This chapter presents some background information on how occupational areas differ in terms of average entry grade, promotion speed, retention, and pay. This background information sheds some light on the degree to which occupations vary in personnel outcomes. While the results are not conclusive, especially since no control is included in these comparisons for other factors that may affect the outcomes observed, significant variation would suggest that personnel managers may have some flexibility in how fast individuals are promoted, whether they are paid more, and, therefore, whether they are retained longer. The specific occupations associated with each occupational area are listed in the Appendix.

MEAN ENTRY GRADE

Characteristics at entry, particularly entry pay grade, are important descriptors of the career profiles of cohorts of personnel. Table 2.1 showed the entry characteristics, including mean entry grades, for the FY88 and FY92 cohorts. The mean entry grades for the two cohorts were 5.4 and 5.7, respectively. Figure 4.1 shows that mean entry grade varied considerably across occupational areas in both cohorts, while the differences between the two cohorts were much smaller.

As one would expect, occupational areas where entrants have more education and therefore better external market opportunities have a higher mean entry grade. This is to be expected because civil service managers must offer higher pay in order to compete successfully with the private sector for better-educated workers and workers in
technical areas. Those in science and mathematics, engineering, and the medical and financial-management fields have higher mean entry grades than those in the clerical and technician areas. For example, workers in science and mathematics entered in FY92 at a mean grade of 9.2, while secretarial workers entered at an average grade of 4.0.

**PROMOTION PROFILES**

While one might expect entry grades to be higher in occupational areas where private-sector opportunities are better, it is unclear *a priori* how promotion profiles should vary by occupational area. A complete theory of the determinants of faster promotion in the civil service by occupational area is beyond the scope of this analysis. Still, it is likely that those determinants will include the retention and therefore the available vacancies in the upper grades, personnel
quality, and the transferability of skills from the civil service to the external market.

Figure 4.2 shows the cumulative probability curve, $S(t)$, defined in Equation 3.2, for months to first promotion for the FY88 and FY92 cohorts. To compute the cumulative promotion probability we grouped the data into three-month intervals. The figure shows the cumulative probability at the midpoint of each interval. Although the FY88 cohort extends for a longer period, the curve stops at month 60 (the point where the FY92 data end) to enable comparison of the profiles across cohorts. For ease of illustration, the figure shows the curves for only a sample of the occupational areas.

In the first three-month interval, no one in either cohort was promoted. By month 24 (i.e., two years), part of each cohort had been promoted. By month 60, even more of the cohorts had been pro-
moted. Although the cumulative probabilities increase with month, they increase at a decreasing rate, i.e., the cumulative probability curve is concave with respect to the origin.

Figure 4.2 shows considerable variation in speed to first promotion across occupational areas. Engineers and workers in personnel management receive the fastest promotions. By 60 months (five years), about 90 percent of the workers in these areas in both cohorts had been promoted at least once. In contrast, by 60 months, about 70 to 75 percent of those in logistical clerical occupational areas had achieved their first promotion.\(^1\) Promotion in the medical and medical technician occupational areas was even slower. In the FY92 cohort, only 35 percent of employees in these area had been promoted after five years. As shown in Figure 4.1, workers in the medical area enter the civil service at a higher grade, but they do not achieve promotions as often as those in other occupational areas. Clearly, medical workers follow a different career track from that of workers in other occupational areas.

Figure 4.2 also shows that except in a few occupational areas, workers in the FY92 cohort were promoted at a somewhat slower pace than those in the FY88 cohort. For example, by six months, 45 percent of the engineers in the FY88 cohort had been promoted, as contrasted to only 38 percent of those in the FY92 cohort. Promotion was also substantially slower for the medical occupations in the FY92 cohort. In the FY88 cohort, 60 percent of the medical workers had achieved their first promotion by month 60, but only 35 percent in the FY92 cohort had done so.

