# Comparing the Costs of DoD Military and Civil Service Personnel

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*National Defense Research Institute*

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# PREFACE

*Civilianization*—the transfer of functions performed by military personnel to civil service personnel—is widely believed to reduce costs, because civil service workers are assumed to be less expensive than their military counterparts. At the request of the Office of the Secretary of Defense (OSD), RAND has undertaken a study to examine the factors influencing the cost-effectiveness of civilianization. Specifically, it presents cost estimates of DoD military and civil service manpower that are essential to the consideration of any policy decision regarding civilianization. It also examines two different methods for comparing the costs of military and civil service personnel.

Study findings should be of interest to OSD, service, and defense agency personnel managers and policymakers, especially those involved in the evaluation of civilianization policy. Managers of outsourcing and cost-comparison processes may also have an interest in the findings.

This research was conducted for the Deputy Assistant Secretary of Defense for Civilian Personnel Policy, within the Forces and Resources Policy Center of RAND's National Defense Research Institute (NDRI). NDRI is a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the unified commands, and the defense agencies.

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# SUMMARY

## INTRODUCTION

Within the Department of Defense (DoD), there is increasing interest in identifying ways to save costs while minimizing impact on force effectiveness. *Civilianization*—the transfer of functions performed by military personnel to civil service personnel—is a frequently discussed way to do this, for two main reasons: (1) Military members are being moved in and out of jobs frequently, so there is high turnover as well as high training costs. (2) Military members do not spend 100 percent of their time performing a certain function; they also have training requirements and other duties. Although conventional wisdom suggests that civil service workers are cheaper than their military counterparts, there has been little analysis of this issue.

This report focuses on two questions that are fundamental to an analysis of civilianization as a policy option:

- What are the costs of civil service workyears and military workyears at specific grade levels?
- What assumptions about military and civil service grade distributions and substitution ratios are appropriate for comparing the costs of military and civil service personnel?

To answer the first question, we reviewed the literature on the costs of the civil service and military workforce and updated previous RAND costing work (Palmer and Osbaldeston, 1988) to calculate the

cost of an incremental workyear by service and paygrade. In this cost analysis, we did not try to develop a comprehensive estimate of all costs related to a military or a civil service workyear; instead, we focused on the elements of cost that differ between civil service and military personnel.

To answer the second question, we used the cost estimates generated from the cost analysis to examine how sensitive approaches to substitution analysis are to changes in assumptions. We determined the sensitivity by comparing the traditional way DoD does substitution analysis with an alternative approach.

## RESULTS OF COST ANALYSIS

To calculate the components of the incremental cost, we used several different sources. We calculated average base pay by service and paygrade using the Defense Manpower Data Center's (DMDC's) "Civilian Personnel Data Files—Department of Defense" master inventory file, which contains salary information for all workers. The cost of benefits and other pay as a fraction of base pay was calculated using service budget information contained in the U.S. Office of Personnel Management (OPM) report *Work Years and Personnel Costs: United States Government, Fiscal Year 1995* (1996). Using these ratios, we then calculated the dollar cost of other pay and benefits, by service and paygrade.

The cost of an incremental military workyear includes basic pay, other direct costs (e.g., basic allowance for subsistence), and other indirect costs (e.g., health care costs). Information on basic pay and other direct costs was available from the services' *Biennial Budget Estimates* for military personnel (U.S. Department of the Air Force, 1997a; U. S. Department of the Army, 1997a; U. S. Department of the Navy, 1997a, b). More effort was required to develop estimates of indirect costs, such as the cost of health benefits for active-duty and retired personnel, and accession and training costs.

To derive an estimate for the cost of health benefits, we calculated a cost of providing health care to active-duty personnel and a separate cost of providing insurance to dependents and retirees. We attributed the costs of health care for active-duty personnel and their dependents to service and paygrade on the basis of the average

number of dependents in that service and paygrade. We allocated the present value of retiree health benefits across the active strength on a per-capita basis.

We argue that military accession and training costs should be considered as incremental costs, because more accessions are required to sustain a larger force. Therefore, we developed a method for attributing these costs to a military workyear. To do so, we calculated annual turnover rates and a cost per accession. We multiplied these terms to obtain accession and training cost per active-duty member, which is then attributed to the cost of military personnel.

## RESULTS OF SUBSTITUTION ANALYSIS

While this cost information was useful, it was not sufficient to permit an analysis of the cost and benefits of civilianization. In addition, we needed to know about the nature of substitution. Specifically, we needed to know the answers to such questions as, Which civil service grades are substituted for which military grades? Do the aggregate military and civil service grade distributions change in the event of civilianization? Is the substitution one-for-one?

Unfortunately, there is no systematized information on these issues; as a result, cost-comparison studies must rely on assumptions. To shed some light on the cost-comparison issue, we present two methods for comparing costs and discuss the policy implications of these different methods. Although these methods embody different assumptions, in both cases we assume that one civil service workyear replaces one military workyear (i.e., the substitution is one-for-one).

The first method is the traditional approach. The DoD and other government entities currently use this approach, which involves comparing the cost of military and civil service personnel at "comparable" grade levels as defined in DoD Instruction (DoDI) 1000.1 (*Identity Cards Required by the Geneva Conventions,* 1974). It assumes that civilianization leads to a change in the aggregate grade distributions of the civil service and military workforces, and that the grade substitutions follow the guidelines set forth in that instruction. Using our cost estimates, we concluded from this approach that civil service employees are less costly than military personnel.

However, the grade equivalencies used in the traditional approach were developed for administrative purposes. There is no evidence that they reflect comparability of work done by individuals in these grades. Ideally, we would want to develop equivalencies by comparing the nature of work done by individuals in the specific grades or by empirical evidence on actual substitutions.

To illustrate the importance of understanding the true nature of these grade-by-grade comparisons, we pose a plausible alternative to the comparisons traditionally employed. Specifically, we conducted an analysis that compares the cost of civil service and military personnel at similar positions in the cost distributions of their respective workforces. Plotting the average cost at the midpoint of the percentile distribution for each military and civil service grade, we found that the cost distributions are strikingly similar. In fact, it is only for the most senior military officers that the cost of military personnel significantly exceeds the cost of similar civil service personnel (Senior Executive Service). While the analysis is not definitive, it does show that cost comparisons based on administrative grade-by-grade comparisons should be viewed with caution.

In the alternative approach, which is most consistent with the way in which military grade strengths are actually managed, we assume that substitution is one-for-one, that the civil service grade structure is altered by civilianization (*altered* in the sense that workers are actually added at the grade level of the new positions, thereby changing the civil service grade distribution, albeit slightly), but that civilianization results in *no* change to the military-grade structure. Because civil service costs are tied closely to the grade of a position, marginal civil service manpower costs (i.e., one person added or removed on the margin, as distinct from removing all civil service workers at a location) are always grade-specific: closely approximated by the average cost of the grade of the position. However, when the grade distribution of a service's military inventory is not adjusted, the expected marginal military manpower cost is a weighted average, where weights are given by budgeted grade distributions.

Using our cost estimates with this approach, we found that civil service employees are not always less costly than military personnel—that there are, instead, "break-even" civil service grades, below which civilianization is cost-effective and above which it is not.

## CONCLUSIONS

We end by specifying some caveats for those who undertake cost comparisons for civilianization. With respect to the cost analysis, some issues surrounding health care, and accession and training costs deserve special attention. For health care costs, our estimates may have attributed too much of the costs of running Military Treatment Facilities to active-duty personnel. We may have underestimated the cost of providing health care to dependents and retirees and overestimated the cost of providing health care to active-duty personnel. This imbalance would lead to overestimates of the health care costs for military personnel having few dependents (personnel in very low and very high grades) and underestimates of the costs for personnel with many dependents (mid-career personnel). Future work would benefit from more in-depth analysis of the health care costs issue.

In estimating the incremental cost of military personnel, we included accession and training costs. We found that these costs are substantial (almost $8,000 per year for officers and over $4,000 per year for enlisted personnel). Given our assumptions as to the way civilianization occurs, we argue that these costs should be viewed as part of the overall cost of maintaining a force of a given size and be allocated accordingly. However, here too, we are concerned that we may have included fixed costs that would lead to overestimates of the incremental cost of a military workyear.

As to the substitution analysis, it suggests that the relative cost of military and civil service personnel depends crucially on how the substitution occurs. We demonstrated that the cost estimates themselves, as well as the conclusions of a cost comparison, vary according to the assumptions made about which military grade levels substitute for which civil service grade levels; consequently, the impact civilianization has on the structure of the workforce also varies.

We believe that the alternative approach presented in this report best reflects the actual military personnel-management and budgeting process. Under these circumstances, cost-effective civilianization would require DoD to limit substitution to positions that could be filled with lower-grade civil service workers. While such a policy

might generate substantial cost savings, it could create personnel-management problems within both workforces.

Thus, we conclude that civilianization can produce cost savings under many, but not all, circumstances, and recommend that the Office of the Secretary of Defense (OSD) modify its current guidance on military/civil service position assignments. Revised guidance should specify that assignment decisions be predicated on three considerations: military necessity, cost, and career-progression opportunities.

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# ACRONYMS

| | |
|---|---|
| 2MTW | two-major-theater war |
| BAQ | basic allowance for quarters |
| BAH | basic allowance for housing |
| BAS | basic allowance for subsistence |
| BOS | base operating support |
| CFR | Code of Federal Regulations |
| CHAMPUS | Civilian Health and Medical Program of the United States |
| COLA | cost-of-living allowance |
| CONUS | continental United States |
| CPI | Consumer Price Index |
| CSRS | Civil Service Retirement System |
| DMDC | Defense Manpower Data Center |
| DoD | Department of Defense |
| DoDI | Department of Defense Instruction |
| DoL | Department of Labor |
| DOPMA | Defense Officer Personnel Management Act |
| FERS | Federal Employees Retirement System |
| FTE | Full-Time Equivalent |
| FWS | Federal Wage System |
| FY | fiscal year |
| GAO | General Accounting Office |
| GS | General Schedule |
| IST | initial skill training |
| MEO | Most Efficient Organization |
| MTF | Military Treatment Facility |

| | |
|---|---|
| MWR | Morale, Welfare and Recreation |
| NCO | noncommissioned Officer |
| OCS | Officer Candidate School |
| O&M | operations and maintenance |
| OMB | Office of Management and Budget (U.S.) |
| OPM | Office of Personnel Management (U.S.) |
| OSD | Office of the Secretary of Defense |
| OSUT | One-Station Unit Training |
| OTS | Officer Training School |
| PCS | permanent change of station |
| PME | professional military education |
| PRMS | Performance Management Recognition System |
| ROTC | Reserve Officer Training Corps |
| SBP | Survivor Benefit Plan |
| SES | Senior Executive Service |
| USC | United States Code |
| VHA | variable housing allowance |
| WC | Workers' Compensation |
| WG | Wage Grade |
| WL | Wage Leader |
| WS | Wage Supervisor |
| YOS | years of service |

Chapter One

# INTRODUCTION

## BACKGROUND

The Department of Defense (DoD) supports *civilianization*—the transfer of functions performed by military personnel to civil service personnel—as a matter of policy. Specifically, DoD Directive 1100.4 (U.S. Department of Defense, 1954) encourages the DoD to use the minimum number of personnel to meet national security objectives and to use civil service personnel whenever possible. The directive justifies the use of military personnel for a number of positions: a position that is an essential element of combat readiness, a position that is needed to ensure rotational opportunities for personnel stationed overseas, or a position that law requires to be staffed by military personnel.[1]

As the DoD looks for ways to reduce operating costs, civilianization is commonly discussed as one option for achieving that aim.[2] In fact, recent studies suggest that the process of civilianization can generate

[1]The General Accounting Office (GAO) notes that DoD deployed over 14,000 civil service and contractor employees to the theater during the Gulf War and suggests that this is not an adequate justification for military staffing. See, GAO, *DoD Force Mix Issues: Converting Some Support Officer Positions to Civilian Status Could Save Money,* Washington, D.C., Letter Report, GAO/NSIAD-97-15, October 23, 1996.

[2]Outsourcing is another option. *Outsourcing* involves the transfer of functions performed by either military or civil service personnel to the private sector. Outsourcing can occur through a direct conversion if the function employs fewer than ten civil service workers. Otherwise, the function is subject to an A-76 cost competition, in which the civil service workforce competes with private-sector providers for the work.

significant savings.[3] In addition, despite the guidance from Directive 1100.4, there is some evidence to suggest that a large number of positions that could be filled by civil service personnel are currently filled by military personnel.[4]

Converting these positions from military to civil service would seem to offer a significant opportunity to cut costs. However, is civilianization always the most cost-effective course of action? In a sense, the DoD policy advocating the use of civil service personnel over military personnel whenever possible reflects a fundamental assumption that civil service personnel are always cheaper than military personnel.

Unfortunately, very little research has been done to establish whether this assumption is actually true. Given the potential scope of civilianization, research is needed on such issues as the cost of civil service versus military personnel and the manner in which civil service workers are substituted for military personnel.

## OBJECTIVES AND APPROACH

The purpose of this report is to inform policy discussion on the benefits of civilianization by addressing two fundamental questions:

1. What are the costs of civil service workyears relative to military workyears[5] at specific grade levels?
2. What assumptions about military and civil service grade distributions and substitution ratios are appropriate for comparing the costs of military and civil service personnel?

This report addresses the first question by updating previous RAND work estimating the incremental cost of military personnel and civil service personnel (Palmer and Osbaldeston, 1988). Although our effort generally parallels that of Palmer and Osbaldeston, our approach

[3]See GAO (1996), Tighe et al. (1996), Tighe, Trunkey, and Kleinman (1996).

[4]See GAO (1996).

[5]A *workyear* is the full-time employment of one worker for one year.

differs in two ways: estimating health care costs for military personnel and considering military accession costs.

Since 1988, significant changes have occurred in how health care is provided to military personnel, retirees, and dependents. In addition, the DoD health care budget is now centralized under the Defense Health Program. Because of these changes, we needed to develop a new approach for estimating health care costs for military personnel. This approach is described in Chapter Three.

With regard to military accession costs, Palmer and Osbaldeston treat these as one-time costs; we treat them as incremental workyear costs. In a steady-state situation, the DoD must access a certain number of personnel each year to maintain the size of the force. Therefore, accession costs can be attributed to each incremental military workyear. (See Appendix A for a further discussion of the rationale underlying this premise.)

We address the second question by inputting the updated cost information generated by our cost analysis into two approaches for analyzing the substitution of civil service personnel for military personnel. In this way, we examine whether the approaches yield different conclusions about the benefits of civilianization.

## SCOPE

Three overall issues relate to this project's scope. First, although our cost analysis is based on the analytical framework developed by Palmer and Osbaldeston (1988), it is limited in scope to the specific issue of civilianization. For example, we do not calculate the total incremental costs of military and civil service personnel. Instead, we focus attention on cost elements that are different for military and civil service workers. In particular, we do not examine costs that are common to military and civil service workers, such as base operating support (BOS) costs, costs associated with military duties for which civil service substitution would generally be regarded as inappropriate (e.g., flight training),[6] and certain one-time transition costs, such

[6]However, even highly trained personnel such as fighter pilots perform functions that do not make use of that specialized training. For example, a fighter pilot may be as-

as the costs of severing a military employee and hiring a civil service employee. As a result, the cost estimates presented in this document should not be interpreted as an accurate, absolute estimate of the total cost of a military or a civil service workyear, but as a relative cost, intended for use in a comparison of military and civil service workyears.

Second, any cost analysis faces a fundamental trade-off between the costs and benefits of additional levels of detail. The nature of this work is suggestive rather than prescriptive, and the DoD is complicated; therefore, we chose a fairly high level of resolution, deciding not to pursue additional detail in cases where the required effort for added precision appeared to be greater than the payoff. For example, we used cost and workyear information that was published in the DoD portion of the federal budget, documents such as the annual *Military Manpower Training Report* (U.S. Department of Defense, 1996b), and service budget justifications (e.g., U.S. DoD, 1997). We did not attempt to gain access to or derive information directly from service financial databases, because the additional costs of doing so would have yielded few benefits in greater detail and would have introduced problems of service comparability.

In addition, whereas the data presented by service and grade for many elements of cost, such as base pay, are reliable and accurately reflect the incremental cost of an additional workyear, data for other cost elements are much less precise and cannot be attributed directly to an incremental workyear. This is particularly true for in-kind benefits provided to military personnel, because the provision of such benefits may have a large fixed cost and small marginal cost component.

One area in which the data are especially limited and where the difference between fixed cost and marginal cost may have important implications is health care costs for military personnel. Although we could have pursued a more in-depth analysis using health care utilization information, we concluded that these data are sufficiently unreliable that the value-added in increased precision from using the data in the cost estimates would not be worth the additional cost in

signed as an installation commander for a few years. Therefore, there may be some reason to attribute these training costs to an incremental military workyear.

the time to do so. Another area where more-precise estimates would require a detailed modeling effort is military training and recruiting costs.

Throughout the document, as a guide to future research, we note where additional cost information would improve the precision of the cost estimates and where it would not. We also note where a lack of information may have introduced a bias into the cost estimates, and we summarize these biases at the end of the cost analysis.

The third issue relates to aggregation of information and use of the cost estimates. The information used throughout the cost analysis reflects national averages and is intended for use in general service-wide or DoD-wide comparisons of the cost of military and civil service workers in a particular grade. Local personnel managers contemplating a civilianization will likely face costs that differ from these averages and will have information available to them to enable more-precise calculations. For example, the workers in a specific grade at a specific installation may receive salaries that are higher or lower than the DoD average for that grade. A local manager would have that specific information to include in the cost comparison. Similarly, we have included a nationwide average locality-pay adjustment in the civil service cost estimates. The locality-pay adjustment for a specific area will differ from that average.

## ASSUMPTIONS

In constructing the estimates of incremental costs for military and civil service personnel, we were faced with important decisions about whether and how to attribute costs to incremental workyears. For many cost elements, the reasonableness of a particular method will depend on specific assumptions about how personnel strengths are managed during a civilianization action. Because of data restrictions, we did not have much flexibility in allocating the costs of civil service personnel. The major assumption we did make is that retirement costs can be allocated to incremental civil service workyears on the basis of dynamic normal cost allocation as estimated by the

OPM Actuary.[7] On the military side, the cost elements contained in this analysis assume that the structure of the military personnel force is in a steady state and that changes in military strength are spread across grades. As a result, we attribute turnover-related costs to incremental workyears.

The steady-state assumption captures long-term effects but ignores transition costs. Therefore, it would fail to account for significant short-term budget impacts if DoD were to engage in large-scale civilianization of specific functions, coupled with changes in the military-grade distribution. As a result, the cost estimates presented in this report would not be appropriate for an analysis of such civilianization actions. Instead, a cost analyst would want to disaggregate and/or modify some of the turnover costs from the incremental man-year costs and consider the short- and long-term implications of a specific policy change. Appendix A contains a detailed discussion of the different assumptions and our justification for the one employed in this cost analysis.

## ORGANIZATION OF THE REPORT

In Chapter Two, we briefly present the two approaches to substitution, examining the costs of military personnel relative to those of civil service personnel. Chapter Three presents the cost estimates for civil service and military personnel, and Chapter Four inputs the cost estimates to compare the two approaches. Chapter Five offers conclusions and some suggestions for further research. Appendix A contains the rationale for our assumptions on changes in military inventory flow and their cost implications. Appendix B presents tables of interservice cost estimates and some detailed percentile distributions used in the analysis presented in Chapter Four.

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[7]The *dynamic normal cost* is the full, adjusted cost of pension benefits earned during working years but paid during retirement, under the assumption that equal payments to the benefit fund are made over the employee's working years. For a more detailed discussion, see GAO, 1997.

Chapter Two

# APPROACHES FOR SUBSTITUTING CIVIL SERVICE PERSONNEL FOR MILITARY PERSONNEL

The central policy question to be answered is: Is it always cheaper to substitute civil service personnel for military personnel? In trying to answer this question, we found that the approach used to evaluate the civil service–military substitutions can potentially make a difference. Approaches can differ with respect to which civil service grades are substituted for which military grades and the nature of that substitution, by which we mean the details about the way the workforces change after civilianization—particularly changes that might have some impact on the DoD budget.

Because the cost implications of military and civil service substitution depend on these factors, approaches to substitution analysis rely on a set of assumptions related to three key questions: (1) What is the replacement ratio (i.e., is one military member replaced by one civil service employee)? (2) Which civil service grades are substituted for which military grades? and (3) Does the aggregate grade structure of the military and civil service workforce change when individual billets are civilianized (which involves adding or subtracting personnel in the specific grade levels involved)?

In this chapter, we present two approaches for comparing the costs of a single military position and a single civil service position, pointing out key assumptions that underlie these approaches. The two approaches include the traditional approach currently used by DoD and other government entities and an alternative approach that is more consistent with the way in which military grade structures are managed. Before presenting these approaches, we provide background information on the management of the military and civil

service workforces for evaluating the appropriateness of different assumptions.

## TRADITIONAL APPROACH TO SUBSTITUTION ANALYSIS

How does DoD currently compare the cost of military and civil service workers? The traditional method of evaluating the relative costs of military and civil service manpower—one that has been used in previous analyses of the benefits of civilianization[1]—is to construct cost estimates for military and civil service personnel at each grade level, then compare the costs of military and civil service personnel at comparable grade levels, as determined by the table of equivalent grades contained in DoD Instruction (DoDI) 1000.1 (U.S. DoD, 1974). These grade equivalencies are reported in Table 2.1.

The table matches the military grades—enlisted personnel (E-1 through E-9), warrant officers (W-1 through W-4), commissioned officers (O-1 through O-6), and flag officers (O-7 through O-10)—with the civil service grades. The civil service grades have two sets of salaried employees—Senior Executive Service (SES) personnel and General Schedule (GS) personnel—and three sets of employees governed by the Federal Wage System (FWS)—Wage Grade (WG) personnel, Wage Leader (WL) personnel, and Wage Supervisor (WS) personnel.[2]

To make comparisons using the table, select the military position to be substituted for (e.g., an O-6), then note the equivalent civil service positions in that row (e.g., GS-15, WL-15, and WS-14–19) and compare the cost of the military grade with the cost of the civil service grade. Note that, whereas the equivalencies matching military personnel with civil service salaried (in particular, GS) employees are fairly precise in the sense that one or two military grades are compared with one or two civil service grades, the equivalencies matching military personnel with FWS (WG, WS, and WL) workers are much less so.

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[1]GAO (1994, 1996).

[2]These different groupings of civil service workers are also referred to as *pay plans*, e.g., the WG pay plan.

**Table 2.1**

**General Civil Service and Military Grade Equivalencies**

| Military Grade | Equivalent Civil Service Grade | | | | |
|---|---|---|---|---|---|
| | SES | GS | WG | WL | WS |
| O-10 | x | | | | |
| O-9 | x | | | | |
| O-8 | x | | | | |
| O-7 | x | | | | |
| O-6 | | 15 | | 15 | 14–19 |
| O-5 | | 13, 14 | | 15 | 14–19 |
| O-4 | | 12 | | 15 | 14–19 |
| O-3 | | 10, 11 | 12–15 | 6–14 | 8–13 |
| O-2 | | 8, 9 | 12–15 | 6–14 | 8–13 |
| O-1 | | 7 | 12–15 | 6–14 | 8–13 |
| W-4 | | 8, 9 | 12–15 | 6–14 | 8–13 |
| W-3 | | 8, 9 | 12–15 | 6–14 | 8–13 |
| W-2 | | 7 | 12–15 | 6–14 | 8–13 |
| W-1 | | 7 | 12–15 | 6–14 | 8–13 |
| E-9 | | 6 | 9–11 | 1–5 | 1–7 |
| E-8 | | 6 | 9–11 | 1–5 | 1–7 |
| E-7 | | 6 | 9–11 | 1–5 | 1–7 |
| E-6 | | 5 | 9–11 | 1–5 | 1–7 |
| E-5 | | 5 | 9–11 | 1–5 | 1–7 |
| E-4 | | 4 | 1–8 | | |
| E-3 | | 1–3 | 1–8 | | |
| E-2 | | 1–3 | 1–8 | | |
| E-1 | | 1–3 | 1–8 | | |

NOTE: With the exception of SES categories, this table represents grade equivalencies found in DoDI 1000.1 (U.S. DoD, 1974).

