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**THE SOLDIER OF THE 21st CENTURY**

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Versatility and leadership top the requirements list for the soldier of the 21st century. The future may or may not threaten a major war, but it requires the ability to fight and win one, as well as to engage in a wide variety of smaller conflicts and other operations, such as peacekeeping. The range of demands and flow of new technology call for personnel who can learn rapidly, reach high levels of competence, adapt in the face of uncertainty, and apply a variety of skills in difficult circumstances.

To obtain a versatile, well-led force, there must be a systematic approach for identifying the factors that determine versatility and leadership and for creating the organizational structures and personnel policies needed to support the desired levels of versatility and leadership. While versatility and leadership are inherently the product of policy decisions, it cannot be taken for granted that the requirements for versatility and leadership are well understood, or that the best policies for achieving those requirements are known, or that the policies are actually in place. More to the point, it is probably far more important that adaptable processes be built than that there be a single vision of future requirements and a commitment to that vision.

Adaptability's value stems from uncertainty about the scope of contingencies, the nature of security threats, the speed and range of advances in technology, and the private-sector demand for the kind of members the military would like to recruit and retain. Dynamic workforce planning models therefore have advantages over rigid, input-output planning models. Dynamic models can select policies

that are robust to uncertainty and find the least-cost path to changed future requirements. The modeling technology exists, so the feasibility of using such models is not in question. What is important is how to assure that the model's data requirements are satisfied and that the model's structure supports the analysis of policy alternatives.

This chapter is not about a particular model, but about factors relevant to developing and supporting the use of dynamic models in defense manpower planning. The discussion looks to the future, to the past, and to theory. Different kinds of future forces that may affect the quantity and quality of personnel needed are described, and the experience of the all-volunteer force that bears on the services' ability to attract and manage high-quality personnel is reviewed. Among other things, this history includes a Department of Defense (DoD) willingness to conduct controlled experiments and field studies to learn about the cost and effectiveness of policy alternatives. Finally, the chapter discusses theoretical concepts underlying the structure of military compensation, a key policy instrument for meeting future manning requirements. Although the common table of basic pay has been the core of military compensation, larger pay differences across occupations and by experience will likely be needed if career lengths are to differ by occupation.

## **VISIONS OF THE FUTURE**

To imagine the range of future needs, consider visions of future forces: the cyber soldier, the information warrior, peace operations, the rapid response force, low-manning vessels, and evolutionary change. These visions will, no doubt, change over time; they are set out here only to emphasize the diversity of requirements they imply. These visions typify a range of responses to the emergence of the new world order and the advance of technology, with its application to better defense. They are not, however, alternatives to one another: they could all occur.

### **Cyber Soldier**

The cyber soldier belongs to a small unit whose mission is to penetrate enemy territory, engage in surveillance and reconnaissance

with the assistance of advanced sensors, and call in remote-fire precision guided weapons. Cyber soldiers will need to be of high quality. The introduction of cyber units will involve organizational changes to assure smooth connections from the unit to the command and control (C2) centers. The cyber soldier concept relies on foreseeable advances in sensor technology, integrated and secure information networks, and computer software capable of tracking large numbers of targets, assigning weapons to them, and firing via remote command. The cyber soldier is entrusted with the decision to fire costly (e.g., million-dollar) weapons and can operate in a stealthy fashion, avoiding detection and capture. The technologies that enable the cyber soldier mean that greater lethality can be achieved with fewer people, with fewer casualties, and, perhaps, at a lower cost (depending on weapon cost and accuracy, as well as how correct the decisions to fire those weapons are). Thus, the cyber soldier concept could reduce the need for large ground forces. The small groups of special operators that fanned out in Afghanistan during 2001–2002, serving as spotters for bringing distant weapons to fire on Taliban and Al Qaeda opponents, were a foretaste of the cyber soldier.

### **Information Warrior**

Enemies will employ asymmetric tactics to harm the United States. In this particular vision, a small number of hackers and terrorists may seek to disrupt information systems in the armed forces and national economy. To counteract this threat, the armed forces have a cadre of highly capable personnel, including contractors, that help develop secure systems, restore systems that have been attacked, trace the source of the attack, and assist in apprehending the attackers. In addition, there is an information warfare capability. Information warriors are up-to-date experts in hardware and software and develop a detailed knowledge of the vulnerabilities of an adversary's information infrastructure. Like pilots and doctors, information warriors have excellent private-sector opportunities (e.g., in safeguarding corporate information systems). Information warriors may be organized into their own units, much as the Air Force has organizations for space systems and missiles.

## **Peace Operations**

Peace operations include disaster relief, humanitarian operations, peacemaking, peacekeeping, nation building, border patrol, and relationship strengthening (such as joint planning exercises and the assignment of U.S. personnel as advisors). With frequent peace operations comes the requirement for a force structure capable of handling several different small-to-medium contingencies at any given time. For some peace operations—such as disaster relief, humanitarian operations, nation building, and peacekeeping—having personnel on the ground is essential, and they need few skills or aptitudes beyond what they have today. But for other peace operations—such as those involving guerillas, urban terrain, large and well-armed adversaries, or chemical, biological, or nuclear weapons (i.e., weapons of mass destruction, or WMD)—special skills and tactics are required. Depending on the variety of peacekeeping operations needed, the services may form specialized units of personnel who are qualified in multiple skills and who take part in unit training for a diversity of threats.

## **Rapid Response Force**

Because a rapid response can reduce the scope, risk, and cost of a major contingency, each service maintains units to deploy on short notice. These units may not require a different quantity or quality of personnel, but they will have undergone unit training and combined-unit training to maintain a high level of readiness. Current training focuses on the possibility of deployment to the next likely trouble spot. To support the rapid response units, logistics are flexible and lean. Supply and repair capabilities are efficient, with no long waits for parts or supplies crucial to the mission. The Air Force, for example, has reorganized as an expeditionary force, a change consistent with reduced overseas basing and an awareness that contingencies can occur anywhere.

## **Low-Manning Vessels**

Labor-saving technologies will allow the services to fulfill their traditional roles and missions with fewer personnel. The Navy builds highly automated vessels that need few crew members. For every

combat position eliminated, two to three fewer combat support crew members are needed. And this reduction, in turn, means a reduced number of support personnel are needed for laundry, mess, and the like. Redundant operating systems help sustain the vessel in case of attack or system failure. Crew members need to know how to operate at least one system and, often, two—e.g., automated weapons, navigation, or propulsion, and responses to system breakdown or damage from attack. Even advances in paint make a difference in the number of crew members required on older Navy ships: highly durable paints reduce the number of Gen Dets (general detail personnel) required to maintain a vessel. Other services also benefit from new technology. For instance, an increased reliance on drone vehicles for reconnaissance reduces the demand for pilots, crews, maintenance, and repairs (although it may also increase the demand for intelligence and communications personnel).

