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Abstract

We report early career outcomes of economics Ph.D.s by tracking the U.S. class of 1996-97. We examine employment outcomes, work activities, salaries, and graduates' attitudes toward their jobs. By 2003, all of the respondents were employed, although almost half changed employers during the six years. Salaries of the cohort increased at an average annual rate of 8.2 percent from 1997 through 2003. Academic-year salaries rose about 5.7 percent per year, while private sector salaries skyrocketed at 15 percent per year. Finally, the median salaries of first-year full-time permanent 9-10 month academic economists hired in 2002-03 actually *exceed* the 2003 salaries of their counterparts initially hired in 1997-98. Some of this apparent salary inversion reflects a different mix of employers and departments between the two cohorts, with the younger group securing relatively more jobs at higher paying institutions.

Where Are They Now? Tracking the Ph.D. Class of 1997

1. Introduction

Students considering graduate school often contemplate various career paths they might follow after completing their Ph.D. dissertations. Young economists who are just completing a disappointing job search may speculate about prospects for future job mobility. Graduate advisors are usually curious about how their graduates' career paths match up against graduates from peer institutions.

It is only natural that economists would compare expected net present values of earnings streams rather than simple starting salaries to determine their best financial options. In order to do so, however, one needs at least some idea of the rate at which starting salaries progress over time, and on this question there is scant information. There has been some research on the careers of individual economists, focusing primarily of the lives of Nobel Prize winners [e.g., Breit and Spencer (1986, 1995); Nasar's *A Beautiful Mind* (2001) being perhaps the most famous] or otherwise notable economists (e.g., Alan Greenspan, Daniel Ellsberg, George Shultz), and much has been written about the *initial* job outcomes of Ph.D. economists. Less research has examined the early career paths that journeymen economists usually travel.

2. Research on Economists' Career Paths

The research on career paths of Ph.D. economists has focused on relationships among salaries, seniority, and measures of productivity, and on gender differences in career outcomes among economists. Bratsberg, Ragan, and Warren (2003), Moore, Newman, and Turnbull (1998), Brown and Woodbury (1998), Oster and Hamermesh (1998), Hoffman (1997), Hansen, Weisbrod, and Strauss (1978), and Siegfried and White (1973) have examined relationships

among salaries, productivity, age, and seniority among economists. Findings generally indicate rising (but diminishing marginal) pay with productivity, but mixed evidence on the size (and sign) of returns to seniority once productivity, quality of job match, and union status of faculty are controlled. Ginther and Kahn (2004) and McDowell, Singell, and Ziliak (2001) examined differences in tenure probabilities by gender among economists, finding that female economists have experienced lower levels of career advancement than have their male colleagues with similar attributes.

Regarding early career outcomes, McMillen and Singell (1994) examined influences on the first job choice of economists among several career paths. Singell and Stone (1993) studied Ph.D. economists' careers from 1960 to 1989 and found that initial job placement has effects that persist throughout an individual's career. Similarly, Grimes, Millea, and Rogers (2004), studying the period 1968 to 1993, found that first job placement has effects that persist through time, particularly with respect to immobility by region, although economists in government and with greater diversity of work experience have more job mobility than other economists.

Buchmueller, Dominitz, and Hansen (1999) examined the research productivity of economists with six years of post-Ph.D. experience, finding that initial job placement and experience as a research assistant during graduate study are related to publication success. They did not, however, link publication success to salaries. This paper adds to this literature by tracking life changes, employment history, work activities, salaries, publications, and job satisfaction of a cohort of economists who earned their Ph.D.s during academic year 1996-97. Based on two surveys administered to this group at different points in time, we can observe levels of and changes in job mobility, research productivity, employment status, job attributes, and salaries during the early career period.

3. Data and Representativeness

Our data are from two surveys of economists who earned degrees from a U.S. Ph.D. program in economics between July 1, 1996 and June 30, 1997. The first survey was administered in late 1997, between six and 18 months after their graduation. The second (sent only to respondents to the first) was administered in February 2003, the middle of the sixth year after they had graduated.

We identified the population of 1996-97 graduates from the list of dissertations published in the December 1997 *Journal of Economic Literature (JEL)*. This list, combined with our survey responses and information from the thesis supervisors of non-respondents, led us to estimate the size of the 1996-97 class at roughly 950 graduates.¹ The first survey generated 483 responses, representing 51 percent of the cohort; the sixth-year follow-up survey yielded 302 returns. Our follow-up response rate of 63 percent is high, but the entire population had already responded affirmatively to an earlier survey. Thus, roughly one-third of the original class of 950 graduates has now completed our two surveys.

The sample of 302 is not random. The 1997 survey appeared to be relatively free of bias relating to anything except citizenship, which exhibited a strong relationship with the likelihood of responding. Of the graduates who responded by the time we reported our original survey results, 55 percent were U.S. citizens.² Based on information on non-respondent graduates that we obtained from their dissertation advisors (whom we assumed were a representative set of the non-respondents' advisors), only 31 percent of non-respondents were U.S. citizens. Using actual graduate responses and advisor-provided information for non-respondents, we projected that 42 percent of the 1996-97 cohort were U.S. citizens, precisely the same percentage calculated by the National Science Foundation from the annual Survey of Earned Doctorates.

Because we have information about all 483 of the respondents in 1997 that we attempted to resurvey in 2003, we can compare the respondents to non-respondents in 2003, which we do in Table 1. For personal characteristics that remain constant since graduation, such as age at degree, race, citizenship,³ and time-to-degree, column (2) presents averages over the combined 302 respondents and 181 non-respondents to the resurvey. Using the original (1997) survey responses, in the third column we project characteristics of all 950 graduates using a weighted average of the 483 graduates' responses and the 125 responses from the advisors of non-respondents.