## ALTERNATIVE APPROACH TO SUBSTITUTION ANALYSIS

Aggregate military-grade structures—the proportions of military workforces in each grade—have a certain rigidity that is ignored in the traditional approach to evaluating military–civil service conversions. These structures are maintained through central promotion processes and controls, and are subject to statutory and budgetary constraints. As a result, a civilianization action at an installation will reduce the military requirements at specific grade levels, but will have no effect on the service's overall grade structure. For example, if an installation civilianizes 10 positions currently held by E-4s, the force-structure reduction will likely be spread over all enlisted

grades, rather than concentrated in the E-4 grade. (See Appendix A for a lengthier discussion of this phenomenon.)

Observing this rigidity, we have constructed an alternative to the traditional approach. There are three separate assumptions in this alternative:

1. The substitution is one-for-one (one civil service worker is replacing one military worker).
2. The civil service grade structure is altered by civilianization (the proportion of people at different grade levels changes).
3. The military grade structure does not change.

Because civil service costs are tied closely to the grade of a position, marginal civil service manpower costs are always grade-specific. However, when the grade distribution of a service's military inventory is not adjusted in response to civilianization, the expected marginal military manpower cost is a weighted average, where weights are given by budgeted grade distributions.

In the next chapter, we explain the cost analysis approach conducted to generate the cost inputs used in Chapter Four to determine how sensitive civilianization benefits are to the two approaches used.

Chapter Three

# COST ANALYSIS

To analyze the benefits of civilianization, we need information on the incremental cost of a military workyear and a civil service workyear. To get this information, we have constructed estimates of the direct and indirect costs of an incremental civil service workyear and a military workyear, using representative members of a service enlisted, officer, or civil service paygrade, by updating the work of Palmer and Osbaldeston (1988). These authors developed a general method for estimating the incremental cost of DoD military and civil service manpower, analyzing direct labor costs (e.g., base pay, benefits), indirect labor costs (e.g., Morale, Welfare and Recreation [MWR], medical care, and BOS costs), and the costs of one-time events (e.g., accession costs, separation pay).

By identifying each cost element independently, the authors provided the components that are necessary for analyzing the cost implications of a variety of policy modifications. However, to provide such flexibility, the authors require the reader to make choices about which cost elements to include and to go through potentially complicated calculations in order to attribute costs. We determined that it would be more useful to make the necessary assumptions and present aggregate numbers that could be used directly in a cost comparison. We provide a detailed explanation of our assumptions below and in Appendix A. In addition, we provide information on individual cost elements in Appendix B, allowing readers to modify cost elements to be consistent with alternative assumptions.

In this chapter, we show how we conducted the cost analysis for both civil service and military personnel and present the cost estimates

themselves, starting first with a discussion of civil service and military grade considerations and their implications for cost estimation.

## GRADE CONSIDERATIONS AND COST ESTIMATION

Since both military and civil service pay scales vary by grade, the incremental costs of military and civil service manpower would seem to be grade-dependent. However, the relationship between pay and grade in the military and that in the civil service differ in important ways. In addition, civil service and military personnel are managed in different ways, and these differences have implications for the cost analysis.

### Civil Service Grades

Civil service compensation is generally based on the grade of the position filled by an employee, although some exceptions permit an employee to be paid above or below this grade for a limited period of time. For example, for developmental purposes, an employee may be appointed at an initial paygrade below the target grade of the position filled.[1] In addition, employees transferred because of a reduction in force may be entitled to grade or pay retention, resulting in pay above the grade of the position filled.[2] In most cases, however, the grade of the position determines the pay scale. Local managers must ensure that funds are available in their budgets before hiring, transferring, or promoting an employee to fill a position.

The civil service system implies a general correspondence between the activities performed by an individual in a given position and the grade level associated with that position. Because the civil service workforce is not subject to top-down restrictions on its structure, we would expect that civilianization would result in changes to the distribution of the workforce in the sense that when one position at a specific grade level is added to the workforce, the total number of

[1]See Title 5, Code of Federal Regulations (5 CFR) 335.103(c)(3)(i) for a discussion of discretionary promotions under these circumstances.

[2]See 5 CFR 536 for a discussion of grade and pay retention.

civil service workers in that grade level increases by one, whereas the total number of workers in other grades remains constant.

## Military Grades

Military compensation is tied to grade, but an individual member's base pay and most other elements of compensation are not tied directly to the grade of a specific position. In addition, the duties performed by an individual at any given time are not necessarily related to the grade level of that individual. In other words, military members may be assigned to billets above or below the grade they hold. Thus, whereas a direct correspondence normally exists between a grade level and duties of a civil service worker, such a correspondence does not necessarily exist between the grade level and duties of a military worker. This discrepancy makes it extremely difficult to understand the nature of the substitution involved in a civilianization act by looking only at the features of the position civilianized. Similarly, an examination of the grade level of the military officer or enlistee currently filling a position reveals little about the function that is to be civilianized.

Although some promotion selections are made locally, grade strengths are managed centrally at service headquarters. Grade strengths correspond approximately to grade requirements, but must meet various statutory and budgetary constraints and are also managed within the context of certain promotion-flow objectives, experience benchmarks, and other personnel-management considerations. (See Appendix A for a full discussion of these considerations and constraints.)

Because of these considerations, military-grade distributions have a rigidity that generally prevents them from being directly influenced by changes in local positions. If grade distributions are not explicitly adjusted in conjunction with a military-strength adjustment, the best short-run expectation is that planned or budgeted grade distributions, expressed as proportions of total strength in each grade, will

remain constant.[3] This implies that, regardless of the specific grade level of the position civilianized, the structure of the military workforce will not change. By adjusting promotion, accession, and exit rates, the DoD can reduce the size of the workforce proportionately, regardless of the specific grade level of the positions eliminated. This reality has important implications for how specific military costs are attributed, particularly retirement costs and accession and training costs.

Because of these differences in military and civil service grade-strength management practices, it may be most appropriate to consider grade differently in evaluating marginal military and civil service cost changes.

## ESTIMATING THE INCREMENTAL COST OF A CIVIL SERVICE WORKYEAR

Here, we estimate the annual incremental cost of filling a position with a representative member of a civil service paygrade in FY96. We discuss how the cost estimation was done and illustrate the process with a selected sample grade—in this case, the DoD average for a GS-13. Table 3.2 at the end of this section contains the DoD average incremental cost for all civil service grades. Specific tables for individual civil service grades by service and pay plan are included in Appendix B. In conducting the analysis, we considered only direct-hire permanent civil servants working in the United States.

To estimate the incremental costs of a civil service workyear, we examined three major elements of costs for civil service personnel:

- **Base Pay**—regular annual salary or wages. Base pay includes a locality-pay adjustment for salaried employees.
- **Other Pay**—overtime, holiday pay, night differential, Sunday pay, and other special pay.

[3]The Defense Officer Personnel Management Act (DOPMA) officer grade table specified in 10 USC 523 provides for slightly increasing proportions of O-4s, O-5s, and O-6s as total officer strength decreases.

- **Benefits**—life insurance, health benefits, Workers' Compensation (WC), Federal Insurance Contributions Act (FICA), and pension and retirement benefits.

Palmer and Osbaldeston also calculate the incremental costs of MWR and other BOS, and include them in the total cost of a civil service workyear. In their analysis, these costs are attributed to both civil service and military personnel on a per-capita basis. They do not affect the *relative* cost of an incremental military versus civil service workyear, and we do not include them in this analysis.

## Base Pay and Locality Pay

The most significant component of the cost of civil service personnel is base pay. We estimated the average base pay of civil service personnel by service, grade, and pay plan. (See Appendix B.) We also calculated DoD-wide average base pay by grade and pay plan. These average base-pay figures are a weighted average of the base pay of civil service personnel in each service, as well as in other DoD agencies.

As discussed in Chapter Two, civil service pay plans fall into two categories: wage rate and salaried. The base pay of wage rate, or hourly, employees is governed by the FWS, and there are three separate wage-rate pay plans: WG, WL, and WS. The base pay of salaried personnel is governed by a variety of pay plans; we confined our analyses to the two that are by far the most prevalent: GS and SES.[4,5]

[4]These five pay plans account for approximately 95 percent of all DoD civil service personnel. In addition, there are about 70 other pay plans that cover small groups of specialized employees such as summer student interns, people working in the Panama Canal area, and motion-picture production. In 1996, the breakdown of civilian personnel by pay plan was as follows: GS, 66 percent; WG, 20 percent; WL plus WS, 3 percent; SES, 5 percent.

[5]The Performance Management and Recognition System (PMRS, also known as the GM schedule), established in 1985, was phased out in 1993. Personnel were reclassified into the GS series. For administrative purposes, the DMDC Civilian Personnel Data Files—Department of Defense inventory file continues to categorize employees who participated in the PMRS as GM employees, although technically they are now GS employees. For this cost analysis, we grouped former PMRS employees with GS employees in the same grade (e.g., GM-13 employees were grouped with GS-13 employees).

Although the U.S. Office of Management and Budget (OMB) Circular A-76 regulations advise estimating the average cost of civil service personnel by using the wage at Step 5 of a given civil service pay-grade,[6] we used the DMDC Civilian Master File to calculate the average wage for individuals in a given grade. These estimates were calculated from DMDC's Civilian Personnel Data Files—Department of Defense inventory file and reflect the average amount of base pay an individual in that grade and service earns over the course of a fiscal year, based on the rate of pay reported in September 1996. We used only full-time workers in the calculations.[7]

The mean base-pay calculations using the DMDC data fell within the published GS base-pay range for 1996 for each grade. Similar validation of the DMDC data for FWS workers was not possible because of the way wages are set through DoL wage surveys.[8] With the exception of GS-1, where the calculated mean salary was slightly less than the base salary for an employee at Step 2 of the series, the mean calculated salaries generally corresponded to the salary of an employee above Step 6. This correspondence differs from an assumption embedded in the A-76 cost-comparison guidelines, which call for the use of Step 5 to determine civil service costs in cost comparisons.

DMDC salary data do not contain adjustments for locality pay. The 1990 Federal Employees Pay Comparability Act (PL 101-509) authorized locality pay for GS employees in response to concerns that federal pay was not competitive with private-sector pay levels in certain parts of the country and that nationwide pay rates were imposing financial hardships on personnel living in parts of the country where the cost of living is above the national average.

The locality-pay adjustment provides all federal civil service employees working in designated metropolitan areas with additional pay equal to some percentage of the base pay. For example, in 1997, the

[6]Within each grade level are 10 different pay levels, called *steps*: Step 1 offers the lowest salary in the grade level; Step 10 offers the highest salary.

[7]*Civil servants* can be classified as full-time, part-time, or intermittent workers. In 1996, 88.8 percent of GS employees, 91.9 percent of WG employees, 96.8 percent of WL/WS employees, and 87.8 percent of SES employees were full-time.

[8]See Robbert, Gates, and Elliott (1997) for a description of the wage-determination process.

locality-pay adjustment for workers in Los Angeles was 9.46 percent. Therefore, a GS employee in Los Angeles occupying a grade and step associated with a base pay of $10,000 would earn an additional $946 in locality pay, for a total adjusted base pay of $10,946. The specific percentage varies by metropolitan area and also changes from year to year. Note that FWS (WS/WL/WG) workers do not receive locality-pay adjustments; their wages are already set through a Department of Labor survey process, which incorporates prevailing wage rates in the local area.

Locality pay for SES and GS employees is based on where a person works, not where the person lives, and an employee does not retain locality pay when transferring from his or her current work location. However, locality pay is considered an element of base pay for purposes of calculating the cost and value of benefits such as retirement, life insurance, premium pay, severance pay, and WC. We therefore adjusted our estimates of base pay for GS and SES workers by the average 1996 national locality-pay adjustment factor of 5.56 percent.[9] We used this adjusted base pay as the basis for calculating the cost of other benefits and the cost of civil service personnel. Thus, as an example, the total DoD average base pay for a GS-13 is $59,327. Of that, $56,028 is base pay and $3,299 is locality pay.

In using this national locality-pay adjustment factor, we assumed that locality-pay adjustment does not differ by grade or service, and that the DoD average is the same as the national average.[10] Individual services may be able to provide more detailed information on the locality-pay adjustment for each service.

## Other Pay

Information on the cost of other pay was derived from the service detail in the OPM publication *Work Years and Personnel Costs* (1996).[11]

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[9]This national locality-pay adjustment factor for 1996 was obtained from OMB.

[10]DoD employed 28 percent of the Federal Civil Service workforce working in the United States in 1996. There is no clear bias in the location of these employees relative to the entire federal workforce.

[11]At the time we were preparing this report, we did not have access to the 1996 data. We are therefore assuming that the rates did not change significantly between 1995 and 1996.

*Other pay* includes overtime pay, holiday pay, Sunday pay, night differential, hazardous duty pay and post differential, and cash awards. We divided the total cost of other pay for a given service by the total cost of base pay to calculate premium-pay multipliers by service. The other-pay multipliers are presented in Table 3.1. These multipliers are then applied to adjusted base-pay information to generate the average costs of other pay by service and grade. For example, for our DoD average GS-13 employee, we used the DoD average multiplier for other pay (6.6 percent) and multiplied it by the base pay ($59,327). Thus, other pay for the GS-13 equals $3,916.

**Caveats in Calculating Other Pay.** We note several caveats about other pay that is calculated on the basis of OPM civil service workforce statistics (OPM, 1996). The first is that the cost information includes payments made to all personnel, not just to full-time permanent personnel. We have no prior assumptions about whether premium pay is more or less likely to flow to permanent or temporary workers. Thus, we cannot assert that the reported ratio is likely to be an under- or overestimate. Another limitation is that the data source did not allow us to calculate separate ratios for different pay plans; being able to do so would likely improve the precision of the analysis, because certain types of workers are more likely to incur premium pay or benefits than are others. For example, FWS workers are more likely to receive overtime pay. By aggregating overtime pay over all types of workers in the calculation of a premium-pay multiplier, we are likely underestimating the cost of FWS workers and overestimating the costs of other types of workers. However,

**Table 3.1**

**Multipliers for Civil Service Other Pay (Percentage of Base Pay)**

| Army | Navy and Marines | Air Force | DoD Average |
|---|---|---|---|
| 5.2% | 9.1% | 6.1% | 6.6% |

SOURCE: Calculations based on OPM (1996).

FWS workers may be less likely to get cash awards, thus introducing a reverse bias. While we do not believe these factors will dramatically influence the cost estimates, more information on the distribution of other pay, by pay plan and paygrade, would be helpful to future cost analysts.

## Benefits

As we mentioned in Chapter One, we did not attempt to gain access to or derive information directly from service financial databases, which would be the first source for calculating the cost of benefits to the individual services. Instead, we used actuarial estimates, from OMB, OPM, and DoD, of the cost of benefits. The cost of health benefits can be attributed as a fixed cost per employee; the cost of other benefits is calculated as a percentage of base pay.

**Health Benefits for Current Employees.** According to OPM estimates, the average cost of providing Federal Employee Health Benefits to a full-time (non-postal) federal employee in 1996 was $2,702.

**Retirement and Other Benefits.** To calculate the cost to the government of retirement and other benefits for civil service workers, we used the benefits multipliers reflected in the *1996 Revised Supplemental Handbook* to OMB Circular A-76. We used the cost estimates generated through these procedures to compare the cost of performing a function in-house with the costs proposed by a potential contractor.[12] The multipliers suggested in the A-76 guidelines include a retirement cost factor and factors for additional benefits.

The retirement cost factor reflects an actuarial estimate of the federal government's complete share of the weighted average of Civil Service Retirement System (CSRS) and Federal Employees Retirement System (FERS) retirement cost to the government based on the full dynamic normal cost of the defined benefit plans, the normal cost of accruing retiree health benefits based on average participation rates,

[12]For more information, see OMB (1996).

and Social Security and Thrift Savings Plan[13] contributions (see the following subsection). This cost factor is updated annually; in 1996, the rate was 23.7 percent of base pay.

Additional benefits include Medicare, 1.45 percent; miscellaneous fringe benefits (WC, bonuses and awards, unemployment programs), 1.7 percent; and federal employee life insurance, 0.02 percent. Summing these multipliers generates an overall benefit cost multiplier of 26.87 percent.

**Costs of Retirement and Other Benefits to DoD.** Although we focus on the cost of civil service workers to the federal government in this analysis, some policymakers might be interested in the budgetary cost of employees to DoD. DoD budget figures do not reflect the full cost of providing the benefits, because government agencies (including the DoD) do not bear the full cost of retirement benefits under CSRS. In 1984, the federal government introduced a new retirement system, the FERS, which replaced the CSRS for most employees hired after that date. The CSRS is not fully funded by agency and employee contributions[14] and, therefore, imposes a cost on the government that is not reflected in the DoD budget. Because FERS was designed to be fully funded by the agency and the employee, it is more expensive for the agency.

In 1996, DoD paid 7 percent of base pay into the retirement fund for CSRS employees. For FERS employees, it paid 21.7 percent on the first $62,700 of base pay and 15.5 percent on base pay above $62,700. This FERS cost factor includes an 11.4-percent contribution to the defined benefit program, an estimated 4.1-percent contribution through the Thrift Savings Plan (a voluntary matching program), and a 6.2-percent contribution to the Social Security program on the first $62,700. In Appendix B, we present estimates of the cost of CSRS and FERS employees to the DoD by replacing the 23.7-percent retirement cost factor with the 7-percent and the 21.7-/15.5-percent factors, re-

[13]The Thrift Savings Plan (TSP) is a supplemental, employer-matching retirement program into which FERS employees may make contributions.

[14]In analyzing the incremental cost of a workyear, one should incorporate the full normal cost of retirement benefits as they are being earned. According to the GAO (1997), CSRS costs are not fully funded from agency and employee contributions. The Office of Personnel Management (OPM) estimates CSRS costs at 25.14 percent of base pay in 1996, but employee and agency contributions total only 14 percent of base pay.

spectively. These estimates can be found in Tables B.3b, c, B.6b, c, B.9b, c, and B.12b, c.[15]

Despite these differences from the agency perspective, the cost to the government (the full dynamic normal cost, less employee contributions) of CSRS benefits is approximately 18 percent of base pay, whereas the cost of FERS benefits is 21.4 percent on the first $62,700 and 14.2 percent on the remainder. Thus, although the total cost of CSRS to the *government* is slightly lower than the government's total cost under FERS, annual *agency* contributions are significantly higher under FERS.[16]

## Calculating the Relative Incremental Cost of Civil Service Personnel

To calculate the incremental cost of civil service manpower to be used in a comparison with the costs of military manpower, we applied the other-pay multiplier of 6.6 percent and the benefits multiplier of 26.87 percent to the appropriate adjusted base-pay figures to calculate the average cost of each type of special pay and benefit. We then added the costs of each special pay and benefit to generate the overall incremental cost of civil service manpower. For the GS-13 example, we added to the adjusted base pay ($59,327) the amount of the other pay ($3,916), the cost of health benefits ($2,702), and the amount of other benefits ($15,941). Thus, the total incremental cost of a DoD average GS-13 is $81,886. The DoD averages for the GS-13 and all other paygrades are shown in Table 3.2. Appendix B contains the tables for all the paygrades, by service.[17]

[15]Note that these estimates reflect the cost of retirement benefits to DoD; they do not take into account the cost of providing retiree health benefits or the fact that the Social Security benefits may be underfunded.

[16]Although very few employees hired before 1984 elected to switch to FERS coverage, new employees are automatically covered under FERS. In 1996, 52.5 percent of the DoD workforce was covered under CSRS—48.8 percent of GS employees, 50.7 percent of WG employees, 78.4 percent of WS and WL personnel, and 83 percent of SES employees.

[17]In these calculations, we used service-specific estimates for the costs of other pay, reflected in Table 3.1.

**Table 3.2**

**FY96 Relative Incremental Cost ($) of Civil Service Personnel**

| Salaried Employees | | FWS Employees—WS, WL, and WG | | | | | |
|---|---|---|---|---|---|---|---|
| Grade | DoD Avg. ($) | Grade | DoD Avg. ($) | Grade | DoD Avg. ($) | Grade | DoD Avg. ($) |
| SES | 146,636 | WS-18 | 87,504 | WL-15 | 64,854 | WG-15 | 57,447 |
| GS-15 | 116,344 | WS-17 | 85,135 | WL-14 | 65,446 | WG-14 | 58,817 |
| GS-14 | 98,047 | WS-16 | 80,922 | WL-13 | 62,310 | WG-13 | 55,553 |
| GS-13 | 81,886 | WS-15 | 75,008 | WL-12 | 56,997 | WG-12 | 52,947 |
| GS-12 | 69,299 | WS-14 | 70,461 | WL-11 | 56,668 | WG-11 | 51,315 |
| GS-11 | 57,699 | WS-13 | 70,449 | WL-10 | 54,556 | WG-10 | 49,489 |
| GS-10 | 54,177 | WS-12 | 65,800 | WL-9 | 51,931 | WG-9 | 46,870 |
| GS-9 | 48,006 | WS-11 | 64,552 | WL-8 | 50,270 | WG-8 | 44,622 |
| GS-8 | 44,607 | WS-10 | 63,079 | WL-7 | 46,726 | WG-7 | 42,793 |
| GS-7 | 40,280 | WS-9 | 60,518 | WL-6 | 45,368 | WG-6 | 41,017 |
| GS-6 | 36,918 | WS-8 | 57,949 | WL-5 | 43,492 | WG-5 | 39,009 |
| GS-5 | 33,488 | WS-7 | 56,594 | WL-4 | 39,624 | WG-4 | 36,401 |
| GS-4 | 30,216 | WS-6 | 54,240 | WL-3 | 36,496 | WG-3 | 33,196 |
| GS-3 | 27,094 | WS-5 | 52,296 | WL-2 | 33,889 | WG-2 | 30,856 |
| GS-2 | 23,608 | WS-4 | 49,955 | WL-1 | 29,645 | WG-1 | 28,213 |
| GS-1 | 19,487 | WS-3 | 48,718 | | | | |
| | | WS-2 | 42,491 | | | | |
| | | WS-1 | 42,547 | | | | |

In making the calculations shown in Table 3.2, we are assuming that the expected benefit and special-pay costs for an incremental workyear are equal to the average cost for all employees. This might not be the case if, for example, an incremental workyear would not receive overtime pay at the same rate as current employees receive it, or if the benefits cost for new employees differed from those of older employees (as do retirement-benefit costs). Similarly, the expected base pay of an incremental civil service employee may differ from the average salary if the average step of that employee is lower or higher than the overall average.

**Caveats to Calculating Incremental Cost of Civil Service Personnel.** Here, we note a few aspects of the cost analysis that may have biased the estimates. In particular, in allocating the cost of other pay, we may have underestimated the cost of FWS workers, who are paid on an hourly basis and thus are more likely to receive overtime pay, and thus have overestimated the cost of GS and SES employees.