Figure 4.3 shows similar patterns in the cumulative survival curves for speed to second promotion for the FY88 and FY92 cohorts. Months to second promotion vary considerably across occupational areas, with engineers and workers in personnel management receiving the fastest promotions. Workers in the FY88 cohort achieved

\(^1\)The differences in speed to first and second promotion across occupational areas (see Figures 4.2 and 4.3) are generally statistically significant. Statistical significance is determined by the significance of the coefficient estimates on the occupational indicator variables in the estimated Cox regression models for promotion speed, shown in Tables 5.2 and 5.3. These coefficient estimates are generally statistically significant at the 5 percent level, even after observed job and individual characteristics are controlled for.
their second promotions somewhat faster than those in the FY92 cohort.

RETENTION PROFILES

Retention profiles also vary by occupational area. Models of retention behavior predict that the decision to stay in the DoD civil service will be affected by individual tastes and the expected financial payoff associated with civil service employment relative to that in the external market.\(^2\) Although a complete model of retention is beyond the scope of this analysis, it is clear that if tastes and the financial payoffs

\(^2\)See Asch and Warner (1994) for a model of the decision to stay in service for active-duty military personnel.
associated with civilian employment vary by occupational area, retention profiles will vary by occupational area as well.

Figure 4.4 shows the survival, or cumulative probability curves, for months until separation by cohort for a selected set of occupational areas. At the beginning of the first month, everyone in the entering cohort was in the civil service, implying that the cumulative probability of staying in service is 1. After two years (24 months), between 55 and 90 percent of the workers were still in service, depending on occupational area and cohort. Engineers and those in logistics management stay the longest, or are the least likely to leave in each cohort. About 70 percent of individuals in those occupational areas are still in service after five years. In contrast, about 35 percent of the medical technicians in the FY88 cohort and about 30 percent of those in the FY92 cohort were still in service after five years.

![Figure 4.4—Cumulative Probability of Retention, FY88 and FY92 Cohorts](image-url)
PAY

Given the differences in promotion speed across occupational areas, one would expect pay growth to differ by occupational area as well. Since all occupational areas use the common pay table, the primary means by which real pay growth can vary is promotion speed. To examine differences in pay growth, controlling for observable job and individual characteristics, we estimated Equation 3.1 for each occupational area, using the FY88 cohort data. The resulting variation in pay growth by years of service is shown in Figure 4.5.3

Figure 4.5—Pay Profiles by Occupational Area, with Job and Individual Characteristics Controlled For, FY88 Cohort

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3As discussed in Chapter Three, the cohort data were divided into two groups to estimate the pay profiles for each year of service. The results shown in Figure 4.5 are for personnel who stayed beyond YOS 8. Also, the estimates were converted from a log scale to a linear scale to make the results more readily accessible.
The differences in the pay profiles across occupational areas shown in Figure 4.5 are dominated somewhat by the differences in mean entry pay shown in Figure 4.1. That is, the biggest differences in the profiles appear to be the differences in the intercepts or in the relative height of the profiles. The height of the profile is determined by the mean entry grade for each occupational area. To control for entry grade and to focus only on pay growth, Figure 4.6 shows the percentage difference between pay at YOS 1 and pay at YOS 8, with observed characteristics held constant in the regression framework. For example, between YOS 1 and YOS 8, real pay grew by 50 percent in the science and mathematics area, by about 40 percent for engineers, and by about 65 percent for workers in personnel management, with observed individual and job characteristics controlled for.

The results in Figure 4.6 show that real pay grew considerably over the eight-year period for the FY88 cohort. Furthermore, pay growth varied across occupational areas. Those in the medical field experi-

Figure 4.6—Percentage Increase in Annual Earnings from YOS 1 to YOS 8 by Occupational Area, with Job and Individual Characteristics Controlled For, FY88 Cohort
enced the least pay growth, while those in personnel management experienced the most. Given that promotion speed is fastest in personnel management and slowest in the medical field, these results are not surprising.