### **Evolutionary Change**

Some variant of major theater war (MTW) is always in the set of future planning scenarios. The prospect of MTW points toward evolutionary change, a slow, formidable process that includes force modernization, the incorporation of maturing technologies, and the gradual impact of these two elements on organization and doctrine. Preparedness for major war remains the benchmark for judging military readiness. Not surprisingly, the rationale for many military assets—tanks, helicopters, aircraft, missiles, ships, submarines, artillery, military hospitals, etc.—comes from major war. Peace operations are lesser-included cases that can be handled by a subset of the forces and resources. Moreover, change can be hard to accelerate. The acquisition life cycle of new weapons is about two decades. As force modernization occurs, old equipment dating from the 1950s through the 1970s will be replaced by versions of equipment whose development began in the 1980s and 1990s. Thus, procurement over the next five to 10 years is unlikely to bring surprises in the form of wholly new equipment or systems not included in today's acquisition outlook.

Modernization involves a host of changes: digitization of the battlefield; the use of advanced information systems in logistics, administration, and medical care; and improved precision guided munitions

(PGMs), increases in stealth, improved body armor for personnel, and so forth. To many observers, the combination of advances in information technology, engineered materials, and sensors provides the foundation not just for an evolution but for a revolution in military affairs (RMA). Yet change is usually gradual and tends to lead to functions that are similar but have greater capability, a fact that has two implications for defense manpower. First, if today's personnel satisfy current military requirements, they should be adequate in the near term—i.e., the same knowledge, skills, and aptitudes are likely to be appropriate. Second, there should be enough time to change the kind of personnel or their preparation as needed. This does not necessarily mean, however, that today's personnel management and compensation policies are well suited to support such change, or even that the policies are sufficient to maintain the status quo.

Table 7.1 summarizes the different visions with respect to the need to change the organizational structure, the use of new technology, the impact on total manpower requirements, and the demand for high-quality personnel. Most changes will probably be evolutionary, yet change in technology, doctrine, or strategy might lead to radical change in manpower requirements for specific force elements.

**Table 7.1**  
**Comparing the Six Visions of the Future in Terms of Needed Changes**

Vision	Organizational Change	New Technology	Manning Requirements	Personnel Quality
Cyber soldier	Yes	Yes	Decrease	High
Information warrior	Maybe	Yes	Increase	High
Peace operations	Maybe	Maybe	Same	Same
Rapid response	Yes	Maybe	Same	Same
Low-manning vessels	No	Yes	Decrease	High
Evolutionary change	Gradual	Gradual	Gradual	Gradual

## EXPERIENCE OF THE ALL-VOLUNTEER FORCE

If versatility and leadership are needed in all visions of future forces, it is worthwhile to reflect on what these concepts mean. To a great extent, both depend on the quality of service members recruited and retained. In the years of the all-volunteer force, a great deal has been

learned about why quality is important to military capability and how much policy action (or inaction) can influence the quality of the force. That knowledge is the background for the analysis and choices ahead.

### **Versatility and Leadership**

Versatility is the ability to engage in multiple activities. At the individual level, training, experience, and aptitude contribute to versatility. Training provides the knowledge and skills required for certain tasks performed on duty assignments; military training typically consists of basic training, advanced individual training, and on-the-job training. Depending on the specialty's complexity, an enlisted person progresses from entry to intermediate to high skill level. The Air Force describes these as skill levels 3, 5, and 7, for example, which are analogous to apprentice, journeyman, and master levels in trade unions. As their experience increases, personnel work on different tasks, equipment, and missions in a wider range of activities, and their versatility increases. Aptitudes measured include, among others, verbal, quantitative, spatial, mechanical, and coding speed (how fast a person can assimilate new information). The U.S. military measures aptitudes with the Armed Services Vocational Aptitude Battery (ASVAB); it summarizes verbal and quantitative aptitudes in the Armed Forces Qualification Test (AFQT) score.

The concept of versatility goes beyond the individual service member. Peace operations in the 1990s often did not require units to perform missions different from their MTW missions; peace missions were mostly a subset of war missions. But the organizational versatility to handle frequent peace operations and yet maintain readiness for MTW was limited. Peace operations created organizational stress because they interfered with training and exercise programs, affected the planned rotation of personnel overseas, and sometimes reduced the quantity and quality of equipment available to nondeploying units. Moreover, there was no budgetary process for prompt funding of the services' added cost of peace operations, and the objective, scope, and duration of certain peace operations were uncertain. Over time, however, peace operations may have induced the services to become more agile and to handle such operations at lower budgetary cost and with less impact on readiness. In addition, peace operations

may have provided information about the effectiveness and vulnerability of current doctrine, equipment, and training.

Because versatility depends on training, experience, and aptitude, it comes at a cost. Senior, experienced personnel cost more than junior personnel, and high-aptitude personnel, who often have better private-sector opportunities, will be bid away unless a military career offers sufficient opportunity for advancement and compensation. Thus, when the services make decisions about desired recruit quality and force experience mix, they are implicitly making decisions about versatility and cost.

Leadership skills, like other human capital, can be strengthened through training, education, and experience. In addition to having specific knowledge about an area (e.g., gunnery, logistics, medicine, intelligence), a leader should be able to identify key objectives, allocate resources efficiently toward them, foster unit cohesion, and motivate personnel to perform at high levels.<sup>1</sup> Allocative efficiency involves balancing marginal gains against marginal costs in a decisionmaking environment that is typically dynamic and uncertain. Poor allocative efficiency implies the leader is not making the most of versatile personnel.

Unit cohesion concerns how well a team functions as a result of its members' knowledge of one another's capabilities and commitment to a common objective.<sup>2</sup> In one view of combat leadership, individual performance follows from cohesion because "unit members are bonded together in their commitment to each other, the unit, and its purposes."<sup>3</sup> But this view does not suggest a mechanism for how cohesion is created. According to another view, cohesion will increase if

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<sup>1</sup>According to William Darryl Henderson (*Cohesion: The Human Element in Combat*, National Defense University Press, Washington, DC, 1985, p. 11): "The leader must transmit organizational goals or objectives effectively from the chain of command to the small, cohesive group. Then he must lead the unit in achieving these objectives through his personal influence and technical expertise. The leader must also maintain unit cohesion by ensuring continuous organizational support and by the detection and correction of deviance from group norms. Finally, the leader assists in making or maintaining an ideologically-sound soldier by setting an example, by teaching, and by indoctrinating."

<sup>2</sup>This describes *task* cohesion, not *social* cohesion.

