married	Years reported married divided by total years in survey.
Proportion of Years with Children < 6	Years reported with children under age 6 divided by total years in survey
Work Experience 1997	Imputed Work Experience 1997 less year received Ph.D..
Years spent in Post Docs	Reported years in Post-doc used if in the 1995 SDR. Otherwise, the total years observed working as Post-doc in the 1973-1997 SDR.
Proportion of Career Working At:	
Top College	Years meeting condition divided by total years in survey. Top and Second Tier based on Rankings from the Carnegie Foundation for the Advancement of Teaching, interacted with Carnegie ranking as Comprehensive or Liberal Arts Institutions.
Top University	Years meeting condition divided by total years in survey. Top and Second Tier based on Rankings from the Carnegie Foundation for the Advancement of Teaching, interacted with Carnegie Ranking as Research University or Doctoral Granting Institutions.
Private Institution	Total years working at private institution divided by total years in survey.
Medical School	Total years working at medical school divided by total years in survey.
First Job At:	
Other Institution	First academic job observed at other academic institution.
Liberal Arts/ College	Institution.
University	First academic job observed at Carnegie ranked Research University or Doctoral Granting Institution.
Medical School	First academic job observed at medical school.
Top Institution	First job observed at top tier Carnegie ranked institution.
Proportion of Primary Work As:	
Research	Years primary work reported as applied or basic research, computer applications, development, or design, divided by total years in survey.
Teaching	Years primary work reported as teaching divided by total years in survey.
Management	Years primary work reported as management divided by total years in survey.
Other Activity	Years primary activity not research, teaching, or management divided by total years in survey.
Government Support Over Career.	Years reporting government support of research divided by total years in survey.
Number of Employers	Total number of employers observed.

TABLE A.3 (CONTINUED)

Variable	Definition
Proportion of Time Spent:	
Unranked	Years working full time in academia without reporting rank of assistant, associate or full professor rank.
Unemployed	Years not working full-time.
Average Papers Written	Number of papers written, presented divided by years of experience in 1995 when available. Otherwise use 1983 data instead.
Average Publications	Number of papers or books published divided by years of experience in 1995 when available. Otherwise use 1983 data instead.

TABLE A.4--SALARY DECOMPOSITION OF MALE-FEMALE SALARY DIFFERENTIALS, 1977-1995 SURVEY OF DOCTORATE RECIPIENTS, CROSS SECTIONAL SAMPLES[27]

		Male Salary Structure		Female Salary Structure	
	Differential	Endowments	Coefficients	Endowments	Coefficients
1973 Gender Salary Decomposition					
Full Sample	0.1661**	0.0896**	0.0765**	0.0652**	0.1009**
	(0.0088)	(0.0001)	(0.0088)	(0.0009)	(0.0088)
Assistant Professors	0.0770**	0.0046**	0.0724**	0.0076**	0.0694**
	(0.0171)	(0.0001)	(0.0170)	(0.0013)	(0.0169)
Associate Professors	0.0714**	0.0116**	0.0597**	0.0255**	0.0458**
	(0.0186)	(0.0001)	(0.0185)	(0.0021)	(0.0185)
Full Professors	*0.1973*	0.0818**	0.1156	0.0356**	0.1617
	(0.1057)	(0.0003)	(0.1054)	(0.0140)	(0.1034)
1975 Gender Salary Decomposition					
Full Sample	0.1703**	0.1058**	0.0645**	0.1082**	0.0621**
	(0.0029)	(0.0000)	(0.0029)	(0.0003)	(0.0029)
Assistant Professors	0.0536**	0.0036**	0.0500**	0.0063**	0.0473**
	(0.0041)	(0.0000)	(0.0040)	(0.0002)	(0.0040)
Associate Professors	0.0626**	0.0156**	0.0470**	0.0367**	0.0259**
	(0.0066)	(0.0000)	(0.0066)	(0.0007)	(0.0066)
Full Professors	0.1605**	0.0612**	0.0992**	0.0685**	0.0920**
	(0.0246)	(0.0001)	(0.0245)	(0.0039)	(0.0247)
1977 Gender Salary Decomposition					
Full Sample	0.1804**	0.1269**	0.0535**	0.1300**	0.0504**
	(0.0023)	(0.0000)	(0.0023)	(0.0002)	(0.0023)
Assistant Professors	0.0504**	0.0077**	0.0427**	0.0162**	0.0342**
	(0.0035)	(0.0000)	(0.0034)	(0.0002)	(0.0034)
Associate Professors	0.0627**	0.0156**	0.0472**	0.0299**	0.0329**
	(0.0066)	(0.0000)	(0.0066)	(0.0008)	(0.0065)
Full Professors	0.1439**	0.0630**	0.0809**	0.0947**	0.0492**
	(0.0157)	(0.0001)	(0.0156)	(0.0020)	(0.0157)

[27] Numbers in parentheses are standard errors. Numbers in **Bold** indicate statistically significant at the one percent level. Numbers in ***Italics*** indicate statistically significant at the five percent level.

