DISCUSSION PAPER SERIES

IZA DP No. 1539

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Michael Gibbs

March 2005

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

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Michael Gibbs
University of Chicago GSB
and IZA Bonn

Discussion Paper No. 1539
March 2005

IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
Email: iza@iza.org

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ABSTRACT

Returns to Skills and Personnel Management: U.S. DoD Scientists and Engineers*

Personnel records are used to examine compensation, recruitment, and retention of a group of very highly skilled workers: civilian scientists and engineers in U.S. Department of Defense laboratories. In contrast to the private sector, returns to skills were largely flat for this group from 1982-1996. Despite this, quality and performance of recruits relative to earlier cohorts, and of those retained relative to those who left, remained stable. One explanation is the importance of defense-industry-specific human capital. These results hold for three different pay plans, including the federal government's primary plan and two intended to introduce greater flexibility in personnel management.

JEL Classification: J24, J31, J44, J45

Keywords: returns to skills, personnel, workforce quality

Corresponding author:

Michael Gibbs
Graduate School of Business
University of Chicago
Chicago, IL 60637
USA
Email: mike.gibbs@gsb.uchicago.edu

* This paper is based on research conducted for the Office of the Secretary of the Defense through contract DASW01-95-0059 to the RAND Corporation (Gibbs 2001). This work does not necessarily reflect the opinions or policies of the sponsor or RAND. Additional funding was provided by the Graduate School of Business, University of Chicago. I am grateful to Diane Disney, Carole Gresenz, Wally Hendricks, Jim Hosek, Sue Hosek, Larry Lacy, John Nestor, Sherwin Rosen, participants at presentations at RAND, USC, the Pentagon, and the Office of Naval Research, and especially Beth Asch and Al Robbert, for helpful comments and discussions. Rachel Louie provided excellent assistance in assembling the data.

1. INTRODUCTION

Labor economics research has documented important changes in the structure of wages in the 1980s and 1990s.[1] Private sector labor market returns to various measures of skills increased dramatically. For example, the college wage premium and the returns to experience both increased. Similarly, dispersion in residual wages (after controlling for education, experience, and other observables) also increased; this has been interpreted as an increase in the returns to unobserved skills. These trends were widespread in the private sector. They have been observed within and between occupations, firms, establishments, and industries, within demographic groups, and within managerial ranks.

In contrast Borjas (2003) found that, though wage dispersion in the public sector increased relative to the private sector until about 1970, it declined thereafter. He concluded that as a result high-skill workers became less likely to stay in or shift to the public sector. Similarly, Katz and Krueger (1991) found that returns to skills remained relatively stable during the 1980s in the public sector, especially in the federal government. They also found that, although job queues rose for government blue-collar jobs, they fell for government white-collar jobs. This suggests that highly skilled federal employees fell behind the public sector in earnings during this period. Indeed, several studies have expressed concern about the federal government's ability to recruit and retain highly skilled employees; see Campbell and Dix (1990).[2] Unfortunately, they were unable to offer systematic evidence on the quality of skilled federal employees.

This paper examines returns to skills for some of the most highly skilled employees in the federal government: civilian scientists and engineers (S/Es) employed in U.S. Department of Defense (DoD) laboratories. Using personnel data provided by the DoD for 1982-1996, I study the evolution of returns to observed and unobserved skills, the quality of this workforce, and the relationship of both to the DoD's personnel policies. Similar to Katz and Krueger's analysis of the 1980s, returns to skills were largely flat among DoD scientists and en-

[1] See, for example, Bound and Johnson (1992); Juhn, Murphy, and Pierce (1993); Katz and Murphy (1992); Murphy and Welch (1992); O'Shaughnessy, Levine, and Cappelli (1998); and the surveys by Levy and Murname (1992) and Gottschalk and Danzinger (1993).

[2] A related literature focuses on the private-public sector pay gap. Most studies conclude that federal workers tend to be paid more than comparable private-sector workers, although some disagreement exists (Congressional Budget Office 1997). Moulton (1990) found that federal administrative and professional workers had pay almost exactly comparable to that of their private sector counterparts in 1988, and that federal pay fell relative to the private sector in the 1980s.

gineers over the entire sample period. This may have been caused by the highly rigid and bureaucratic nature of DoD (and federal) pay and personnel policies compared to the private sector.

I then exploit the panel nature of the data to examine whether this affected the DoD's ability to attract and retain high quality S/Es. For recruiting, I compare characteristics and subsequent job performance of new entrants to comparable employees promoted into a similar job. For retention, I compare characteristics and prior job performance of those exiting to comparable employees staying with the DoD. Changes in these comparisons over time would suggest a trend in the ability of the DoD to attract and retain qualified S/Es. Surprisingly, there is little evidence of a systematic decline in the relative quality of the scientific and engineering workforce within the DoD over the period, despite the decline in returns to skills relative to the private sector. One possible explanation is that during this period the U.S. defense industry underwent substantial downsizing in both the public and private sectors. To the extent that S/Es had industry-specific human capital, their private sector opportunities may not have risen much relative to their DoD earnings.

Finally, I compare personnel outcomes across three different pay plans. Most sampled employees were paid under the major federal pay plan, the General Schedule (GS), but some were paid under two other plans that were intended to introduce greater flexibility in personnel management. I find little evidence that the other pay plans provided much more flexibility, as trends in returns to skills and relative workforce quality were similar to the GS pay plan.

2. DATA

The dataset used in this study was constructed from confidential personnel records provided by the Defense Manpower Data Center (DMDC) to the RAND Corporation. DMDC produced a snapshot of personnel information for all DoD civilian employees at the beginning (October 1) of fiscal years 1982 through 1996. Temporary, seasonal, part-time, and inactive workers were excluded.[3] From these raw data, records were selected for employees classified as a scientist, engineer (but not civil engineer), or mathematician according to the DoD's Functional Occupational Group codes. To focus on skilled workers, those with less than a bachelor's

[3]A 20 percent random sample of this base dataset was used by Asch & Warner (1999).

degree were excluded. Finally, the DMDC provided a list of Unit Identification Codes (UICs) for DoD labs, which were matched to the sample to identify lab employees.

The DMDC provided many variables for each employee each year. Demographic variables included age, race, gender, degree and academic discipline, veteran status, and region and census district.[4] Job variables included agency (Army, Navy, Air Force, or other), bureau within each agency, unit identification code, functional and occupational codes, supervisory or managerial status, and years of service with the DoD.[5] Compensation variables included salary, pay plan, pay grade, performance rating, and type of retirement plan. The data also included information on whether the employee was a new hire or left the DoD in the fiscal year.[6] Exits were classified into retirements and separations using DMDC transaction codes. Promotions were defined as increases in salary grade (if the employee stayed in the same pay plan) between years.

Table 1 presents summary statistics. The sample was roughly 90 percent male and 85 percent white, with both proportions declining over time. Average age and years of service crept up over the second half of the period. This was caused by the manner in which the DoD implemented the "drawdown" (downsizing) during the 1990s (see below). More than half were employed by the Navy, about a third by the Army, and the remainder by the Air Force. Almost no lab employees worked in the "fourth estate" (DoD agencies outside of the military services), and none for the Marines. About 10 percent of lab employees had a Ph.D., law, or medical degree, and about 25 percent an M.A.[7] About 75 percent had an engineering degree (other than civil engineering). Math and physics constituted an important but declining fraction of the sample, down to 15 percent by 1994. About 3 percent had their most recent recorded degree in business.