Another omission that is relevant to a comparison of the costs of military and civil service workers is the cost of the implicit commitment that is made when a civil service worker is hired. As discussed in Robbert, Gates, and Elliott (1997), once civil service workers are hired, they acquire a property interest in their job, requiring costly (from both a political and an economic perspective) due-process procedures to remove them from the workforce. We did not include such costs, because we had no way of explicitly estimating them. Of course, financial and political costs also are associated with reducing the number of military employees, as evidenced by the severance payments given to military personnel during the drawdown. It is an open question whether and to what extent the costs of shedding civil service employees exceed those associated with reducing military force structure.

## ESTIMATING THE INCREMENTAL COST OF A MILITARY WORKYEAR

To estimate the incremental costs of filling a position with a representative member of an enlisted or officer paygrade in each of the military services in FY96, we examined two major elements of costs for military personnel:

- **Direct Costs**—include basic pay, basic allowance for quarters (BAQ), basic allowance for subsistence (BAS), variable housing allowance (VHA), retirement accrual, employer Social Security contributions (6.2 percent up to $62,700 for FICA, plus 1.45 percent for Medicare on all wages),[18] and clothing allowance.[19]
- **Indirect Costs**—include the costs of health benefits for active-duty and retired personnel and their dependents, accession and

[18]The 1995 Defense Authorization Act provided for a cost-of-living allowance (COLA) for military personnel assigned to high-cost areas in the continental United States (CONUS). In 1996, *a high-cost area* was defined as an area in which the cost of living is 109 percent of the national cost of living. Far fewer than 1 percent of the personnel receive this adjustment. This component of pay is excluded from the analysis because it contributes very little, on average, to the cost of military personnel.

[19]In January 1998, the BAQ/VHA system was replaced by a single Basic Allowance for Housing (BAH) system. See "Special Section: Guide to Military Pay, 1998 Edition," *Army Times*, January 12, 1998, for more information on this change.

training costs, and other costs (such as apprehension of deserters).

This information is derived from several sources, including the *FY 1998/99 Biennial Budget Estimates* for each service (U.S. Department of the Air Force, 1997a, b; U.S. Department of the Army, 1997a, b; U.S. Department of the Navy, 1997a–c) and for the Defense Health Program,[20] the DMDC Active Duty Family Database, and the FY 1997 *Military Manpower Training Report* (U.S. DoD, 1996b). As in the civil service section, we use an example to illustrate the process; in this case, because different costs are associated with enlisted and officer personnel, we show examples for two grades—an O-4 and an E-5. Once again, Appendix B contains complete tables by grade and service.

## Direct Costs

Here, we consider each of the direct costs in turn, starting with basic pay.

**Basic Pay.** Information on the average basic pay for military personnel was derived from the services' *1998/99 Biennial Budget Estimates* for military personnel (U.S. Department of the Air Force, 1997a; U.S. Department of the Army, 1997a; U.S. Department of the Navy, 1997a, b). The average pay for each grade takes into account the distribution of personnel within each paygrade across years of service. We calculated DoD average pay as a weighted average of the pay of each service, using information on workyears by grade and service (see Tables B.13 and B.22 in Appendix B). For our examples, basic pay for a DoD average O-4 is $45,941; basic pay for an E-5 is $18,350.

**BAS.** Military personnel receive either subsistence in-kind (the DoD feeds them) or a cash allowance for subsistence. Although it is difficult to estimate the cost of directly feeding a service member (because of their duty locations, living arrangements, and deployment status), the services' *Biennial Budget Estimates* for military personnel include information on BAS cash payments to eligible

[20]These reports include information on the actual number of personnel and the cost of pay and benefits by paygrade for FY96.

military personnel. Following Palmer and Osbaldeston (1988), we assumed that incremental workyears incur basic subsistence costs at cash rates.[21] Officers and enlisted personnel receive different cash payments for subsistence. For our examples, an O-4 (as does any other officer) receives $1,789; an E-5 (as does any other enlisted person) receives $2,605.

**BAQ.** The military provides housing in-kind (i.e., military members live in DoD-owned housing) to many of its members. However, the housing stock does not allow the services to provide housing to all members of the service. Those who either choose to or are forced to live "off base" receive a cash BAQ. Because fixed investments are required to provide quarters in-kind and because the current stock of housing cannot currently provide housing for all service members, we assumed that incremental military workyears incur basic quarters costs at cash rates. The services' *Biennial Budget Estimates* contain information on the standard full-BAQ rate.

Whereas the size of the BAS does not depend on whether the service member has any dependents, there is one BAQ rate for individuals with dependents and a lower BAQ rate for those without. To calculate the expected BAQ cost for an incremental military workyear in a particular grade and service, we used DMDC's Active Duty Family File to calculate the probability that a service person in a given grade has dependents. We used that probability, along with information on BAQ rates with and without dependents from the services' 1997 budget estimates for military personnel, to calculate a weighted-average BAQ for an additional workyear. For our examples, the average O-4 receives an $8,677 BAQ, and the average E-5 receives $4,895.

**VHA.** Military personnel who do not live in military housing are eligible for a VHA. This cash payment, given to military personnel stationed in locations with high housing costs, supplements the full BAQ. Because we have assumed that an incremental workyear receives cash payments for quarters rather than quarters in-kind, it follows that the incremental military workyear will also be eligible for VHA. To calculate the average VHA costs associated with an incre-

[21]The authors make the point that capital investment is required to provide subsistence and quarters in-kind, and that an incremental workyear would incur the cash payment.

mental workyear, we calculated the average VHA for the population potentially eligible for VHA (that is, people receiving full BAQ). Information on the average VHA payment, the number in each grade receiving BAQ, and the number receiving VHA is reported in the services' 1997 *Biennial Budget Estimates* for military personnel. For each paygrade in each service, we calculated the expected VHA cost of an incremental workyear by multiplying the average VHA payment for a grade and service by the probability that personnel in that grade receiving full BAQ also receive VHA. For our examples, an average O-4 eligible for VHA receives $2,548; the E-4 receives $1,318.

**Retired Pay Accrual.** Each service is required to contribute a fixed percentage (a *normal cost percentage*) of basic pay into the military retirement fund. The percentage is determined annually by the DoD Actuary. For fiscal year 1996, the rate was 32.9 percent. It will decline to 32.7 percent for fiscal year 1997, and to 30.5 percent for fiscal year 1998. The retired-pay accrual cost for a military workyear in 1996 is thus equal to the cost of basic pay times 0.329. For our examples, the O-4 costs $15,115 and the E-5 costs $6,037.

While this procedure accurately reflects the short-term incremental cost of a military workyear to the DoD, it is worth noting that the normal cost percentage is determined through complicated calculations based on projected retirement patterns. A significant change in the structure of military careers—for example, changes in the number of personnel in the grade level of those military positions that are eliminated—would likely alter this normal cost percentage and, thus, the incremental cost of retired-pay accrual. A more complete costing analysis of a proposed policy change would examine the potential effect on retirement patterns and the implication for retirement costs.

**Social Security (FICA).** The DoD must pay a FICA (Social Security and Medicare) tax on wages paid to military personnel. In 1996, the tax rules stipulated a payment of 6.2 percent on wages up to $62,700, and 1.45 percent on all wages. We applied this rule to basic pay by grade and service to calculate the cost of FICA payments by grade and service. For our examples, FICA payments amount to $2,848 for the O-4 and $1,138 for the E-5.[22]

[22]After this report went to press, we learned that, in lieu of FICA payments on BAS and BAQ benefits, the DoD makes a lump-sum payment to the Social Security

**Clothing Allowance.** DoD provides a cash clothing allowance to enlisted personnel and to some officers to subsidize the cost of uniforms. We derived an average allowance for officers and enlisted personnel by dividing the total clothing allowance by the number of servicepersons of that type. For our examples, the O-4 clothing allowance amounts to $10 and the E-5 allowance amounts to $260.

## Indirect Costs

Here, we discuss the various indirect costs, starting with health care costs.

**Health Care Costs.** The payment of health care costs is complicated for a number of reasons.

First, the military provides health care in a variety of forms to military personnel and their dependents. Direct care is provided through the operation of Military Treatment Facilities (MTFs). In addition, the military provides insurance coverage for military dependents and retirees through TRICARE (a program that combines in-house, commercial managed care, and fee-for-service insurance options) or the Civilian Health and Medical Program of the United States (CHAMPUS). (TRICARE is replacing CHAMPUS on a regional schedule that began in 1995 and will be complete in 1998.)

Second, active-duty military members generally receive more-extensive health care, including services such as dental care and prescription eyeglasses, than do dependents or retirees.

Third, military members are treated on a space-required basis in Military Treatment Facilities; retirees and dependents are treated on a space-available basis. That is, MTFs must serve military members but can turn away retirees and dependents if space is limited.

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Administration. The size of the payment is determined by the Department of Health and Human Services on the basis of a complicated actuarial formula. In fiscal year 1996, the DoD contributed approximately $500 per officer and $200 per enlisted military member in this manner. These contributions are not included in our cost figures.

Fourth, some components of the total military health program costs are incurred to support wartime military operations and should not be attributed to military manpower costs.

Given differences in treatment levels, we reasoned that the marginal cost of medical care for military members would be equal to the direct costs of operating Military Treatment Facilities—direct patient care, BOS for medical facilities, procurement, and the cost of military medical manpower)—less wartime medical capability costs, spread over the population of active-duty beneficiaries.[23] The marginal cost for dependents and retirees would be the government's costs for CHAMPUS, managed care contracts, TRICARE, and other treatment outside of military treatment facilities made available expressly for non–active-duty beneficiaries, spread over the total number of those beneficiaries.

Most of the aggregate cost categories and beneficiary counts needed for these calculations are contained in the Defense Health Program's budget justification data (DoD, 1997, pp. 1, 37). While such DoD budget data do not distinguish between wartime and peacetime costs, Goldberg et al. (1994) provide an estimate of wartime medical capability costs as a fraction of total medical costs.[24] The per-capita calculations using these costs are shown in Tables 3.3 and 3.4 for active-duty and non–active-duty beneficiaries, respectively.

Our cost calculations omit certain components of the defense health program that we felt were unrelated to the marginal cost of military manpower. For example, we excluded a category labeled "Patient Care Support," which includes management headquarters, public and occupational health activities, recruit examining activities, and other similar institutional or overhead activities. In addition, we also

[23]These cost categories probably contain some fixed costs, which we were unable to isolate, that would not vary with marginal changes in military strength. Thus, our computations probably overstate the marginal health care–related costs of military manpower.

[24]Goldberg et al.'s Institute for Defense Analyses (IDA) report was completed in 1994 and was based on 1990 data. The assumptions about wartime medical requirements underlying the estimates may have changed—in particular, they were likely based on a Cold War scenario rather than on a two-major-theater-war (2MTW) scenario. However, on the basis of current information, we cannot conclude that the costs would be higher or lower in the current environment. Thus, we use the IDA estimate with appropriate caution.

**Table 3.3**

**Active-Duty Per-Capita Health Care Cost Calculations**

| | Thousands |
|---|---|
| Direct patient costs[a] | $3,412,121 |
| BOS costs[a] | $1,009,622 |
| Procurement[a] | $286,597 |
| Military medical manpower[b] | $5,071,528 |
| less: Wartime medical costs[c] | $2,881,498 |
| Total direct costs in Military Treatment Facilities | $6,898,369 |
| Total active-duty beneficiaries[d] | 1,642,456 |
| **Cost per active-duty beneficiary** | **$4,200** |

[a]DoD, 1997, p. 1.

[b]DoD, 1997, pp. 37–38 (reported cost per beneficiary multiplied by total number of beneficiaries).

[c]Goldberg, et al., 1994, p. I-10 (FY90 data reported in Goldberg et al. was adjusted to 1996 dollars at the Consumer Price Index [CPI] rate of inflation).

[d]DoD, 1997, p. 37.

excluded medical education and training costs, as well as costs of the Uniformed Services University of the Health Sciences. These latter costs would not likely be incurred by the DoD if there were no wartime requirement for a military medical corps.[25]

[25]In spite of these omissions and adjustments, the health care costs likely contain a substantial amount of fixed costs for the provision of MTF services that are used by dependents and retirees, as well as by active-duty personnel. Ideally, we would like to omit all fixed costs in calculating the incremental cost of providing health care for military manpower. However, in many instances, we could not isolate the relevant fixed costs. By attributing all of these fixed costs to active-duty personnel, we are likely overestimating the cost of providing health services to this population and underestimating the costs of providing health services to dependents and retirees. This possibility will tend to bias the cost estimates for paygrades with few dependents (the lowest and highest paygrades) upward and bias the cost estimates for paygrades with more dependents (mid-level paygrades) downward. An alternative to the procedure we followed would be to simply calculate an average cost per beneficiary, without distinguishing between different types of beneficiaries. This type of calculation leads to estimates that are between $1,000 and $2,000 per year lower for E-1, E-2, E-3, O-1, and O-2 personnel. There is also a slight (under $600 per year) upward bias for flag officers, and a slight (under $700 per year) downward bias for other officers. The bias introduced because of health care cost estimates is clearly most significant at the low end of the grade distribution, where it is larger in magnitude and represents a higher percentage of total costs.

**Table 3.4**

**Dependent and Retiree Per-Capita Health Care Cost Calculations**

| | Thousands |
|---|---|
| CHAMPUS, managed care contract, and TRICARE costs[a] | $3,364,957 |
| Care in nondefense facilities[a] | $441,487 |
| Total direct costs | $3,806,444 |
| | |
| Active-duty dependents[b] | 2,265,123 |
| Retirees[b] | 770,194 |
| Dependents of retirees[b] | 1,319,470 |
| Total beneficiaries | 4,354,787 |
| | |
| **Cost per beneficiary** | **$874** |

[a]DoD, 1997, p. 1.
[b]DoD, 1997, p. 37.

Health care costs for active-duty personnel and their dependents are a current employment benefit, whereas health care costs for retirees and their dependents are a retirement benefit. These costs must be attributed to an incremental workyear in different ways:

*Active-Duty Health Care Costs.* Family health care costs for active-duty members are attributed to different military paygrades according to the average number of dependents per serviceperson in that paygrade, as reported in DMDC's Active Duty Family Database. The average health benefit cost for personnel in a particular paygrade is thus the sum of the per-capita cost of health care for the military member plus the cost for the average number of dependents in that grade. For example, if the average number of dependents for a particular grade is 2.2, the total health care cost is $4,200 for the military member plus 2.2 times $874 for the dependents, or a total of $6,123. For our examples, the costs for an average DoD O-4 are $6,323 and the costs for an E-5 are $5,853. The costs for all grades and services are reported in Appendix B.[26]

[26]These costs per employee for health benefits appear to be much higher those faced by other employers. In 1996, the combined annual health care premiums paid by employers *and* employees averaged $3,915 per employee (Freudenheim, 1997).

*Retiree Health Care Costs.* Health care costs for retirees and their dependents are incurred after active service has been completed. To be included in marginal active-duty manpower costs, the cumulative total of these costs over a period of retirement must be determined and then allocated across expected active military workyears per retirement.

We assumed these costs will be incurred over the period from average retirement age (49 for officers, 44 for enlisted personnel[27]) to age 65, when retirees become Medicare-eligible and generally lose their eligibility for CHAMPUS or TRICARE benefits. Using these average retirement ages and an assumed spouse's age equal to the retiree's age minus three years, we applied life tables used by the DoD Actuary for Survivor Benefit Plan (SBP) calculations to determine the expected survival of retirees and their spouses during the period before they reach age 65. As indicated in Table 3.5, the ratio of retiree dependents to retirees is 1.71:1 (1,319,470 divided by 770,194). We made an additional assumption that each retiree has one eligible de-

**Table 3.5**

**Expected Retirement Health Care Costs per Unit of Active Strength**

| | Officer | Enlisted |
|---|---|---|
| Cost per beneficiary[a] | $874 | $874 |
| Dependents per retiree[b] | 1.71 | 1.71 |
| Expected years of coverage during retirement | | |
| Retiree | 15.3 | 20.0 |
| Spouse | 18.4 | 23.2 |
| Other dependent | 7.7 | 11.0 |
| Total discounted cost during retirement | $31,489 | $39,659 |
| Expected annual retirements per unit of active strength | 0.0251 | 0.01884 |
| **Expected cost per unit of active strength** | **$790** | **$747** |

[a]From Table 3.4.

[b]Computed from data in Table 3.4.

[27]FY96 data provided by the DoD Office of the Actuary.

pendent, in addition to a spouse, for as many years as necessary to bring the total expected dependent-to-retiree ratio to 1.71:1. We used an annual cost per beneficiary of $874, as indicated in Table 3.5, discounting the stream of costs occurring during the retirement period to the beginning of the period at a real rate of interest of 2 percent.[28] The results are summarized, for both officers and enlisted personnel, in Table 3.5.

These costs must be allocated across total active-duty strength. In another analysis (see Table 3.6 below), we found DoD-wide turnover rates (accessions per unit of active strength) of 0.088 for officers and 0.157 for enlisted personnel. We also found reported survival rates from accession to 20 years of service (retirement eligibility) for Army officers and enlisted personnel, which we assumed to be representative of DoD personnel. These rates are 0.285 for officers and 0.12 for enlisted personnel.[29] The product of the turnover rate and the survival-to-retirement rate is a rate expressing expected annual retirements per unit of active strength, or 0.0251 for officers and 0.01884 for enlisted personnel. Multiplying these rates by total health costs per retiree yielded expected retirement health care costs per unit of active strength of $790 for officers (including our O-4 example) and $747 for enlisted personnel (including our E-5 example), as shown in Table 3.5.

**Reenlistment Bonuses.** To retain high-quality enlisted personnel, the military offers reenlistment bonuses. The cost of these bonuses is attributed on a per-capita basis to all enlisted personnel in a particular service. Although retention bonuses are also paid to officers, these are mostly paid to highly specialized personnel (fighter pilots, doctors, nuclear engineers). Since those personnel occupying these positions are not likely to be civilianized, we do not consider reten-

[28]The *real rate of interest* is the government's assumed cost of capital, net of inflation. The stream of medical costs used over the entire retirement period was expressed in 1996 dollars. Thus, a price deflator was not included in the discount rate.

[29]These survival rates are based on an average of 1987–1989 continuation rates. See Asch and Warner, 1994, pp. 35–39. Since some individuals retire with more than 20 years of service, use of these rates in the calculations below overstates the expected number of retirements per unit of active strength.

tion bonuses for officers. The DoD average annual cost per workyear for reenlistment bonuses for our sample E-5 is $181.

**Military Recruiting and Training Costs.** Military personnel generally require training when they are first accessed. Moreover, significant recruiting costs are incurred for enlisted personnel. These expenses can be viewed as part of the total life-cycle cost of military personnel. To maintain the size of the force, given some expected personnel inventory turnover, the services need to bring in new people every year. In a steady state, the costs of recruiting and training new people should be viewed as a cost of maintaining the force at a given size. These accession costs can be allocated across the active strength of each service and can then be added to other annual pay and benefits expenses to determine the full cost of military personnel. (See Appendix A for a discussion of alternative ways of viewing these costs and our rationale for using the steady state as the basis for estimating this cost element.)

To distribute the costs, we first calculated annual *turnover rates,* which we defined operationally to be accessions divided by total strength. The turnover rate multiplied by the cost per accession yields the annual allocated accession cost per unit of total strength. For example, if historical data indicate that a service population of 100,000 is sustained by 20,000 accessions per year (offsetting 20,000 losses per year), the annual turnover rate is 0.2 (i.e., 0.2 accessions per year are required to sustain each individual in the total strength). If the cost of accessing one service member is $10,000, then the allocated annual accession cost per unit of strength is $10,000 multiplied by .2, or $2,000. This is a marginal cost because, in the steady state (excluding transitional effects of moving from one strength level to another), turnover varies proportionally with strength.

An alternative but mathematically equivalent way to allocate accession costs is to assume that they would be amortized over the expected period that each accession will serve on active duty. *Expected workyears per accession* are computed as the reciprocal of the turnover rate (in the above example, 1 divided by 0.2, or 5). If each accession is expected to serve five years on active duty, the $10,000 accession cost must be divided by five to amortize it over the ex-

pected life cycle. Thus, the annual life-cycle accession cost would be $2,000.[30]

*Excluded Costs.* Many training and education costs for military members are not accession-related. For example, members undergo various forms of advanced and specialized training and take part in academic or professional military education (PME) programs throughout their careers. Civil service employees also attend advanced training and take part in many PME programs. We suspect that military members receive more-advanced training and education than do civil service employees, but we were unable to isolate cost and attendance data for civil service employees. Lacking data to demonstrate any military and civil service differences in advanced training and education costs, we have excluded them from both military and civil service marginal-cost computations.

We have also excluded flight training from our military cost computations. Military–civil service conversions seldom if ever occur for aircrew positions. Flight training, however, is very expensive. Including it among other forms of initial skills training would significantly raise the average costs of that training, but would distort the expected marginal cost of officer strength changes. An analysis of the civilianization of such specialized activities would require detailed, specialized cost data.

Finally, recruiting and initial skill training (IST) costs for civil service employees are totally excluded from our marginal-cost calculations. While these costs are probably nontrivial, we found no way to capture them. Civil service recruiting, candidating, selection, and other hiring costs are shared by local personnel offices and line supervisors, but the associated workloads cannot be isolated from other activities. IST is less common among civil service employees than it is among military members, because civil service employees are generally required to be qualified for the jobs they are hired to fill.

[30]The *expected man-years per accession* is the mean of a distribution of actual man-years per accession: Some individuals will remain in the service for one year or less, whereas others may have a 30-year military career. In order to compensate for the fact that some people leave the service before five years have elapsed, and although it takes five years to recoup the training costs of an individual, the annual costs are attributed to each current man-year, even if YOS is greater than five.

However, some civil service employees in specialized jobs do attend training or orientation courses incidental to their initial employment.

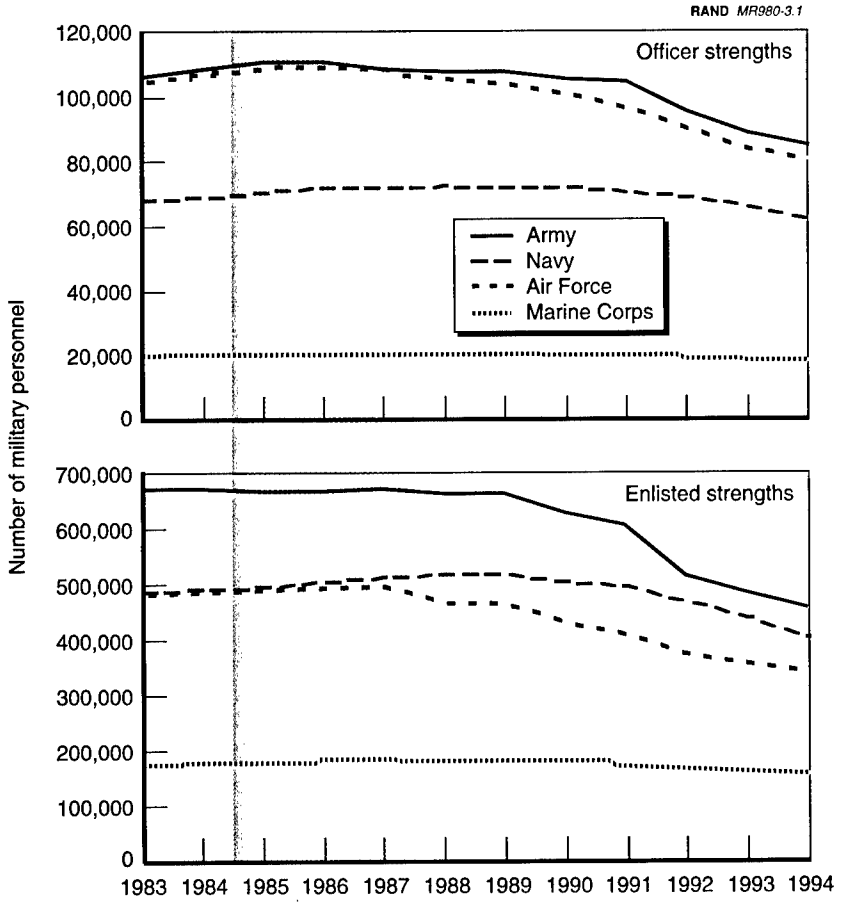
*Turnover Rates.* In computing turnover rates, several considerations apply:

- Because changes in strength from one year to the next affect accessions disproportionately, one should use data from a period of relatively stable strength levels. Building on the example above, if the strengths of a population in two successive years were reduced from 100,000 to 90,000 in one year (a 10-percent reduction), accessions would drop from 20,000 to around 10,000 during that year (a 50-percent reduction), unless extraordinary actions were taken to create more than the expected 20,000 losses. The Reagan administration defense buildup during the early 1980s, followed by a post–Cold War drawdown beginning in the late 1980s and extending to the present, make it difficult to find a recent period of stable strengths.
- Service turnover rates can be influenced by exogenous economic factors, such as unemployment rates and a military/private-sector pay gap, that vary over time. Thus, to avoid relative biases among service turnover rates, all observations should be drawn from the same time period.
- To smooth out the effects of random shocks, one should use observations over more than a single year.