TABLE A.4 (CONTINUED)

	Differential	Male Salary Structure Endowments	Male Salary Structure Coefficients	Female Salary Structure Endowments	Female Salary Structure Coefficients
1979 Gender Salary Decomposition					
Full Sample	0.1957**	0.1597**	0.0360**	0.1468**	0.0489**
	0.0033	(0.0000)	(0.0032)	(0.0002)	(0.0032)
Assistant Professors	0.0467**	0.0161**	0.0306**	0.0136**	0.0331**
	(0.0060)	(0.0001)	(0.0059)	(0.0003)	(0.0059)
Associate Professors	0.0794**	0.0474**	0.0320**	0.0325**	0.0469**
	(0.0074)	(0.0001)	(0.0073)	(0.0005)	(0.0073)
Full Professors	0.1294**	0.0750**	*0.0544**	0.0818**	0.0477
	(0.0267)	(0.0001)	(0.0267)	(0.0017)	(0.0267)
1981 Gender Salary Decomposition					
Full Sample	0.1877**	0.1435**	0.0441**	0.1389**	0.0488**
	0.0023	(0.0000)	(0.0023)	(0.0001)	(0.0023)
Assistant Professors	0.0497**	0.0086**	0.0411**	0.0130**	0.0367**
	(0.0059)	(0.0001)	(0.0058)	(0.0002)	(0.0058)
Associate Professors	0.0664**	0.0268**	0.0396**	0.0342**	0.0322**
	(0.0056)	(0.0001)	(0.0055)	(0.0003)	(0.0055)
Full Professors	0.1511**	0.0883**	0.0628**	0.1021**	0.0490**
	(0.0130)	(0.0001)	(0.0130)	(0.0009)	(0.0130)
1983 Gender Salary Decomposition					
Full Sample	0.1782**	0.1515**	0.0268**	0.1320**	0.0462**
	0.0024	(0.0000)	(0.0023)	(0.0001)	(0.0023)
Assistant Professors	0.0536**	0.0256**	0.0280**	0.0163**	0.0373**
	(0.0069)	(0.0001)	(0.0067)	(0.0002)	(0.0067)
Associate Professors	0.0547**	0.0383**	0.0164**	0.0368**	0.0179**
	(0.0058)	(0.0001)	(0.0057)	(0.0003)	(0.0057)
Full Professors	0.1445**	0.0971**	0.0475**	0.0736**	0.0709**
	(0.0124)	(0.0001)	(0.0124)	(0.0008)	(0.0124)

TABLE A.4 (CONTINUED)

	Differential	Male Salary Structure Endowments	Male Salary Structure Coefficients	Female Salary Structure Endowments	Female Salary Structure Coefficients
1985 Gender Salary Decomposition					
Full Sample	0.1832**	0.1512**	0.0320**	0.1421**	0.0411**
	0.0020	(0.0000)	(0.0020)	(0.0001)	(0.0020)
Assistant	0.0635**	0.0376**	0.0259**	0.0259**	0.0375**
Professors	(0.0061)	(0.0001)	(0.0060)	(0.0001)	(0.0060)
Associate	0.0664**	0.0329**	0.0335**	0.0378**	0.0286**
Professors	(0.0048)	(0.0001)	(0.0047)	(0.0002)	(0.0047)
Full	0.1437**	0.0980**	0.0457**	0.0855**	0.0582**
Professors	(0.0113)	(0.0001)	(0.0113)	(0.0007)	(0.0113)
1987 Gender Salary Decomposition					
Full Sample	0.1757**	0.1481**	0.0275**	0.1461**	0.0296**
	0.0021	(0.0000)	(0.0021)	(0.0001)	(0.0021)
Assistant	0.0565**	0.0402**	0.0163**	0.0309**	0.0257**
Professors	(0.0057)	(0.0001)	(0.0056)	(0.0001)	(0.0056)
Associate	0.0582**	0.0290**	0.0292**	0.0408**	0.0174**
Professors	(0.0054)	(0.0001)	(0.0053)	(0.0001)	(0.0053)
Full	0.1364**	0.0862**	0.0502**	0.1131**	0.0233**
Professors	(0.0107)	(0.0001)	(0.0107)	(0.0005)	(0.0108)
1989 Gender Salary Decomposition					
Full Sample	0.1650**	0.1461**	0.0189**	0.1357**	0.0292**
	(0.0021)	(0.0000)	(0.0021)	(0.0001)	(0.0021)
Assistant	0.0752**	0.0621**	0.0131**	0.0480**	0.0272**
Professors	(0.0053)	(0.0002)	(0.0052)	(0.0001)	(0.0052)
Associate	0.0534**	0.0391**	0.0143**	0.0443**	0.0092
Professors	(0.0059)	(0.0001)	(0.0058)	(0.0001)	(0.0058)
Full	0.1210**	0.0864**	0.0346**	0.0898**	0.0312**
Professors	(0.0105)	(0.0001)	(0.0105)	(0.0004)	(0.0105)