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[4] According to the DMDC, this information was not always updated when an individual acquired more education. It is not known how often DoD lab S/Es acquired additional education while employed at the DoD. Thus, the education variable provides at least the employee's academic discipline and highest level of education upon hiring.

[5] The years of service variable was not sequential from year to year for some employees (most were in the Air Force Materiel Command or were veterans; see Asch and Warner 1999, Appendix B). These observations were excluded from analyses involving years of service. Alternative specifications for years of service were tried with no difference in empirical inferences.

[6] New hires may have been rehires or had prior experience with some federal agency. In some cases, it is possible that a new hire previously worked at the same DoD lab, but as an employee for a different agency such as the Department of Energy. It is impossible to identify such cases, or how frequent they are. One implication of rehires is that years of service can be greater than zero for a new hire.

[7] The education variable was coded with M.D.'s and law degrees lumped together with Ph.D.'s. This is unlikely to make much difference for this study. Both groups should earn more on average than M.A.'s. Moreover, there were very few lawyers or doctors in the sample.

Figure 1 plots new hire, separation, and retirement rates. For example, about 7 percent of employees in 1982 were new hires, about 1 percent retired that year, and about 3 percent separated. Separations and retirements are plotted as negative numbers because they represent outflows from the workforce. Summing all types of outflows plus new hires gives a rough idea of the total percentage change in the sample each year.

Sample size fell from 1992 through 1996. This is due in part to an increase in retirements from 1993 onward. The primary cause is that the DoD began a major drawdown at the end of fiscal year 1989, decreasing its labor force through attrition, hiring freezes, and early retirement incentives. The drawdown hit S/Es less dramatically then other DoD employees, partly because of the DoD's increasing reliance on high technology for weapons design and other purposes. Nevertheless, it had an important impact.

A net result of the drawdown was to make the DoD S/E workforce top-heavy in salary grades over time. For this reason, average salary crept up in the second half of the period (Table 1 shows this for the GS pay plan, but it is also true for the PMRS and China Lake samples). Because data on job duties are unavailable, it is not clear whether this reflects any change in job responsibilities of technical workers. Given the reduced hiring, it is likely that many labs simply kept technical workers in their current duties but promoted them to higher salary grades in order to retain them and offer expected salary increases. Thus, it may be that the DoD increased its compensation cost for similar work over the period, although it is impossible to state this with certainty.

Most lab employees were in the General Schedule (GS) pay plan, but many were in two other plans, Performance Management and Recognition System (PMRS) and China Lake. These plans were intended to provide greater flexibility in pay, so it is interesting to compare the effects of the three plans in the analyses that follow.

The GS pay plan, a classic salary grade system similar to those used in the private sector, was the same plan used for most federal employees outside of the DoD. Employees were assigned to one of 15 salary grades, which specified the minimum and maximum salary they could earn without changing grades. Scientists and engineers were primarily in the higher grades, so most analyses in this paper focus on higher grades only. Most S/Es skipped even numbered grades below Grade 11. For example, there are many more employees in Grades 9 and 11 than in Grade 10. Raises were awarded primarily for seniority, so that pay for performance came about chiefly through promotions.

About twenty percent were paid for part of the period under the PMRS pay plan, a modification of the GS plan that was designed to provide greater recognition and incentives. It covered selected managers in Grades 13 through 15. The system affected the way that within-grade pay raises were determined. Rather than receiving step increases based on time in grade, as in the GS system, employees competed for merit increases based on performance evaluations (Mace and Yoder 1995). PMRS was technically in effect through 1993 but in practice persisted through the end of the sample period (the start of fiscal year 1996) because PMRS employees were off-step compared with GS employees when the pay plan ended. After that, they remained off-step, receiving the same time-in-grade–based step increases that they would have received under the GS plan. Employees were gradually switched back to the GS plan when they were promoted, demoted, transferred to another agency, or had a break in service.

The Navy instituted an experimental pay plan at the Naval Weapons Center at China Lake, California (located in the Mojave Desert near Edwards Air Force Base, north of the Los Angeles region), during the period. This plan covered 12 percent of sampled employees by 1996. At China Lake, a number of flexibilities in personnel management were implemented, including a dual-career ladder in which technical workers were promoted based on technical skills and could earn more than their managers. China Lake was a broadband plan, with only five primary pay grades (as opposed to 15 under the GS plan). Broadband plans are often advocated as a way of providing more flexible salary growth and incentives than traditional salary band plans. Some initial success with the plan was reported, including an improvement in quality of hires as measured by managerial perceptions, and increases in grade point average of recruits (Office of Personnel Management 1986).

3. RETURNS TO SKILLS

I now analyze how returns to observed and unobserved skills evolved for DoD scientists and engineers. First, it is worth emphasizing how rigid federal pay systems were (and still are). For example, in the GS plan, the structure of relative pay across grades did not change over the sample period (and for many years prior). Instead, the federal government gave across-the-board percentage raises to all employees, regardless of grade or step (seniority in grade). Figure 2a illustrates this by plotting the median salary among S/Es each year, by GS grade.[8] While overall pay levels moved around a little over time, relative pay across salary grades did not change at all in 15 years. In contrast, Figure 2b shows a similar plot of median salary levels by level of responsibility over the same period, for private sector engineers, using the U.S. Department of Labor's survey of Professional, Administrative, Technical, and Clerical (PATC) data. As suggested by the literature on returns to skills, in the private sector there was growing dispersion over time in pay by level of responsibility. For example, Ferrall (1995) found that higher-level engineers were paid proportionately more than lower level engineers by the end of the period than at the beginning.

Of course, GS grades need not correspond directly to job responsibilities, and there may have been some salary grade inflation among S/Es over time.[9] However, the comparison does suggest that returns to skills probably did not grow among DoD scientists and engineers as they did in the private sector. Any changes in returns to skills would have had to occur solely through changes in the grade at hiring, or in promotion rates. Managers had little discretion over both, as they were subject to centralized personnel policies and civil service rules. In any case, Figures 1-2 provide a graphic illustration of the comparative rigidity of federal pay systems compared to the private sector.

Table 2 presents estimates of how returns to education for S/Es evolved over the sample period. For each pay plan in each year *t*, log salary regressions were estimated for employees within occupational or academic discipline groups:

$$\ln W_{it} = \mathbf{a}_t + \mathbf{b}_t \cdot MA_{it} + \mathbf{g}_t \cdot PhD_{it} + X_{it} \cdot \mathbf{d}_t + \tilde{\mathbf{e}}_{it} \,,$$

where *MA* and *PhD* were dummies indicating the highest degree of worker *i*, and *X* was a set of controls. $\mathbf{b}_t$ and g_t represent the premiums for having those advanced degrees, compared to only a BA, in year *t*. *X* included controls for the employee's age, race, gender, veteran status, occupation, agency, region, and a quadratic for years of service. Table 2 indicates how $\mathbf{b}_t$ and g_t changed over time by reporting $\mathbf{b}_t/\mathbf{b}_T$ and g_t/g_T, the ratios of each to their

[8] Plots are very similar for PMRS and China Lake employees.