Taking these three considerations into account, we chose the 3-year period from 1985 to 1987—shown in the shaded portion of Figure 3.1—as the basis for computing turnover rates. As depicted in the figure, which shows officer and enlisted strength levels by service from 1984 through 1994, although patterns of strength buildup and drawdown varied somewhat among the services, in this 3-year period, both officer and enlisted strength changes were minimal.[31]

The turnover rates and expected workyears derived from data in this period are shown in Table 3.6. Note that officer turnover rates are

[31]Specifically, for both officer and enlisted strengths evaluated separately, this is the contiguous 3-year period between 1983 and 1994 when the sum of the absolute values of service-strength changes over rolling 3-year increments is minimized.




NOTE: Shaded area (1985–1987) indicates contiguous 3-year period when strength levels were most stable.

**Figure 3.1—Service-Strength Levels, 1983–1994**

lower than enlisted turnover rates and that rates vary widely among the services.

*Accession Costs.* Accession costs for officers comprise officer-acquisition training costs and IST costs. Officer-acquisition training occurs through service academies, Reserve Officer Training Corps (ROTC) programs, Officer Candidate School or Officer Training

**Table 3.6**

**Average Strengths, Accession Levels, and Turnover Rates, 1985–1987**

| Average Strengths, Accession Levels, and Turnover Rates | Army | Navy | Marine Corps | Air Force | Total DoD |
|---|---|---|---|---|---|
| **Officers** | | | | | |
| 1985–1987 avg strength | 109,136 | 71,582 | 20,140 | 108,262 | 309,120 |
| 1985–1987 avg accessions | 9,397 | 7,986 | 1,793 | 8,006 | 27,181 |
| Turnover rate | 0.086 | 0.112 | 0.089 | 0.074 | 0.088 |
| Expected workyears per accession | 11.61 | 8.96 | 11.24 | 13.52 | 11.37 |
| **Enlisted** | | | | | |
| 1985–1987 avg strength | 667,212 | 503,347 | 178,648 | 492,838 | 1,842,044 |
| 1985–1987 avg accessions | 121,967 | 67,667 | 35,133 | 63,633 | 288,400 |
| Turnover rate | 0.183 | 0.134 | 0.197 | 0.129 | 0.157 |
| Expected workyears per accession | 5.47 | 7.44 | 5.09 | 7.75 | 6.39 |

NOTE: Both the service and the DoD totals are averages. The service averages do not always add to the DoD total, because of rounding.

School (OCS/OTS) programs, health professions acquisition programs, and other miscellaneous commissioning programs. Following commissioning, officers generally attend one or more courses in the skills needed for their military occupations.

For enlisted personnel, accession costs are incurred for recruiting, recruit training, and IST. Recruiting costs include the personnel costs of recruiters and other support personnel, advertising, enlistment bonuses, education incentives, and recruiting operations and maintenance (O&M) costs. Recruit training orients new enlistees to military life, and IST serves the same function it does for officers.

In general, the training costs we used for this analysis are those reflected in the *FY 1997 Military Manpower Training Report* (MMTR; DoD, 1996b). They include pay and allowances for both trainees and staff, BOS costs, construction and procurement, and overhead costs for training administration and command. These data reflect the costs incurred by the services to *provide* training of various types,

even though some of the training is received by members of other services, members of the National Guard and Reserves, civil service employees, foreign military members, and others. To minimize distortions in computing costs per graduate, we included these other categories of trainees whenever possible in course-graduate counts.

Table 3.7 displays the flows and costs for various accession-related expenses. Costs per workyear in this table were computed using expected workyears per accession as reflected in Table 3.6. Note that Army recruits are trained through two possible tracks: about two-thirds proceed through conventional recruit training and then on to IST. The other one-third proceed through One-Station Unit Training (OSUT), which combines recruit training with IST, saving about four weeks of total training time.[32] Note also that the cost per workyear for Marine enlisted recruit training is much higher than that for the other services. This is so because Marine recruit training takes longer, the attrition rate from this training is higher, and the turnover rate (see Table 3.6 above) is higher.[33]

*IST Costs.* IST costs required some additional computations, because available cost data do not distinguish between officer and enlisted training or between IST and other types of specialized skill training.[34] To estimate officer and enlisted initial skill training, we first divided the total cost of specialized skill training by the number of graduates from all such training courses. Since many members attend cross-service training (training provided by another service), we do not believe that the cost per graduate for any single service reliably indicates the cost of providing training to that service's personnel. Rather, it indicates the cost of training provided by that service to its own or other personnel. To eliminate any interservice biases,

[32]DoD, 1996b, pp. 21–22.

[33]Course lengths and attrition rates can be found in the FY97 MMTR (DoD, 1996b), pp. 19–20.

[34]As defined in the FY97 MMTR (DoD, 1996b), *initial skill training* includes all formal training given immediately after commissioning or recruit training and leading toward the award of a military occupational specialty or rating at the lowest skill level.

**Table 3.7**

**FY96 Accession-Related Flows and Costs**

| Type of Training | Army | Navy | Marine Corps | Air Force | Total DoD |
|---|---|---|---|---|---|
| Officer-Acquisition Training[a] | | | | | |
| Graduates | 4,804 | 3,371 | 1,372 | 3,893 | 13,440 |
| Costs ($M) | 355.7 | 359.2[b] | | 374.4 | 1,089.4 |
| Cost per graduate ($) | 74,052 | 75,731[b] | | 96,179 | 81,054 |
| Cost per workyear ($) | 6,376 | 8,449 | 6,741 | 7,112 | 7,127 |
| Enlisted Recruit Training[a] | | | | | |
| Graduates | 74,825 | 49,571 | 34,559 | 30,354 | 189,309 |
| Costs ($M) | 536.4 | 477.9 | 509.7 | 239.0 | 1763.0 |
| Cost per graduate ($) | 7,169 | 9,640 | 14,749 | 7,875 | 9,313 |
| Cost per workyear ($) | 1,310 | 1,296 | 2,901 | 1,017 | 1,458 |
| Army One-Station Unit Training[a] | | | | | |
| Graduates | 34,350 | | | | |
| Costs ($M) | 432.6 | | | | |
| Cost per graduate ($) | 12,594[c] | | | | |
| Cost per workyear ($) | 2,302 | | | | |
| Enlisted Recruiting Costs[d] | | | | | |
| Cost per accession ($) | 8,506 | 8,506 | 8,506 | 8,506 | 8,506 |
| Cost per workyear ($) | 1,555 | 1,143 | 1,673 | 1,098 | 1,332 |

[a]Source for number of graduates and total training costs: FY97 MMTR (DoD, 1996b). Data on officer-acquisition training pertain to active-duty accessions only. Data on enlisted recruit-training graduates and costs include both active and reserve component accessions, because aggregate training costs reported in the MMTR were not separable for those two components.

[b]The Navy and Marine Corps share some officer-commissioning sources (Naval Academy and Naval ROTC). To determine costs per graduate, we pooled all Navy and Marine officer-acquisition costs and divided by the sum of Navy and Marine graduates.

[c]This cost per graduate compares favorably with the sum of costs ($14,591) for enlisted recruit training (shown above in this table) and initial skill training (shown in Table 3.9 below).

[d]Source for cost per accession: administrative data made available by the Office of the Assistant Secretary of Defense (Force Management Policy)(Military Personnel Policy)(Accession Policy) (ASD[FMP][MPP][AP]).

we combined these data for all services and computed a single DoD cost per graduate for all specialized skill-training courses. We then noted that IST graduates exceed officer-acquisition and recruit-

training graduates—an indication that officer and enlisted accessions attend, on average, more than one IST course.[35]

To determine the average number of IST courses attended by each accession, we divided officer and enlisted initial-skill course graduates (shown in Table 3.8) by the number of officer-acquisition or

**Table 3.8**

**FY96 Initial Skill Training Flows and Costs**

| IST Flows and Costs | Army | Navy | Marine Corps | Air Force | Total |
|---|---|---|---|---|---|
| Graduates[a] | | | | | |
| Initial skill (officer) | 11,652 | 3,212 | 2,979 | 4,311 | 22,154 |
| Initial skill (enlisted) | 84,184 | 76,579 | 69,022 | 45,056 | 274,841 |
| Other | 149,031 | 431,722 | 31,838 | 63,804 | 676,395 |
| Total | 244,867 | 511,513 | 103,839 | 113,171 | 973,390 |
| Costs ($M) | 2,569.8 | 1,881.4 | 694.2 | 1,276.1 | 6,421.5 |
| Cost per graduate ($) | | | | | 6,597 |
| Courses per accession[b] | | | | | |
| Officer | 1.60 | 0.94 | 2.04 | 0.92 | 1.28 |
| Enlisted | 1.05 | 1.59 | 1.95 | 1.30 | 1.45 |
| Cost per accession ($) | | | | | |
| Officer | 10,523 | 6,180 | 13,487 | 6,095 | 8,454 |
| Enlisted | 6,919 | 10,480 | 12,850 | 8,588 | 9,546 |
| Cost per workyear ($) | | | | | |
| Officer | 906 | 689 | 1,200 | 451 | 743 |
| Enlisted | 1,265 | 1,409 | 2,527 | 1,109 | 1,495 |

[a]Source for number of graduates and total training costs: FY97 MMTR (DoD, 1996b). Data on graduates and costs pertain to both active and reserve component training, because aggregate training costs reported in the MMTR were not separable for those two components.

[b]These ratios are based on active-duty initial-skill-training flows divided by active-duty officer acquisition and recruit-training flows. The ratios cannot be computed using the number of graduates reported in Table 3.7 and this table, which in some cases include both active-duty and reserve component training flows.

[35]Some individuals attending IST courses are retrainees from other military specialties, rather than accessions. Because we were unable to determine the mix of retrainees and accessions in initial skill training courses, our figures in Table 3.8 overstate the number of courses per accession.

recruit-training graduates, respectively, shown in Table 3.7. We then multiplied the courses-per-accession figure by the cost per graduate to obtain IST costs per accession. Finally, as with other accession-related training costs, we divided by the expected workyears per accession (from Table 3.6) to obtain costs per workyear.

All accession-related and initial skill training costs per workyear are summarized in Table 3.9. For our example, recruiting and training costs for a DoD average O-4 would be $7,913; equivalent costs for a DoD average E-5 are considerably lower, at $3,994.

The MMTR generally does not provide separate cost and flow data for warrant officers. We suspect that warrant officers incur acquisition training costs similar to those for enlisted personnel and initial skill training costs similar to those for officers. Lacking data for separate warrant-officer computations, and relying on these assump-

**Table 3.9**

**FY96 Accession-Related Costs per Workyear**

| Acquisition-Related Cost | Army ($) | Navy ($) | Marine Corps ($) | Air Force ($) | Total DoD Avg. ($) |
|---|---|---|---|---|---|
| Officer | | | | | |
| Acquisition training | 6,376 | 8,449 | 6,741 | 7,112 | 7,127 |
| Initial skill training | 906 | 689 | 1,200 | 451 | 743 |
| Total | 7,282 | 9,138 | 7,941 | 7,652 | 7,870 |
| Warrant Officer[a] | 5,663 | 6,492 | 7,521 | — | 6,051 |
| Enlisted | | | | | |
| Recruiting | 1,555 | 1,143 | 1,673 | 1,098 | 1,332 |
| Recruit training | 1,310 | 1,296 | 2,901 | 1,017 | 1,458 |
| Initial skill training | 1,265 | 1,409 | 2,527 | 1,109 | 1,495 |
| Army OSUT | 2,302 | | | | 2,302 |
| Total | 4,044[b] | 3,848 | 7,100 | 3,224 | 4,231[b] |

[a]Warrant-officer costs shown here are the average of officer and enlisted costs. See discussion in text.

[b]Enlisted total costs per workyear in the "Army" and "Total DoD" columns are computed by weighting conventional recruit training/initial skill training and OSUT training costs according to the number of recruits in each track. For the Army total, the weights are .685 for the conventional (IST and recruit training) track and .315 for the OSUT track. For the DoD total, the weights are .917 for the conventional track and .083 for the OSUT track.

tions, we show warrant-officer costs as the average of officer and enlisted costs.

**Other Costs.** The services incur a number of other miscellaneous personnel costs that are directly or indirectly related to the size of the force. These other costs include apprehension of deserters, interest on uniformed services savings deposits, death gratuities, unemployment compensation, survivor benefits, education benefits, adoption expenses, and surviving-dependent quarters allowance. These "other personnel costs" incurred by each service are reported in the services' 1997 *Biennial Budget Estimates* for military personnel. To attribute these costs to an incremental workyear, we divided the total expenditures on these activities by the total officer and enlisted population to calculate the other costs per workyear. For our example, other costs for a DoD average O-4 are $302; other costs for a DoD average E-5 are $291.

## Calculating the Relative Incremental Cost of Military Personnel

To generate an estimate of the total incremental costs of military personnel for use in a comparison with costs of DoD civil service personnel, we added the direct- and indirect-cost elements discussed above. Table 3.10 shows how we obtained the totals for our two examples—the O-4 and the E-5. Table 3.11 shows the DoD averages for the two examples and for all the other grades. Appendix B contains the interservice totals for all the grades.

Because we have omitted permanent change of station (PCS) costs, mid-career training costs, the cost of BOS services, and special pays for fighter pilots and other specialized personnel, the cost estimates shown in Table 3.11 do not reflect the total average cost of military personnel. Our goal has been to construct cost estimates that reflect the average incremental cost of a military workyear for use in a comparison with the incremental costs of a civil service workyear. We omitted the aforementioned costs either because they were also excluded from the civil service analysis or because it would be inappropriate to include them for purposes of cost comparison with civil service workers.

**Table 3.10**

**FY96 Incremental Costs ($) for a DoD Average O-4 and E-5**

| Components of Military Pay | O-4 ($) | E-5 ($) |
|---|---|---|
| Direct Costs | | |
| Basic Pay | 45,941 | 18,350 |
| BAS | 1,789 | 2,604 |
| BAQ | 8,677 | 4,895 |
| VHA | 2,548 | 1,318 |
| Retired Pay Accrual | 15,115 | 6,037 |
| Social Security (FICA) | 2,848 | 1,138 |
| Clothing Allowance | 10 | 260 |
| Indirect Costs | | |
| Active-Duty Health Care Costs | 6,323 | 5,853 |
| Retire Health Care Costs | 790 | 747 |
| Reenlistment Bonuses | — | 181 |
| Military Recruiting and Training | 7,913 | 3,994 |
| Other Costs | 302 | 291 |
| Total Compensation | 92,256 | 45,668 |

**Table 3.11**

**FY96 Relative Incremental Cost ($) of Military Personnel**

| Flag Officer | | Other Commissioned Officer | | Warrant Officer | | Enlisted Personnel | |
|---|---|---|---|---|---|---|---|
| Grade | DoD Avg. ($) | Grade | DoD Avg. ($) | Grade | DoD Avg. ($) | Grade | DoD Avg. ($) |
| O-10 | 179,919 | O-6 | 127,507 | W-5 | 94,512 | E-9 | 77,142 |
| O-9 | 173,941 | O-5 | 108,257 | W-4 | 87,105 | E-8 | 66,604 |
| O-8 | 160,710 | O-4 | 92,256 | W-3 | 73,729 | E-7 | 58,921 |
| O-7 | 146,336 | O-3 | 78,075 | W-2 | 63,841 | E-6 | 52,478 |
| | | O-2 | 64,569 | W-1 | 56,611 | E-5 | 45,667 |
| | | O-1 | 52,618 | | | E-4 | 39,021 |
| | | | | | | E-3 | 35,101 |
| | | | | | | E-2 | 32,926 |
| | | | | | | E-1 | 29,956 |

**Caveats to Calculating Incremental Personnel Costs.** In constructing these estimates, we were faced with many data limitations and made several simplifying assumptions that might have introduced a bias into the estimates. In this subsection, we summarize those as-

sumptions and describe the potential biases so that the reader can adjust the estimates to conform to alternative views of the world.

On the civil service side, the most significant caveat relates to the use of OMB estimates of the cost of benefits rather than actual budget data from the U.S. Office of Personnel Management (OPM). As discussed earlier in this chapter, the OMB estimates the cost of benefits for full-time permanent workers at 26.87 percent of base pay. Our calculations, which are based on OPM budgetary data, reveal an agency cost of 20.7 percent. We used the higher figure because we believe it more accurately reflects the actual cost of an incremental full-time permanent civil service workyear to the government. We also note that, to the extent that the *decremental workyear* (i.e., an employee who is *removed* from the civil service on the margin) is more likely to be a CSRS employee, the cost of that workyear will be slightly lower, because the cost of CSRS benefits to the government (but not the agency) is lower. Similarly, to the extent that an incremental workyear is more likely to be a FERS employee, the cost of that workyear will be slightly higher.

A second issue on the civil service side is the omission of training and recruiting costs: both IST and long-term training relate to career development. While we included accession and IST costs in the estimate of the cost of an incremental military workyear, we were unable to include such estimates for civil service personnel. However, we believe that hiring and initial training costs are very small on the civil service side. They would include the costs of screening resumes, testing, and providing the employee with orientation and on-the-job training. Some of these costs would be included in the costs of running the local or regional personnel offices, and some of the costs would be borne by employing units. Unlike in the military, civil service personnel are hired into specific positions for which they possess the requisite skills. It is worth mentioning that the IST for military personnel provides them mainly with combat-related skills, not skills required for specific jobs. The job-specific orientation and training required for civil service personnel would also be required for military personnel in addition to the training costs we have captured on the military side. With respect to long-term career-development training, we had no way to capture those costs for civil service employees, so we have omitted them for both military and civil service personnel.

On the military side, because there is no non-arbitrary way of attributing costs of one-time events such as recruiting, training, and retirement to an incremental workyear, the military cost analysis is based on several specific assumptions. Most important, it incorporates a general belief that indirect turnover-related costs should be attributed in a way that reflects the long-term impact of civilianization on personnel flows. Those that disagree with this approach may want to attribute the cost of one-time events differently. We used DoD actuarial rates to attribute retirement costs to an incremental military workyear. In so doing, we implicitly assumed that the military workforce is in a steady state and that the retirement patterns will remain constant in the face of civilianization. If civilianization or some other policy change leads to changes in the steady state, then those retirement costs might also change.

In estimating health care costs for active-duty personnel and their dependents, we attributed all the non–wartime-related costs of operating Military Treatment Facilities to the cost of providing health care to active-duty personnel. In truth, the MTFs also serve dependents and retirees. Therefore, our calculations likely overestimate the cost of providing health benefits to active-duty personnel and underestimate the cost of providing health benefits to dependents. As a result, we are likely overestimating the cost per workyear for those military grades having a low number of dependents and underestimating the costs of military grades having a large number of dependents. At the lowest grades, the overestimate may be substantial, on the order of $2,000, or 7 percent of the total cost estimate. For other military grades, the possible bias is much smaller, both in dollars and as a percentage of the cost estimate.

Chapter Four

# COMPARING THE COSTS OF CIVIL SERVICE AND MILITARY PERSONNEL: TWO APPROACHES

In Chapter Two, we described two approaches to substituting civil service for military personnel: (1) the traditional approach, which reflects the way that the DoD currently does such substitution analysis and (2) an alternative approach, which accounts for the rigidity in military grade structures that is ignored in the traditional approach to evaluating military–civil service conversions. The question we want to answer here is, When we use the cost estimates generated in Chapter Three, how sensitive are the results of the cost comparison to the assumptions underlying these two approaches?

## THE TRADITIONAL APPROACH

The traditional approach to doing substitution analysis is to compare the cost of military and civil service personnel at "comparable" grade levels. The comparable grade level is determined through the table of equivalent grades contained in DoDI 1000.1 (DoD, 1974), which is presented in Table 4.1.

Using the correspondence in this table, we can compare the incremental cost of an equivalent military and civil service workyear using the total cost figures generated in Chapter Three. This grade-by-grade comparison reveals that military personnel are unequivocally more expensive to DoD than are salaried (GS and SES) civil service personnel of a comparable grade. For example, an O-6 (who has an annual cost of $127,507) is more expensive than a "comparable" GS-15 (who has an annual cost of $116,344).

**Table 4.1**

**General Civil Service and Military Grade Equivalencies**

| Military Grade | Equivalent Civil Service Grade | | | | |
|---|---|---|---|---|---|
| | SES | GS | WG | WL | WS |
| O-10 | x | | | | |
| O-9 | x | | | | |
| O-8 | x | | | | |
| O-7 | x | | | | |
| O-6 | | 15 | | 15 | 14–19 |
| O-5 | | 13, 14 | | 15 | 14–19 |
| O-4 | | 12 | | 15 | 14–19 |
| O-3 | | 10, 11 | 12–15 | 6–14 | 8–13 |
| O-2 | | 8, 9 | 12–15 | 6–14 | 8–13 |
| O-1 | | 7 | 12–15 | 6–14 | 8–13 |
| W-4 | | 8, 9 | 12–15 | 6–14 | 8–13 |
| W-3 | | 8, 9 | 12–15 | 6–14 | 8–13 |
| W-2 | | 7 | 12–15 | 6–14 | 8–13 |
| W-1 | | 7 | 12–15 | 6–14 | 8–13 |
| E-9 | | 6 | 9–11 | 1–5 | 1–7 |
| E-8 | | 6 | 9–11 | 1–5 | 1–7 |
| E-7 | | 6 | 9–11 | 1–5 | 1–7 |
| E-6 | | 5 | 9–11 | 1–5 | 1–7 |
| E-5 | | 5 | 9–11 | 1–5 | 1–7 |
| E-4 | | 4 | 1–8 | | |
| E-3 | | 1–3 | 1–8 | | |
| E-2 | | 1–3 | 1–8 | | |
| E-1 | | 1–3 | 1–8 | | |

SOURCE: With the exception of SES categories, this table represents grade equivalencies found in DoDI 1000.1 (DoD, 1974).

For FWS employees, cost comparisons become more complicated, because the equivalencies are less precise and because there is a substantial amount of overlap in the cost of comparable military and civil service personnel, particularly at lower grades. For example, Table 4.1 suggests that E-1 through E-4 military personnel are generally comparable to WG-1 through WG-8 and GS-1 through GS-4 civil service personnel. The cost of these military personnel ranges from $29,956 to $39,021 per year; the cost of the comparable civil service personnel ranges from $19,487 to $44,622 per year. There is sufficient overlap in the cost of the these military and civil service personnel that conclusions about the relative cost-effectiveness will

depend on the particular paygrades compared. While a GS-1 (annual cost of $19,487) is much less costly than an E-1 (annual cost of $29,956), a WG-6 (annual cost of $41,017) is more costly than an E-3 (annual cost of $35,101). Thus, cost comparisons based on the grade equivalencies reported in Table 4.1 generate qualified support for the notion that a military workyear is more expensive to DoD than an equivalent civil service workyear.