<sup>3</sup>Henderson, *Cohesion*, p. 23.

a leader can improve performance: “While cohesiveness may indeed lead the group to perform better, the tendency for the group to experience greater cohesiveness after successful performance may be even stronger.”<sup>4</sup> A leader can presumably improve performance, and hence cohesion, by improved allocation of unit resources under uncertainty.

### **Attracting Quality Personnel**

The volunteer force is premised on the ability to set military pay high enough that the supply of volunteers equals manpower requirements. Before the volunteer force, conscripts were paid below their average market wage. Moreover, even if their pay had equaled the average wage, the involuntary nature of conscription meant that a sizable portion of entering personnel would still have paid a “conscription tax”—i.e., the difference between the wage required to induce the person to enlist voluntarily and the military wage. Individuals with a high market wage or a low taste for the military had high reservation wages and therefore paid a high conscription tax. It is not surprising that first-term attrition was high among conscripts. Countries that still rely on conscription, such as Germany, Italy, and Russia, set a short mandatory term of service (a year or less). They thus have high turnover and low experience in their junior force.

The shift to an all-volunteer force in 1973 required a large increase in entry pay. Monthly pay for an enlistee rose from \$144 in January 1971 to \$288 in January 1972 and \$307 in October 1972. As a result, the cost of first-term personnel, who made up about 50 percent of enlisted personnel, became a greater factor for a service to consider in determining personnel force size and experience mix.

The volunteer force began successfully but then faltered, in the late 1970s, as military pay fell relative to private-sector pay. This caused the services difficulty in meeting their recruiting and retention targets, and the quality of recruits declined, particularly in the Army. Lower-quality recruits had higher attrition rates and were less likely to complete training successfully. Given these circumstances, the

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<sup>4</sup>Brian Mullen and Carolyn Copper, “The Relation Between Group Cohesiveness and Performance: An Integration,” *Psychological Bulletin*, Vol. 115, 1994, pp. 210–227.

services and the Office of the Secretary of Defense (OSD) initiated research on whether higher-quality soldiers were cost-effective. The research included controlled experiments on enlistment incentives for the active and reserve forces, controlled trials that measured the effect of quality and experience on the performance of mission-essential tasks, and specially designed surveys and field studies related to the relationship between experience and productivity. The tools and methods used in this research were necessary to obtain solid, unbiased estimates of policy alternatives that in most cases had not been tried before and thus could not be studied using historical data.

While the research was under way, Congress boosted military pay by 26 percent between 1980 and 1982, increased recruiting resources, and raised individual enlistment incentives. The Army and Navy introduced their “college funds” to supplement the basic educational benefits available from the GI Bill, and all services made greater use of enlistment bonuses. Reenlistment bonuses were increased in size and offered to more specialties. In addition, the 1982 recession spurred both recruiting and retention. Within a few years, these factors produced large improvements in recruit quality and the retention of experienced personnel.

Table 7.2 summarizes the results of selected analyses of personnel productivity.<sup>5</sup> Of the four indicators of personnel productivity shown—education, AFQT score, experience, and unit stability—the first two are the foremost measures of enlisted personnel quality. Recruits with a high school degree who also score in the upper half of the AFQT score distribution are classified as high quality. Unit stability means a slow turnover of personnel in the unit and hence more experience together on average. Whereas education, AFQT score, and experience are person-specific measures of quality, unit stability is not.

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<sup>5</sup>The table is mainly based on articles cited in John T. Warner and Beth J. Asch, “The Economics of Military Manpower,” in Keith Hartley and Todd Sandler (eds.), *Handbook of Defense Economics, Volume I*, Elsevier, New York, 1995, pp. 368-373, although several other articles were also used.

**Table 7.2**  
**Factors Affecting Personnel Productivity**

Output Measure	Education	AFQT Score	Individual Experience	Unit Stability
Sorties			√ (a)	
Mission capable rates	√ (b)	√ (b)	√ (a)	√ (c,d)
Maintenance downtime	√ (b,c)	√ (b,c)	√ (b)	
Multitasking			√ (e)	
Supervisor ratings			√ (f)	
Job performance tests	√ (g)	√ (g,h,i,j)	√ (k)	√ (h)

<sup>a</sup>A. Marcus, *Personnel Substitution and Naval Aviation Readiness*, P-3631, Center for Naval Analyses, 1982.

<sup>b</sup>Laura I. Junor and Jessica S. Oi, *A New Approach to Modeling Ship Readiness*, CRM 95-239, Center for Naval Analyses, 1996.

<sup>c</sup>S. Horowitz and A. Sherman, "A Direct Measure of the Relationship Between Human Capital and Productivity," *Journal of Human Resources*, Vol. 15, pp. 67–76, 1980.

<sup>d</sup>Russell W. Beland and Aline D. Quester, "The Effects of Manning and Crew Stability on the Material Condition of Ships," *Interfaces*, Vol. 21, pp. 111–120, 1991.

<sup>e</sup>Glenn Gotz and Richard E. Stanton, *Modeling the Contribution of Maintenance Manpower to Readiness and Sustainability*, R-3200-FMP, RAND, 1986.

<sup>f</sup>Mark J. Albrecht, *Labor Substitution in the Military Environment: Implications for Enlisted Force Management*, R-2330-MRAL, RAND, 1979.

<sup>g</sup>Thomas V. Daula and D. Alton Smith, "Are High Quality Personnel Cost Effective? The Role of Equipment Costs," *Social Science Quarterly*, Vol. 73, pp. 266–275, 1992.

<sup>h</sup>Barry L. Scribner, D. Alton Smith, Robert H. Baldwin, and Robert Phillips, "Are Smarter Tankers Better? AFQT and Military Productivity," *Armed Forces and Society*, Vol. 12, pp. 193–206, 1986.

<sup>i</sup>Bruce Orvis, Michael Childress, and J. Michael Polich, *The Effect of Personnel Quality on the Performance of Patriot Air Defense System Operators*, R-3901-A, RAND, 1992.

<sup>j</sup>John D. Winkler and J. Michael Polich, *Effectiveness of Interactive Videodisc in Army Communications Training*, R-3848, RAND, 1990, and Judith C. Fernandez, "Soldier Quality and Job Performance in Team Tasks," *Social Science Quarterly*, Vol. 73, pp. 253–265, 1992.

<sup>k</sup>C. Hammond and S. Horowitz, *Flying Hours and Crew Performance*, P-2379, Institute for Defense Analyses, 1990, and *Relating Flying Hours to Aircrew Performance: Evidence for Attack and Transport Missions*, P-2608, Institute for Defense Analyses, 1992.