[9] Katz and Krueger (1991) find evidence of a little grade inflation in the 1980s, but across all GS grades, not just those occupied by highly skilled federal employees. In personal conversations, DoD human resource personnel expressed skepticism that there could be substantial title / salary grade inflation due to civil service rules.

values in a base year T near the beginning of the sample period. Ratios greater than 1 indicate that, controlling for observable factors, the estimated return to that degree increased relative to the base year, and vice versa. Similar analyses of the returns to experience (years of service) were also estimated, but are not reported for brevity. They yielded similar conclusions.

Panel a of Table 2 shows that wage premiums for advanced degrees stayed flat or *declined* for employees in the GS pay plan, which covered about 75 percent of the sample. The estimates vary somewhat, but there are similar patterns across most columns. Education premiums generally rose initially, but in most cases started declining around 1988 or 1990. There is a noticeable decline in the 1990s, so that in most groups the degree premium was below 75% of its initial value in 1982.

Panel b shows similar estimates for PMRS employees. There is no clear pattern for this pay plan. Most groups show a rise in education premiums from 1984 to 1986, but then about half rose by 1996 and half fell. Panel c shows that there is more of a pattern for employees in the China Lake plan. In all groups of China Lake employees, returns to advanced degrees fell from the mid to late 1980s for the next ten years or so. This is similar to the results for GS employees.

Tables 3a-c analyze trends in returns to unobserved skills for employees in the three pay plans, using the standard method from the literature on returns to skills. Log salary regressions similar to those employed in Table 2 were estimated for relevant sub-samples in each year. The distributions of residuals from these regressions were interpreted as information on dispersion in the returns to unobserved skills. A typical measure of this dispersion is the ratio of the 90th percentile to the 10th percentile in the distribution of regression residuals. These percentile ratios were calculated for each group. Since we are interested in how this dispersion changed over time, these were compared to the same ratio in the base year, using the same method as in Table 2. Thus, if $R_{jt} = P90_{jt}/P10_{jt}$ is the ratio of the 90th to the 10th percentile residual log wage, for group j in year t, then the table reports R_{jt}/R_{jT}, where T is a base year near the beginning of the sample period.

Table 3a shows that returns to unobserved skills appear to have generally declined for GS employees. In almost every occupational / years of service / educational subgroup, measured dispersion in wage residuals fell at least a small amount from 1982 to 1996. For PMRS employees, wage dispersion appears to have fallen for employees with low years of service (though sample sizes are small), but risen for those with greater years of service. This is actually the opposite of what we might expect, since employment conditions tend to be more sensitive to labor market conditions for younger workers than for older workers; see Beaudry and DiNardo (1991). Changes in residual wage dispersion was mixed for China Lake employees, though somewhat consistent with PMRS employees, in that it tended to decline for those with low years of service but was more likely to rise for those with high years of service.

In summary, returns to skills declined for DoD scientists and engineers over 1982-1996 in the major pay plan (GS), though they may have risen for certain S/Es in the PMRS and China Lake plans. Given the increase in returns to skills in the private sector as a whole, and the very high skill level of the S/Es studied here, it is logical to ask if the DoD had difficulty attracting and retaining high quality employees in these jobs, especially in the GS pay plan. The next two sections examine these questions.

4. RECRUITMENT

In this section, quality of recruits is examined. The dataset has several indicators of quality: education, experience, and job performance (performance ratings, promotions, and wage growth). While the level of quality is difficult to assess, in part because it is subjective, for our purposes trends are of interest. These can be assessed by taking a differences-in-differences approach: comparing quality measures of new recruits to comparable internal candidates (who are the firm's alternative to new hires), and evaluating how this comparison may have changed over time. Thus, new hires are compared to those promoted into similar jobs (same grade level, pay plan, and period). Table 4 shows summary statistics on new hires and promotes.

An initial question is whether or not observable characteristics of new hires changed over time. The age of new hires declined slightly. Performance ratings increased over time, but it is hard to assess the meaning of this because there appears to be a general pattern in the data of rating inflation over time (see the columns for promotes, and Table 6 below). Most interesting is that new hires were more likely to have advanced degrees, especially PhDs, in later years. This is the opposite of what would be predicted, given changes in pay structures relative to the private sector.

Characteristics of promotes changed even less (other than rating inflation). Educational attainment was relatively flat. Promotes in later years were slightly younger and had slightly less years of service. It is possible that this was driven by the reduction in hiring in the 1990s, so that open slots were filled more often by internal candidates who were not as experienced as in the past. Interestingly, promotes were less likely to have advanced degrees, and were slightly younger, than new hires. This makes sense. In general, internal candidates have an advantage over new hires: firm specific human capital (note the high years of service of PMRS promotes). In order for new hires to be preferred over internal candidates, new hires must have greater general human capital (and/or greater ability or fresher scientific training). That said, there is no suggestion in the table that the *relative* education or experience of new hires declined over time.

Table 5 examines the future performance of new hires and promotes after they have entered the new job. The internal labor market literature would suggest that new hires and promotes might not have the same performance; see Baker, Gibbs and Holmstrom (1994) and Chan (2003). New hires might perform better on average (since they might have greater ability to overcome lack of firm specific human capital), but with greater variance in outcomes (since the firm knows less about them than promotes). Once again, however, we are interested in the trend.

Table 5 shows regressions predicting two measures of job performance. The first is the annualized percentage real salary growth since entering the grade. Note that since salary is so closely tied to grade (and seniority step for GS and China Lake jobs), this is equivalent to using promotions as the performance measure. The second is a dummy variable indicating whether or not the employee's most recent performance rating was the best possible (=1).[10] Regressions of this general form were run for each pay plan and grade of hiring or promotion, each year (for brevity, every third year is shown):

$$Performance_i = m + k \cdot Cohort_i + h \cdot NewHire_i + l \cdot (NewHire_i \times Cohort_i) + X_i \cdot d + \tilde{e}_i ,$$

where *Performance* = annualized salary growth or the performance rating dummy. *Cohort* = year employee *i* entered the grade, *New Hire* = dummy indicating whether the employee was hired into the grade instead of promoted, and the regressions also included the interactions of these two variables.[11] Controls *X* included education,

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[10] These regressions employ linear probability models; logits yield similar results. Models using the percentage of best possible performance ratings earned by the employee, rather than the most recent rating, yielded similar conclusions.

[11] More flexible interactions between new hire dummies and cohorts were also tried, with similar conclusions.

race, gender, veteran status, agency, and region; *d* was a vector of coefficients. New hires were often brought into grades at lower seniority steps than promotes (in GS and China Lake jobs, which employ steps), so the employee's step on hire or promotion was included, to control for the possibility that new hires might exhibit more rapid salary growth in the first years to bring them in line with promotes.

The question of interest in Table 5 is whether or not the job performance of new hires declined relative to internal candidates. If the DoD had increasing difficulty recruiting high quality S/Es over time (if their pay structures lagged the private sector), then we would expect new hires to fare worse than internal promotes. If relative performance of new hires declined over time, then interaction terms will have negative signs. The only coefficients shown are for the new hire dummy and its interaction with cohort.