However, it is important to recognize that the grade equivalencies were developed for administrative purposes. There is no evidence that they reflect comparability of work done by individuals in these grades. Therefore, cost comparisons based on these grade-by-grade comparisons should be viewed with caution. Ideally, we would want to develop equivalencies by comparing the nature of work done by individuals in the specific grades or by empirical evidence on actual substitutions. Unfortunately, no database tracks the grade level of civilianized military positions.

Lacking information on the actual grade equivalencies obtained in past conversions that could serve as a check on the administrative grade equivalencies shown in Table 4.1, we conducted an analysis to provide an alternative to these grade equivalencies. Specifically, we compared the cost of civil service and military personnel at similar positions in the cost distributions of their respective workforces. Such a comparison is valid if the distribution of skill requirements among military personnel is roughly equivalent to the distribution of skill requirements among civil service positions.[1]

To do this comparison, we used DoD average costs for civil service and military personnel at each grade level. We intermingled and ranked all civil service grades (SES, GS, WS, WL, and WG) according to their respective costs. Similarly, we intermingled and ranked all military grades (flag officer, other commissioned officer, warrant officer, and enlisted personnel) by cost. Then, using workforce statistics, we calculated the distributions of the military and civil service workforces at each cost-ranked grade level.

[1]We are not asserting that this is true. In fact, there are reasons to believe that the skill distribution of military and civil service personnel will differ. We know of no study that compares the nature of work performed by military and civil service personnel.

We were then able to observe the grade and cost of the workers at each percentile in the military and civil service distributions. Each grade spans a range in the cost distribution. For example, E-1s represent 4 percent of the military workforce—from the very lowest-cost worker to the 4th percentile worker. The median E-1 is at the second percentile of the cost distribution.

Figure 4.1 plots the cost distribution of the military and civil service workforce by average cost against the midpoint of the percentile distribution for each military and civil service grade. The plots for the two workforces are strikingly similar. Below the 90th percentiles of the distributions, the cost of a workyear at any point in the military distribution is not substantially different from the cost of a workyear at the corresponding point in the civil service distribution. In other words, the 25th percentile military workyear costs DoD about the same as does the 25th percentile civil service workyear. It is only for the most senior military officers that the cost of military personnel significantly exceeds the cost of similar civil service personnel (SES).

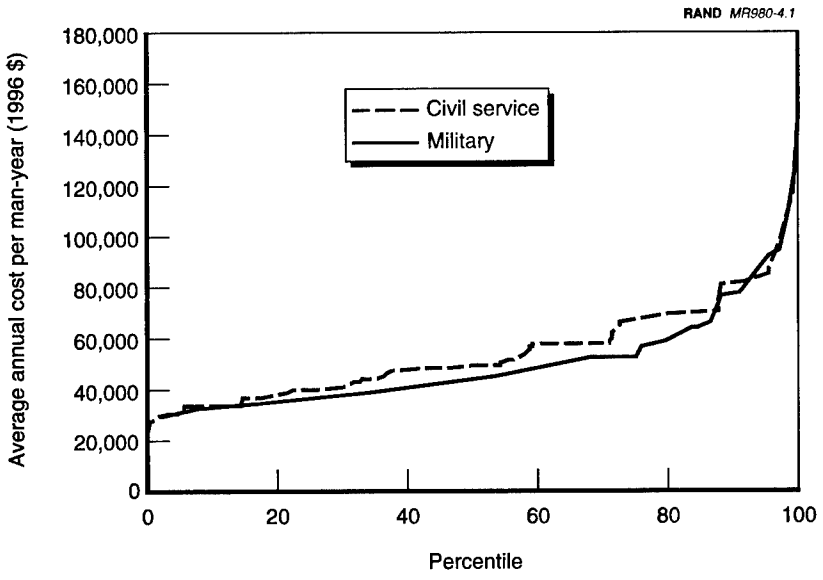



**Figure 4.1—Cost Distribution of Military and Civil Service Personnel**

Although it is possible to compare the cost of military and civil service workers at any point in the cost distribution, for purposes of discussion it is useful to focus attention on deciles of the cost distribution. Table 4.2 contains the grade level and average salary of a workyear at each decile of the cost distribution for each workforce. It appears that the cost distribution for civil service workers is "flatter" than the distribution for military workers, so that the costs of military and civil service workers are roughly comparable at the low end of the cost distribution, that civil service workers are slightly more costly in the middle of the distribution, and that military personnel are more costly at the high end of the cost distribution. For example, the 10th percentile military worker is an E-2 who costs the DoD $32,926. At the 10th percentile of the cost distribution of the civil service workforce is a GS-5 who costs the DoD $33,488. Thus, the civil service workers at the 10th percentile of the civil service cost distribution are approximately 2 percent more expensive than the military workers at the 10th percentile of the cost distribution. The 40th percentile military worker costs the DoD $39,021, whereas the 40th percentile civil service worker costs the DoD $48,006. At this point in the percentile distribution, the military worker is almost 19

**Table 4.2**

**Decile Comparisons of the Military and Civil Service Workforce**

| Percentile | Military Cost | Military Grade | Civil Service Cost | Civil Service Grade |
|---|---|---|---|---|
| 10 | 32,926 | E-2 | 33,488 | GS-5 |
| 20 | 35,101 | E-3 | 36,918 | GS-6 |
| 30 | 39,021 | E-4 | 41,017 | WG-6 |
| 40 | 39,021 | E-4 | 48,006 | GS-9 |
| 50 | 45,667 | E-5 | 49,489 | WG-10 |
| 60 | 45,667 | E-5 | 57,699 | GS-11 |
| 70 | 52,478 | E-6 | 57,699 | GS-11 |
| 80 | 58,921 | E-7 | 69,299 | GS-12 |
| 90 | 78,075 | O-3 | 81,886 | GS-13 |
| 95 | 92,256 | O-4 | 81,886 | GS-13 |
| 98 | 108,257 | O-5 | 98,047 | GS-14 |

NOTE: This table uses DoD-wide composite military and civil service marginal costs by grade. The grade shown is the grade level of the individual at the noted percentile of the cost distribution; the cost is the average cost for personnel in that grade.

percent less costly than the civil service worker. Given the caveats about the cost estimates presented in Chapter Three, differences on the order of 10 percent may be too small to matter—the actual cost of military and civil service personnel evaluated in this manner may be essentially the same.

A comparison of Tables 4.1 and 4.2 suggests that the civil service workforce may be more "top heavy" than the military workforce. For example, the traditional equivalency table places GS-10 and GS-11 (58th through 71st percentile) on the same level as an O-3 (88th to 94th percentile). Thus, 42 percent of the civil service workforce is in grade GS-10 or above, apparently occupying positions comparable in responsibility to the 12 percent of the military workforce in grade O-3 and above. This suggests that either the grade equivalencies expressed in Table 4.1 are inappropriate (i.e., the functions performed by an O-3 are not comparable to the functions performed by a GS-10), or that there are substantial differences in the distribution of military and civil service assignments. Civil service assignments may, in fact, be skewed toward mid-to-higher levels of responsibility in DoD, because high turnover rates among military personnel and limited points of entry into the military workforce imply a need for a large stock of low-skill, entry-level military positions. If this is the case, then it is inappropriate to compare positions at similar points in the percentile distribution. However, if civil service assignments are not so skewed toward mid-to-higher levels of responsibility, the data indicate grade inflation in the civil service workforce and inappropriate matching of grades in the traditional equivalency table.

The juxtaposition of the comparable-grades approach and the percentile-based comparison suggests that the results of a cost analysis are extremely sensitive to assumptions about how substitution occurs. This observation argues for better information about the nature of substitution.

## Cost-Effective Substitutions

The rigidities found in military-grade distributions could conceivably be eliminated through changes in statute, policy, and programming practice. Assuming flexibility were obtainable in military-grade distributions, the question remains whether military–civil service

conversions at expected grade equivalencies would be cost-beneficial.

An alternative to using such predetermined grade equivalencies is to examine what substitutions would be cost-effective. If grade-distribution plans at service headquarters are adjusted in close coordination with a military–civil service conversion action, then it is appropriate to compare the grade-specific military and civil service costs. Under these circumstances, a military–civil service conversion will be cost-effective if

1. The new civil service grade for the converted position is below a cost break-even point corresponding to the old military grade
2. The service-wide military *inventory* in the corresponding grade is decremented.[2]

For the second condition to be met across multiple conversion actions, the revised service-wide military grade distribution must conform to statutory and budgetary constraints, which more than likely means that it must be *proportional to or leaner* than the ex ante grade distribution. For this to be the case, the distribution of the military positions being converted must be *proportional to or richer* than the ex ante service-wide distribution. We describe a grade distribution as being relatively *lean* if it is proportionally smaller in the higher grades (and proportionally larger in the lower grades) relative to some other distribution. A distribution is relatively *rich* if it is proportionally larger in the higher grades.

Under these assumed circumstances, both marginal military and civil service manpower costs are grade-specific; the civilianization of a position actually results in a military force reduction at the specified grade and a civil service force increase at the specified grade. When we combine composite marginal costs of military manpower by grade with the composite marginal costs of civil service manpower, we can determine cost-equivalent military and civil service grades, as shown in Table 4.3. Given the required flexibility in

[2]If military authorizations are converted to civil service positions that are well below break-even points, cost savings can be realized even if higher-grade inventories are decremented proportionally less than higher-grade requirements.

military-grade inventory management, conversion of a military position will be cost-effective if the resulting civil service grade is at or below the grade shown in this table.

If, as is commonly the case, shortfalls exist in higher-grade military inventories relative to requirements, military inventory managers may be unwilling to decrement higher-grade inventories when higher-grade military–civil service conversions occur. If so, higher-grade conversions would likely generate costs rather than

**Table 4.3**

**Cost Break-Even Grades for Military–Civil Service Conversions**

| | Highest Civil Service Grade with Lower Cost per Workyear | | | | |
|---|---|---|---|---|---|
| Military Grade | SES | GS | WG | WL | WS |
| O-10 | x | 15 | 15 | 15 | 18 |
| O-9 | x | 15 | 15 | 15 | 18 |
| O-8 | x | 15 | 15 | 15 | 18 |
| O-7 | x | 15 | 15 | 15 | 18 |
| O-6 | | 15 | 15 | 15 | 18 |
| O-5 | | 14 | 15 | 15 | 18 |
| O-4 | | 13 | 15 | 15 | 18 |
| O-3 | | 12 | 15 | 15 | 15 |
| O-2 | | 11 | 15 | 13 | 11 |
| O-1 | | 9 | 11 | 9 | 5 |
| W-5 | | 13 | 15 | 15 | 18 |
| W-4 | | 13 | 15 | 15 | 17 |
| W-3 | | 12 | 15 | 15 | 14 |
| W-2 | | 11 | 15 | 13 | 11 |
| W-1 | | 10 | 13 | 10 | 7 |
| E-9 | | 12 | 15 | 15 | 15 |
| E-8 | | 11 | 15 | 15 | 12 |
| E-7 | | 11 | 15 | 12 | 8 |
| E-6 | | 9 | 11 | 9 | 5 |
| E-5 | | 8 | 8 | 6 | 2 |
| E-4 | | 6 | 5 | 3 | — |
| E-3 | | 5 | 3 | 2 | — |
| E-2 | | 4 | 2 | 1 | — |
| E-1 | | 3 | 1 | 1 | — |

NOTE: This table uses DoD-wide composite military and civil service marginal costs by grade. The civil service grade shown is the highest grade that costs the same or less than the corresponding military grade.

savings, but might be beneficial nonetheless because they would help to reduce the higher-grade military manning shortfalls.

### A Note on Very Senior Positions

For very senior positions, requirements are established as either general/flag officer or SES billets. As noted above, general/flag officer strengths are constrained under 10 USC 526. These constraints are expressed in the form of absolute quotas for each service rather than as proportions of strength. General/flag officer requirements generally exceed these quotas. If a general/flag officer position is converted to SES, the general/flag officer quota is likely to be reallocated to an unsatisfied senior military officer requirement elsewhere and the number of general/flag officers will not change. Thus, military–civil service conversions at this level typically do not generate cost savings, but they do free up general/flag officer quotas to be applied against other requirements. Such conversions are predicated on interests other than cost.

## THE ALTERNATIVE APPROACH

In the alternative approach, which is most consistent with the way in which military grade strengths are actually managed, a civilianization action at an installation will reduce the military requirements at specific grade levels, but will have no effect on the service's overall grade structure. For example, if an installation civilianizes 10 positions currently held by E-4s, the force-structure reduction will likely be spread over all enlisted grades, rather than concentrated in the E-4 grade. We make three separate assumptions:

1. The substitution is one-for-one (one civil service worker is replacing one military worker).
2. The civil service grade structure is altered by civilianization (the proportion of people at different grade levels changes).
3. The military grade structure does not change.

Because civil service costs are tied closely to the grade of a position, marginal civil service manpower costs are always grade-specific. However, when the grade distribution of a service's military inven-

tory is not adjusted, the expected marginal military manpower cost is a weighted average, where weights are given by budgeted grade distributions.

When marginal manpower changes are evaluated this way, it can be seen that a military–civil service conversion yields a savings if the grade-specific civil service manpower cost is less than the grade-weighted average cost of the corresponding flag officer (O-7 through O-10; $155,919), other commissioned officer (O-1 through O-6; $83,063), warrant officer (W-1 through W-5; $69,372), or enlisted manpower (E-1 through E-9; $43,479) type that it replaces. These grade-weighted costs of military manpower, by service and grade type, are shown in Appendix B. When we compare these grade-weighted average costs with the costs for civil service personnel generated in Chapter Three to determine relative costs, we find the break-even points shown in Figure 4.2.

Civil service personnel in grades above the line are more expensive than the average military workyear of a given type. For example, commissioned officers (other than flag officers) are less expensive than GS-14, GS-15, and SES civil service personnel, but more expensive than most other civil service personnel. No break-even line is presented for flag officers, because they are more expensive than all civil service personnel, including SES employees.

The effect of using cost alone as a criterion for civilianization would be to select junior-officer and enlisted positions for conversion (those that convert to civil service positions below the indicated break-even points) while retaining senior positions as military authorizations. Because the greatest cost savings can be reaped by converting activities that would be filled by the lowest-graded civil service personnel, these incentives tend to relegate civil service work to lower grades, which would hamper civil service career-progression opportunities.

Using cost alone also tends to create or exacerbate military-inventory shortfalls relative to requirements in higher grades. Consider, for example, an action to convert 100 enlisted positions in a given activity to civil service performance. To maximize savings, the service would select activities that could be performed by GS-1 employees.

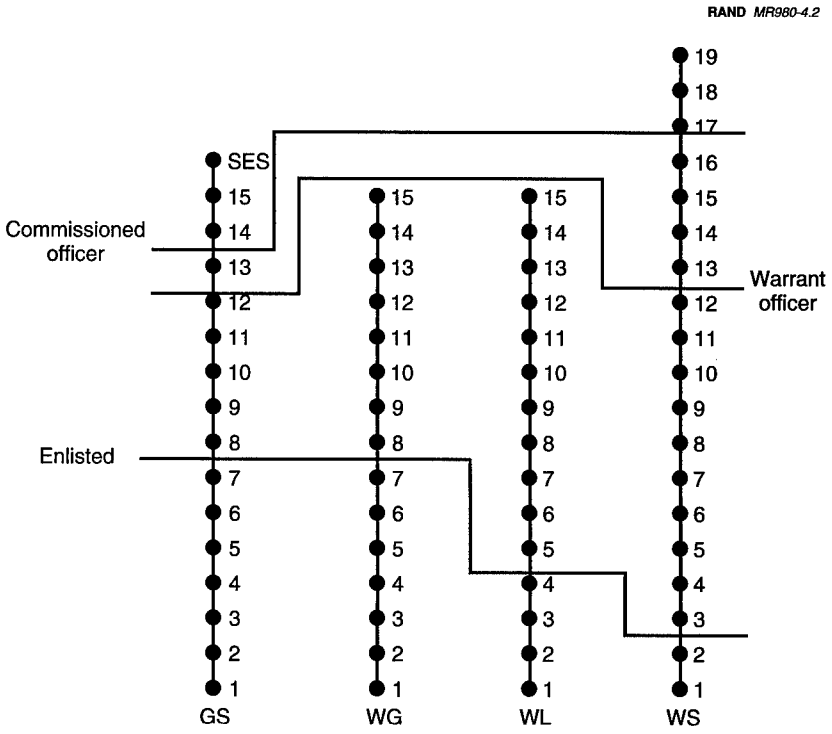



**Figure 4.2—Military–Civil Service Conversion Cost Break-Even Points When Military-Grade Distributions Are Not Adjusted**

Accordingly, 100 military requirements in grades E-1 through E-3 would be deleted.[3] However, if the inventory-grade distribution of military personnel remained proportionally the same, the service-wide enlisted inventory would be reduced by only about 29 in grades E-1 through E-3, where all the requirements were deleted, and another 71 in higher grades, where no requirements were deleted.[4]

[3]We were unable to locate any empirical data regarding actual grade equivalencies observed in past military–civil service conversions. Civil service grades are established idiosyncratically by local classifiers and are often not recorded in service manpower requirements files.

[4]We used the FY96 Army grade distribution to generate this example.

This pattern of changes is illustrated in Figure 4.3. Repetition of this pattern would contribute to a growing military manning imbalance, with higher-grade inventories falling below requirements and lower-grade inventories exceeding requirements.

Alternatively, given a military–civil service conversion of some size, a group of positions with a grade distribution representative of the current grade structure could be selected, mitigating the problems with civil service career progression and military inventory/requirement mismatches cited above. When a more representative distribution of grades is converted, the cost-effectiveness of the action can be evaluated by comparing the sum of the grade-specific civil-service-position costs to the sum of the military manpower type-specific (flag officer, other noncommissioned officer, warrant officer, enlisted personnel) costs. Although the civilianization of various groups of positions would yield net savings, the cost impact of civilianizing individual positions within that group could be nega-

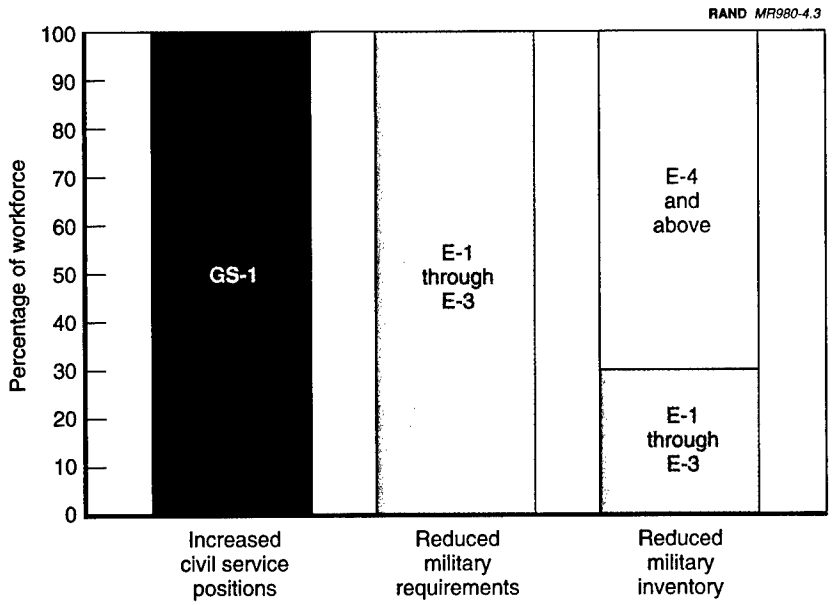



**Figure 4.3—Notional Expected Impacts of a Cost-Driven Conversion**

tive. For example, it might be cost-effective to civilianize a group of three positions staffed by an E-2, E-5, and E-8, even though the civilianization of the E-2 position alone would not be cost-effective. However, some sacrifice of savings may be appropriate to avoid the career-progression and inventory/requirement-mismatch problems that would accompany an approach that maximizes savings.

Chapter Five

# CONCLUSIONS

This report has focused on answering two questions that are fundamental to an analysis of civilianization as a policy option:

- What are the relative costs of civil service and military workyears at specific grade levels?
- What assumptions about military and civil service grade distributions and substitution ratios are appropriate for comparing the costs of military and civil service personnel?

Our conclusions respond to these questions.

## RELATIVE COSTS OF CIVIL SERVICE AND MILITARY WORKYEARS

Overall, our analysis of the relative costs of civil service and military workyears updates previous RAND work by Palmer and Osbaldeston (1988) that estimated the incremental cost of military and civil service workyears by grade and service. We constructed these estimates for comparative purposes, omitting costs (such as the cost of BOS) that are essentially the same for a military and a civil service workyear. On the civil service side, we were able to estimate basic pay by grade and service. For other cost elements, such as other-pay and benefits costs for civil service workers, we could not construct separate estimates by grade and were forced to use service-wide averages. More-detailed information on the cost of benefits by service and paygrade could help refine the estimates. It is worth keeping in mind that, while our analysis has focused on the cost of civil service

workers to the government, agencies pay only a fraction of the full normal cost of retirement benefits for civil service workers. As a result, local personnel managers face different incentives for civilianization than does the federal government as a whole.

On the military side, although most information was directly available from service budget estimates, two aspects of our military cost estimates deserve special attention: health care, and accession and training costs. We faced significant challenges in estimating the cost of health care for military personnel and their dependents. Because such benefits are partly provided "in-house" in MTFs and partly through insurance programs, it is difficult to attribute the cost of health care for an incremental military workyear. Our estimates may have attributed too much of the costs of running MTFs to active-duty personnel, thereby causing us to underestimate the cost of providing health care to dependents and retirees and to overestimate the cost of providing health care to active-duty personnel and leading, in turn, to overestimates of the health care costs for military personnel with few dependents (very-low- and very-high-grade personnel) and underestimates of the costs for personnel with many dependents (mid-career personnel). Future work would benefit from more in-depth analysis of the health care costs issue.

In estimating the incremental cost of military personnel, we included accession and training costs. We found that these costs are substantial (nearly $8,000 per year for officers and over $4,000 per year for enlisted personnel), and argue that they should be viewed as part of the overall cost of maintaining a force of a given size and allocated accordingly. However, here, too, we are concerned that we may have included fixed costs that would lead to overestimates of the incremental cost of a military workyear.

## COST COMPARISON OF APPROACHES TO SUBSTITUTION

Our analysis of the benefits of civilianization suggests that the relative cost of military and civil service personnel depends crucially on how the substitution occurs. We demonstrated that the cost estimates themselves, as well as the conclusions of a cost comparison, vary with the assumptions made about which military grade levels substitute for which civil service grade levels. More important is the issue of whether the substitution is actually one civil service worker

for one military worker. Because military personnel turn over at a higher rate than do civil service personnel and tend to have less experience, there are clear reasons to conjecture that military personnel are less productive than their civil service counterparts and, hence, that fewer civil service personnel would be needed to perform a particular function. On the other hand, military personnel tend to work much more than 40 hours per week,[1] but do not receive overtime pay. Taking advantage of this fact, service manpower managers may be systematically underfunding military manpower relative to mission requirements. If this is so, more civil service than military workers might be required to perform a particular function, or commanders would have to forgo whatever productive output is associated with the long hours typically expended by military workers. Systematic research on this topic would help elucidate this issue.