As the table shows, the analyses used different measures of output. Sorties are a direct measure of current output—aircraft sorties produced per day. Mission capable rates indicate a capacity, in this case how well a ship is ready to perform its mission, where readiness depends on equipment availability and operability and personnel availability and training readiness. Maintenance downtime is an indirect measure of maintenance output; multitasking indicates the extent to which personnel with multiple-skill training differed from single-skill personnel in their ability to handle different items for repair that arrive randomly. Supervisor ratings are not tied to any specific production process; supervisors were asked to assess a person's productivity at  $y$  months ( $y < 48$ ) in the first term compared with the "typical" productivity at 48 months. Job performance tests measure the capacity to perform a job such as multichannel radio equipment repair, the operation of Patriot missiles, or the operation of a tank.

In every case, the indicators of personnel quality had a positive effect on output. The results for education and AFQT vindicated the services' earlier push to increase recruit quality and confirmed what the services were reporting from field experience: high-quality personnel outperform low-quality personnel. Experience measured by years of service was also positively related to output. Since experience was a factor in all the studies, the robustness of its effect is clear. As shown and discussed below, experience levels rose throughout the 1980s and into the 1990s, increasing military capability.

After the late-1970s crisis, personnel quality improvements were nothing short of dramatic. Table 7.3 shows the percentage of recruits who were high school graduates and the percentage defined as high quality. From 1975 to 1980, the Army recruited less than 60 percent high school graduates at a time when 80 percent of 18–24 year olds had a high school degree. By 1980, only 21 percent of its recruits were high quality. By comparison, consider that the median value of the AFQT score was normed at 50 in 1980 for a nationally representative sample of the youth population. Given that 80 percent of youths were high school graduates, at least 40 percent should have been defined as high quality. The Navy's percentage of high-quality recruits was around the national average, the Marine Corps's was below average, and the Air Force's was well above average.

**Table 7.3**  
**Percentage of Recruits That Are High School Graduates and Percentage That Are High Quality, by Service and Year<sup>a</sup>**

Service	1975	1980	1985	1990	1995	1997
Army						
High school graduate	58	52	86	94	94	90
High quality <sup>b</sup>	38	21 <sup>c</sup>	49	61	64	58
Navy						
High school graduate	74	74	88	90	92	95
High quality	49	44 <sup>c</sup>	49	53	60	61
Marine Corps						
High school graduate	47	70	90	93	95	96
High quality	32	35 <sup>c</sup>	49	61	62	62
Air Force						
High school graduate	87	84	99	99	99	99
High quality	63	56 <sup>c</sup>	67	84	82	77

SOURCE: *Population Representation in the Military Services, Fiscal Year 1997*, pp. D-12 and D-14.

<sup>a</sup>These are all non-prior service accessions.

<sup>b</sup>High-quality individuals are defined as those who score in the upper half of the AFQT distribution and have a high school degree.

<sup>c</sup>Values reflect test misnorming that led to inflated 1977–1981 scores.

By 1985, a turnaround had occurred. In the Army, Navy, and Marine Corps, the percentage of recruits with a high school degree was 5 to 10 percentage points above the national average, and the percentage of recruits that were of high quality, at 50 percent, was also above the national average. These values continued to increase into the 1990s; by 1995, the Army had 94 percent high school graduates and 64 percent high-quality recruits. The Navy and Marine Corps had over 92 and 95 percent high school graduates, respectively, and 60 and 62 percent high-quality recruits. The Air Force also made substantial gains. In 1995, 99 percent of its recruits were high school graduates and 82 percent were high quality. But recruit quality fell after 1995 because of the strong economy and the increase in college atten-

dance, again demonstrating the need for policy action to be responsive to changes in the external environment.

Table 7.4 shows experience trends for enlisted personnel and officers. The large increase in enlisted experience allowed the services to reap substantial benefits from the higher quality of recruits: more expected years of service, higher performance during those years, and, perhaps, a greater increase in performance with experience because high-quality personnel probably learn faster. Average years of service increased by over a third for enlisted personnel and by 10 percent for officers from 1980 to 1995. Enlisted experience reached 7.4 years in 1997, versus 5.5 years in 1980, partly because of the increase in the percentage of recruits with high school degrees and the fact that their attrition was lower. In the early 1980s, the first-term attrition rate was approximately twice as high for non-high school graduates as for graduates. As the services, especially the Army, reached over 90 percent high school graduates, attrition fell and years of service increased.<sup>6</sup> Officers averaged 9.9 years of service in 1980 and 10.8 in 1997, indicating that an additional year of service

**Table 7.4**  
**Average Years of Service and Percent Increase in Mean Years for Enlisted Personnel and Officers**

	1980	1985	1990	1995	1997
Average years of service					
Enlisted	5.5	6.0	6.8	7.4	7.4
Officers	9.9	9.9	10.4	10.7	10.8
Percent increase since 1980					
Enlisted	—	9	23	34	34
Officers	—	0	5	8	10

SOURCE: *Population Representation in the Military Services, Fiscal Year 1997*, pp. D-17 and D-27.

<sup>6</sup>In the late 1990s, Army first-term attrition was once again high, upwards of 35 percent. This was in part due to the Army's tightening of its training standards. Other causes were the more immediate accession of recruits from the delayed entry pool—i.e., recruits who would have dropped out while waiting to enter service instead dropped out during training. Increases in smoking and decreases in physical fitness also played a role.

was gained from these personnel, which is advantageous given their high costs of accession and training and long learning curves.

The gain in quality and experience was driven by systemic changes. Higher pay, bonuses, educational benefits, increased recruiting resources, improved recruiter management, and a recession led to better recruiting and retention. Higher recruit quality and higher retention rates both meant lower attrition, hence less need to recruit. This allowed the recruiting establishment to focus more on attracting high-quality recruits, which fed the positive cycle. These factors worked together fairly rapidly; much of the revolution in recruit quality occurred between 1980 and 1985. Most of the gain in high school graduates had been attained by 1985, and probably over half the gain in high-quality recruits had been attained by then.<sup>7</sup>

The negative cycle at the end of the 1970s was comparably rapid.<sup>8</sup> Both cycles reflected the potential hazards and benefits of an all-volunteer force. The late-1970s cycle destabilized the volunteer force concept, whereas the early-1980s cycle demonstrated the potential for recovery. Both episodes underscore how dependent the volunteer force is on good management, especially in compensation and recruiting. Also, even though both cycles lasted only a short time, their effects on the force quality were long lasting. Just as high-quality recruits produced the benefits described above, lower-quality recruits pointed to less military capability. They had lower pass rates in training, higher attrition and hence more unit turbulence, and lower

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<sup>7</sup>In 1980, the recorded percentage of high-quality recruits was inflated by an error in test norming. Therefore, the gain in high quality from 1980 to 1985 was actually greater than shown in Table 7.3.