Patterns are consistent across the two performance measures in Table 5. This provides a rough check that both are indicators of employee performance. For GS employees, new hires tend to perform better than internal promotes, as expected. However, the opposite is true for PMRS employees. PMRS employees are in the high grades, and internal promotes have very high years of service, so it may be that these jobs emphasize management or other skills more than scientific knowledge, compared to jobs in the GS and China Lake pay plans.

Of greater interest are the interaction terms. For the salary regressions, many of the interaction terms are statistically significant, while few are for the rating regressions. The general pattern for GS employees is that new hires in lower grades (especially Grade 11) had declining relative performance over the period. For higher grades, there is little trend, or perhaps the opposite. This might indicate that labor market trends are more likely to impact younger workers, who are less deeply embedded in internal labor markets. PMRS new hires generally had improving relative performance (though sample sizes for PMRS new hires are small), while the results are mixed for China Lake new hires.

However, estimated interaction terms are small, with little economic significance. For example, most of the largest interaction terms are in the 1987 regressions (most but not all are positive in that year). The first indicates that as of 1987, relative annual salary growth of new hires declined by about 2% with each new cohort of entrants into Grade 11. Since new hires averaged about 6% greater annual salary growth than promotes to 1987, their relative salary growth declined by just 0.12% with each cohort. In general, the interaction terms indicate that trends in relative performance of new hires versus promotes were economically trivial in all three pay plans.

5. RETENTION

A second personnel outcome for the DoD that might be affected by a possible decline in relative returns to skills is retention of high quality workers. That issue is examined in this section. We are interested in turnover that is not caused by retirements. For this reason, retirees were excluded from analyses in Tables 6-7. First, DoD transaction codes distinguished between retirements and other separations. Second, there was a spike in turnover among S/Es in their 54th year (which was not completely explained by DoD transaction codes); apparently many retired when they first became eligible at age 55. Therefore, employees aged 54 or older were excluded.

Table 6 presents summary statistics on characteristics of exits and stays, by pay plan, grade, and year. Most characteristics of stays were largely flat over the sample period. Once again there is evidence of rating inflation, so it is difficult to infer anything from raw trends in ratings. Exits were less likely to have advanced degrees in later years, especially in the GS pay plan. This is consistent with the observation from Table 4 that new hires were more likely to have advanced degrees over time. Though average age of exits was flat over time, years of service increased a little. Therefore, there is mixed evidence on the trend in the quality of exits: they were less educated but also had less firm specific human capital in later years. Observable characteristics of exits and stays were more similar than were characteristics of new hires and promotes in Table 4. This is not surprising, since both groups had been observed by the DoD for at least some period of time.

Table 7 presents analyses similar in spirit to Table 5. Instead of predicting future performance as a function of whether the employee was a new hire or not, the (linear probability model) regressions in Table 7 predict whether or not the employee exited as a function of quality and performance measures. Regressions were run for each pay plan and grade:

$$Exit_i = p + Qual_i \cdot j + Perf_i \cdot r + g \cdot Year + [(Qual_i \quad Perf_i) \times Year] \cdot w + X_i \cdot d + \tilde{e}_i \,,$$

where *Qual* = M.A. and Ph.D. dummies, *Perf* = performance measures from Table 5 (annualized salary growth and performance rating indicator), and *w* was a vector of interaction coefficients. *X* included the same controls as the regressions in Table 5, plus a quadratic for years of service.

Consistent with Table 6, the regressions show no substantial difference between exits and stays in quality or performance. Most coefficients are statistically insignificant. There is no tendency for exits to have had systematically better or worse performance than stays in any pay plan or grade. The one notable exception is that the DoD had difficulty retaining Ph.D.'s in the PMRS plan in all grades.

Following the approach of Table 5, we are interested not so much in the direct effects of these variables as in how they evolved over time. Thus, interactions of each with a year dummy were included. None of the interaction terms is economically significant, few are statistically significant, and there are no clear patterns of coefficient signs. Thus, there is no evidence of a negative (or positive) trend in the DoD's ability to retain relatively high quality S/Es in any of the pay plans.

6. DISCUSSION

This study has extended prior work on returns to skills in the 1980s and 1990s in several ways. It added to the small literature on skill differentials for public sector employees. It offered a detailed look at a specific group of workers with very high skill levels in a single organization. It allowed comparison of three different pay plans. It bridged the literatures on returns to skills and on empirical studies of internal labor markets, by using personnel records. This allowed for analysis of the quality and performance of individuals over time, and the linking of two important personnel outcomes, recruitment and retention, to returns to skills.

The relative stability of returns to skills in the sample studied are in stark contrast to what happened in the private sector overall. For GS and China Lake employees, returns to education did not rise over the period as they did among private sector firms. Even for PMRS employees, there is no obvious indication of a systematic rise in returns to education over the 1980s and early 1990s.

Despite this difference, little evidence was found that the DoD experienced any decline in its ability to attract and retain high quality S/Es over the 1980s and early 1990s. Measured quality and performance of new hires relative to promotes, and of exits relative to stays, were essentially flat over the period. These findings hold for the most important federal pay plan, the General Schedule, as well as for two other plans that were intended to provide greater flexibility in personnel management.

At first glance it seems difficult to reconcile these sets of findings. One possibility is that DoD pay levels were above market levels at the beginning of the sample period, but the private sector gained ground over time. If so, the quality of S/Es might not decline substantially, though rents from DoD employment would. This seems unlikely in consideration of the literature on the private-public sector pay gap. Another possibility is that there were changes in quality of the workforce, but they were masked in the data because of inflation in titles and salary grades. This also does not seem likely, as none of the various measures of quality, including relative performance of new hires v. promotes, or exits v. stayers, show any trends. Moreover, DoD personnel expressed skepticism that substantial title or salary grade inflation is possible given rigid civil service rules and personnel procedures.

Another possibility is that quality of DoD S/Es is insensitive to pay levels, because employees select into the DoD based on other factors. DoD work has several features that may make it a particularly strong job match for some scientists and engineers. Some S/Es may simply be patriotic. Others may have armed forces experience or be in the Reserves or National Guard, thus having affinity for the DoD. Federal jobs provide stability, security, and substantial benefits. Most importantly, S/Es employed in DoD labs do some of the most advanced, technical research in the world. Much of this research is classified, and may not be conducted in private sector firms. And, of course, the DoD's research budget and other resources is unparalleled. Thus, intrinsic motivation for DoD work may well be very important. All of these factors may imply that most DoD S/Es earn large rents for working at the DoD, and are infra-marginal with respect to pay levels.

An additional consideration consistent with this explanation is the unusual nature of the private sector labor market that is relevant for DoD scientists and engineers. Many S/Es that leave the DoD end up working for private defense contractors. Private sector defense work may be more similar to DoD laboratory work than to jobs that DoD S/Es might obtain in other industries. In other words, there may be important *industry* specific human capital for defense sector S/Es. If so, comparisons with the overall private sector are not appropriate. Rosen and Ryoo (1997) found that the private sector market for engineers exhibits high elasticities of supply and demand, and therefore adjusts rapidly to market changes. If alternative employment opportunities of DoD S/Es were primarily in the defense industry, it may be that their outside options did *not* increase as much as would be suggested by considering returns to skills for the entire private sector labor market.