<Insert Table 1 here>

The citizenship response bias prevalent in 1997 increases in the 2003 resurvey. Relative to those who responded in 1997, resurvey respondents were even more likely to be U.S. citizens (63 percent, compared to 53 percent of 1997 respondents). This is a natural consequence of the difficulty we encountered locating many of the graduates living overseas. Resurvey respondents are also more likely to be white, single, childless, younger when they earned their Ph.D., and to have earned their degree at a top-15 Ph.D. program rather than a program ranked below 30, based on 1993 National Research Council (NRC) rankings (Goldberger, Maher, and Flattau 1995). Forty-six percent of the resurvey sample graduated from a top-15 department, even though those departments are projected by the NRC (and by us in column (3) of Table 1) as producing only 30 percent of new Ph.D.s in economics. Thus, the experiences reported here emphasize the career outcomes of graduates of top departments rather than the entire 1996-97 cohort. Those in the resurvey sample were also more likely to be employed, more likely to be working in the U.S., more likely to be in academe, and less likely to work in the private sector than either the 1997 survey respondents or the entire population of graduates.

4. Changes in Employment Characteristics

There has been remarkable stability in the employment status of the economics Ph.D. class of 1997. All of the 302 respondents reported their employment status in both years. Of these, 296 were employed in both October 1997 and February 2003. The four who were unemployed in 1997 had all secured a job by 2003, and none of the respondents was unemployed in 2003. The one Ph.D. who was not in the labor force in 1997 remained that way in 2003, and one formerly employed graduate left the labor force by 2003. Among the employed, all 12 graduates who were part-time in 1997 had migrated to full-time jobs by 2003; only three who were full-time in 1997 switched to part-time by 2003.

Economists do relatively well securing full-time permanent employment immediately after graduation. Among the *original* sample of graduates reporting their employment characteristics in 1997 ($n = 483$), only 19 percent of the employed were in temporary jobs (those with a fixed termination date), a smaller fraction than experienced by new Ph.D.s in psychology, political science, sociology, chemistry, engineering, mathematics, or physics (Siegfried and Stock, 1999, Table 7). A similar fraction (18 percent) of the *resurvey* respondents employed in 1997 were initially in temporary positions. By 2003, only 6 percent were in temporary positions. All but six of the 54 *resurvey* respondents who were in a temporary position in 1997 had found a permanent job by 2003. On the other hand, 13 of those initially in “permanent” jobs (nine of which were untenured tenure-track appointments) had moved to temporary status by 2003.

In contrast to the relative stability in employment status, there has been considerable mobility among jobs. Of the 288 graduates who reported their employer in both years or were unemployed in 1997 and reported an employer in 2003, 84 (29 percent) had been unemployed, employed in a temporary position, or actively seeking a new job in spite of holding a full-time

permanent appointment in 1997. Seventy (83 percent) of these 84 had found a new job by 2003. In addition, over 30 percent of those who had full-time permanent positions and were *not* actively seeking work in October 1997 also were in a new job by February 2003.

Overall, 45 percent of those responding to the resurvey worked for a different employer in 2003 than in 1997. Among those with full-time permanent jobs in both years, 34 percent (n = 74) changed employers. As shown in Table 2, 30 of the resurvey respondents with full-time permanent jobs in both years switched employment sectors between 1997 and 2003, representing 41 percent of the job changes among those with full-time permanent jobs. The largest migration occurred between the government, international organization, and research organization (G/IO/RO) sector (e.g., the Fed, BLS, World Bank, IMF, Rand, and Brookings) and academe.

<Insert Table 2 here>

Of the 136 respondents who changed employers, 15 percent crossed a U.S. border in order to start their new job, with 12 graduates moving to the U.S. from abroad, and 9 leaving (at least 2 others moved between countries other than the U.S.). Of the 55 non-U.S. citizens who took an initial position in the U.S. in 1997, 49 remained in the U.S. by 2003. In contrast, of the nine U.S. citizens who began their careers overseas, all but three had returned to the U.S. by 2003. By six years post-degree, 81 percent of the respondents were employed in the U.S., representing 53 percent of the non-citizens and 97 percent of the U.S. citizens in the survey. Due to the strong citizenship-related response biases mentioned earlier, however, our figures undoubtedly overstate the U.S. employment among the entire cohort.

5. Changes in Work Activities

To examine whether the nature of jobs changed over time for the group, we compared primary work activities in 1997 and 2003 for those who worked in full-time permanent jobs in

both years and did not change employment sectors. Of the 120 Ph.D.s who were employed in full-time permanent jobs in academe in both years, the percentage reporting teaching as their primary work activity declined from 48 to 41, while the percentage reporting research as their primary activity increased from 51 to 55. The other 4 percent in 2003 mostly report management or administration as their primary work activity. Of the 26 Ph.D.s who were in full-time permanent jobs in business/industry in both years, seven identified research as their primary work activity in 1997. By 2003, however, all 26 worked in management, administration, product or service development, or professional services.⁴ Finally, 59 percent of the 46 Ph.D.s who were in full-time permanent G/IO/RO jobs in both years identified research as their primary work activity in 1997; by 2003, this fraction had fallen to 46 percent. Thus, although there is a modest increase in focus on research among academics as careers develop, other Ph.D. economists move in the opposite direction.

6. Salaries

Our sequential surveys of 1996-97 Ph.D. graduates enable us to track and compare economists' salaries over the first six years of their careers for a panel of individuals with similar experience. Tables 3 and 4 report the February 2003 and October 1997 nominal salaries for the 203 doctorates that held full-time (permanent or temporary) jobs in the U.S. in both years.

<Insert Table 3 here>

The respondents are not an unbiased sample of economists who earned their Ph.D.s in 1996-97. Among other differences that might be related to salaries or salary growth, our sample favors graduates of more elite Ph.D. programs. However, the salaries of these 203 economists do not vary much from the salaries of the 255 more representative 1996-97 graduates working full-time in the U.S. who responded one year after graduation. The original sample that includes

both respondents and non-respondents to our February 2003 resurvey earned an overall median salary of \$55,000 for full-time permanent U.S. jobs in 1997, with those holding full-time permanent academic appointments earning \$51,000 (Siegfried and Stock 1999, Table 3).