<sup>8</sup>Military/civilian pay fell throughout this period; the GI Bill, an enlistment incentive, was allowed to lapse; and the national economy improved as unemployment fell from 8.5 percent in 1975 to 5.8 percent in 1979. Recruit quality and retention rates sank, reaching perilous lows in 1980. Further, the ASVAB misnorming masked an even lower quality of recruits. The decline in recruit quality fed higher attrition, and higher attrition plus lower retention kept recruiting requirements high. Recruiting resources were not immediately increased, however, so recruiters were hard pressed to make their goals. In a scramble, they shifted more of their effort away from high-quality prospects to the easier-to-recruit segments of the market—non-graduates and those scoring in the lower half of the AFQT score distribution. As a result, although the recruiters largely succeeded in meeting their recruit quantity goals, the proportion of high-quality recruits fell.

scores on tests of skills and knowledge. The services, particularly the Army, tried to thin out low performers by tightening reenlistment standards, but a large portion of lower-quality personnel reenlisted nonetheless.

Is the conventional definition of high-quality enlisted personnel—i.e., having a high school degree and scoring in the upper half of the AFQT score distribution—too narrow? Although these two indicators are associated with high performance, research has shown (Table 7.2) that only on-the-job experience can reveal certain important but previously unobserved aspects of quality, such as effort, reliability, leadership, ability to work as part of a team, and communication skills.<sup>9</sup>

Information about unobserved quality can be inferred from a person's speed of promotion in the first term.<sup>10</sup> If, when education and AFQT are held constant, a person reaches E-4 faster than his or her peers, this might indicate the person is high quality, but it might also simply be a good random outcome. However, a person who reaches both E-4 and E-5 early is probably a high-quality individual. By analyzing promotion to E-4 and E-5, the net effect of the unobserved quality can be detected, although the individual aspects themselves cannot be identified. Empirical work suggests that unobserved quality plays a major role in accounting for the variation of quality among individuals, a role larger than that of education and AFQT.

In addition, quality and later outcomes appear to be linked. Analysis based on the extended measure of quality indicates that those who perform well in their first term stay for longer careers and reach higher ranks that have leadership responsibilities. Putting this in perspective, since education and AFQT contribute to superior performance, it is advantageous to keep these higher-quality personnel. But personnel with high AFQT scores are actually slightly more likely to leave service after the first term than are personnel with low AFQT

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<sup>9</sup>Along the same lines, SAT scores predict which students will do well at elite colleges but have far less to say about subsequent earnings.

<sup>10</sup>Michael P. Ward and Hong W. Tan, *The Retention of High-Quality Personnel in the U.S. Armed Forces*, R-3117-MIL, RAND, 1985; James R. Hosek and Michael G. Mattock, *Learning About Quality: How the Quality of Military Personnel Is Revealed over Time*, MR-1593-OSD, RAND, 2002.

scores—an empirical fact that has been known for some time. It suggests that the civilian labor market offers somewhat better career opportunities for high-aptitude individuals than does the military, but this is speculation. The good news is that the military tends to keep personnel who perform well on duty, after controlling for AFQT score.<sup>11</sup>

It is worth mentioning several other issues related to the all-volunteer force that may have a place in future, dynamic models for personnel management. While these may not return as prominent issues, they have been of significant concern in the past. Specifically, critics of the volunteer force have questioned its viability given demographic trends, have decried its seemingly perverse impact on the military as a national institution, and have suggested its potential for weakening societal support for the military.

The first of these concerns—that the high accession requirements of an all-volunteer force could not be supported by the decreasing size of youth population cohorts—became moot as accession requirements fell in the early 1980s. The percentage decrease was greater than the projected percentage decline in the youth population from its high point in 1979 to its low point in 1995. The services also recruited more women.

The second concern was that the all-volunteer force would convert the military from “an organizational format that is predominately institutional to one that is becoming more and more occupational.”<sup>12</sup> This would affect the legitimacy of and social regard for military service by replacing normative values, such as honor, duty, and country, and “esteem based on notions of service” with “prestige based on level of compensation.”<sup>13</sup> Military personnel would no longer define their role commitment and military reference groups in

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<sup>11</sup>Related work has found that with education and AFQT held constant, personnel expecting faster promotion to E-5 are more likely to reenlist—another sign of proselectivity (Richard Buddin, Daniel S. Levy, Janet M. Hanley, and Donald M. Waldman, *Promotion Tempo and Enlisted Retention*, R-4135-FMP, RAND, 1992).

<sup>12</sup>Charles C. Moskos, “Institutional and Occupational Trends in the Armed Forces,” in Charles C. Moskos and Frank R. Wood (eds.), *The Military: More Than Just a Job?* Pergamon-Brassey’s, New York, 1988, p.15.

<sup>13</sup>Moskos, “Institutional and Occupational Trends.”

terms of their military peers, but instead would make comparisons to civilian occupations. The structure of compensation would shift toward salary and bonuses and away from noncash and deferred compensation.

Although the military changed under the all-volunteer concept, there is little evidence it became a weaker institution or a less capable force or was held in lower esteem by society. The volunteer concept eliminated the conscription tax and proved successful in meeting manpower requirements when pay and recruiting resources were sufficient. It is unclear whether military personnel became less likely to define themselves relative to their military role and military peers. Even under conscription, the military was a volunteer force beyond the first term of service for enlisted personnel or beyond the minimum service obligation for officers; the conversion to an all-volunteer force changed the front end. Senior personnel, those volunteering to remain in service, compare their pay and careers to those in the civilian sector as they no doubt did before the all-volunteer force.

The third concern—about an all-volunteer force weakening societal support for the military—stemmed from the observation that the fraction of the youth population serving in the military had declined. Additionally, fewer members of Congress had military experience. Table 7.5 shows enlistment figures for 18-year-olds for 1955 through 2000. In 1960, 1965, and 1970, about one in four young men entered the military. By 1980, about one in seven joined; and a decade after the Cold War, one in 12 joined. The percentage of young women entering has grown since the all-volunteer force began, but at around 2 percent, it remains small.<sup>14</sup> Still, it is not obvious that the decline in the percentage of young men entering the military reduced society's regard for the military or weakened Congress's resolve to keep the military strong. Fewer youth served because the volunteer force succeeded in keeping personnel longer.

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<sup>14</sup>The table focuses on non-prior service enlistment, but its message would be little changed by including officers. Officers would add about 1 percentage point to the percentage of males entering service and 0.2 percentage point to the percentage of females.