The private sector defense industry was hit very hard by downsizing during the period; its employment showed patterns similar to those in Figure 1. Regions disproportionately employing defense workers were especially hard hit. For example, private sector employment in aerospace fell about 33% in Southern California, and about 50% in Los Angeles County, over the sample period (Schoeni, Dardia, McCarthy and Vernez 1996). This may explain why the China Lake plan did not seem to lead to any substantive differences from the GS pay plan, since China Lake is not far from Los Angeles.

Moreover, the literature on earnings of displaced workers finds substantial, long-term losses in earnings when workers lose their jobs. For example, Jacobson, LaLonde and Sullivan (1993) found that long-term earnings losses are large even for workers with low tenure, and for those who find new jobs in similar firms. Thus, a distinct possibility is that even those DoD S/Es who might have found work in the private sector did not have the same opportunities to enjoy rising returns to their skills that were seen outside the defense industry.

Large private sector firms often pay systems that appear to be bureaucratic (Gibbs and Hendricks 2004). Federal pay systems are even more centralized, simple, and rigid in structure. These characteristics may have many benefits, including simplified personnel management and perceived equity across organizational units. However, they can also make it difficult to respond effectively to changes in the private sector labor market. In particular, federal pay systems have not evolved over time. In contrast, compensation structures changed dramatically in the private sector over the 1980s and 1990s, driving up returns to skills. For such reasons, federal pay systems are often criticized, and the U.S. government has experimented with various changes in pay systems to try to better attract or retain quality workers, using the private sector labor market as a benchmark.

However, the results here suggest that some such efforts may be misplaced. There is little evidence that the more complex PMRS or China Lake pay plans performed better than the original GS plan. It may be that federal workers are sufficiently infra-marginal because of job characteristics that they are not highly sensitive to differences between federal pay levels and those of similar jobs in the private sector. In the case of the DoD in particular, it may also be that S/Es have a strong degree of industry specific human capital, so that the overall private sector labor market may not be the appropriate benchmark. If so, then the GS system, despite its rigidity, may serve adequately for most of the DoD’s personnel management requirements, perhaps with some salary flexibility at hiring or to respond to outside offers.

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Table 1.
Summary Statistics

		1982	1989	1996
Female (%)		5	9	11
Race (%)	Black	3	3	3
	Hispanic	2	3	4
	White	92	87	84
	Other	4	7	9
Age (mean years)		42.4	41.5	43.8
Years of service (mean)		15.6	14.3	16.5
Education (%)	BA	63	67	62
	MA	26	23	28
	PhD, MA, or Law	11	10	10
Academic discipline (%)	Biology	2	2	2
	Business	3	3	3
	Computer science	1	1	2
	Engineering	65	74	76
	Math/ statistics	9	6	5
	Physics	17	12	10
	Chemistry	2	1	1
	Geology	1	1	1
Agency (%)	Army	33	32	33
	Navy	53	56	55
	Air Force	13	12	12
	Fourth estate	0	1	1
Annual salary (mean $1996)		55,394	53,694	57,432
Pay plan (%)	GS	95	68	68
	PMRS	0	23	19
	China Lake	0	8	12
	Other	5	1	1
GS Grades (%)	1-9	10	16	2
	10-11	10	18	6
	12-13	63	61	82
	14-15	17	5	10
N		32,721	43,472	41,287

Notes: Academic disciplines are for 1994 in the last column, as that is the last available year for this variable.

Table 2.
Trends in Returns to Education

		Academic Discipline:						Occupation:					
		Engineering		Math & Stats		Physics		Engineer		Mathematician		Scientist	
		MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD
a. GS	1982	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1984	1.01	1.00	1.07	1.10	1.35	1.06	0.92	0.97	0.97	1.04	1.15	1.02
	1986	1.09	1.09	1.03	1.26	1.36	1.05	1.06	1.07	0.92	1.01	1.08	1.00
	1988	1.00	1.00	0.85	0.96	1.39	1.03	0.97	0.90	0.81	0.85	1.16	1.00
	1990	0.92	0.92	0.67	0.84	1.39	1.06	0.89	0.90	0.63	0.76	1.07	1.01
	1992	0.70	0.70	0.83	0.85	1.10	0.94	0.71	0.82	0.80	0.73	1.17	1.01
	1994	0.56	0.56	0.78	0.77	0.91	0.86	0.59	0.69	0.71	0.67	0.93	0.89
	1996							0.56	0.70	0.64	0.57	0.95	0.91
	N: 1982	15,479		2,083		3,814		18,112		2,581		5,667	
	N: 1994/96	19,491		1,146		1,911		21,227		1,522		3,279	
b. PMRS	1982	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1984	0.91	0.91	0.89	1.02	0.68	0.85	0.79	0.87	0.70	0.70	1.01	1.01
	1986	1.01	1.00	1.02	1.14	0.74	1.05	0.86	0.97	1.33	0.95	1.12	1.25
	1988	1.29	1.03	0.81	1.06	0.63	0.92	0.94	1.00	1.78	0.86	1.17	1.19
	1990	1.43	1.17	0.74	1.12	0.82	1.05	1.02	1.06	1.45	0.84	1.31	1.33
	1992	1.51	1.17	0.64	1.15	0.63	1.06	1.09	1.06	1.35	0.85	0.95	1.29
	1994	1.67	1.12	0.50	0.96	0.64	0.91	1.16	1.06	1.61	0.74	1.03	1.19
	1996							1.00	1.05	1.52	0.71	1.37	1.23
	N: 1982	2,618		274		512		3,363		323		935	
	N: 1994/96	5,897		545		1,222		5,204		480		1,447	
c. China Lake	1986	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1988	1.10	1.05	0.76	0.86	0.79	0.98	1.11	1.09	0.73	0.96	0.69	0.90
	1990	1.07	1.03	0.99	0.93	0.94	0.99	1.06	1.12	0.88	1.05	0.83	0.88
	1992	0.95	0.97	0.60	1.01	0.87	0.93	0.89	1.01	0.58	0.90	0.85	0.86
	1994	0.76	0.95	0.91	0.75	0.70	0.86	0.77	1.03	0.62	0.66	0.79	0.82
	1996							0.89	0.75	0.64	0.30	0.85	0.72
	N: 1986	1,804		312		612		857		136		293	
	N: 1994/96	3,184		313		521		3,816		382		475	

Notes: Statistics are coefficients on education dummy variables from earnings regressions, normalized relative to the corresponding coefficients in the 1982 regressions (1986 for the China Lake pay plan). Virtually all coefficients were significant at better than 1%.