Comparable values for the resurvey respondents are reported in Table 4; they are very close to those of the original sample -- \$54,000 and \$51,000, respectively.

<Insert Table 4 here>

The resurvey sample earned a median of \$54,000 for full-time permanent jobs in October 1997 and \$80,000 in February 2003. For academics in the sample, the salary comparison reflects raises over five years. For non-academics, some of whom may work for institutions that adjust compensation in January, the comparison may reflect raises over either five or six years.

Treating the 64 month differential between the two surveys as five years, the overall salary base increased at an annual rate of 8.2 percent. The median academic salary (including both those on 11-12 month and those on 9-10 month contracts) rose at an annual rate of 6.3 percent. For those on typical 9-10 month contracts the average annual rate of increase was 5.7 percent.⁵ These figures compare to an average annual inflation rate during the period of 2.3 percent.

Salaries for those in temporary 9-10 month academic appointments rose at an average annual rate of 11.1 percent, revealing that six years of experience had the effect of closing the salary gap between temporary and permanent academics among this cohort from a ratio of 0.72 in 1997 to 0.92 in 2003. This reduced gap in *sixth-year salaries* contrasts sharply to the widening gap in *starting salaries* for temporary versus permanent academics that occurred between 1997 and 2002 (Siegfried and Stock 2004). Among Ph.D.s who graduated in 2001-02, the median starting salary for permanent full-time 9-10 month academic appointments was 47

percent higher than for similar temporary jobs, a premium that had been only 25 percent six years earlier, when the 1996-97 cohort started their careers.

According to the Bureau of Labor Statistics (BLS) National Compensation Survey, the rate of pay among professional specialty occupations increased by 4.4 percent annually over the same period.⁶ Of course, these figures include workers at all stages of their careers. To generate a comparable benchmark, we computed the average annual salary increase for Ph.D.s in all disciplines who were ages 33-39 and working full-time, full-year in the March 1997 Current Population Survey (CPS) and those ages 39-45 and working full-time, full-year in the March 2003 CPS (i.e., the same age cohort six years later). For this synthetic cohort, the median annual salaries increased 4.2 percent per year.⁷ For Ph.D. economists in our sample who are working in the private sector, the average annual increase (based on medians) was 15.0 percent over five years or 12.4 percent over six years of raises, both substantially above the average rate of increase experienced by other professionals from 1997 to 2003. For those working in G/IO/RO, the average annual raise was 11.8 percent over five years or 9.8 percent over six years. Overall, business/industry and G/IO/RO economists' earnings growth from 1997 to 2003 almost doubled that of both their academic counterparts and other similar professionals.

Salary Analysis

We have previously related various personal and job characteristics to starting salaries of new Ph.D. economists from the classes of 1996-97 and 2001-02 (Siegfried and Stock 1999, 2004; Stock and Siegfried 2001). To examine the relationships between personal, educational, and job characteristics and earnings for the 1996-97 cohort six years post-Ph.D., we again conducted a regression analysis. Our estimates are based on the equation

$$Y_i = \beta_0 + \beta_1 X_{i,1997} + \beta_2 Z_{i,2003} + \beta_3 G_{i,1997} + \beta_4 R_{i,2003} + \beta_5 E_{i,2003} + u_i,^8 \quad (1)$$

where Y_i alternately represents the log of annual salary for individual i [$\ln(\text{salary}_{i,2003})$] or the difference in the natural logarithms of the 2003 and 1997 salaries for individual i [$\ln(\text{salary}_{i,2003}) - \ln(\text{salary}_{i,1997})$], $X_{i,1997}$ is a vector of fixed demographic characteristics as observed at the time we first surveyed the individuals (age, years to degree, and binary indicators for female, married, have any children, white, and U.S. citizen), and Z_i is a vector of changes in demographics (had child since degree, female*had child since degree, got married since degree, and female*got married since degree). $G_{i,1997}$ is a vector of individual i 's graduate program characteristics (indicators for quality tier of the program and for the individual's field of specialization). $R_{i,2003}$ is a vector of research output indicators for the individual (number of journal publications and number of Top-50 journal publications). Finally, $E_{i,2003}$ is a vector of job and employment characteristics (indicators for employment in the academic or business/industry sector, for employment in a business school, and for employment in a Ph.D.-producing economics program). $E_{i,2003}$ also includes years of experience (measured as years since the individual began the job they held at the time of the 1997 survey) and its square⁹ and an indicator for whether the individual is with the same employer in 2003 as in 1997.¹⁰ In some specifications, we also include years of seniority (measured as years since the individual began their current job) to distinguish its relationship to salary from that of more general experience.

Table 5 reports the estimated coefficients and corresponding standard errors from a regression of the natural logarithm of annual salaries as reported in February 2003 on demographic, Ph.D. program, publication, and employer-related explanatory variables.¹¹ As we have done before, academic-year salaries were not inflated to match the calendar-year salaries of others, on the grounds that most assistant professors work during the summer whether they are compensated directly or not. Salaries were adjusted to reflect cost-of-living differentials at the

job location relative to Washington, D.C. using the fourth-quarter 2002 American Chamber of Commerce Researchers Association cost-of-living index, available online at www.acra.org. Finally, because the vast majority of jobs held by this cohort are full-time permanent jobs and because the earnings and labor market experiences of those outside such jobs differ substantially from those in the majority, we limit the sample to include members of the class of 1996-97 who were employed in full-time permanent positions in the U.S. in *both* October 1997 and February 2003 ($n = 147$).¹² We discuss below only estimates that are statistically significant at the 0.10 level or better (two-tailed tests).