**Table 7.5**  
**Enlistment Figures for 18-Year-Olds, 1955–2000**

Year	18-Year-Olds (in thousands)		Non-Prior Service Accessions			Percent Accessing	
	Men	Women	Men	Women	Total	Men	Women
1955	1,074	1,068	611 <sup>a</sup>	12 <sup>a</sup>	623	56.9	1.1
1960	1,323	1,289	381 <sup>a</sup>	8 <sup>a</sup>	389	28.8	0.6
1965	1,929	1,875	406	8	414	21.0	0.4
1970	1,914	1,868	619	13	632	32.3	0.7
1975	2,159	2,097	374	36	410	17.3	1.7
1980	2,156	2,089	303	49	352	14.1	2.3
1985	1,877	1,809	259	—	297	13.8	2.1
1990	1,849	1,755	193	30	223	10.5	1.7
1995	1,796	1,710	138	29	167	7.7	1.7
2000	2,011	1,918	160	33	193	8.0	1.7

SOURCE: *Population Representation in the Military Services, Fiscal Year 1997*, pp. D-1 and D-10.

<sup>a</sup>Author's estimate.

### Economic Theories of Compensation

Military compensation plainly is a key policy instrument for attracting and keeping high-quality personnel and for shaping the personnel force. According to a global survey of pay, “The increasing importance of human capital is transforming pay and the lives of the human resources managers who administer it. Companies see pay as their main tool for recruiting, motivating and retaining good people. All three are important.”<sup>15</sup> Another observation: “The true value of a business (or, for that matter, of a household or a country) is often not fully reflected in the audited numbers because markets value assets that don’t show up on the balance sheet. What is the key asset not shown on the balance sheet? It sounds too simple, but a good part of it is people. In today’s knowledge-based economy, nothing equals the contribution of people.”<sup>16</sup> In theory, compensation can be structured in different ways for different purposes.

<sup>15</sup>*The Economist*, “A Survey of Pay,” May 8–14, 1999, unnumbered.

<sup>16</sup>Michael Milken, “From the Chairman,” *Milken Institute Magazine*, First Quarter, 1999.

Military compensation includes basic pay, allowances, special and incentive pay, educational benefits, and retirement benefits.<sup>17</sup> Basic pay now depends solely on rank and years of service. The chief allowances are for subsistence and housing. The sum of basic pay, the subsistence allowance, the housing allowance, and the implicit tax advantage from the nontaxability of the allowances is called *regular military compensation*. Special pay supplements are associated with arduous or dangerous duty—e.g., sea pay, submarine pay, aviator continuation pay, and imminent danger pay (formerly called hazardous duty pay). Incentive pay, such as enlistment and reenlistment bonuses, is paid selectively by military occupation and changes in response to the supply of personnel. Educational benefits are available to enlisted personnel through the Montgomery GI Bill and to officers through Reserve Officers Training Corps (ROTC) scholarships and appointments to the service academies. The services supplement the GI Bill benefits with their “college funds” to attract high-quality recruits for certain military occupations. Retirement benefits do not vest until the 20th year of service, are payable immediately upon retirement from the service, and pay approximately 40 to 75 percent of basic pay depending on rank and years of service at time of retirement. There are many other elements of military compensation—uniform allowances, relocation reimbursement, and so forth—but these are more incidental in nature.<sup>18</sup>

The following subsections describe five theoretical perspectives on, or models of, compensation—general human capital, specific human capital, motivation of effort, initial sorting, and tournaments—and how these relate to military compensation.

**General Human Capital.**<sup>19</sup> General human capital is assumed to be equally valuable in alternative uses—for instance, as valuable in the

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<sup>17</sup>A comprehensive description of military compensation and its legislative background may be found in *Military Compensation Background Papers*, 5th ed., Department of Defense, Office of Secretary of Defense, 1996.

<sup>18</sup>In addition, the military provides health care to service members and health care coverage to their families, and attends to the schooling of dependents (e.g., by arranging to provide it directly or by compensating local school districts to allow the children of military families based nearby to attend).

<sup>19</sup>The seminal contributions are Gary S. Becker, “Investment in Human Capital: A Theoretical Analysis,” *Journal of Political Economy*, Vol. 70, October 1962, pp. 9–49;

military as in the private sector. Common instances of general human capital are elementary and secondary schooling, and verbal and quantitative skills. Money and equipment constitute investments in human capital, as does the individual's time. The main cost to the individual comes from forgone earnings during the time spent in school or training. Because general human capital can be used anywhere, the employer has no incentive to pay for it, and the worker bears the full cost and receives all the returns. An employer that paid for the investment could not expect to capture the returns without paying the worker a wage above his marginal value product. Such a wage would cause the worker to remain with the employer, but it would also cause the employer to lose money. Therefore, the worker bears all the cost, and the worker's subsequent wage just equals his marginal value product. Thus, in this model, the costs and returns to human capital investment are entirely the worker's, the worker receives a wage equal to marginal value product in each period, and the worker has no incentive to stay with a particular employer.

If education is taken to be an indicator of general human capital, it follows that military compensation must keep pace with market wage for those with education in order to maintain a flow of recruits. One way to judge whether compensation is keeping pace is to compare military pay with the market wage for a particular group. For instance, we can compare regular military compensation for an E-4 with the wage deciles of 22- to 26-year-old white males who are full-time year-round workers.<sup>20</sup> Military pay was at a value equal to the 50th percentile (median wage) in 1982, rose over the next few years to above the 60th percentile, subsided, and then rose sharply to the 70th percentile as the nation's economy slowed down and entered a recession in the early 1990s. The increase in military pay over this period thus fueled the increase in recruit quality. But from 1993 to 2000, military pay fell, relatively, and the services reported increasing difficulty in recruiting.<sup>21</sup>

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and Jacob Mincer, "On-the-Job Training: Costs, Returns, and Some Implications," *Journal of Political Economy*, Vol. 70, October 1962, pp. S50-S90.

<sup>20</sup>Regular military compensation equals the sum of basic pay, basic allowance for subsistence, basic allowance for housing, and a tax adjustment account for the allowances not being subject to federal income tax.

<sup>21</sup>For further discussion, see Beth Asch, James Hosek, and John Warner, *On Restructuring Enlisted Pay*, AB-468-OSD, RAND, December 2000.

**Specific Human Capital.**<sup>22</sup> Suppose an employer can profit from a firm-specific investment in a worker if the worker remains at the firm. The only way the employer can be sure to retain the worker is to pay more than the worker can get elsewhere. The employer can do this by using part of the returns to support the increased wage. But on the margin, if the employer shares the returns but pays the full cost of the investment, the investment is unprofitable. A feasible alternative is for the employer to allow the worker to participate in the investment, sharing the returns and costs proportionately. Then the worker's wage is less than his or her opportunity wage during the investment phase and more than the opportunity wage afterwards. The employer pays part of the investment cost and afterwards receives a stream of returns equal to the difference between the worker's marginal value product and wage. Because of the sharing, the worker's wage profile is not as steep as it would be for an equal-size investment in general human capital, where the worker would bear the full cost and receive the full returns.

