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The Quality of Personnel in the Enlisted Ranks

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Summary

As the armed services transform to develop capabilities to meet a spectrum of uncertain threats, a constant objective will be to ensure the military's compensation and personnel systems are structured to attract, retain, and promote high-quality personnel.¹ The research presented in this monograph provides evidence on the military's ability to meet these goals in the past, using two traditional and one nontraditional metric of personnel quality. Specifically, we use longitudinal data provided by the Defense Manpower Data Center (DMDC) through FY96 on enlistees who entered the military between FY78 and FY92 to address the following questions by service, occupational area, and cohort entry date:

- Are high-quality personnel more likely than low-quality personnel to enter the military and to complete their first terms? Are personnel who attrite of lower quality?
- Are high-quality personnel more likely to reenlist than are low-quality personnel?
- Are high-quality personnel more likely to stay beyond their first term, e.g., to their early and midcareer, than are low-quality personnel?
- Are high-quality personnel more likely than low-quality personnel to be promoted?

The traditional measures of personnel quality are the Armed Forces Qualification Test (AFQT) score and high school diploma status. The AFQT is a composite of four of the subtests of the ten-part Armed Services Vocational Battery (ASVAB) administered to all recruits prior to enlistment. It was designed as an enlistment test to predict success in training and on-the-job performance. The services use various composites of the ASVAB to predict job skill (occupational) training. In the 1980s and 1990s, the Department of Defense sponsored the Joint-Service Job Performance Measurement (JPM) Project to address whether AFQT scores actually predicted job performance. The JPM research study provided strong evidence of a positive relationship between AFQT scores and "hands-on" (or work sample) measures of performance across the four services (Wigdor and Green, 1991). More recent analysis of the Army's portion of the JPM Project, Project A, demonstrated a relationship between AFQT scores, effort, and leadership metrics (Oppler et al., 2001). As for high school diploma status, attainment of a diploma was found to be associated with a higher probability of completing the first term of enlistment.

As metrics of performance, AFQT scores and high school diploma status have the advantage of being available to the military before entry, and therefore, before expensive re-

¹ Although these have always been objectives underlying the systems, the general principles of the compensation system were first articulated by the Seventh Quadrennial Review of Military Compensation in 1992 and summarized in the fifth edition of the *Military Compensation Background Papers* (Morris, 1996).

cruiting and training costs have been incurred. As such, they have proven to be an excellent method for identifying at entry individuals who are likely to complete their first term and perform successfully on tasks that are important for their military jobs. Yet, as noted by Mayberry and Carey (1997) in their analysis of the Marine Corps segment of the JPM study, the hands-on performance tests used in the JPM study do not capture all dimensions of performance under all circumstances. For example, they note that the tests “do not necessarily measure a Marine’s ability to operate in a hostile environment, or to work effectively with others” (Mayberry and Carey, p. 146). More broadly, taste, suitability, discipline, fitness, and career potential might be factors that affect performance independently of AFQT scores. Also, the focus of the JPM study was on the relationship between aptitude and performance, holding job experience constant. Performance may be revealed over time as the individual member experiences military service, that is, as his or her “goodness of fit” is learned by both the service and the individual. Individuals learn whether they enjoy the regimented lifestyle the military offers, whether they can manage successfully the inherent dangers and associated stresses, the frequent moves, the demanding work schedule, and the requirements for physical fitness. In turn, the services learn whether the individual is successful at adapting and performing in the military environment, is suitable in the current job, and has future career potential. Thus, as useful as AFQT scores and education are as metrics of entry quality and correlates of subsequent job performance, additional metrics would be useful that capture information about quality revealed on the job and over time. In this study, we use a nontraditional measure of personnel quality, the so-called “quality index.”