<Insert Table 5 here>

Earlier research has found that personal or background characteristics are generally unrelated to starting salaries.¹³ Demographic characteristics would be unlikely to affect starting salaries if, for example, academic departments must get administrative approval for their starting salary offers prior to conducting a job search, or if employers pay similar starting salaries to all new hires in any given year in order to avoid the appearance of discrimination. Exceptions for this cohort include a 15 percent *starting salary* premium for U.S. citizens and a 2 percent per year salary discount associated with taking longer to earn the Ph.D. (Siegfried and Stock 1999). The estimates in Table 5 indicate that the difference in salaries between U.S. and non-U.S. citizens has disappeared by the sixth year, but that the discount associated with taking longer to earn the Ph.D. persists, and is slightly larger (2.9 percent per year versus 2 percent per year).¹⁴

Although demographic characteristics in general appear unrelated to the salaries of Ph.D. economists, one could reasonably expect that demographic characteristics that are correlated with productivity (e.g., getting married and/or becoming a parent) *would* be associated with differences in salary by the sixth year, once employers have time to adjust earnings to reflect

differences in productivity. Our estimates suggest that getting married is associated with 23 percent higher sixth-year salaries for males. Females who got married post-degree experienced a 35 percent salary penalty relative to their female counterparts whose marital status did not change. Anticipating the possibility of this finding, we asked the respondents whether their partner's employment prospects affected the job they took. The percentage of women who reported that their partner's job opportunities were important for their own job choice is almost twice that of men, consistent with the idea from labor economics that more women than men are tied movers (Mincer 1978). Indeed, in a probit regression of *same employer* on the independent variables in equation (1) plus an indicator for urban residence (see footnote 10), males who got married had no difference in the probability that they stayed with the same employer than their counterparts whose marital status did not change. Females who married, however, were half as likely as their counterparts to remain with the same employer (p-value 0.09).

Previous researchers have found positive relationships between graduate program quality and earnings (Hansen, Weisbrod, and Strauss 1978; Siegfried and Stock 1999, 2004; Stock and Siegfried 2001). The estimates in Table 5 are consistent with these findings, suggesting positive earnings differentials ranging from 0.20 to 0.25 associated with graduating from Ph.D. programs ranked 1 - 30 relative to tier 5 programs. For graduates from the top 15 programs, the sixth-year premiums are less than the 0.29 starting salary premium earned by this group. In contrast, the sixth-year premium is slightly higher than the 0.22 starting salary premium for those from tier 3 programs. These results may indicate that as careers progress and employers learn more about graduates' actual productivity, they shift away from paying for signals of productivity and toward rewarding productivity directly.

Employment sector continues to be related to economists' salaries. By February 2003, the 14 percent premium in 1997 for those working in the business/industry sector (including consulting) had grown to a 26 percent salary premium over colleagues in government, international organizations, and research organizations (G/IO/RO, the benchmark). Graduates in our regression who were working in academe, but outside business-schools and economics Ph.D.-granting departments, had no *starting* salary differential relative to G/IO/RO, but six years later, they experienced a 27 percent discount relative to G/IO/RO. Those who were employed in business schools enjoyed a 20 percent premium at the outset. However, there is no 2003 salary advantage for academics working in business schools once we control for cost-of-living differences and other factors included in the regression, implying that by their sixth year, those who had landed their first job with these employers lost the significant salary edge that the placements had initially afforded them.¹⁵

The relationships between academic economists' experience, seniority, and earnings have been examined thoroughly. Researchers have suggested that negative estimated returns to seniority for academics stem from bias due to omitted controls for faculty research productivity (e.g., Moore, Newman, and Turnbull 1998), the quality of the job match (Bratsberg, Ragan, and Warren 2003), or monopsony power on the part of universities (e.g., Ransom 1993). In our estimates of equation (1), the estimated partial return to experience is -0.05 per year at the mean experience level of the sample (6.09 years), but it is not statistically different from zero. When we control for seniority using a simple binary indicator for *same employer as in 1997*, the estimates indicate that changing employers is not associated with sixth-year salaries.¹⁶ When we instead include seniority and its square in the regressions, the estimated partial effect of seniority on earnings is 0.02 per year at the mean level of seniority (4.94 years), but again the effect is

insignificant. The partial effects of seniority and experience are also insignificant if the sample is limited to include only those in academic jobs. Although our finding of no returns to experience and seniority are consistent with those of Moore, Newman, and Turnbull (1998), we hesitate to interpret our estimates too broadly because of the generally limited range of experience and seniority in our sample.¹⁷

Siegfried and White (1973) found that more publications and higher-quality publications are associated with higher salaries. Hansen, Weisbrod, and Strauss (1978) used a simultaneous equations model to estimate the impact of publications on salaries and found positive, but diminishing, impacts of publications on earnings. Both of these studies focused only on academics, however, which is limiting because only about half of the graduates in recent cohorts of economics Ph.D.s are employed in academe (Siegfried and Stock 1999, 2004).¹⁸

Because of their low frequency, we did not include measures of publications in our earlier efforts to explain starting salaries. After six years, however, 70 percent of the sample had published at least one economics journal article and 40 percent had published at least once in a Top-50 economics journal.¹⁹ The average Ph.D. in the regression sample (including both academics and non-academics) had 3.7 journal publications and 1.4 publications in the Top-50 economics journals.

Because we have two alternative measures of scholarly productivity with no basis to know which measure likely would be more closely related to salaries of early career economists, we tried each measure--total journal publications and Top-50 journal publications--separately in the salary regression.²⁰ To examine the importance of scholarly productivity for academics relative to others, we included both the productivity measure and its interaction with *Academic* and tested the statistical significance of the sum of the two coefficients (which represents the net

effect on salary for academics). Having no theoretical or empirical basis to choose between the two, we report in Table 5 the results using total journal publications and note important differences below.