TABLE A.4 (CONTINUED)

	Differential	Male Salary Structure Endowments	Male Salary Structure Coefficients	Female Salary Structure Endowments	Female Salary Structure Coefficients
1991 Gender Salary Decomposition					
Full Sample	0.1753**	0.1658**	0.0095	0.1485**	0.0268**
	0.0059	(0.0001)	(0.0058)	(0.0004)	(0.0058)
Assistant	0.0634**	0.0722**	-0.0088	0.0794**	-0.0160
Professors	(0.0120)	(0.0004)	(0.0117)	(0.0009)	(0.0117)
Associate	0.0644**	0.0517**	0.0127	0.0482**	0.0162
Professors	(0.0157)	(0.0003)	(0.0155)	(0.0011)	(0.0154)
Full	0.1282**	0.0942**	0.0340	0.0671**	0.0611
Professors	(0.0421)	(0.0002)	(0.0421)	(0.0030)	(0.0421)
1993 Gender Salary Decomposition					
Full Sample	0.1716**	0.1407**	0.0309**	0.1316**	0.0400**
	0.0044	(0.0001)	(0.0043)	(0.0003)	(0.0043)
Assistant	0.0872**	0.0596**	0.0276**	0.0582**	0.0290**
Professors	(0.0081)	(0.0003)	(0.0078)	(0.0007)	(0.0078)
Associate	0.0555**	0.0303**	0.0252**	0.0307**	0.0247**
Professors	(0.0117)	(0.0002)	(0.0115)	(0.0010)	(0.0115)
Full	0.1257**	0.0880**	0.0377	0.0785**	0.0472
Professors	(0.0309)	(0.0002)	(0.0309)	(0.0019)	(0.0308)
1995 Gender Salary Decomposition					
Full Sample	0.1735**	0.1505**	0.0231**	0.1202**	0.0533**
	0.0047	(0.0001)	(0.0046)	(0.0004)	(0.0045)
Assistant	0.0667**	0.0478**	0.0189**	0.0490**	0.0177**
Professors	(0.0091)	(0.0003)	(0.0088)	(0.0008)	(0.0087)
Associate	0.0474**	0.0534**	-0.0060	0.0345**	0.0129
Professors	(0.0140)	(0.0002)	(0.0137)	(0.0016)	(0.0136)
Full	0.1444**	0.0880**	0.0564**	0.0522**	0.0922**
Professors	(0.0284)	(0.0002)	(0.0284)	(0.0016)	(0.0284)

TABLE A.4 (CONTINUED)

	Differential	Male Salary Structure Endowments	Male Salary Structure Coefficients	Female Salary Structure Endowments	Female Salary Structure Coefficients
1997 Gender Salary Decomposition					
Full Sample	0.1941**	0.1672**	0.0269**	0.1337**	0.0604**
	0.0066	(0.0001)	(0.0065)	(0.0005)	(0.0064)
Assistant	0.0470**	0.0218**	0.0252**	0.0278**	0.0192
Professors	(0.0121)	(0.0004)	(0.0117)	(0.0009)	(0.0116)
Associate	0.0763**	0.0609**	0.0154	0.0486**	0.0277
Professors	(0.0229)	(0.0004)	(0.0225)	(0.0021)	(0.0224)
Full	0.1512**	0.0897**	0.0615	0.0543	0.0970**
Professors	(0.0476)	(0.0003)	(0.0476)	(0.0027)	(0.0475)