Table 3a.
Trends in Returns to Unobserved Skills, GS Pay Plan

Occupation		Years of Service 1-5			6-10			11+		
		BA	MA	PhD	BA	MA	PhD	BA	MA	PhD
a. Engineer	1982	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1984	1.20	1.01	0.95	0.98	0.97	0.97	0.92	0.88	1.04
	1986	1.16	1.04	0.96	1.04	0.97	0.97	0.89	0.88	1.04
	1988	1.00	1.01	0.97	1.02	0.96	0.94	0.86	0.85	0.98
	1990	1.02	1.02	0.91	0.96	0.95	0.93	0.85	0.84	0.97
	1992	1.06	1.01	0.97	0.95	0.91	0.91	0.84	0.85	0.98
	1994	0.87	0.96	0.92	0.95	0.91	0.91	0.84	0.88	1.00
	1996	0.92	0.96	0.91	0.93	0.91	0.89	0.84	0.90	1.01
	N: 1982	1,604	314	95	1,732	491	144	9,186	3,265	426
	N: 1996	1,127	369	170	5,604	1,405	166	8,354	3,333	403
b. Mathematician	1982	1.00			1.00	1.00		1.00	1.00	1.00
	1984	1.00			0.97	0.97		0.96	0.94	1.10
	1986	1.00			1.03	0.97		0.99	0.94	1.13
	1988	1.00			0.95	0.91		0.99	0.94	1.07
	1990	1.03			0.95	1.00		1.02	0.94	1.13
	1992	1.03			0.82	0.89		1.00	0.92	1.04
	1994	0.87			0.90	0.91		1.02	0.92	1.04
	1996	0.72			0.93	0.83		0.96	0.97	1.13
	N: 1982	229			213	120		1,056	593	111
	N: 1996	51			194	73		644	424	75
c. Scientist	1982	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1984	0.81	1.11	0.97	1.00	0.88	0.90	0.92	0.93	1.07
	1986	0.94	1.03	0.99	0.94	0.88	0.85	0.92	0.93	1.07
	1988	0.94	1.08	0.91	0.88	0.91	0.87	0.92	0.96	1.10
	1990	0.97	1.00	0.91	0.88	0.91	0.88	0.95	0.98	1.07
	1992	1.00	1.06	0.94	0.93	0.88	0.89	0.95	0.96	1.07
	1994	0.98	0.99	0.90	0.99	0.90	0.91	0.94	0.92	1.07
	1996	0.97	1.08	0.99	0.87	0.86	0.91	0.92	0.92	1.07
	N: 1982	245	175	309	199	156	330	1,740	1,172	1,171
	N: 1996	97	86	228	245	188	283	783	610	672

Notes: Statistics are ratios of the 90th percentile to the 10th percentile of the distribution of residual log salary, among employees in that cell, normalized relative to the corresponding ratios in 1982. Cells with very small sample sizes were omitted.

Table 3b.
Trends in Returns to Unobserved Skills, PMRS Pay Plan

Occupation		Years of Service 1-5	6-10			11+		
		PhD	BA	MA	PhD	BA	MA	PhD
a. Engineer	1983		1.00	1.00	1.00	1.00	1.00	1.00
	1984		0.96	0.91	1.07	1.00	1.01	1.01
	1986		0.93	0.91	1.06	1.04	1.03	1.03
	1988		0.93	0.90	1.06	1.03	1.02	1.05
	1990		0.96	0.88	1.08	1.00	1.00	1.07
	1992		0.91	0.86	1.07	0.99	1.01	1.07
	1994		0.91	0.86	1.09	1.01	1.02	1.05
	1996		0.98	0.94	1.20	1.01	1.05	1.05
	N: 1983		59	39	24	1,854	1,069	130
	N: 1996		89	50	46	2,682	1,951	348
b. Mathematician	1983					1.00	1.00	1.00
	1984					1.01	1.01	1.03
	1986					1.07	1.06	1.11
	1988					1.04	1.06	1.03
	1990					1.04	1.06	1.04
	1992					1.02	1.05	1.01
	1994					1.02	1.08	0.99
	1996					1.02	1.10	1.00
	N: 1983					146	120	32
	N: 1996					199	210	57
c. Scientist	1983	1.00			1.00	1.00	1.00	1.00
	1984	0.88			1.02	1.01	1.00	1.02
	1986	0.87			0.96	1.01	0.99	1.06
	1988	0.88			0.99	1.03	0.98	1.08
	1990	0.86			1.05	0.99	1.02	1.08
	1992	0.84			1.02	1.03	1.03	1.07
	1994	0.83			1.01	1.02	1.03	1.06
	1996	0.83			1.01	1.05	1.05	1.07
	N: 1983	28			69	251	202	346
	N: 1996	30			106	248	323	712

Notes: Statistics are ratios of the 90th percentile to the 10th percentile of the distribution of residual log salary, among employees in that cell, normalized relative to the corresponding ratios in 1983. Cells with very small sample sizes were omitted.

Table 3c.
Trends in Returns to Unobserved Skills, China Lake Pay Plan

Occupation		Years of Service						
		1-5		6-10		11+		
		BA	MA	BA	MA	BA	MA	PhD
a. Engineer	1986	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1988	1.06	0.97	1.01	1.00	1.00	1.01	1.01
	1990	1.10	1.04	0.96	1.01	1.02	0.99	1.02
	1992	1.03	0.88	0.95	1.08	1.03	1.00	0.98
	1994	0.96	0.78	0.86	1.03	1.01	1.04	0.96
	1996	1.09	1.15	0.90	0.98	0.99	1.04	0.97
	N: 1986	357	58	149	52	812	459	70
	N: 1996	158	32	774	138	1,820	741	94
b. Mathematician	1986			1.00		1.00	1.00	1.00
	1988			0.96		1.03	1.00	0.97
	1990			0.81		1.06	0.98	1.02
	1992			0.87		1.15	1.00	0.97
	1994			0.92		1.15	1.05	1.22
	1996			0.97		1.18	1.07	1.26
	N: 1986			28		118	81	24
	N: 1996			38		161	118	26
c. Scientist	1986			1.00		1.00	1.00	1.00
	1988			1.01		1.01	0.98	0.96
	1990			0.98		1.03	1.08	1.02
	1992			0.88		1.13	1.09	0.97
	1994			0.89		1.14	1.10	0.96
	1996			0.96		1.01	1.10	0.95
	N: 1986			26		144	125	120
	N: 1996			42		125	130	119

Notes: Statistics are ratios of the 90th percentile to the 10th percentile of the distribution of residual log salary, among employees in that cell, normalized relative to the corresponding ratios in 1986. Cells with very small sample sizes were omitted.

Table 4.
Characteristics of New Hires and Promotes

	New Hires					Promotes				
	1982 -84	1985 -87	1988 -90	1991 -93	1994 -96	1982 -84	1985 -87	1988 -90	1991 -93	1994 -96
a. GS, Grades 11-14										
MA (%)	29	27	27	23	19	25	21	16	15	20
PhD (%)	35	35	36	48	60	8	7	5	5	6
Rating = 1 (%)	1	1	3	6	8	6	7	19	24	40
Age	40.0	39.4	37.4	36.6	37.2	36.0	35.0	33.2	32.6	33.4
Years of Service						10.2	9.4	8.2	7.5	8.8
N	1,535	1,324	1,136	695	387	3,006	6,982	9,532	9,599	6,601
b. PMRS, Grades 13-14										
MA (%)	33	18	25	22	29	36	37	33	33	37
PhD (%)	56	74	62	69	71	16	21	18	19	24
Rating = 1 (%)	4	0	10	9	14	8	12	23	31	54
Age	45.2	45.1	47.8	46.1	44.6	44.0	44.4	44.8	45.0	44.7
Years of Service						20.0	19.9	20.5	20.5	19.4
N	57	75	91	45	7	441	1,600	1,845	1,254	209
c. China Lake, Grades 2-3										
MA (%)	47	32	42	48	25	—	20	18	16	15
PhD (%)	25	23	22	26	17	—	7	6	7	4
Rating = 1 (%)	—	0	1	5	71	—	—	5	6	6
Age	35.5	36.4	35.8	33.7	38.4	33.3	32.7	32.8	33.4	32.6
Years of Service						7.4	8.1	8.0	8.2	7.7
N	116	402	204	99	80	81	626	918	736	511

Notes: Summary statistics are shown only for major entry levels for each pay plan.