The specific human capital model suggests why workers at a firm who have greater seniority and who are more educated are less likely to be laid off or dismissed during a business slump. These workers tend to have more firm-specific capital invested in them. Since a worker's marginal value product exceeds his or her wage, there is room for a decrease in the marginal value product before it drops below the wage and triggers a separation. One question this model does not address is: After the investment has been made, what stops the employer from paying the worker less than promised but more than his opportunity wage? An answer stems from the concepts of repeated contracting and reputation that have been developed in game theory. With repeated contracting, the employer who wants the option of making later investments in the worker should not renege on the initial deal. If the employer damages his reputation by acting in bad faith, employees will be unwilling to deal without safeguards on their returns, the costs of which will have to be borne either by the employer directly or by the worker and then passed on to the employer as a cost of the transaction.

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<sup>22</sup>The seminal contributions here are also from Becker, "Investment in Human Capital," and Mincer, "On-the-Job Training."

In military compensation, bonuses and special pay are mechanisms for rewarding investments in military-specific human capital. They are found in occupations having no direct civilian counterpart—e.g., combat arms, submariner, fighter pilot. Because bonuses and special pay encourage retention, they enable the services to get more return on their investment in military-specific human capital. Bonuses and special pay are also found in military occupations whose skills are transferable to private-sector jobs that offer more than basic pay. Because private-sector wages vary across occupations but the military uses a common basic pay table across all of them, the military must pay some occupations more to make them competitive with outside opportunities.

**Motivation of Effort.**<sup>23</sup> In this model, the employer wants the worker to exert effort, but effort is assumed to create disutility for the worker. The employer knows that a worker can be induced to exert more effort in exchange for higher future pay, but the employer cannot pay more than the worker is worth to the firm over his/her working lifetime at the firm, given the expected level of effort. Because the worker's choice of effort depends on his/her expected wage growth, the employer offers the worker a schedule of wage/effort profiles. Each worker selects the wage/effort profile that maximizes utility; higher-effort profiles generally have faster wage growth. In addition, to attract the worker, the employer must make the value of the selected wage profile at least as great as that of any alternative opportunity with a different employer. But faster wage growth cannot go on forever, because it would exceed the worker's value to the firm. Hence, if the firm is to offer steeper wage profiles to induce greater effort and thereby make the worker more valuable to the firm, the firm must also stipulate a mandatory retirement date for each wage profile.

In the military, pay growth occurs through time in service, promotion, and the year-to-year increase in expected future retirement benefits. At a given rank, the growth of time-in-service basic pay is shallow and offers little incentive for greater effort. In fact, during the first 10 or so years of service, most wage growth comes from promo-

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<sup>23</sup>A key initial source is Edward P. Lazear, "Why Is There Mandatory Retirement?" *Journal of Political Economy*, Vol. 87, December 1979, pp. 1261–1284. Lazear's later reflections appear in "Personal Economics: Past Lessons and Future Directions," *Journal of Labor Economics*, Vol. 17, No. 2, pp. 199–236.

tions. But promotions are not the main focus of the effort motivation theory, which aims at effort on a given job—i.e., in the military, at a given rank. For personnel who reach 10 years of service, expected retirement benefits become an increasingly important factor in their compensation. Also, discounting causes the expected present value of retirement benefits to rise dramatically as the 20th year of service approaches. For many service members, the value of annual compensation, including the increment in expected future retirement benefits, is greater than the value of his or her output during these years—a result that fits the ideas in the incentive motivation model. The military also sets a mandatory retirement date of 30 years of service—another fit with the model.

But do expected retirement benefits actually offer a strong incentive for performance during service years 10 to 20? To reach 20 years of service at current rank, the service member must guard against a mistake or misbehavior that would result in demotion or dismissal from service. Passable behavior probably does not require much effort, so, from an organizational perspective, it is important that people *not* reach 10 to 12 years of service without having been selected for their knowledge, skills, initiative, and effort. This observation suggests the value of sorting and tournament models.

**Initial Sorting.**<sup>24</sup> Despite the information gained from résumés, job interviews, screening tests, and even handwriting analysis, employers are hard pressed to tell if a new employee is well matched to the job. Job changes are frequent among young workers; about half of all unemployment falls on workers under age 25. To some people, frequent job changes represent aimless churning within the labor market; to others, they are a sorting process. Economic models of sorting assume there is uncertainty about a worker's ability, even given observable characteristics such as education, test scores, and prior experience. Each worker has an incentive to claim high ability, especially if the employer cannot verify the claim. What the employer must do, then, is observe the worker's performance on the job and be willing to offer a contract in which higher future wages are conditional on revealed ability. Using repeated observations comparing

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<sup>24</sup>Boyan Jovanovich, "Firm-Specific Capital and Turnover," *Journal of Political Economy*, Vol. 87, December 1979, pp. 1246–1260.

the worker's performance to external or internal standards, the employer can assess the worker's ability. Since assessment comes in the context of performance within the firm, ability becomes synonymous with "quality of job match."

The military does a great deal of sorting. Most officers have an initial service obligation of four years, and much of the sorting occurs after this period and during the rank of captain (O-3). That is, most officers (70 to 90 percent) continue in service after completing their service obligation but then leave service at a fairly steady rate while they are captains, say, years six to 11. About 50 percent of officer cohorts reach the O-4 promotion window around 11 to 13 years of service, and about 40 percent continue to 20 years of service (retirement eligibility). Among enlisted personnel, about 30 of every 100 accessions are lost to first-term attrition, and about half of the remaining 70 reenlist. So, about 35 percent of those in an enlisted cohort stay for a second term, and eventually about 13 percent reach 20 years of service. Those who stay tend to be personnel who have performed well relative to their peers and personnel who have a taste for the military.

**Tournaments.**<sup>25</sup> Tournament models analyze competition for promotion within a hierarchical organization. The organization is assumed to be a pyramid: the number of positions decreases as job rank increases. The employer wants the most-capable workers to ascend to positions of highest authority because high-level decisions affect productivity at all lower levels. The tournament model describes a mechanism to induce effort and sort workers efficiently. Consider a firm with two ranks, mid and high, and a worker at the mid level. The worker's incentive to compete for promotion to the high level depends on the probability of promotion and the high-level wage. The product of these two is the worker's expected wage at the high level. If the worker is a wealth maximizer, the expected wage must exceed the mid wage or the worker has no incentive to compete.