The quality index is a metric of personnel quality developed by Ward and Tan (1985) and extended recently by Hosek and Mattock (2002). This index is intended to reflect the overall quality of the job match between a member and the military as revealed over time, both by AFQT score and other factors. As we have suggested, determinants of this match may include innate ability but also job proficiency and knowledge, attitude, effort and initiative, ability to work successfully under duress or with others in a team environment, capabilities to learn and perform military-specific skills, and leadership and career potential in future positions. The index is formulated to be the sum of the member’s observed and unobserved quality characteristics. The observed characteristics may include the traditional measures of AFQT score and education. Observable characteristics embody the quality that can be expected at entry from such personnel. The unobserved factor reflects a persistently good or bad match relative to other personnel who appeared comparable upon enlistment. The importance of the unobserved factor to the quality index indicates the degree to which quality is revealed on the job.

The quality index is estimated using information on promotion speed for members in a given service, enlistment cohort, and occupation, where the size of the correlation in promotion speeds to E-4 and E-5 provides information about the relative importance of the unobserved quality factor. For example, holding AFQT scores constant, fast trackers will have a higher unobserved quality factor that causes them to be promoted more quickly to E-4 and E-5 relative to their peers in their occupation and enlistment cohort. To the extent that promotions are based on assessments of current performance and suitability in both current and future positions, the quality index is a more informative measure of quality than the traditional measures. Hosek and Mattock (2002) apply the Ward-Tan method using the DMDC longitudinal data used in our study, and estimate a quality index by service and three-digit Department of Defense (DoD) occupation code for enlisted personnel entering

service from FY78 to FY92. In this monograph, we regenerate the quality index for a set of illustrative three-digit DoD occupations, using the computer programs and results of the Hosek and Mattock study, and use it, together with the two traditional measures of personnel quality—AFQT score and high school diploma status—to examine whether high-quality personnel are enlisted, retained, and promoted to their early and midcareer, specifically to year of service (YOS) 4, YOS 8, and YOS 12. While our analysis of personnel outcomes in the first term is quite rich (e.g., distinguishing among entry cohorts, services and occupations), our analysis of retention and promotion through the midcareer is the main contribution of this monograph.

To answer questions about the quality of those who leave or attrite versus complete the first term of enlistment, we compare the mean quality of those who leave versus those who complete. To answer questions about the quality of reenlistees, we compare the mean quality of those who reenlist versus those who separate at the end of their first term. To answer questions about the quality of those retained through the early and midcareer years, we compare the average quality of those at the fourth, eighth, and twelfth YOS with the average quality of those who enter. These years roughly correspond to the end of the first, second, and third term of enlistment. If the average quality is higher at these points than at entry, we conclude that those who are retained are of better quality than those who separated. Finally, to answer questions about the quality of those in the upper ranks, we compare the average quality of those in the upper grades with the average quality of those in the lower grades, holding YOS constant. In the process of answering these questions, we also present trends over time in attrition, reenlistment, first-term retention, and midcareer retention.

Results

Table S.1 summarizes the results. In terms of AFQT and education, the average quality of entering recruits rose dramatically in the early 1980s, as has been well documented in previous studies; the quality index cannot be estimated for those who do not enlist. Using AFQT score as the measure of personnel quality, we find that across entering cohorts and occupational groups, the average quality of those who attrite is generally not much different than those who complete their first term, that those who reenlist are slightly lower in average quality than those who separate at the end of the first enlistment term in the Army and Navy, and that those who stay until their early and midcareers are not much different in terms of average quality than those who leave, with the exception of a few occupational areas and cohorts in the Navy and Marine Corps. In general, the differences in average AFQT scores of those retained versus those who leave are generally quite small. We also find that those in the upper grades have significantly higher AFQT scores on average than those in the lower grades, holding YOS constant. Therefore, based on AFQT scores, we would conclude that the average quality of personnel that the services recruit is the quality they generally end up keeping through the midcareer.

Table S.1
Summary of Results for Cohorts Entering FY78 to FY91: Are Higher-Quality Enlisted Personnel Recruited and More Likely to Complete Their First Terms? Are Higher-Quality Personnel Retained? Are Higher-Quality Personnel Promoted?