Outside academe, scholarly writing does not seem to be rewarded financially over the first six years of new economists' careers once other factors are controlled, since neither of the (non-interacted) productivity measures is significantly related to sixth-year salary. The sum of the coefficients on the productivity and interaction variables is 0.016 for journal publications and 0.035 for Top-50 journal publications (both statistically significant at the 0.05 level or better). At the mean salary for a sixth-year academic in the regression sample (\$77,500), the average journal article returns \$1,240, and the average Top-50 journal article is worth \$2,713. It is possible to make limited comparisons with earlier estimates of the returns to publishing because Siegfried and White (1973) estimated the 1972 academic salary returns to national/general journal, specialty/regional journal, and other publications as \$392, \$345, and \$76, respectively. Their two top publication categories included 46 journals, close to the Top-50 we have used, and they found similar average returns for each of the two categories. Inflating their estimates to 2003 dollars implies returns of \$1,343, \$1,182, and \$260, respectively. The comparisons are consistent with higher returns for publications today than 30 years earlier, particularly for top publications.²¹

The number of publications by the average faculty member in the regression sample using the journal and Top-50 publication productivity measures is 5.0, and 1.9, respectively, generating quite plausible *total* payoff estimates from average scholarly activity as it is represented by the two measures of \$6,200 and \$5,155, respectively. These payoffs imply a

marginal effect of a top-50 journal article of \$2,713 and a journal article that is not in the Top-50 of \$337.²²

Finally, although market conditions might generate higher salaries for graduates in fields where shortages occur or where skills are more easily transferable to higher-paying job sectors, the regression revealed no difference in sixth-year salaries by field, as was also the case for the cohort's starting salaries.

The estimated coefficients from a regression of the difference in the natural logarithms of the 2003 and 1997 salaries on the explanatory variables are reported in columns 3 and 4 of Table 5. In terms of salary growth during the six years since graduation, the only significant demographic variables relate to marriage. Having been married at the time of graduation is associated with 15 percent higher salary growth, while *got married* is associated with a 25 percent salary growth premium for men. Alternatively, females who got married experienced a 23 percent salary growth penalty relative to other women. There are no differences in salary growth by tier of Ph.D. program or by field of specialization.

Consistent with our earlier calculation of uncontrolled growth rates in nominal salaries, faculty in academe had the smallest salary growth, 22 percent lower than that of G/IO/RO economists. Finally, although young professors are often advised that the way to get a raise is to change jobs (or at least get outside offers), our evidence does not reveal an advantage to changing employers, even if we estimate the effect separately for academics, perhaps because some job changes are not voluntary during the first six years of a career, or because bona fide offers often lead to counteroffer salary increases for Ph.D.s who elect not to move.²³

Salary Inversion

Combining the resurvey data with that from the class of 2001-02 allows us to examine how 2003 salaries differ between economists with six years of post-graduate experience and newly minted Ph.D.s. As an example, the 22 Ph.D. economists from the class of 2001-02 who were in *temporary* 9-10 month academic appointments in 2002-03 earned a median salary of \$45,000. The six Ph.D.s in our resurvey of the class of 1996-97 who were in temporary positions in 2003 earned a median salary of \$61,000, six years of experience garnering them a 35 percent premium relative to their new Ph.D. counterparts.

For Ph.D.s in *permanent* academic appointments, however, there does not appear to be such a return to experience. Our survey indicated that new graduates in *permanent* full-time 9-10 month academic appointments in 2003 earned a median starting salary of \$67,000, while those from the class of 1996-97 who were in similar academic positions in 2003 earned a median salary of \$66,000 - \$1,000 *less* than their first-year colleagues. It appears that salary compression may have progressed to within-rank salary inversion. Part of this apparent inversion in nominal salaries, however, is due to a higher proportion of the younger cohort accepting employment at higher paying types of institutions, in business schools, or in relatively high cost-of-living areas. For example, 40 percent of the class of 2001-02 in tenure track 9-10 month academic positions started at a business school (average salary \$73,800 vs. \$67,000 for all comparable academics in the cohort), whereas only 23 percent of the class of 1996-97 were in a business school (average salary \$70,000 vs. \$66,000 for all comparable academics in the cohort) in 2003. Similarly, a higher proportion (37 vs. 30 percent) of the class of 2001-02 than the class of 1996-97 had jobs in (nominally higher paying) Ph.D.-producing economics departments in 2003.

Although very limited, our data offer an opportunity to examine the salary inversion hypothesis directly because we have 14 cases where employees from both the 1996-97 cohort and the 2001-02 cohort work for the same employer in the same department, allowing us to compare salaries of economists with six years experience against those of new Ph.D.s working along side them. Ten of the 14 pairs are employed at universities; four are outside academe. Nine of the ten university pairs in the sample are at institutions that award a Ph.D. in economics.²⁴

In each of the non-academic cases, the economist with six years of experience is paid a higher salary than the economist in the same workplace with one year of experience. The same is true for seven of the ten academic cases. For the other three cases, however, all at Ph.D. granting institutions, the first-year professor earns more than the sixth-year professor, providing direct evidence of *some* salary inversion in academe. Even when we compare the publication records of these individuals, it does not appear to be the case that the more experienced economists are "less productive" than average and that this is reflected in their pay. In two of the three cases, the sixth-year professor actually had *more* overall and top-50 journal publications than the average sixth-year professor in the same quality tier of Ph.D. programs. Although this evidence is largely anecdotal, the fact that in eleven of the 14 matched pairs the more experienced economist earns relatively more than the first-year professor supports the conclusion that the higher overall median salary for first-year than for sixth-year faculty with permanent full-time 9-10 month appointments in 2002-03 is due in part to a gravitation of cohorts toward higher paying employers over time, rather than to widespread within-employer salary inversion.

7. Changes in Job Fit

We asked several identical questions of the 1996-97 cohort in both years to gauge their attitudes toward their jobs.²⁵ Respondents were asked to rate the statements: "This position is related to my field," "The position is commensurate with my education and training," and "The position is similar to what I expected to be doing when I began my Ph.D. program," using a 1 (strongly disagree) to 5 (strongly agree) scale.

It is difficult to interpret aggregate responses to such questions because various individuals may apply different standards to determine whether they agree with a subjective statement. However, a comparison of responses from the same individuals at different points in time might be more reliable if the benchmark applied by an individual is more consistent over time than benchmarks applied by different individuals at one point in time.