Table 5.
Recruitment

	Hired or Promoted Into …	Model Year	N	Salary Growth Regressions: New Hire	Salary Growth Regressions: New Hire x Cohort	Rating Linear Probability Models: New Hire	Rating Linear Probability Models: New Hire x Cohort
a. GS	Grade 11	1987	4,197	0.0641 **	–0.0190 *	–0.0308 **	0.0162 ***
		1990	8,411	0.0095 ***	–0.0031 ***	–0.0265	0.0053
		1993	12,278	0.0193 ***	–0.0048 ***	0.0270	–0.0048
		1996	13,446	0.0126 ***	–0.0020 ***	0.0239	–0.0047
	Grade 12	1987	4,314	–0.0117 ***	0.0050 ***	–0.0495 ***	0.0219 ***
		1990	8,479	0.0001	0.0005 *	0.0063	–0.0011
		1993	14,036	0.0152 ***	–0.0027 ***	0.0457 **	–0.0046
		1996	17,253	0.0055 ***	–0.0005 ***	0.0598 **	–0.0040
	Grade 13	1987	1,621	–0.0133 **	0.0079 ***	–0.2284 **	0.0754 **
		1990	2,917	–0.0053 *	0.0021 ***	–0.1095	0.0207
		1993	4,632	0.0100 ***	–0.0018 ***	0.0505	–0.0104
		1996	6,082	0.0008	0.0004	0.0045	–0.0022
	Grade 14	1987	320	–0.0216 *	0.0115 ***	–0.0837	–0.0113
		1990	703	0.0009	–0.0004	–0.2368 *	0.0420
		1993	1,176	0.0170 ***	–0.0039 ***	–0.0201	–0.0212
		1996	1,328	–0.0001	0.0002	0.1891	–0.0198
b. PMRS	Grade 13	1987	71	–0.0430 **	0.0132 ***	–0.3259	0.0333
		1990	140	–0.0293 **	0.0019	–0.0514	0.0475 **
		1993	211	0.0000	–0.0013 ***	0.2248	0.0277 **
		1996	178	–0.0057	0.0002	0.1812	0.0025
	Grade 14	1987	886	–0.0376 ***	0.0133 ***	–0.3945 ***	0.1496 ***
		1990	1,829	–0.0181 ***	0.0022 **	–0.2422 **	0.0692 ***
		1993	2,572	–0.0001	–0.0020 ***	–0.1415	0.0118
		1996	1,991	–0.0119 ***	0.0004	–0.0621	0.0045
c. China Lake	Grade 2	1990	99	0.0209 *	–0.0032	0.1437	–0.0236
		1993	143	0.0079	–0.0027	0.0195	–0.0224
		1996	117	–0.0118	0.0003	0.0929	–0.0110
	Grade 3	1990	107	–0.0224 ***	0.0036 **	–0.2421 *	0.0398
		1993	182	0.0078	–0.0019	–0.0656	–0.0135
		1996	175	–0.0010	–0.0001	–0.2928 *	0.0340 **

Notes: ***=significant at 1%; **=at 5%; *=at 10%. See text for regression specifications.

Table 6.
Characteristics of Exits and Stays

	Exits					Stays				
	1982 -84	1985 -87	1988 -90	1991 -93	1994 -96	1982 -84	1985 -87	1988 -90	1991 -93	1994 -96
a. GS, Grades 11-15										
MA (%)	52	39	28	32	33	39	35	29	27	34
PhD (%)	28	24	16	11	11	13	12	10	8	9
Rating = 1 (%)	7	7	14	20	29	7	8	16	23	37
Age	35.6	33.7	33.0	33.7	34.7	39.4	37.9	36.2	35.8	36.9
Years of Service	9.7	7.9	7.7	8.6	10.4	14.7	12.8	11.2	10.8	12.1
N	1,448	1,807	1,964	1,500	2,299	57,512	53,938	62,733	71,263	70,993
b. PMRS, Grades 13-15										
MA (%)	34	27	27	25	37	35	34	34	33	36
PhD (%)	25	34	29	24	14	14	17	17	15	16
Rating = 1 (%)	10	13	24	29	36	8	12	23	31	48
Age	41.9	41.2	42.7	41.9	45.5	44.0	44.1	44.0	43.7	44.4
Years of Service	16.3	15.6	17.5	17.1	22.6	20.0	20.2	20.0	19.8	20.5
N	219	391	365	335	490	12,672	20,817	23,990	25,739	19,371
c. China Lake, Grades 2-4										
MA (%)	6	18	11	10	3	14	13	11	11	6
PhD (%)	6	17	11	10	3	14	13	11	11	6
Rating = 1 (%)		19	3	8	2		4	5	7	7
Age	36.2	35.9	33.7	36.3	37.6	41.4	40.8	40.1	40.0	39.8
Years of Service	10.2	8.6	7.5	11.2	13.3	16.4	15.6	14.7	14.7	15.1
N	58	183	154	123	306	3,233	6,906	7,417	7,463	11,648

Notes: Summary statistics are shown only for major levels for each pay plan.

Table 7.
Retention

		Linear Probability Models Predicting Whether the Employee Exits that Year				
		Grade 11	Grade 12	Grade 13	Grade 14	Grade 15
a. GS	Salary Growth	0.3809	–11.3406 ***	–18.7958 ***	13.9805	–51.1636 *
	Salary Growth x Year	–0.0002	0.0057 ***	0.0095 ***	–0.0070	0.0257 *
	Rating = 1	–3.2438	–0.0814	0.9473	2.0024	–1.8610
	(Rating = 1) x Year	0.0016	0.0000	–0.0005	–0.0010	0.0009
	MA	–0.8444	0.9136 **	0.9210 **	0.1540	1.1349
	MA x Year	0.0004	–0.0005 **	–0.0005 **	–0.0001	–0.0006
	PhD	–7.4335	3.4435 ***	1.1515 *	1.1945	0.2383
	PhD x Year	0.0038	–0.0017 ***	–0.0006 *	–0.0006	–0.0001
	N	49,008	178,829	67,241	17,647	2,676
			Grade 13	Grade 14	Grade 15	
b. PMRS	Salary Growth		7.4148	–22.0674 ***	–1.6888	
	Salary Growth x Year		–0.0037	0.0111 **	0.0009	
	Rating = 1		3.4691 **	1.1680	1.0966	
	(Rating = 1) x Year		–0.0017 **	–0.0006	–0.0005	
	MA		–0.9189	–0.1084	–0.0518	
	MA x Year		0.0005	0.0001	0.0000	
	PhD		3.3746 ***	2.8228 ***	2.0621 ***	
	PhD x Year		–0.0017 ***	–0.0014 ***	–0.0010 ***	
	N		42,616	43,872	24,201	
			Grade 2	Grade 3	Grade 4	
c. China Lake	Salary Growth		33.8822	3.2549	–41.9922	
	Salary Growth x Year		–0.0170	–0.0016	0.0211	
	Rating = 1		9.3007	7.9809 **	7.2429 **	
	(Rating = 1) x Year		–0.0047	–0.0040 **	–0.0036 **	
	MA		–8.6546	1.6848	1.4105	
	MA x Year		0.0044	–0.0008	–0.0007	
	PhD		–6.9591	5.8609 ***	–0.5445	
	PhD x Year		0.0035	–0.0029 ***	0.0003	
	N		2,548	20,122	5,584	

Notes: ***= significant at 1%; **=at 5%, *=at 10%. See text for regression specifications.