Question	Measure of Personnel Quality		
	AFQT	High School Diploma Status	Quality Index
Do higher-quality personnel enlist?	Yes, except for early cohorts	Yes, except for early cohorts	Not available
Do higher-quality personnel complete their first terms?	About the same	Yes, early cohorts	Yes
Are higher-quality personnel retained:			
At the end of their first term?	No, but only slightly	Yes, early cohorts	Yes
Through the early career (YOS 4)?	Slightly no	Yes, early cohorts	Yes
Through the midcareer (YOS 8)?	Slightly no	Yes, early cohorts	Yes
Through the midcareer (YOS 12)?	Slightly no	Yes, early cohorts	Yes
Have higher-quality personnel been promoted as of:			
YOS 4?	Yes	Yes, early cohorts	Yes
YOS 8?	Yes	About the same	Yes
YOS 12?	Yes	About the same	Yes

SOURCE: Authors' calculations using the Defense Manpower Data Center (DMDC) Defense Special Cohort Accession Continuer (DSCAC) file.

We find that using education, and specifically high school diploma attainment, as a measure of quality, is problematic in the later cohorts in our data (FY84 through FY92) because almost all enlisted personnel in recent years have been high school graduates. Therefore, for the later cohorts, we tend to detect little difference in the quality of those who stay, leave, or get promoted.² Using this measure, we conclude that the quality of those recruited is the quality that is retained and promoted.

However, the quality index results lead us to a different conclusion. Using the quality index as our measure of quality, we find that those who complete their first term, those who stay until the eighth or twelfth YOS (that is, to their midcareer) and those who are promoted to higher grades are of significantly higher quality. We find these results even among more recent cohorts. The conclusions we draw about the quality of personnel retained differ when we use the quality index because it is designed to include information about quality that cannot be predicted at entry but is instead revealed on the job.³

² However, when high school diploma attainment varies significantly, such as in the FY80 Army cohort, we see that the quality of those who completed their first terms, who stayed until their midcareers, or who were promoted (through YOS 8), was significantly higher than those who left or were not promoted.

³ Research from Project A shows a relationship between AFQT scores and effort and leadership (Oppler et al., 2001). We argue that the quality index incorporates both the quality that can be expected due to AFQT score and new information as revealed through the promotion process. Thus the index adds information to AFQT score. Furthermore, the focus of our study is on whether high-quality personnel are retained. Based on AFQT score, it appears that those of higher quality are neither more nor less likely to leave the service. Based on the quality index, we find that higher-quality personnel are more likely to stay.

While the quality index has clear advantages as a more informative measure of personnel quality, we should note its limitations.⁴ The quality index methodology rests on a key assumption, specifically that promotion speed to E-4 and E-5 reveals information about job-related performance during the first term. This assumption is generally reasonable to the extent that the military's promotion systems are merit based for members in a given occupation in a given service, enlistment cohort, and occupational area; our analysis is indeed conducted holding cohort, service, and occupation constant.

Though reasonable, the assumption that promotion is merit based within a cohort, service, and occupation does limit the quality index's value somewhat. With the traditional measures of quality, one could assess whether the military became more or less successful in retaining and promoting high-quality enlisted personnel within each cohort over the period FY78–FY92. Yet the quality index cannot be compared across cohorts, services, or occupations. Nevertheless, we can and do address the policy-relevant issue of whether the military was consistently successful in absolute (if not relative) terms across cohorts, service, and occupation, only within these categories.

In conclusion, the results of this study show the value of developing a measure of quality that includes information not only about entry characteristics but also about assessments of performance during and through the end of the first enlistment term. While the quality index uses information about promotion speed in the first term, other information could also be used. For example, the quality index method could be adapted to use information on promotion points awarded for supervisor ratings, skill test performance, and so on (Buddin et al., 1992), as of the end of the first term. Furthermore, the method could be expanded to incorporate information beyond the first term, such as promotions to E-5 that occur during the second term or even promotions to E-6. The development of such improved measures of quality should be a topic for future research.

⁴The limitations are discussed further in both the Ward and Tan and the Hosek and Mattock studies.