Eighty-eight percent of the employed graduates in the cohort agreed that their job was commensurate with their education and training in 1997, and a similar percentage agreed that their job was related to their field. There was no change in these percentages in 2003. Similarly, in 1997, 64 percent agreed that their position was similar to what they expected to be doing when they began their Ph.D. program, the same fraction as in 2003.

To further explore relationships between Ph.D. economists' job activities, salaries, and attitudes toward their jobs, we also estimated OLS regressions of the levels and changes from 1997 to 2003 in responses to the attitudinal statements, using salary (or change in salary for the change in attitude regressions) and the independent variables in equation (1) as regressors. The most consistent outcome from these regressions is that those in academe had higher levels of agreement with the attitudinal statements than those in G/IO/RO, while those in the business/industry sector had consistently less agreement with the statements. In addition, those

with higher salaries (larger salary growth) had higher levels of agreement (changes in level of agreement) that their job was commensurate with their education, and that their job matched their expectations at the time they began their Ph.D. programs.

8. Conclusion

All economics Ph.D.s (or at least all willing to respond to a survey about their employment) get a job. Six years after they graduate, almost all of them have permanent jobs. This rosy picture, however, obscures considerable volatility in the labor market for young Ph.D. economists before they reach this point, as 45 percent of them change jobs within their first six years.

Not surprisingly, publications do not seem to enhance the salaries earned by those in business, government, and international organizations. For those in academe, however, journal publications are rewarded, each worth about \$1,200.

Men who married between 1997 and 2003 enjoyed a substantial salary premium, gaining 23 percent relative other male economists in their cohort. In sharp contrast, women who married during their first six years in the labor market earned 35 percent less than other female economists in their cohort. Women who married were also more likely to have changed employers during the period than their counterparts whose marital status did not change.

Because the salary premium earned by graduates of the top- ranked departments relative to graduates of departments ranked lower persists at least through economists' early careers, college seniors applying to Ph.D. programs in economics might be advised to seek out a Top 30 program if financial considerations matter much. Noteworthy, however, is the result that the starting salary premium earned by those graduating from the most prestigious 15 programs (relative to those in Tier 5) declines over the years, while the premium for graduates from

programs ranked 16 through 30 rises. This pattern may reflect a growing reluctance to pay a premium for the prestige of graduates' Ph.D. programs as careers progress and rewards for promise evolve into rewards for productivity.

In earlier work, we noted the widening gap from 1997 to 2003 in starting salaries between permanent and temporary first-year full-time academics. We interpreted this dramatic change in the starting salary differential between permanent and temporary jobs as evidence of increasingly intense competition for tenure-track job candidates. Now we have more evidence in support of that hypothesis. By 2002-03, first-year full-time permanent 9-10 month academic economists earned *more* on average than the 2003 salaries of sixth-year full-time permanent 9-10 month academic economists initially hired in 1997-98. Some of this apparent nominal salary inversion reflects the fact that the younger cohort found relatively more jobs at higher paying employers in higher paying locations.

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Endnote

¹ Information based on the first survey was published in the *Journal of Economic Perspectives* (Siegfried and Stock 1999).

² Thirty-eight of the 483 total responses to the first survey arrived after the 1999 *Journal of Economic Perspectives* paper was completed.

³ Only two respondents changed citizenship status between 1997 and 2003. Both became U.S. citizens.

⁴ This number is less than the 27 reported in Table 2 because one graduate did not report his work activities in both years.

⁵ According to the American Economic Association's Universal Academic Questionnaire, the average annual increase in salaries for *all* assistant professors from 1997-98 through 2001-02 was 4.4 percent at Ph.D.-granting institutions (n = 45 and 42, respectively) and 3.5 at B.A.-granting institutions (n = 47 and 25, respectively) (Scott and Siegfried 1999, 2002, Table 2). The difference between these figures and ours stems in part because we include only new graduates' salaries in 1997 and sixth-year salaries in 2003 and because of the overrepresentation of top-tier graduates in our resurvey sample.

⁶ Computed from BLS National Compensation Survey data (available at www.bls.gov).

⁷ Source: Authors' calculations based on the March 1997 and 2003 Current Population Surveys.

⁸ It is likely that heteroskedasticity is present in the residuals of equation (1). For example, variation in salaries may differ among graduates from different program tiers or in different employment sectors. Accordingly, we report heteroskedasticity-robust standard errors in Table 5.

⁹ The years of experience variable ranged from 5.3 to 33.8 years, and the outliers in experience had statistically significantly lower average log salaries than the rest of the sample. For the salary regressions, we excluded the nine individuals who started the job they held in 1997 before January 1995 (i.e., at least two years prior to completing their Ph.D.). Including the outliers generated predictions of positive returns to experience only after 28 years, whereas in the sample used, positive returns to experience are predicted to accrue after 14 years. A similar large difference in predictions also resulted when we excluded observations from the salary regression if their years of experience were beyond two standard deviations from the mean.

¹⁰ We tested for the potential endogeneity of the *same employer* variable in the salary and salary change regressions using a Hausman test and a binary indicator for residence in 1997 in Boston, Chicago, Los Angeles, New York City, San Francisco, or Washington, D.C. (urban areas in which the majority of economists of this cohort were initially employed) as an instrument, since it is unlikely to affect cost-of-living-adjusted salaries but may affect job change decisions. The p-value on the null hypothesis of endogeneity was never below 0.40 in either of the two regressions.

¹¹ Although not reported in the table, for comparison purposes, we also estimated the log of the 1997 salaries of this group as a function of a similar set of explanatory variables. We discuss the *starting* versus *sixth-year* salary comparisons in the text. Because of insufficient observations in some cells, we had to aggregate a few of the field of study and type of employer categories used in our earlier work on this cohort's starting salaries (Stock and Siegfried 2001).

¹² We also estimated the 2003 salary regression while reducing the sample restrictions to include graduates employed in full-time permanent jobs in the U.S. only in 2003 (rather than using the

restriction that graduates worked in such jobs in *both* 1997 and 2003). Estimates from this larger sample ($n = 174$ vs. $n = 147$) generated very similar results to those in Table 5. The only significant difference was a positive return to having specialized in international economics relative to microeconomics in the larger sample (the coefficient was positive, but insignificant in the smaller sample).