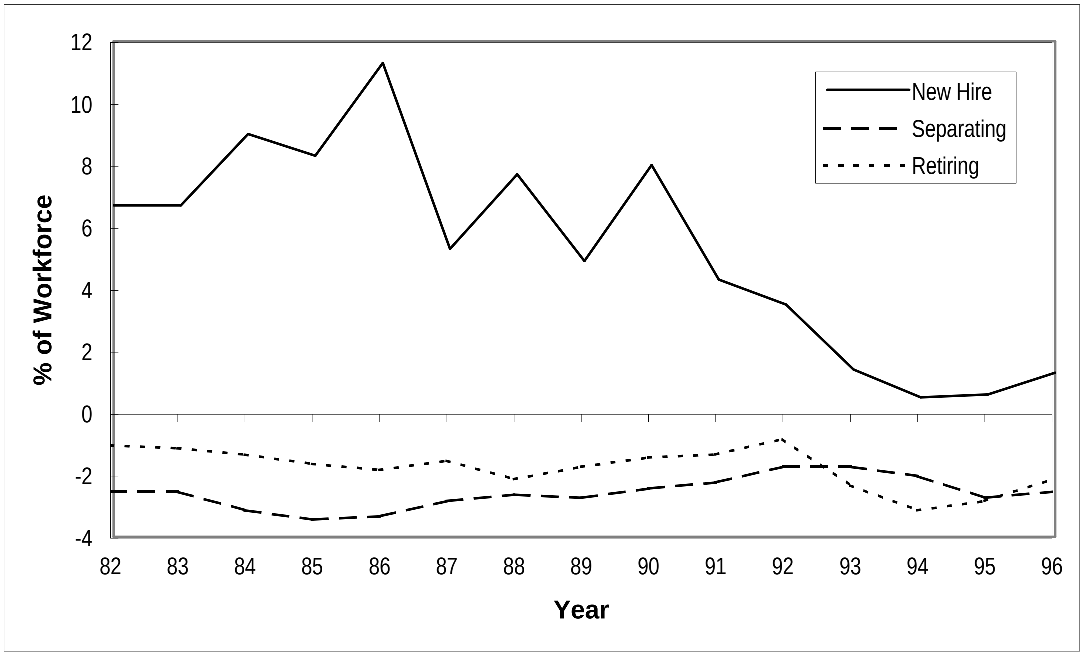

Figure 1.
Entry & Exit

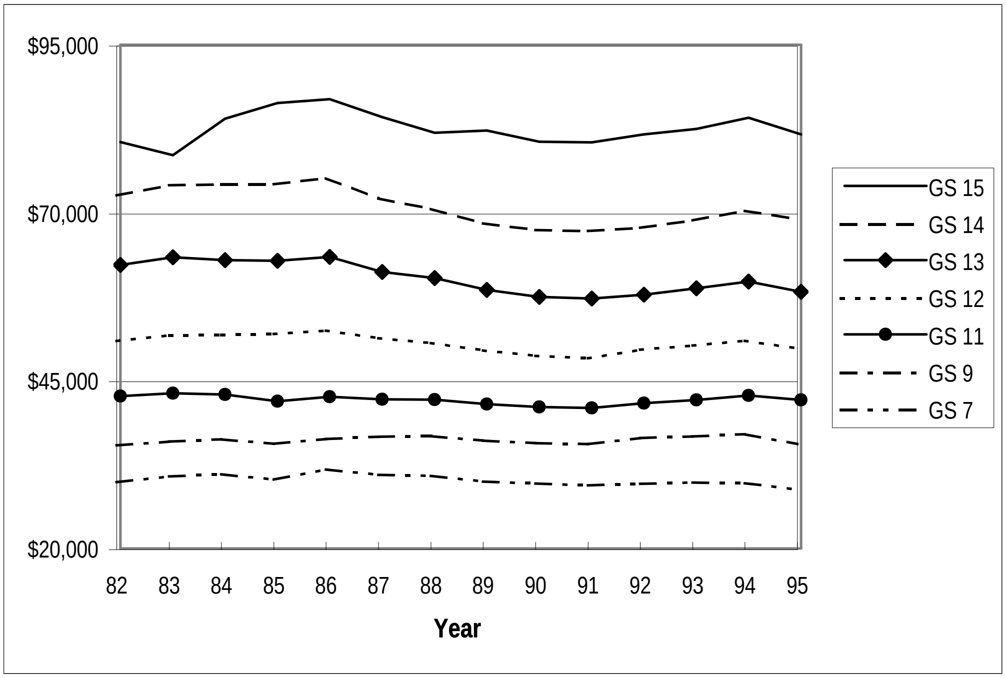

Figure 2a.
Median Salary by Grade, GS Scientists & Engineers

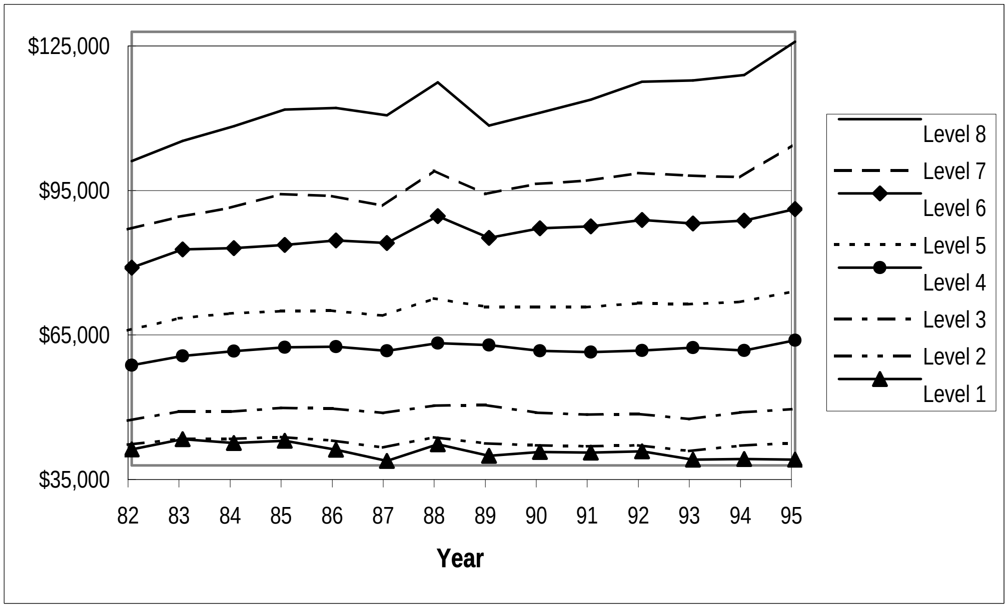

Figure 2b.
Median Salary by Level of Responsibility, Private-Sector Engineers