We believe that the alternative grade-substitution approach we have proposed best reflects the actual military personnel management and budgeting process. Under these circumstances, cost-effective civilianization would require DoD to limit substitution to positions that could be filled with lower-grade civil service workers. While such a policy might generate substantial cost savings, it could create grade-strength management problems within both workforces. Specifically, shortages in higher-grade military requirements would be exacerbated and the civil service workforce would become more bottom-heavy, with fewer opportunities for advancement. An alternative to this approach would be to find a way to alter military-grade distributions following civilianization. This would require coordination between localized personnel decisions and service-wide budgeting decisions. Another alternative is to sacrifice some cost savings in the interest of maintaining better career progression in both military and civil service workforces.

Our analysis confirms that civilianization can produce cost savings under many, but not all, circumstances. Accordingly, we recommend that the Office of the Secretary of Defense modify its current guidance on military/civil service position assignments. Current

[1]Robbert et al. (1997, p. 14) found that military personnel in one broadly based, four-service sample averaged 56 hours of work per week.

guidance assumes that a civil service assignment is *always* less costly than a military assignment: It prescribes a civil service assignment whenever there is no military necessity for a military assignment. Revised guidance should specify that assignment decisions be predicated on three considerations:

- military necessity
- cost
- career progression.

Requiring explicit cost comparisons in assignment decisions will compel defense manpower and budget officials to develop a clearer sense of how indirect expenses contribute to overall marginal manpower costs. Requiring career-progression considerations in addition to cost comparisons recognizes that military/civil service assignment decisions should be part of a larger human resource strategy for obtaining an effective total workforce.

Appendix A

# ASSUMPTIONS ABOUT MILITARY STRENGTH CHANGES AND RELATED COSTS

In a departure from the approach taken by Palmer and Osbaldeston (1988), we associated turnover-related costs (accessions, initial training, and retirement) with active workyears. In doing so, we made certain assumptions about how active-duty military strengths and inventory flows are affected by incremental changes in requirements. In this appendix, we present several alternative assumptions and our justification for the assumption we chose for use in our cost comparisons. We also distinguish between long-term and transitional cost impacts and argue that the former are the appropriate basis for manpower cost comparisons.

## ALTERNATIVE ASSUMPTIONS

Below we describe several possible alternative assumptions, starting with what we consider to be the least realistic case and progressing to the cases we consider more realistic. We discuss the implications of these assumptions for accession and training and for retirement costs.

### Strength Changes in a Specific Grade, and Inventory Adapts Through Shifts in Retention

Under this assumption, deleting a military requirement in a specific grade causes the inventory to be decremented, or reduced, in that grade. For each decremented requirement, inventory managers would immediately sever one member in the affected grade and lower retention incentives and controls in that grade, so that the in-

ventory in the specific grade and in the aggregate inventory would remain at the new level. This approach to civilianization would have no effect on accession costs, since the same number of personnel would continue to be accessed. Therefore, viewing civilianization in this way would cause accession and training costs to be excluded from incremental workyear costs.

With respect to retirement, this perspective on civilianization would have different cost implications, depending on whether the grade level of the civilianized position was retirement-eligible. If not, then it would be appropriate to ignore retirement costs altogether; if so, then it would be necessary to consider the full retirement costs of the eliminated position (not simply the annual retirement accrual charges considered here).

This scenario is unlikely, because it is incompatible with the way that military grade strengths are managed. Although some promotion selections are made locally, grade strengths are managed centrally at service headquarters levels. Grade strengths correspond roughly to grade requirements, but they must meet various statutory and budgetary constraints and are also managed by considering certain promotion-flow objectives, experience benchmarks, and other personnel-management issues.[1]

One such restriction is that, for both officers and NCOs at the senior end of the grade distributions, grades are constrained by law. General and flag officer authorized grade distributions are contained in Title 10 of the United States Code (10 USC) 526. For grades O-4 through O-6, a table in 10 USC 523 specifies the maximum strength each service may have at various total-officer-strength levels. The top two enlisted grades are constrained under 10 USC 517 to 1 percent and 2 percent (2.5 percent in the Army), respectively, of total enlisted strength, and the services generally budget to promote to these ceilings.

[1]For enlisted personnel, promotion flows must generally conform to the provisions of DoD Directive 1304.20, *Enlisted Personnel Management System* (U.S. DoD, 1984). For officers, grades are generally structured to achieve promotion-flow objectives contained in House and Senate reports accompanying the Defense Officer Personnel Management Act (DOPMA) of 1980 (Rostker et al., 1993).

At the junior end of the grade distributions—officer promotions through the grade of O-3 and enlisted promotions through the grade of E-3 or E-4, depending on the service—promotions are based on time-in-grade, time-in-service, and other policy considerations not directly related to manpower grade requirements.

Thus, all officer-grade strengths and more than half of the enlisted-grade strengths are policy-constrained rather than purely requirements-driven. The remaining policy-free grades (the middle enlisted grades, E-4 or E-5 through E-7) are constrained for budgetary purposes. The constraints often result in senior and middle-grade inventories that are below requirements—that is, inventory grade distributions are *leaner* than the grade distributions found in manpower requirements.[2] Because of these conditions, military-grade distributions have a rigidity that generally prevents them from being directly influenced by changes in grade requirements.

This assumption is also unrealistic, because inventory managers cannot precisely control retention in a specific grade. To keep aggregate and grade inventories aligned with targets, they tend to rely primarily on adjustment of accession and promotion flows rather than on retention controls.

This alternative is captured in Panel B of Figure A.1, where we depict alternative assumptions about how a reduction in requirements would affect military strengths. In this figure, we depict a reduction in grade E-5 requirements in a notional enlisted force.[3] The profiles represent long-term, steady-state conditions reached after all flow adjustments have leveled out. In Panel B, the entire strength reduction is taken in the same grade as the requirements reduction. This requires personnel inventory managers to reduce promotions to grade E-5 and also reduce retention in years 4 through 7. It also requires increased retention in years 8 through 12.

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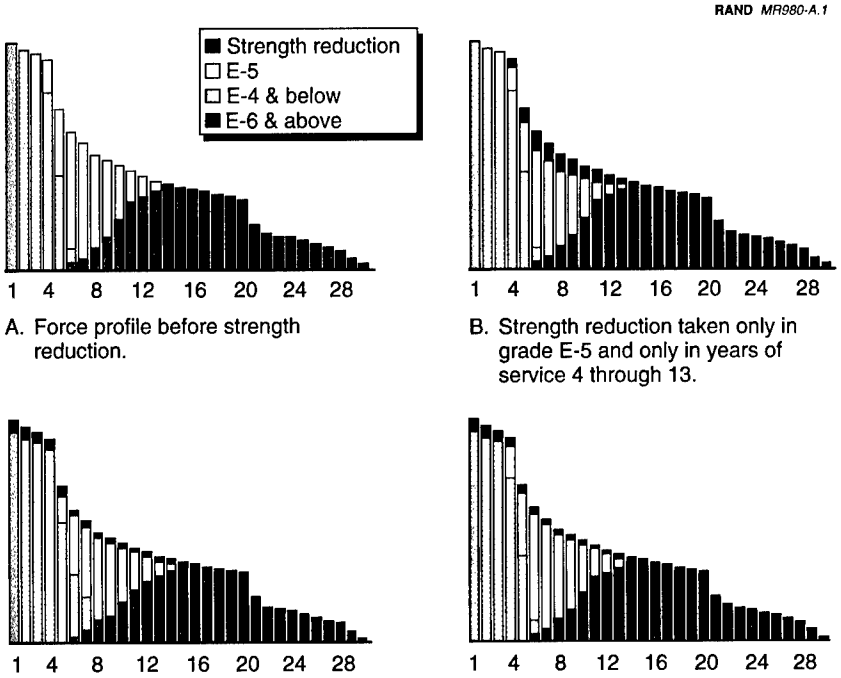
[2]We describe a grade distribution as being relatively *lean* if it is proportionally smaller in the higher grades (and proportionally larger in the lower grades) relative to some other distribution. A distribution is relatively *rich* if it is proportionally larger in the higher grades.

[3]For illustrative purposes, we depict a proportionally large reduction (5 percent of the total force) concentrated in a single grade. The intent of this admittedly unrealistic scenario is to illustrate how and why grade-inventory changes do not necessarily match grade-requirement changes.




A. Force profile before strength reduction.

B. Strength reduction taken only in grade E-5 and only in years of service 4 through 13.

C. Strength reduction taken only in grade E-5, but proportionally in all years of service. The number of E-4 and below and E-5 and above in this figure is the same as in Panel B, but the distribution of their years of service is different. This causes the years-of-service distribution for grade E-5 to shift noticeably to the right.

D. Strength reduction taken proportionally in all grades and all years of service.

**Figure A.1—Alternative Assumptions Regarding Military-Strength Reductions**

Year 1 strength in Panel B is the same as year 1 strength in Panel A (which represents a baseline profile of the notional force, before any inventory adjustment is made). Since year 1 strengths are the same, accession levels in the alternative depicted here are equal to accession levels in the base case. Likewise, years 14 through 30 are the same size in Panel A and Panel B, implying that late-career and retirement losses are unchanged.

## Strength Changes in a Specific Grade, and Inventory Adapts Through Shifts in Accession and Promotion Flows

Under this assumption, deleting a military requirement in a specific grade also causes the inventory in that grade to be decremented by one. However, aggregate and grade strengths are adjusted by modifying accession and promotion flows. Accessions are immediately decremented by one, and promotion to the affected grade is decremented by one. Future accession and promotion flows are adjusted to maintain the new aggregate and grade-strength targets.[4]

This assumption would lead to a one-time savings equal to the cost of one accession and to long-term changes in cost reflecting lower annual accessions and changes in retirement patterns. The required promotion-flow adjustments would induce changes in the years-of-service distributions within both the reduced-strength grade and adjacent grades, altering grade-specific costs such as those we provide in Chapter Three.

Under this assumption, it is unnecessary to postulate that retention behavior will change. Retention might remain constant (all things being equal) or might decline slightly because of slower promotion flows. Second-order cost effects[5] of a decline in retention would be a decrease in direct costs per workyear because of a lowered time-in-service distribution and an increase in indirect accession costs. In our analyses, we have not attempted to account for these potential second-order effects. We believe they would be imperceptible for small changes in requirements.

This assumption is more likely than the first, because it is consistent with the control mechanisms available to military inventory managers. However, as discussed above, it is not consistent with the rigidity found in military-grade distributions.

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[4]In an idealized sense, the first *expected* adjustment to future accession flow would occur following a period equal to the expected man-years per accession (see Table 3.6). The first expected adjustment to the future promotion flow would occur following a similarly calculated expected man-years per promotion.

[5]First-order effects are those caused by a given phenomenon. Second-order effects are the results of first-order effects.

Panel C in Figure A.1 illustrates this assumption. The entire force is scaled down proportionally, implying that accessions and losses at all career points would be scaled down by the same proportion. However, promotion flows would change noticeably in order to focus the entire strength reduction in grade E-5. Note that the E-5 population shifts to the right in the profile. For example, in contrast to the baseline case, there are no E-5s in year 4, fewer in year 5 than in Panel B, and there continue to be some E-5s as late as year 14. Personnel managers would cause this shift by slowing promotions to E-5 and all higher grades.

### Strength Change Is Spread Across Grades

Under this assumption, deleting a military requirement causes the aggregate inventory to decline by one, effected through an immediate reduction of one accession and appropriate adjustments to future-year accession flows. However, because of the rigidity in grade-inventory distributions, the reduction would be spread across all military grades. The precise grade at which a single reduction would occur cannot be predicted; it would be determined by reapplying and rerounding various grade constraints, which are typically expressed as a proportion of total strength. If a large number of requirements are deleted, the distribution of strength reductions across grades will approximately equal the service's aggregate grade distribution. Accession, loss, and promotion flows would all be reduced proportionally.

As in the preceding case, this perspective on civilianization would lead to a one-time savings equal to the cost of one accession and to long-term changes in cost reflecting lower annual accessions and changes in retirement patterns. This alternative is depicted in Panel D of Figure A.1.

## LONG-TERM AND TRANSITIONAL COST IMPACTS

As discussed earlier in this appendix, a change in requirements is expected to have an immediate effect on accession and promotion flows, followed by a long-term adjustment of flows. Our methods for allocating indirect turnover-related costs reflect these long-term adjustments. They do not capture short-term, transitional effects.

As an example, reducing military aggregate strength by one individual would be expected to result (all things being equal) in an immediate reduction of one accession in the same time period and other accession reductions in some subsequent time periods. Subsequent reductions would echo the initial reduction at expected intervals equal to expected workyears per accession. However, the expected-workyears-per-accession parameter merely indicates the central tendency of a probability distribution: Actual workyears served by random accessions range from near zero to over 30 years. When strength reductions occur, these varying periods of service cause the irregularly periodic echoes to diminish over time, and (all things being equal) annual turnover approaches a new steady-state level. If individual behavior is held constant, the new steady state has the same turnover rate that prevailed prior to the strength reduction.

In allocating flow-related costs savings to an active workyear reduction, we calculate a cost element that reflects the long-term, steady-state reduction in flows. This understates the initial-period budget savings associated with a strength reduction and overstates the savings in some near-term subsequent periods. However, it represents the best long-run estimate of annual savings.

Appendix B

# INTERSERVICE DATA DISPLAYS AND PERCENTILE DISTRIBUTIONS

In Chapter Three, we present cost data in terms of DoD averages by grade. Here, we present additional data displays by the individual services by grade, both civil service and military. In addition, we present the percentile distributions from an analysis conducted in Chapter Four.

## CIVIL SERVICE INTERSERVICE DATA DISPLAYS

Here, we present civil service interservice data displays for salaried workers (Senior Executive Service [SES] and General Schedule [GS]) and then for Federal Wage System (FWS) workers (Wage Supervisor [WS], Wage Leader [WL], and Wage Grade [WG]). In particular, Tables B.1–B.12 present base pay, numbers of personnel, and marginal costs for SES/GS and for WS, WL, and WG employees. Marginal costs for a CSRS employee and a FERS employee are presented, in addition to the average figures.

**Table B.1**

**FY96 Base Pay ($) of Full-Time Salaried Workers**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| SES | 108,315 | 108,459 | 106,503 | 105,855 | 107,840 |
| GS-15 | 85,417 | 86,147 | 84,416 | 85,512 | 85,144 |
| GS-14 | 71,948 | 72,234 | 71,139 | 71,516 | 71,435 |
| GS-13 | 59,534 | 59,819 | 59,004 | 58,737 | 59,327 |
| GS-12 | 50,003 | 50,516 | 49,447 | 49,218 | 49,896 |
| GS-11 | 41,257 | 41,700 | 40,644 | 40,819 | 41,205 |
| GS-10 | 39,097 | 38,660 | 37,716 | 39,121 | 38,566 |
| GS-9 | 33,943 | 34,380 | 33,778 | 33,830 | 33,943 |
| GS-8 | 31,421 | 31,462 | 31,133 | 31,548 | 31,396 |
| GS-7 | 28,239 | 28,368 | 27,841 | 27,995 | 28,155 |
| GS-6 | 25,767 | 25,676 | 25,480 | 25,747 | 25,636 |
| GS-5 | 23,054 | 23,172 | 23,025 | 22,824 | 23,066 |
| GS-4 | 20,562 | 20,715 | 20,545 | 20,506 | 20,614 |
| GS-3 | 18,648 | 18,064 | 17,931 | 17,646 | 18,275 |
| GS-2 | 15,935 | 15,779 | 15,166 | 15,071 | 15,663 |
| GS-1 | 12,493 | 12,707 | 12,503 | 12,453 | 12,575 |

SOURCE: Calculations based on Defense Manpower Data Center (DMDC) Civilian Personnel Data Files—Department of Defense inventory file.

NOTE: Includes a 5.56-percent adjustment for locality pay.

**Table B.2**

**Number of FY96 DoD Non–Wage Rate Salaried Civil Service Personnel, by Grade and Service**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| SES | 257 | 309 | 153 | 10 | 1,259 |
| GS-15 | 2,791 | 2,709 | 1,298 | 78 | 9,262 |
| GS-14 | 7,017 | 5,552 | 3,403 | 182 | 19,889 |
| GS-13 | 18,052 | 14,658 | 10,925 | 552 | 52,138 |
| GS-12 | 30,983 | 33,511 | 20,419 | 1,116 | 103,799 |
| GS-11 | 25,551 | 20,568 | 17,210 | 1,367 | 80,781 |
| GS-10 | 1,996 | 1,474 | 1,092 | 107 | 4,974 |
| GS-9 | 18,351 | 11,493 | 14,974 | 1,249 | 52,665 |
| GS-8 | 3,370 | 1,945 | 1,664 | 165 | 8,890 |
| GS-7 | 17,159 | 10,795 | 10,700 | 1,102 | 47,878 |
| GS-6 | 12,654 | 9,082 | 7,952 | 897 | 38,431 |
| GS-5 | 21,594 | 13,018 | 12,795 | 1,499 | 58,525 |
| GS-4 | 12,072 | 6,414 | 5,326 | 653 | 28,842 |
| GS-3 | 1,879 | 1,228 | 1,239 | 203 | 6,225 |
| GS-2 | 172 | 181 | 287 | 20 | 776 |
| GS-1 | 31 | 35 | 152 | 3 | 254 |

SOURCE: Calculations from DMDC Civilian Personnel Data Files—Department of Defense inventory file. Numbers reflect full-time, active-strength accountable personnel working in the United States in FY 1996.

**Table B.3a**

**FY96 Average Marginal Costs ($) to Government of DoD Salaried Civil Service Manpower**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| SES | 149,150 | 153,578 | 147,613 | 149,891 | 149,951 |
| GS-15 | 117,620 | 121,985 | 117,000 | 121,085 | 118,393 |
| GS-14 | 99,072 | 102,284 | 98,599 | 101,267 | 99,331 |
| GS-13 | 81,979 | 84,703 | 81,780 | 83,171 | 82,495 |
| GS-12 | 68,855 | 71,531 | 68,534 | 69,693 | 69,381 |
| GS-11 | 56,811 | 59,047 | 56,332 | 57,799 | 57,296 |
| GS-10 | 53,837 | 54,742 | 52,274 | 55,396 | 53,627 |
| GS-9 | 46,739 | 48,682 | 46,816 | 47,903 | 47,197 |
| GS-8 | 43,266 | 44,550 | 43,151 | 44,673 | 43,657 |
| GS-7 | 38,885 | 40,169 | 38,588 | 39,641 | 39,149 |
| GS-6 | 35,482 | 36,357 | 35,315 | 36,458 | 35,647 |
| GS-5 | 31,746 | 32,812 | 31,913 | 32,319 | 32,073 |
| GS-4 | 28,313 | 29,332 | 28,475 | 29,037 | 28,664 |
| GS-3 | 25,678 | 25,578 | 24,853 | 24,986 | 25,411 |
| GS-2 | 21,943 | 22,343 | 21,020 | 21,341 | 21,780 |
| GS-1 | 17,203 | 17,993 | 17,329 | 17,633 | 17,486 |

**Table B.3b**

**FY96 Average Marginal Costs ($) to DoD of Salaried Civil Service Manpower Covered Under the Civil Service Retirement System (CSRS)**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| SES | 127,639 | 132,011 | 126,502 | 128,907 | 128,631 |
| GS-15 | 101,228 | 105,412 | 100,829 | 104,654 | 102,130 |
| GS-14 | 85,693 | 88,825 | 85,397 | 87,969 | 86,122 |
| GS-13 | 71,374 | 74,023 | 71,291 | 72,733 | 71,983 |
| GS-12 | 60,382 | 62,932 | 60,183 | 61,385 | 60,971 |
| GS-11 | 50,293 | 52,421 | 49,950 | 51,371 | 50,822 |
| GS-10 | 47,802 | 48,797 | 46,546 | 49,347 | 47,741 |
| GS-9 | 41,857 | 43,695 | 41,969 | 43,039 | 42,342 |
| GS-8 | 38,948 | 40,216 | 38,895 | 40,319 | 39,369 |
| GS-7 | 35,278 | 36,527 | 35,068 | 36,082 | 35,583 |
| GS-6 | 32,428 | 33,318 | 32,324 | 33,403 | 32,642 |
| GS-5 | 29,298 | 30,333 | 29,471 | 29,918 | 29,641 |
| GS-4 | 26,423 | 27,403 | 26,587 | 27,155 | 26,779 |
| GS-3 | 24,216 | 24,243 | 23,549 | 23,744 | 24,047 |
| GS-2 | 21,087 | 21,519 | 20,335 | 20,675 | 20,997 |
| GS-1 | 17,117 | 17,857 | 17,240 | 17,553 | 17,391 |

**Table B.3c**

**FY96 Average Marginal Costs ($) to DoD of Salaried Civil Service Manpower Covered Under the Federal Employees Retirement System (FERS)**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| SES | 140,409 | 144,792 | 139,131 | 141,485 | 141,364 |
| GS-15 | 112,212 | 116,452 | 111,734 | 115,645 | 113,092 |
| GS-14 | 95,626 | 98,780 | 95,267 | 97,868 | 96,015 |
| GS-13 | 80,121 | 82,811 | 79,960 | 81,362 | 80,700 |
| GS-12 | 67,727 | 70,353 | 67,447 | 68,615 | 68,301 |
| GS-11 | 56,353 | 58,546 | 55,919 | 57,366 | 56,874 |
| GS-10 | 53,544 | 54,475 | 52,085 | 55,093 | 53,405 |
| GS-9 | 46,841 | 48,744 | 46,929 | 48,007 | 47,326 |
| GS-8 | 43,562 | 44,836 | 43,467 | 44,952 | 43,979 |
| GS-7 | 39,425 | 40,692 | 39,156 | 40,193 | 39,717 |
| GS-6 | 36,210 | 37,087 | 36,064 | 37,183 | 36,405 |
| GS-5 | 32,682 | 33,734 | 32,850 | 33,268 | 33,027 |
| GS-4 | 29,441 | 30,443 | 29,602 | 30,164 | 29,804 |
| GS-3 | 26,952 | 26,893 | 26,180 | 26,333 | 26,728 |
| GS-2 | 23,424 | 23,834 | 22,560 | 22,885 | 23,294 |
| GS-1 | 18,948 | 19,720 | 19,073 | 19,379 | 19,235 |

**Table B.4**

**FY96 Base Pay ($) of Full-Time Wage Supervisor Workers**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WS-18 | 62,865 | 67,469 | 62,090 | — | 63,536 |
| WS-17 | 61,626 | 63,780 | 60,943 | 63,570 | 61,761 |
| WS-16 | 57,176 | 61,401 | 57,463 | 60,189 | 58,605 |
| WS-15 | 49,829 | 56,381 | 54,314 | 55,311 | 54,174 |
| WS-14 | 49,797 | 55,128 | 48,945 | 55,937 | 50,758 |
| WS-13 | 49,455 | 52,254 | 50,563 | 50,544 | 50,767 |
| WS-12 | 47,151 | 48,311 | 47,054 | 46,761 | 47,275 |
| WS-11 | 46,003 | 47,145 | 46,016 | 48,105 | 46,340 |
| WS-10 | 44,705 | 46,532 | 44,413 | 46,138 | 45,236 |
| WS-9 | 42,464 | 45,178 | 43,639 | 45,229 | 43,317 |
| WS-8 | 40,299 | 42,709 | 41,739 | 41,823 | 41,392 |
| WS-7 | 39,223 | 41,149 | 41,099 | 40,623 | 40,378 |
| WS-6 | 38,164 | 39,629 | 39,254 | 40,307 | 38,614 |
| WS-5 | 36,808 | 37,927 | 37,211 | 38,542 | 37,158 |
| WS-4 | 34,317 | 36,219 | 35,472 | 35,815 | 35,403 |
| WS-3 | 33,835 | 34,058 | 35,136 | 30,721 | 34,476 |
| WS-2 | 30,351 | 30,967 | 27,050 | 32,323 | 29,811 |
| WS-1 | 28,068 | 31,380 | 29,919 | 33,601 | 29,853 |

SOURCE: Calculations based on DMDC Civilian Personnel Data Files—Department of Defense inventory file.