¹³ Siegfried and Stock (1999, 2004) and Stock and Siegfried (2001) find no relation between age, sex, race, marital status, dependents, undergraduate major or prior master's degree and starting salaries. Similarly, Hansen, Weisbrod, and Strauss (1978) find no relation between age or sex and earnings when they estimate a simultaneous equations model that controls for research productivity. Bratsberg, Ragan, and Warren (2003) find no salary differences by gender. Siegfried and White (1973) do not include demographics in their salary regressions. The relationships between demographic factors and early career productivity, and demographic factors (gender) and choice of first job, and gender and promotion are examined by Buchmueller, Dominitz, and Hansen (1999), McMillen and Singell (1994), and McDowell, Singell, and Ziliak (2001), respectively, but these studies do not examine salaries.

¹⁴ Although she did not examine salaries, Barbezat (1992) found differences in the probabilities of various job outcomes associated with additional years taken to earn the Ph.D., with those taking longer being less likely to secure either academic or nonacademic employment.

¹⁵ Siegfried and Stock (1999, 2004) estimate salary premiums associated with business school placement of 14 and 26 percent, respectively, for the classes of 1997 and 2002. Regression estimates of the 1997 salaries for the 147 graduates in our regression sample indicate a 20 percent starting salary premium relative to academics outside of business schools.

¹⁶ We also estimated the regression while including an interaction between *same employer* and *got married*. The results indicate no differential impact of *same employer* on salary for graduates who married than for graduates who did not, and the partial effects of *same employer* are insignificant for both groups.

¹⁷ Moore, Newman, and Turnbull (1998) showed that negative estimated returns to seniority became smaller and insignificant once controls for research productivity were included. Our results can be most closely compared to theirs when we limit our sample to those in academe ($n = 76$). Consistent with their result, our estimated partial effect of seniority on salary is negative at the mean and is more negative when productivity measures (publications) are excluded from the regression. However, unlike Moore, Newman, and Turnbull (1998), the estimated partial effects are insignificant even when productivity measures are excluded from the regression.

¹⁸ Buchmueller, Dominitz, and Hansen (1999) also examine research productivity, but they do not estimate salary regressions.

¹⁹ The publications were counted using EconLit entries as of December 2004. The top-50 journals were defined using Table 1 of Kalaitzidakis, Manuneas, and Stengos (2001).

²⁰ We did not include the alternative measures together because they are highly correlated, and multicollinearity then obscures the relationships.

²¹ Caution is warranted because estimates of returns to publications are likely to depend on the experience level of the sample and Siegfried and White's sample contains academics at all ranks. For example, working papers are likely to be of relatively greater value among less-experienced cohorts, and then to decline in importance as the cohort "ages." Because we do not have

publication information on this cohort at their time of graduation, however, we cannot formally test this hypothesis.

$$^{22} \$337 = \{[(\$1,240 * 5.0) - (\$2,713 * 1.9)] / (5.0 - 1.9)\}$$

²³ As with the salary level regression, estimated coefficients on years of seniority and its square were insignificant in the salary growth regression.

²⁴ In 12 of the 28 matches, there was more than one graduate from a given cohort at the employer and department. In these cases we use the mean salary of the graduates in the cohort-employer-department cell.

²⁵ For information regarding how these graduates rate how their graduate training relates to their jobs six years post-graduation, see Stock and Hansen (2004).

Table 1 - Characteristics of 1996-97 Economics Ph.D. Graduates

	(1) 2003 resurvey responses (n = 302) ^a	(2) 1997 survey responses (n = 483) ^a	(3) 1997 population projections (n = 950) ^b
<i>Demographics</i>			
Percent female	24.2	25.1	24.4
Percent U.S. citizen	62.9 ^c	53.4	41.3
Percent white	79.3 ^c	69.4	-
Percent married in 1997	58.0 ^c	62.1	-
Percent with children in 1997	30.3 ^c	35.4	-
Median age at degree	31 ^c	32	-
Median time to degree	5.3	5.3	-
<i>Ph.D. Program Characteristics (distribution)</i>			
Tier 1: program ranks 1-6	21.2 ^c	18.4	15.7
Tier 2: program ranks 7-15	24.8 ^c	21.1	14.7
Tier 3: program ranks 16-30	16.2	15.3	21.6
Tier 4: program ranks 31-48	12.6 ^c	14.3	14.3
Tier 5: program ranks >=48	25.2 ^c	30.8	33.8
<i>Employment Characteristics (1997)</i>			
Percent unemployed	1.3 ^c	2.7	3.1
Percent of employed with full-time job	96.0	95.5	95.4
Percent of employed with permanent ^d job	81.8	80.6	82.0
Percent of employed with job in U.S.	79.5 ^c	74.9	63.6
Distribution by employment sector (percentage):			
Percent of employed in academe	62.6 ^c	57.9	52.5
Percent of employed in business/industry	12.1 ^c	17.0	17.5
Percent of employed in government, international organizations, research organizations	25.3	25.1	30.0
<i>Employment Characteristics (2003)</i>			
Percent unemployed	0.0	-	-
Percent of employed with full-time job	99.0	-	-
Percent of employed with permanent ^d job	93.7	-	-
Percent of employed with job in U.S.	80.6	-	-
Distribution by employment sector (percentage):			
Percent of employed in higher education	60.3	-	-
Percent of employed in business/industry	13.3	-	-
Percent of employed in government, international organizations, research organizations	26.0	-	-
Median years of experience	6.3	-	-
Median years of seniority	5.4	-	-
Same employer as in 1997	54.2	-	-
Number of journal publications	3.4	-	-
Number of top-50 journal publications	1.2	-	-

Source: Authors' surveys.

^a Sample size varies by row, reported *n* is maximum. All reported data are based on at least five observations.