Now add a low level to the organization. A low-level worker's incentive to compete for promotion to mid level depends on the increase

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<sup>25</sup>The concept of tournaments comes from Sherwin Rosen, "Prizes and Incentives in Elimination Tournaments," *American Economic Review*, Vol. 76, September 1986, pp. 701-715.

in expected wealth, which depends on the mid-level wage and the wage expected with promotion from mid to high level. Also, the low wage must be lower than the mid-level wage to create a positive incentive to compete. Now assume that the probability of promotion from mid to high level is less than that of promotion from low to mid level. This assumption accords with the job pyramid, but it is subtle because the probability of promotion depends not only on the number of higher-rank positions, but also on the rate of outflow of personnel from those positions and the firm, which in turn depends on the promotion and wage structure. It follows that the ratio of the high-level to the mid-level wage must be greater than the ratio of the mid-level to the low-level wage.<sup>26</sup> In other words, the wage structure is skewed by rank. The tournament model thus implies that wages should be disproportionately greater at each rank. Moreover, competing for promotion may entail exerting greater effort than otherwise and investing in human capital. In most cases, the workers compete against one another, not an external standard. To move up the promotion queue, the worker must outperform fellow workers, who are also exerting more effort. If the competition is stiff, some workers will not bother to compete. Also, if highly able workers can get by with little effort, they will do so unless they face high stakes at the higher ranks in the form of skewed pay.<sup>27</sup>

The military makes extensive use of promotions. Competition for them tends to induce greater effort among the competitors, and since competition favors the more able, they are the ones more likely

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<sup>26</sup>The mid wage cannot be greater than the high wage. If it were, there would be no incentive for mid-level workers to compete for the high-level job. For low-level workers, the increase in expected wealth depends on mid- and high-level promotion probability and wages. Conceivably, the mid wage could be *less* than the low wage if the expected high-level wage were high enough. The second assumption rules out this possibility. This assumption is consistent with a rationality constraint: If the mid-level job required higher skills or more effort than the low-level job, qualified workers being hired from outside the firm would not choose the mid-level job unless it paid more than the low-level job.

<sup>27</sup>Another model is that of principal and agent (e.g., see Bengt Holmstrom, "Moral Hazard and Observability," *The Bell Journal of Economics*, Vol. 10, No. 1, Spring 1979, pp. 74–91). Typically, an efficient principal-agent contract involves the principal assigning a property right to the agent (e.g., a portion of net revenues or stock options), with the principal remaining as a residual claimant. This model does not translate easily to the military context because it is difficult to assign a property right to income or the opportunity for added wealth (stock option).

to compete. Because each rank in the military is a stepping stone to the next, the expected gain from future promotions enters current decisionmaking about whether to compete and how much effort to exert. At first glance, military compensation does not appear skewed, because basic pay does not have a prominent nonlinear increase with rank. But as mentioned earlier, after 10 years of service, the draw of retirement benefits grows much stronger each year. Since retirement benefits depend on rank at retirement, the gain associated with promotion is substantial. Thus, retirement benefits impart skew, the more so with promotion.

This does not mean retirement benefits are necessarily the best way to skew the wage structure. One could argue that a better way would be to move a large portion of military compensation from retirement benefits to current compensation to create a skewed basic pay structure.<sup>28</sup> And there is a definite limitation associated with using retirement benefits to create skew. The services operate their promotion systems in a way meant to provide equal opportunity for advancement regardless of one's military occupation. As a result, the expected pay grade at retirement is roughly the same across occupations. This affords little freedom to tailor career paths to specific occupations, as might be advantageous in the case of certain skills and areas (e.g., information technologists and acquisition specialists). By the same token, pay differentials across occupations can be introduced only through bonuses or special pay, neither of which counts toward increasing the size of a service member's retirement benefits.

## ISSUES FOR THE FUTURE

The capability of future military forces depends on the versatility and leadership of their personnel, which, in turn, depend on the quality of not only the enlisted and officer recruits, but also the policies affecting training, experience, career development, and cohesion.

How can the military recruit and retain these high-quality personnel? The history of the all-volunteer force tells a profound story. Competitive, well-structured compensation and adequate recruiting re-

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<sup>28</sup>See Beth J. Asch and John T. Warner, *A Theory of Military Compensation and Personnel Policy*, MR-439-OSD, RAND, 1994.

sources have enabled the military to attract and keep the personnel it most needs, whereas lapses in compensation and recruiting led to a manpower crisis. Moreover, a willingness to conduct formal experiments and demonstrations, as well as an ongoing program of research and analysis, was required to determine an appropriate level and structure of compensation. By managing the volunteer force well, policymakers increased quality, increased reenlistment, and increased the average career length—all of which contributed to greater military capability. The types of tools used successfully in the past can be applied to future policy alternatives. Moreover, the scope of inquiry can expand, since most past analysis focused primarily on supply issues rather than on demand (requirement) issues.

New recruiting challenges have already presented themselves. More high school graduates are choosing to attend college, shrinking the traditional recruiting pool. The number of new accessions needed has risen from levels held low during the drawdown and may rise further if force size is increased to ease the manning of peace operations, as some suggest. Private-sector wages have been rising faster for persons with some college than for those with only a high school degree, and faster for those with high aptitudes. Also, officer retention has fallen in certain areas (e.g., Air Force captains). Close monitoring and timely action are required to keep military careers competitive with private-sector opportunities, and innovative recruiting strategies are needed to align the military's recruiting strategies with the increased numbers of young people going to college and to then penetrate the two-year college market. The risk of not taking these steps is a costly loss of high-quality human capital and leadership.

Officers and enlisted personnel can expect the heightened pace of peacetime operations to continue. Service members complain of being too busy and that the unpredictability of deployments disrupts family life. Even so, those who have been deployed have somewhat higher reenlistment rates than those who have not, although extensive deployment into hostile areas can eat into this higher rate.<sup>29</sup> Thus, the military needs to manage the tempo of work life and the nature and frequency of deployments for all personnel.

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<sup>29</sup>James R. Hosek and Mark Totten, *Does Perstempo Hurt Reenlistment? The Effect of Long or Hostile Perstempo on Reenlistment*, MR-990-OSD, RAND, 1998.

The services will also want to look at longer careers in occupations with high military-specific capital. Today's pay table is based on rank and time in service, providing most pay growth through promotions. Senior military specialists may not need a higher rank (and the command authority it provides), however, although they presumably do need incentives for performance. The pay table may have to be restructured to provide these incentives. Specialists in other areas, such as information technology, may require more-creative work environments with access to the latest technology.

Future manpower requirements will also be an issue. As future force concepts, such as the cyber soldier and information warrior, are developed, manpower will have to be brought into defense planning so that force structure assessments consider the benefits and costs of having more-experienced personnel in certain functional areas or occupations. Changes in experience mix, pressures to maintain or increase recruit quality, and private-sector wage growth may lead the military to reevaluate the structure of military compensation and military careers with respect to their cost-effectiveness in attracting, keeping, motivating, and sorting personnel.