**Table B.5**

**Number of FY96 DoD Wage Supervisor Civil Service Personnel, by Grade and Service**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WS-18 | 5 | 6 | 14 | 0 | 25 |
| WS-17 | 18 | 16 | 40 | 1 | 76 |
| WS-16 | 34 | 53 | 87 | 1 | 177 |
| WS-15 | 108 | 192 | 132 | 15 | 454 |
| WS-14 | 111 | 218 | 504 | 12 | 852 |
| WS-13 | 74 | 91 | 196 | 7 | 374 |
| WS-12 | 130 | 94 | 440 | 10 | 690 |
| WS-11 | 581 | 441 | 626 | 37 | 1,744 |
| WS-10 | 953 | 1,700 | 2,167 | 138 | 5,052 |
| WS-9 | 1,076 | 225 | 1,422 | 56 | 2,845 |
| WS-8 | 285 | 138 | 337 | 55 | 895 |
| WS-7 | 151 | 106 | 242 | 15 | 693 |
| WS-6 | 204 | 98 | 236 | 9 | 849 |
| WS-5 | 204 | 73 | 94 | 21 | 622 |
| WS-4 | 103 | 30 | 67 | 11 | 287 |
| WS-3 | 35 | 11 | 33 | 1 | 115 |
| WS-2 | 29 | 23 | 34 | 4 | 106 |
| WS-1 | 21 | 14 | 19 | 1 | 58 |

SOURCE: Calculations from DMDC Civilian Personnel Data Files—Department of Defense inventory file. Numbers reflect full-time, active-strength accountable personnel working in the United States in FY 1996.

**Table B.6a**

**FY96 Average Marginal Costs ($) to Government of DoD Wage Supervisor Manpower**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WS-18 | 86,565 | 95,536 | 86,057 | — | 88,347 |
| WS-17 | 84,859 | 90,312 | 84,467 | 90,015 | 85,879 |
| WS-16 | 78,731 | 86,944 | 79,644 | 85,228 | 81,490 |
| WS-15 | 68,615 | 79,835 | 75,279 | 78,320 | 75,329 |
| WS-14 | 68,570 | 78,061 | 67,838 | 79,207 | 70,592 |
| WS-13 | 68,100 | 73,992 | 70,080 | 71,570 | 70,579 |
| WS-12 | 64,927 | 68,408 | 65,217 | 66,214 | 65,736 |
| WS-11 | 63,346 | 66,757 | 63,778 | 68,117 | 64,436 |
| WS-10 | 61,559 | 65,889 | 61,556 | 65,331 | 62,901 |
| WS-9 | 58,473 | 63,972 | 60,484 | 64,044 | 60,232 |
| WS-8 | 55,492 | 60,476 | 57,850 | 59,221 | 57,556 |
| WS-7 | 54,010 | 58,267 | 56,963 | 57,522 | 56,145 |
| WS-6 | 52,552 | 56,115 | 54,406 | 57,075 | 53,693 |
| WS-5 | 50,685 | 53,705 | 51,574 | 54,575 | 51,668 |
| WS-4 | 47,255 | 51,286 | 49,164 | 50,714 | 49,229 |
| WS-3 | 46,591 | 48,226 | 48,698 | 43,501 | 47,940 |
| WS-2 | 41,793 | 43,849 | 37,491 | 45,769 | 41,453 |
| WS-1 | 38,650 | 44,434 | 41,468 | 47,579 | 41,511 |

**Table B.6b**

**FY96 Average Marginal Costs ($) to DoD of Wage Supervisor Manpower Covered Under CSRS**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WS-18 | 75,234 | 83,177 | 74,899 | — | 76,898 |
| WS-17 | 73,805 | 78,777 | 73,565 | 78,527 | 74,825 |
| WS-16 | 68,671 | 75,940 | 69,519 | 74,494 | 71,140 |
| WS-15 | 60,195 | 69,953 | 65,858 | 68,676 | 65,966 |
| WS-14 | 60,158 | 68,458 | 59,615 | 69,423 | 61,977 |
| WS-13 | 59,763 | 65,030 | 61,497 | 62,991 | 61,988 |
| WS-12 | 57,105 | 60,328 | 57,417 | 58,479 | 57,910 |
| WS-11 | 55,781 | 58,937 | 56,210 | 60,082 | 56,818 |
| WS-10 | 54,283 | 58,206 | 54,346 | 57,736 | 55,529 |
| WS-9 | 51,698 | 56,591 | 53,446 | 56,652 | 53,288 |
| WS-8 | 49,200 | 53,646 | 51,237 | 52,589 | 51,041 |
| WS-7 | 47,959 | 51,785 | 50,493 | 51,158 | 49,856 |
| WS-6 | 46,737 | 49,973 | 48,348 | 50,781 | 47,797 |
| WS-5 | 45,172 | 47,943 | 45,972 | 48,676 | 46,096 |
| WS-4 | 42,299 | 45,905 | 43,950 | 45,424 | 44,048 |
| WS-3 | 41,742 | 43,328 | 43,560 | 39,348 | 42,965 |
| WS-2 | 37,723 | 39,641 | 34,158 | 41,259 | 37,518 |
| WS-1 | 35,089 | 40,134 | 37,494 | 42,783 | 37,567 |

**Table B.6c**

**FY96 Average Marginal Costs ($) to DoD of Wage Supervisor Manpower Covered Under FERS**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WS-18 | 84,459 | 92,761 | 84,021 | — | 86,175 |
| WS-17 | 82,859 | 88,074 | 82,519 | 87,807 | 83,899 |
| WS-16 | 77,071 | 84,961 | 77,961 | 83,337 | 79,750 |
| WS-15 | 67,515 | 78,236 | 73,837 | 76,802 | 73,925 |
| WS-14 | 67,473 | 76,557 | 66,805 | 77,641 | 69,433 |
| WS-13 | 67,028 | 72,707 | 68,924 | 70,416 | 69,446 |
| WS-12 | 64,031 | 67,424 | 64,329 | 65,348 | 64,855 |
| WS-11 | 62,538 | 65,862 | 62,969 | 67,148 | 63,625 |
| WS-10 | 60,850 | 65,041 | 60,870 | 64,513 | 62,174 |
| WS-9 | 57,935 | 63,227 | 59,856 | 63,295 | 59,651 |
| WS-8 | 55,119 | 59,919 | 57,368 | 58,732 | 57,121 |
| WS-7 | 53,719 | 57,829 | 56,529 | 57,125 | 55,786 |
| WS-6 | 52,342 | 55,793 | 54,113 | 56,701 | 53,468 |
| WS-5 | 50,578 | 53,513 | 51,437 | 54,337 | 51,553 |
| WS-4 | 47,338 | 51,225 | 49,160 | 50,683 | 49,247 |
| WS-3 | 46,711 | 48,330 | 48,720 | 43,859 | 48,028 |
| WS-2 | 42,180 | 44,188 | 38,129 | 46,005 | 41,895 |
| WS-1 | 39,210 | 44,742 | 41,887 | 39,361 | 41,950 |

**Table B.7**

**FY96 Base Pay ($) of Full-Time Wage Leader Workers**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WL-15 | — | 46,566 | — | — | 46,566 |
| WL-14 | 50,457 | 46,422 | 48,418 | — | 47,010 |
| WL-13 | 43,080 | 45,660 | 46,331 | — | 44,660 |
| WL-12 | 39,750 | 42,040 | 41,150 | 44,036 | 40,679 |
| WL-11 | 39,145 | 40,943 | 41,956 | 43,605 | 40,433 |
| WL-10 | 38,444 | 39,896 | 37,646 | 39,540 | 38,851 |
| WL-9 | 36,361 | 38,657 | 36,513 | 36,997 | 36,884 |
| WL-8 | 35,117 | 36,526 | 36,329 | 35,297 | 35,639 |
| WL-7 | 32,102 | 33,746 | 32,639 | 34,128 | 32,984 |
| WL-6 | 31,730 | 32,463 | 31,493 | 32,453 | 31,967 |
| WL-5 | 29,558 | 31,754 | 29,561 | 29,722 | 30,561 |
| WL-4 | 26,309 | 27,361 | 27,089 | 25,900 | 27,663 |
| WL-3 | 24,989 | 27,786 | 23,646 | 26,254 | 25,320 |
| WL-2 | 23,590 | 23,469 | 21,632 | 23,437 | 23,366 |
| WL-1 | 21,997 | 19,583 | — | — | 20,187 |

SOURCE: Calculations based on DMDC Civilian Personnel Data Files—Department of Defense inventory file.

**Table B.8**

**FY96 DoD Wage Leader Civil Service Personnel, by Grade and Service**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WL-15 | 0 | 4 | 0 | 0 | 4 |
| WL-14 | 3 | 20 | 1 | 0 | 24 |
| WL-13 | 23 | 33 | 2 | 0 | 58 |
| WL-12 | 72 | 28 | 52 | 3 | 159 |
| WL-11 | 247 | 236 | 115 | 11 | 640 |
| WL-10 | 790 | 1,131 | 771 | 111 | 2,864 |
| WL-9 | 385 | 177 | 274 | 30 | 881 |
| WL-8 | 299 | 115 | 93 | 19 | 542 |
| WL-7 | 133 | 84 | 55 | 8 | 470 |
| WL-6 | 169 | 93 | 28 | 20 | 443 |
| WL-5 | 137 | 62 | 30 | 12 | 613 |
| WL-4 | 23 | 12 | 3 | 2 | 139 |
| WL-3 | 32 | 8 | 3 | 1 | 46 |
| WL-2 | 37 | 43 | 4 | 4 | 103 |
| WL-1 | 1 | 3 | 0 | 0 | 4 |

SOURCE: Calculations from DMDC Civilian Personnel Data Files—Department of Defense inventory file. Numbers reflect full-time, active-strength accountable personnel working in the United States in FY 1996.

**Table B.9a**

**FY96 Average Marginal Costs ($) to Government of DoD Wage Leader Manpower**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WL-15 | — | 65,937 | — | — | 64,750 |
| WL-14 | 69,479 | 65,734 | 67,107 | — | 65,367 |
| WL-13 | 59,321 | 64,655 | 64,215 | — | 62,100 |
| WL-12 | 54,736 | 59,529 | 57,034 | 62,355 | 56,564 |
| WL-11 | 53,903 | 57,975 | 58,151 | 61,745 | 56,222 |
| WL-10 | 52,937 | 56,493 | 52,177 | 55,989 | 54,022 |
| WL-9 | 50,069 | 54,738 | 50,607 | 52,388 | 51,287 |
| WL-8 | 48,356 | 51,721 | 50,352 | 49,981 | 49,556 |
| WL-7 | 44,204 | 47,784 | 45,238 | 48,325 | 45,865 |
| WL-6 | 43,692 | 45,968 | 43,649 | 45,953 | 44,450 |
| WL-5 | 40,701 | 44,964 | 40,972 | 42,086 | 42,495 |
| WL-4 | 36,227 | 38,743 | 37,545 | 36,674 | 38,465 |
| WL-3 | 34,410 | 39,345 | 32,773 | 37,176 | 35,207 |
| WL-2 | 32,483 | 33,232 | 29,982 | 33,187 | 32,490 |
| WL-1 | 30,290 | 27,730 | — | — | 28,069 |

**Table B.9b**

**FY96 Average Marginal Costs ($) to DoD of Wage Leader Manpower Covered Under CSRS**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WL-15 | — | 58,246 | — | — | 57,082 |
| WL-14 | 60,919 | 58,075 | 59,003 | — | 57,600 |
| WL-13 | 52,408 | 57,166 | 56,576 | — | 54,857 |
| WL-12 | 48,567 | 52,848 | 50,552 | 55,229 | 50,208 |
| WL-11 | 47,869 | 51,540 | 51,489 | 54,715 | 49,921 |
| WL-10 | 47,060 | 50,291 | 46,478 | 49,866 | 48,073 |
| WL-9 | 44,657 | 48,813 | 45,161 | 46,833 | 45,776 |
| WL-8 | 43,221 | 46,272 | 44,947 | 44,806 | 44,323 |
| WL-7 | 39,743 | 42,956 | 40,656 | 43,411 | 41,223 |
| WL-6 | 39,314 | 41,426 | 39,324 | 41,414 | 40,035 |
| WL-5 | 36,808 | 40,580 | 37,078 | 38,156 | 38,393 |
| WL-4 | 33,060 | 35,340 | 34,203 | 33,598 | 35,009 |
| WL-3 | 31,537 | 35,847 | 30,200 | 34,020 | 32,273 |
| WL-2 | 29,923 | 30,698 | 27,859 | 30,660 | 29,991 |
| WL-1 | 28,085 | 26,064 | — | — | 26,279 |

**Table B.9c**

**FY96 Average Marginal Costs ($) to DoD of Wage Leader Manpower Covered Under FERS**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WL-15 | — | 65,086 | — | — | 63,922 |
| WL-14 | 68,331 | 64,894 | 66,115 | — | 64,505 |
| WL-13 | 58,736 | 63,873 | 63,382 | — | 61,417 |
| WL-12 | 54,405 | 59,023 | 56,596 | 61,697 | 56,183 |
| WL-11 | 53,618 | 57,553 | 57,652 | 61,120 | 55,859 |
| WL-10 | 52,706 | 56,151 | 52,007 | 55,674 | 53,779 |
| WL-9 | 49,997 | 54,491 | 50,523 | 52,267 | 51,193 |
| WL-8 | 48,379 | 51,636 | 50,282 | 49,989 | 49,557 |
| WL-7 | 44,457 | 47,912 | 45,449 | 48,423 | 46,066 |
| WL-6 | 43,973 | 46,193 | 43,948 | 46,179 | 44,729 |
| WL-5 | 41,148 | 45,243 | 41,418 | 42,521 | 42,880 |
| WL-4 | 36,922 | 39,358 | 38,180 | 37,400 | 39,070 |
| WL-3 | 35,205 | 39,927 | 33,671 | 37,874 | 35,990 |
| WL-2 | 33,386 | 34,143 | 31,033 | 34,101 | 33,421 |
| WL-1 | 31,313 | 28,937 | — | — | 29,241 |

**Table B.10**

**FY96 Base Pay ($) of Full-Time Wage Grade Workers**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WG-15 | 44,168 | 40,796 | 37,754 | — | 41,016 |
| WG-14 | 40,978 | 42,415 | 41,903 | — | 42,043 |
| WG-13 | 38,563 | 41,627 | 38,378 | 40,338 | 39,598 |
| WG-12 | 36,718 | 39,344 | 37,583 | 38,539 | 37,645 |
| WG-11 | 36,161 | 37,883 | 35,626 | 37,513 | 36,422 |
| WG-10 | 34,415 | 36,170 | 34,452 | 35,599 | 35,054 |
| WG-9 | 32,830 | 34,335 | 32,409 | 34,160 | 33,092 |
| WG-8 | 30,636 | 32,820 | 30,956 | 32,064 | 31,407 |
| WG-7 | 29,747 | 30,767 | 29,484 | 30,467 | 30,037 |
| WG-6 | 28,139 | 29,309 | 28,915 | 29,514 | 28,707 |
| WG-5 | 26,602 | 28,803 | 26,202 | 27,640 | 27,202 |
| WG-4 | 24,822 | 25,424 | 25,149 | 26,423 | 25,248 |
| WG-3 | 22,927 | 24,787 | 21,249 | 22,309 | 22,847 |
| WG-2 | 20,644 | 21,608 | 20,496 | 21,046 | 21,094 |
| WG-1 | 18,010 | 20,700 | 17,651 | 19,529 | 19,114 |

SOURCE: Calculations based on DMDC Civilian Personnel Data Files—Department of Defense inventory file.

**Table B.11**

**Number of FY96 DoD Wage Grade Civil Service Personnel, by Grade and Service**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WG-15 | 6 | 71 | 1 | 0 | 78 |
| WG-14 | 74 | 257 | 120 | 0 | 451 |
| WG-13 | 273 | 416 | 457 | 18 | 1,170 |
| WG-12 | 1,029 | 731 | 4,346 | 46 | 6,211 |
| WG-11 | 5,070 | 3,491 | 5,140 | 341 | 14,361 |
| WG-10 | 10,694 | 17,197 | 21,878 | 1,617 | 52,137 |
| WG-9 | 7,254 | 3,384 | 4,468 | 625 | 16,055 |
| WG-8 | 6,648 | 4,579 | 4,572 | 950 | 17,416 |
| WG-7 | 2,898 | 1,834 | 2,257 | 525 | 9,725 |
| WG-6 | 3,509 | 1,726 | 2,120 | 302 | 10,443 |
| WG-5 | 4,428 | 2,458 | 1,746 | 460 | 14,895 |
| WG-4 | 850 | 201 | 219 | 33 | 2,692 |
| WG-3 | 621 | 340 | 466 | 132 | 1,633 |
| WG-2 | 708 | 688 | 592 | 102 | 2,547 |
| WG-1 | 70 | 86 | 89 | 4 | 271 |

SOURCE: Calculations from DMDC Civilian Personnel Data Files—Department of Defense inventory file. Numbers reflect full-time, active-strength accountable personnel working in the United States in FY 1996.

**Table B.12a**

**FY96 Average Marginal Costs ($) to Government of DoD Wage Grade Manpower**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WG-15 | 60,819 | 57,767 | 52,327 | — | 57,033 |
| WG-14 | 56,427 | 60,060 | 58,078 | — | 58,461 |
| WG-13 | 53,101 | 58,944 | 53,192 | 57,119 | 55,061 |
| WG-12 | 50,561 | 55,711 | 52,090 | 54,571 | 52,345 |
| WG-11 | 49,794 | 53,642 | 49,378 | 53,118 | 50,645 |
| WG-10 | 47,389 | 51,217 | 47,750 | 50,408 | 48,743 |
| WG-9 | 45,207 | 48,618 | 44,919 | 48,371 | 46,014 |
| WG-8 | 42,186 | 46,473 | 42,905 | 45,403 | 43,672 |
| WG-7 | 40,962 | 43,566 | 40,865 | 43,141 | 41,767 |
| WG-6 | 38,747 | 41,502 | 40,076 | 41,792 | 39,916 |
| WG-5 | 36,631 | 40,785 | 36,316 | 39,138 | 37,825 |
| WG-4 | 34,180 | 36,000 | 34,857 | 37,415 | 35,107 |
| WG-3 | 31,570 | 35,098 | 29,451 | 31,590 | 31,768 |
| WG-2 | 28,427 | 30,597 | 28,407 | 29,801 | 29,331 |
| WG-1 | 24,800 | 29,311 | 24,464 | 27,653 | 26,577 |

**Table B.12b**

**FY96 Average Marginal Costs ($) to DoD of Wage Grade Manpower Covered Under CSRS**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WG-15 | 53,664 | 51,364 | 46,604 | — | 50,602 |
| WG-14 | 49,983 | 53,295 | 51,428 | — | 51,801 |
| WG-13 | 47,197 | 52,356 | 47,329 | 50,818 | 48,945 |
| WG-12 | 45,069 | 49,633 | 46,405 | 48,672 | 46,665 |
| WG-11 | 44,426 | 47,890 | 44,129 | 47,449 | 45,237 |
| WG-10 | 42,412 | 45,847 | 42,764 | 45,166 | 43,640 |
| WG-9 | 40,583 | 43,658 | 40,389 | 43,450 | 41,348 |
| WG-8 | 38,052 | 41,851 | 38,700 | 40,950 | 39,381 |
| WG-7 | 37,026 | 39,403 | 36,988 | 39,045 | 37,781 |
| WG-6 | 35,171 | 37,664 | 36,326 | 37,908 | 36,228 |
| WG-5 | 33,398 | 37,060 | 33,172 | 35,673 | 34,471 |
| WG-4 | 31,344 | 33,030 | 31,948 | 34,222 | 32,189 |
| WG-3 | 29,158 | 32,270 | 27,413 | 29,315 | 29,385 |
| WG-2 | 26,524 | 28,479 | 26,538 | 27,809 | 27,338 |
| WG-1 | 23,485 | 27,396 | 23,230 | 25,999 | 25,026 |

**Table B.12c**

**FY96 Average Marginal Costs ($) to DoD of Wage Grade Manpower Covered Under FERS**

| Civil Service Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| WG-15 | 60,151 | 57,356 | 52,148 | 49,669 | 56,626 |
| WG-14 | 56,002 | 59,525 | 57,582 | 47,181 | 57,976 |
| WG-13 | 52,861 | 58,470 | 52,966 | 56,743 | 54,761 |
| WG-12 | 50,461 | 55,411 | 51,924 | 54,333 | 52,194 |
| WG-11 | 49,737 | 53,454 | 49,361 | 52,958 | 50,587 |
| WG-10 | 47,466 | 51,159 | 47,824 | 50,394 | 48,788 |
| WG-9 | 45,404 | 48,701 | 45,148 | 48,466 | 46,208 |
| WG-8 | 42,550 | 46,671 | 43,245 | 45,658 | 43,993 |
| WG-7 | 41,394 | 43,921 | 41,317 | 43,519 | 42,192 |
| WG-6 | 39,302 | 41,967 | 40,572 | 42,242 | 40,442 |
| WG-5 | 37,303 | 41,289 | 37,019 | 39,731 | 38,465 |
| WG-4 | 34,988 | 36,763 | 35,640 | 38,101 | 35,896 |
| WG-3 | 32,523 | 35,909 | 30,532 | 32,589 | 32,739 |
| WG-2 | 29,554 | 31,650 | 29,546 | 30,897 | 30,434 |
| WG-1 | 26,128 | 30,434 | 25,820 | 28,865 | 27,831 |

## MILITARY INTERSERVICE DATA DISPLAYS

Here, we show a series of military data displays by service. In some cases, the displays are by grade; in other cases, the displays are by category of grade (e.g., enlisted).

**Table B.13**

**FY96 Average Basic Pay ($) of Military Manpower, by Grade and Service**

| Grade | Army | Navy | Air Force | Marines | DoD Average |
|---|---|---|---|---|---|
| O-10 | 108,202 | 108,197 | 108,202 | 108,201 | 108,201 |
| O-9 | 103,627 | 103,611 | 103,613 | 103,625 | 103,618 |
| O-8 | 93,893 | 93,791 | 93,879 | 93,892 | 93,862 |
| O-7 | 82,862 | 82,829 | 82,821 | 82,861 | 82,840 |
| O-6 | 70,396 | 69,534 | 69,592 | 70,062 | 69,851 |
| O-5 | 56,489 | 55,285 | 56,283 | 58,131 | 56,206 |
| O-4 | 46,063 | 45,013 | 46,142 | 47,575 | 45,941 |
| O-3 | 37,945 | 37,390 | 37,822 | 38,188 | 37,774 |
| O-2 | 29,828 | 30,416 | 29,266 | 30,205 | 29,865 |
| O-1 | 22,102 | 22,935 | 21,653 | 22,181 | 22,189 |
| W-5 | 49,877 | — | — | 48,695 | 49,722 |
| W-4 | 44,732 | 44,725 | — | 42,243 | 44,400 |
| W-3 | 35,248 | 36,802 | — | 35,279 | 35,556 |
| W-2 | 28,703 | 31,158 | — | 30,449 | 29,196 |
| W-1 | 24,822 | 25,603 | — | 26,708 | 25,046 |
| E-9 | 38,425 | 37,636 | 38,241 | 38,959 | 38,207 |
| E-8 | 30,971 | 30,629 | 31,491 | 31,230 | 31,020 |
| E-7 | 26,054 | 26,010 | 26,596 | 26,217 | 26,221 |
| E-6 | 21,830 | 22,108 | 22,746 | 22,157 | 22,163 |
| E-5 | 18,126 | 18,100 | 18,990 | 17,765 | 18,350 |
| E-4 | 14,884 | 14,880 | 15,279 | 14,516 | 14,950 |
| E-3 | 12,357 | 12,683 | 12,483 | 12,575 | 12,532 |
| E-2 | 11,795 | 11,715 | 11,698 | 11,698 | 11,733 |
| E-1 | 10,130 | 10,068 | 9,693 | 9,974 | 10,007 |

SOURCE: Services' *FY 1998/99 Biennial Budget Estimates* for military personnel (U.S. Department of the Air Force, 1997a; U.S. Department of the Army, 1997a; U.S. Department of the Navy, 1997a, b).