^b Projection = .508(graduates' response) + .492(advisors' response) [.508 = 483/950]; 950 is the estimated number of 1996-97 U.S. Ph.D.s in economics (Siegfried and Stock 1999).

^c Difference between 2003 resurvey respondents' and nonrespondents' mean values is statistically significant at the 0.10 significance level or better. For variables for which we report the medians, we tested for differences in the means of the variables.

^d Permanent means the job has no specific termination date. Untenured faculty are in permanent jobs if they are on a tenure track.

Table 2 - Transitions of 1996-97 Economics Ph.D. Graduates
with Full-time Permanent jobs in 1997 and 2003

Sector in 1997	Sector in 2003			
	<u>Academic</u>	<u>Business/Industry</u>	<u>G/IO/RO</u>	<u>Total</u>
Academic	120	5	8	133
Business/Industry	2	27	2	31
G/IO/RO	10	3	46	59
Total	132	35	56	223

Source: Authors' surveys. G/IO/RO: Government, International Organization, or Research Organization.

Table 3 -1996-97 Economics Ph.D. Graduates' Annual Salaries, February 2003

	<i>Median</i>	<i>Mean</i>	<i>Low</i>	<i>High</i>	<i>N</i>
All full-time jobs in the U.S.	\$80,000	\$93,000	\$35,000	\$450,000	203
Permanent positions	80,000	94,000	35,000	450,000	193
Academic	69,000	74,000	35,000	180,000	105
9-10 month	66,000	71,000	35,000	163,000	86
11-12 month	80,000	85,000	45,000	180,000	19
Business/Industry	125,000	144,000	60,000	450,000	35
Government, Research Organizations, International Organizations	98,000	102,000	54,000	180,000	52
Temporary positions	68,000	71,000	40,000	120,000	10
Academic, 9-10 month	61,000	62,000	40,000	78,000	6

Source: Authors' survey. Includes only those with full-time jobs in the U.S. The sector "other" is excluded from the subcategories, but not from the overall totals.

Table 4 -1996-97 Economics Ph.D. Graduates' Annual Salaries, October 1997

	<i>Median</i>	<i>Mean</i>	<i>Low</i>	<i>High</i>	<i>N</i>
All full-time jobs in the U.S.	\$54,000	\$58,000	\$20,000	\$165,000	203
Permanent positions	55,000	60,000	34,000	165,000	174
Academic	51,000	55,000	34,000	130,000	98
9-10 month	50,000	53,000	34,000	130,000	80
11-12 month	58,000	62,000	34,000	128,000	18
Business/Industry	62,000	77,000	40,000	165,000	27
Government, Research Organizations, International Organizations	56,000	61,000	35,000	106,000	49
Temporary positions	40,000	46,000	20,000	100,000	29
Academic, 9-10 month	36,000	41,000	20,000	80,000	16

Source: Authors' survey. Includes only those with full-time jobs in the U.S. The sector "other" is excluded from the subcategories, but not from the overall totals.

Table 5 - Levels and Changes in Economics Ph.D. Salaries^a

	2003 Log Salary		2003 Log Salary- 1997 Log Salary		Means
	Coeff.	(St. Error)	Coeff.	(St. Error)	
<i>Demographics</i>					
Female	-0.056	(0.082)	-0.032	(0.056)	0.28
Age at degree	-0.003	(0.006)	0.000	(0.004)	31.61
Married at degree	0.137	(0.113)	0.146	(0.081)	0.61
Got married	0.234	(0.122)	0.251	(0.096)	0.18
Female*Got married	-0.354	(0.132)	-0.232	(0.126)	0.05
Any children at time of degree	-0.023	(0.101)	-0.070	(0.076)	0.25
Had first child since degree	-0.114	(0.112)	-0.109	(0.084)	0.34
Female*Had first child since degree	0.160	(0.130)	0.029	(0.086)	0.09
White	0.053	(0.081)	0.011	(0.048)	0.86
U.S. Citizen	0.132	(0.108)	0.098	(0.075)	0.80
Time to degree	-0.029	(0.016)	-0.016	(0.012)	5.83
<i>Ph.D. Program Characteristics</i>					
Tier 1: program ranks 1-6	0.228	(0.085)	-0.002	(0.052)	0.25
Tier 2: program ranks 7-15	0.204	(0.092)	-0.057	(0.054)	0.27
Tier 3: program ranks 16-30	0.250	(0.105)	0.037	(0.069)	0.17
Tier 4: program ranks 31-48	-0.001	(0.120)	-0.090	(0.067)	0.10
Tier 5: program ranks >=48 & unranked					0.21
<i>Employment and Productivity Characteristics</i> (2003, unless stated otherwise)					
Academic	-0.272	(0.094)	-0.220	(0.068)	0.52
Business/Industry	0.261	(0.116)	0.162	(0.086)	0.18
G/IO/RO	-	-	-	-	0.30
Business school	0.052	(0.085)	-0.066	(0.057)	0.17
Ph.D. producing economics program	-0.059	(0.100)	0.035	(0.068)	0.14
Same employer as in 1997	-0.014	(0.073)	-0.072	(0.050)	0.67
Years of experience	-0.367	(0.909)	0.099	(0.532)	6.09
Years of experience-squared	0.026	(0.072)	-0.007	(0.042)	37.50
Number of journal publications	-0.006	(0.017)	-0.005	(0.010)	3.70
Journal publications * academic	0.022	(0.018)	0.011	(0.012)	2.58
R-squared		0.525		0.487	

^a N = 147 and includes those in full-time permanent jobs in the U.S. in both 1997 and 2003. Heteroskedasticity robust standard errors are in parentheses. Numbers in bold are statistically significant at the 0.10 level or better (two-tailed tests). The regression also includes a constant and binary indicators for field of specialization. Salaries have been adjusted for cost of living differences relative to Washington D.C. using the American Chamber of Commerce Researchers Association (ACCRA) cost-of-living index for the fourth quarters of 1997 and 2002. Because we were unable to obtain a consistent ACCRA index for those employed at Columbia University, we included a separate dummy variable identifying those Ph.D.s.