**Table B.14**

**Average Annual Basic Allowance ($) for Subsistence, by Service**

| Grade Category | Army | Navy | Air Force | Marines | DoD Average |
|---|---|---|---|---|---|
| Enlisted | 2,601 | 2,601 | 2,612 | 2,601 | 2,605 |
| Officer | 1,785 | 1,785 | 1,796 | 1,785 | 1,789 |

SOURCE: U.S. Department of the Air Force, 1997a; U.S. Department of the Army, 1997a; U.S. Department of the Navy, 1997a, b.

**Table B.15**

**FY96 Average Annual Basic Allowance for Quarters ($), by Service**

| Grade | Army | Navy | Air Force | Marines | DoD Average |
|---|---|---|---|---|---|
| O-10 | 11,510 | 11,510 | 11,646 | 11,501 | 11,551 |
| O-9 | 11,456 | 11,510 | 11,646 | 11,501 | 11,536 |
| O-8 | 11,423 | 11,429 | 11,597 | 11,501 | 11,486 |
| O-7 | 11,419 | 11,415 | 11,583 | 11,501 | 11,478 |
| O-6 | 10,241 | 10,209 | 10,389 | 10,283 | 10,286 |
| O-5 | 9,813 | 9,778 | 9,941 | 9,892 | 9,857 |
| O-4 | 8,639 | 8,615 | 8,750 | 8,701 | 8,677 |
| O-3 | 7,035 | 7,021 | 7,117 | 7,094 | 7,067 |
| O-2 | 5,666 | 5,746 | 5,694 | 5,640 | 5,693 |
| O-1 | 4,736 | 4,905 | 4,842 | 4,655 | 4,802 |
| W-5 | 8,455 | — | — | 8,427 | 8,451 |
| W-4 | 7,745 | 7,751 | — | 7,723 | 7,743 |
| W-3 | 7,045 | 7,069 | — | 7,061 | 7,052 |
| W-2 | 6,373 | 6,455 | — | 6,463 | 6,393 |
| W-1 | 5,434 | 5,508 | — | 5,570 | 5,450 |
| E-9 | 7,358 | 7,362 | 7,199 | 7,367 | 7,314 |
| E-8 | 6,768 | 6,771 | 6,571 | 6,784 | 6,726 |
| E-7 | 6,221 | 6,215 | 5,996 | 6,251 | 6,153 |
| E-6 | 5,703 | 5,656 | 5,461 | 5,723 | 5,633 |
| E-5 | 4,996 | 4,911 | 4,771 | 4,916 | 4,895 |
| E-4 | 4,024 | 3,921 | 3,888 | 3,857 | 3,947 |
| E-3 | 3,552 | 3,506 | 3,472 | 3,470 | 3,502 |
| E-2 | 2,921 | 2,834 | 2,857 | 2,768 | 2,852 |
| E-1 | 2,727 | 2,471 | 2,509 | 2,466 | 2,563 |

SOURCE: U.S. Department of the Air Force, 1997a; U.S. Department of the Army, 1997a; U.S. Department of the Navy, 1997a, b.

**Table B.16**

**FY96 Average Variable Housing Allowance ($)**

| Grade | Army | Navy | Air Force | Marines | DoD Average |
|---|---|---|---|---|---|
| O-10 | 3,536 | 4,107 | 3,408 | 4,661 | 3,734 |
| O-9 | 3,536 | 4,107 | 3,408 | 4,661 | 3,737 |
| O-8 | 3,536 | 4,107 | 3,408 | 4,661 | 3,731 |
| O-7 | 3,536 | 4,107 | 3,408 | 4,661 | 3,725 |
| O-6 | 3,126 | 4,067 | 2,578 | 4,110 | 3,252 |
| O-5 | 2,811 | 3,727 | 2,392 | 3,579 | 2,926 |
| O-4 | 2,177 | 3,384 | 2,188 | 3,205 | 2,548 |
| O-3 | 1,535 | 2,809 | 1,698 | 2,469 | 1,981 |
| O-2 | 1,168 | 2,292 | 1,210 | 1,463 | 1,513 |
| O-1 | 1,182 | 1,856 | 1,111 | 1,924 | 1,398 |
| W-5 | 2,071 | — | — | 3,630 | 2,276 |
| W-4 | 1,882 | 3,893 | — | 2,783 | 2,412 |
| W-3 | 1,497 | 3,354 | — | 1,675 | 1,882 |
| W-2 | 1,401 | 3,645 | — | 2,668 | 1,816 |
| W-1 | 1,470 | 5,000 | — | 2,933 | 1,645 |
| E-9 | 1,534 | 2,924 | 1,972 | 2,619 | 2,207 |
| E-8 | 1,481 | 2,724 | 1,803 | 2,281 | 1,994 |
| E-7 | 1,368 | 2,581 | 1,627 | 1,562 | 1,762 |
| E-6 | 1,118 | 2,228 | 1,283 | 1,785 | 1,607 |
| E-5 | 945 | 1,874 | 1,051 | 1,550 | 1,318 |
| E-4 | 747 | 1,577 | 842 | 1,634 | 1,060 |
| E-3 | 629 | 1,363 | 629 | 1,139 | 965 |
| E-2 | 567 | 1,263 | 583 | 666 | 792 |
| E-1 | 546 | 1,176 | 226 | 309 | 652 |

SOURCE: U.S. Department of the Air Force, 1997a; U.S. Department of the Army, 1997a; U.S. Department of the Navy, 1997a, b.

**Table B.17**

**FY96 Annual Government Cost ($) of Family Health Benefits for Active-Duty Military Personnel**

| Grade | Army | Navy | Air Force | Marines | DoD Average |
|---|---|---|---|---|---|
| O-10 | 5,406 | 5,625 | 5,467 | 5,660 | 5,501 |
| O-9 | 5,520 | 5,826 | 5,730 | 5,266 | 5,648 |
| O-8 | 5,494 | 5,546 | 5,721 | 5,791 | 5,603 |
| O-7 | 6,035 | 5,887 | 6,210 | 6,123 | 6,062 |
| O-6 | 6,245 | 6,271 | 6,315 | 6,289 | 6,280 |
| O-5 | 6,507 | 6,359 | 6,507 | 6,577 | 6,474 |
| O-4 | 6,315 | 6,201 | 6,376 | 6,507 | 6,323 |
| O-3 | 5,677 | 5,511 | 5,695 | 5,721 | 5,645 |
| O-2 | 4,995 | 5,057 | 4,960 | 4,908 | 4,992 |
| O-1 | 4,733 | 4,882 | 4,759 | 4,611 | 4,767 |
| W-5 | 5,931 | — | — | 6,280 | 5,976 |
| W-4 | 6,341 | 6,298 | — | 6,490 | 6,352 |
| W-3 | 6,499 | 6,586 | — | 6,612 | 6,530 |
| W-2 | 6,210 | 6,665 | — | 6,560 | 6,304 |
| W-1 | 6,009 | 6,822 | — | 6,411 | 6,057 |
| E-9 | 6,245 | 6,394 | 6,132 | 6,350 | 6,269 |
| E-8 | 6,534 | 6,577 | 6,411 | 6,673 | 6,535 |
| E-7 | 6,499 | 6,499 | 6,437 | 6,612 | 6,489 |
| E-6 | 6,333 | 6,263 | 6,324 | 6,385 | 6,309 |
| E-5 | 5,913 | 5,730 | 5,974 | 5,660 | 5,853 |
| E-4 | 5,179 | 5,013 | 5,126 | 4,856 | 5,093 |
| E-3 | 4,707 | 4,602 | 4,620 | 4,550 | 4,620 |
| E-2 | 4,541 | 4,419 | 4,453 | 4,366 | 4,453 |
| E-1 | 4,576 | 4,322 | 4,375 | 4,322 | 4,417 |

SOURCE: RAND calculations and DMDC Active Duty Family Database.

**Table B.18**

**FY96 Average Annual Cost ($) for Reenlistment Bonuses**

| Grade | Army | Navy | Air Force | Marines | DoD Average |
|---|---|---|---|---|---|
| Enlisted | 91 | 388 | 83 | 91 | 176 |

SOURCE: Calculations based on services' *FY 1998/99 Biennial Budget Estimates* for military personnel (U.S. Department of the Air Force, 1997a; U.S. Department of the Army, 1997a; U.S. Department of the Navy, 1997a, b).

**Table B.19**

**FY96 Average Annual Other Military Personnel Costs ($)**

| Grade | Army | Navy | Air Force | Marines | DoD Average |
|---|---|---|---|---|---|
| All | 136 | 242 | 508 | 248 | 278 |

SOURCE: Calculations based on services' *FY 1998/99 Biennial Budget Estimates* for military personnel (U.S. Department of the Air Force, 1997a; U.S. Department of the Army, 1997a; U.S. Department of the Navy, 1997a, b).

**Table B.20**

**FY96 Cost ($) of an Incremental Military Workyear**

| Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| O-10 | 178,807 | 181,546 | 179,624 | 180,940 | 179,919 |
| O-9 | 172,720 | 175,586 | 173,721 | 174,399 | 173,941 |
| O-8 | 159,583 | 162,032 | 160,586 | 161,847 | 160,710 |
| O-7 | 145,301 | 147,632 | 146,205 | 147,359 | 146,336 |
| O-6 | 127,174 | 128,908 | 126,512 | 128,561 | 127,507 |
| O-5 | 107,715 | 108,728 | 107,885 | 111,681 | 108,257 |
| O-4 | 91,212 | 92,777 | 92,253 | 95,363 | 92,256 |
| O-3 | 77,035 | 79,313 | 77,875 | 79,176 | 78,075 |
| O-2 | 63,327 | 67,366 | 63,328 | 64,799 | 64,569 |
| O-1 | 51,402 | 55,508 | 51,587 | 52,817 | 52,618 |
| W-5 | 94,223 | — | — | 96,416 | 94,512 |
| W-4 | 86,578 | 89,471 | — | 86,099 | 87,105 |
| W-3 | 72,459 | 77,518 | — | 74,766 | 73,729 |
| W-2 | 62,299 | 69,422 | — | 68,390 | 63,841 |
| W-1 | 55,829 | 62,261 | — | 62,409 | 56,611 |
| E-9 | 76,464 | 77,140 | 75,905 | 81,581 | 77,142 |
| E-8 | 65,740 | 66,786 | 65,999 | 70,233 | 66,604 |
| E-7 | 58,207 | 59,583 | 58,464 | 61,946 | 58,921 |
| E-6 | 51,397 | 53,008 | 52,116 | 55,767 | 52,478 |
| E-5 | 44,945 | 45,801 | 45,621 | 47,890 | 45,667 |
| E-4 | 38,531 | 39,318 | 38,518 | 41,592 | 39,021 |
| E-3 | 33,955 | 35,222 | 33,493 | 37,703 | 35,101 |
| E-2 | 32,314 | 32,921 | 31,574 | 35,125 | 32,926 |
| E-1 | 29,818 | 30,083 | 28,002 | 32,024 | 29,956 |

**Table B.21**

**FY96 Composite Marginal Costs ($) of Military Manpower, by Manpower Type**

| Grade | Army | Navy | Air Force | Marines | Total DoD |
|---|---|---|---|---|---|
| Flag Officer | 154,724 | 157,351 | 155,695 | 157,107 | 155,919 |
| Other Commissioned Officer | 81,571 | 84,510 | 83,719 | 81,398 | 83,063 |
| Warrant Officer | 67,558 | 76,516 | — | 72,812 | 69,372 |
| Enlisted | 43,065 | 43,961 | 43,606 | 43,197 | 43,479 |

**Table B.22**

**Number of Military Personnel, by Grade and Service**

| Grade | Army | Navy | Air Force | Marines | DoD Total |
|---|---|---|---|---|---|
| O-10 | 13 | 9 | 11 | 3 | 36 |
| O-9 | 36 | 29 | 36 | 9 | 110 |
| O-8 | 97 | 72 | 89 | 22 | 280 |
| O-7 | 152 | 109 | 142 | 34 | 437 |
| Total Flag Officer | 298 | 219 | 278 | 68 | 863 |
| O-6 | 3,640 | 3,320 | 4,129 | 628 | 11,717 |
| O-5 | 9,225 | 7,155 | 10,745 | 1,641 | 28,766 |
| O-4 | 14,913 | 11,037 | 16,058 | 3,179 | 45,187 |
| O-3 | 24,451 | 20,850 | 32,019 | 5,458 | 82,778 |
| O-2 | 8,587 | 6,843 | 7,339 | 2,796 | 25,565 |
| O-1 | 9,392 | 6,423 | 7,365 | 2,280 | 25,460 |
| Total Officer (O-1 through O-6) | 70,208 | 55,628 | 77,655 | 15,982 | 219,473 |
| W-5 | 390 | | | 59 | 449 |
| W-4 | 1,373 | 423 | | 275 | 2,071 |
| W-3 | 3,007 | 861 | | 537 | 4,405 |
| W-2 | 5,529 | 892 | | 781 | 7,202 |
| W-1 | 1,890 | 1 | | 254 | 2,145 |
| Total NCO | 12,189 | 2,177 | 0 | 1,906 | 16,272 |
| E-9 | 31,22 | 3,189 | 3,191 | 1,368 | 10,870 |
| E-8 | 10,931 | 8,097 | 6,396 | 3,264 | 28,688 |
| E-7 | 40,082 | 26,789 | 32,995 | 8,595 | 108,461 |
| E-6 | 60,580 | 65,150 | 40,983 | 13,885 | 180,598 |
| E-5 | 77,448 | 80,315 | 78,369 | 21,921 | 258,053 |
| E-4 | 121,704 | 73,803 | 80,540 | 30,401 | 306,448 |
| E-3 | 49,570 | 58,515 | 43,123 | 45,732 | 196,940 |
| E-2 | 29,396 | 27,303 | 18,152 | 19,394 | 94,245 |
| E-1 | 21,883 | 20,968 | 11,459 | 10,988 | 65,298 |
| Total Enlisted | 414,716 | 364,129 | 315,208 | 155,548 | 1,249,601 |
| Total | 497,411 | 422,153 | 393,141 | 173,504 | 1,486,209 |

SOURCE: Calculations based on services' *FY 1998/99 Biennial Budget Estimates* for military personnel (U.S. Department of the Air Force, 1997a; U.S. Department of the Army, 1997a; U.S. Department of the Navy, 1997a, b).

NOTE: NCO = noncommissioned officer.

**Table B.23**

**Average Number of Dependents, by Grade and Service**

| Grade | Army | Navy | Air Force | Marines |
|---|---|---|---|---|
| O-10 | 1.38 | 1.63 | 1.45 | 1.67 |
| O-9 | 1.51 | 1.86 | 1.75 | 1.22 |
| O-8 | 1.48 | 1.54 | 1.74 | 1.82 |
| O-7 | 2.10 | 1.93 | 2.30 | 2.20 |
| O-6 | 2.34 | 2.37 | 2.42 | 2.39 |
| O-5 | 2.64 | 2.47 | 2.64 | 2.72 |
| O-4 | 2.42 | 2.29 | 2.49 | 2.64 |
| O-3 | 1.69 | 1.50 | 1.71 | 1.74 |
| O-2 | 0.91 | 0.98 | 0.87 | 0.81 |
| O-1 | 0.61 | 0.78 | 0.64 | 0.47 |
| W-5 | 1.98 | — | — | 2.38 |
| W-4 | 2.45 | 2.40 | — | 2.62 |
| W-3 | 2.63 | 2.73 | — | 2.76 |
| W-2 | 2.30 | 2.82 | — | 2.70 |
| W-1 | 2.07 | 3.00 | — | 2.53 |
| E-9 | 2.34 | 2.51 | 2.21 | 2.46 |
| E-8 | 2.67 | 2.72 | 2.53 | 2.83 |
| E-7 | 2.63 | 2.63 | 2.56 | 2.76 |
| E-6 | 2.44 | 2.36 | 2.43 | 2.50 |
| E-5 | 1.96 | 1.75 | 2.03 | 1.67 |
| E-4 | 1.12 | 0.93 | 1.06 | 0.75 |
| E-3 | 0.58 | 0.46 | 0.48 | 0.40 |
| E-2 | 0.39 | 0.25 | 0.29 | 0.19 |
| E-1 | 0.43 | 0.14 | 0.20 | 0.14 |

SOURCE: DMDC Active Duty Family Database.

In Chapter Four, we conducted an analysis to compare the cost of civil service and military personnel at similar positions in the cost distributions of their respective workforces. Figure 4.1 presented the distributions graphically. The specific distributions are listed in Tables B.24 and B.25.

**Table B.24**

**Percentile Distribution of Military Personnel, by Average Cost of Grade**

| Grade | Total Average Cost ($) | Percentile Lower Bound | Percentile Upper Bound | Percentile Midpoint |
|---|---|---|---|---|
| E-1 | 29,956 | 0.000 | 0.044 | 0.022 |
| E-2 | 32,926 | 0.044 | 0.107 | 0.076 |
| E-3 | 35,101 | 0.107 | 0.240 | 0.174 |
| E-4 | 39,021 | 0.240 | 0.446 | 0.343 |
| E-5 | 45,667 | 0.446 | 0.620 | 0.533 |
| E-6 | 52,478 | 0.620 | 0.741 | 0.680 |
| O-1 | 52,618 | 0.741 | 0.758 | 0.750 |
| W-1 | 56,611 | 0.758 | 0.760 | 0.759 |
| E-7 | 58,921 | 0.760 | 0.833 | 0.796 |
| W-2 | 63,841 | 0.833 | 0.838 | 0.835 |
| O-2 | 64,569 | 0.838 | 0.855 | 0.846 |
| E-8 | 66,604 | 0.855 | 0.874 | 0.864 |
| W-3 | 73,729 | 0.874 | 0.877 | 0.876 |
| E-9 | 77,142 | 0.877 | 0.884 | 0.881 |
| O-3 | 78,075 | 0.884 | 0.940 | 0.912 |
| W-4 | 87,105 | 0.940 | 0.941 | 0.941 |
| O-4 | 92,256 | 0.941 | 0.972 | 0.957 |
| W-5 | 94,512 | 0.972 | 0.972 | 0.972 |
| O-5 | 108,257 | 0.972 | 0.992 | 0.982 |
| O-6 | 127,507 | 0.992 | 0.999 | 0.995 |
| O-7 | 146,336 | 0.999 | 1.000 | 1.000 |
| O-8 | 160,710 | 1.000 | 1.000 | 1.000 |
| O-9 | 173,941 | 1.000 | 1.000 | 1.000 |
| O-10 | 179,919 | 1.000 | 1.000 | 1.000 |

**Table B.25**

**Percentile Distribution of DoD Civil Service Personnel, by Average Cost of Grade**

| Grade | Average Total Cost | Percentile Lower Bound | Percentile Upper Bound | Percentile Midpoint |
|---|---|---|---|---|
| GS-1 | 19,487 | — | 0.000 | 0.000 |
| GS-2 | 23,608 | 0.000 | 0.001 | 0.001 |
| GS-3 | 27,094 | 0.001 | 0.011 | 0.006 |
| WG-1 | 28,213 | 0.011 | 0.011 | 0.011 |
| WL-1 | 29,645 | 0.011 | 0.011 | 0.011 |
| GS-4 | 30,216 | 0.011 | 0.053 | 0.032 |
| WG-2 | 30,856 | 0.053 | 0.057 | 0.055 |
| WG-3 | 33,196 | 0.057 | 0.059 | 0.058 |
| GS-5 | 33,488 | 0.059 | 0.144 | 0.102 |
| WL-2 | 33,889 | 0.144 | 0.144 | 0.144 |
| WG-4 | 36,401 | 0.144 | 0.148 | 0.146 |
| WL-3 | 36,496 | 0.148 | 0.148 | 0.148 |
| GS-6 | 36,918 | 0.148 | 0.204 | 0.176 |
| WG-5 | 39,009 | 0.204 | 0.226 | 0.215 |
| WL-4 | 39,624 | 0.226 | 0.226 | 0.226 |
| GS-7 | 40,280 | 0.226 | 0.296 | 0.261 |
| WG-6 | 41,017 | 0.296 | 0.311 | 0.303 |
| WS-2 | 42,491 | 0.311 | 0.311 | 0.311 |
| WS-1 | 42,547 | 0.311 | 0.311 | 0.311 |
| WG-7 | 42,793 | 0.311 | 0.325 | 0.318 |
| WL-5 | 43,492 | 0.325 | 0.326 | 0.326 |
| GS-8 | 44,607 | 0.326 | 0.339 | 0.333 |
| WG-8 | 44,622 | 0.339 | 0.364 | 0.352 |
| WL-6 | 45,368 | 0.364 | 0.365 | 0.365 |
| WL-7 | 46,726 | 0.365 | 0.366 | 0.365 |
| WG-9 | 46,870 | 0.366 | 0.389 | 0.377 |
| GS-9 | 48,006 | 0.389 | 0.466 | 0.427 |
| WS-3 | 48,718 | 0.466 | 0.466 | 0.466 |
| WG-10 | 49,489 | 0.466 | 0.542 | 0.504 |
| WS-4 | 49,955 | 0.542 | 0.542 | 0.542 |
| WL-8 | 50,270 | 0.542 | 0.543 | 0.542 |
| WG-11 | 51,315 | 0.543 | 0.564 | 0.553 |
| WL-9 | 51,931 | 0.564 | 0.565 | 0.564 |
| WS-5 | 52,296 | 0.565 | 0.566 | 0.565 |
| WG-12 | 52,947 | 0.566 | 0.575 | 0.570 |
| GS-10 | 54,177 | 0.575 | 0.582 | 0.579 |
| WS-6 | 54,240 | 0.582 | 0.583 | 0.583 |
| WL-10 | 54,556 | 0.583 | 0.588 | 0.585 |

**Table B.25—continued**

| Grade | Average Total Cost | Percentile Lower Bound | Percentile Upper Bound | Percentile Midpoint |
|---|---|---|---|---|
| WG-13 | 55,553 | 0.588 | 0.589 | 0.588 |
| WS-7 | 56,594 | 0.589 | 0.590 | 0.590 |
| WL-11 | 56,668 | 0.590 | 0.591 | 0.591 |
| WL-12 | 56,997 | 0.591 | 0.591 | 0.591 |
| WG-15 | 57,447 | 0.591 | 0.592 | 0.592 |
| GS-11 | 57,699 | 0.592 | 0.709 | 0.650 |
| WS-8 | 57,949 | 0.709 | 0.710 | 0.710 |
| WG-14 | 58,817 | 0.710 | 0.711 | 0.711 |
| WS-9 | 60,518 | 0.711 | 0.715 | 0.713 |
| WL-13 | 62,310 | 0.715 | 0.715 | 0.715 |
| WS-10 | 63,079 | 0.715 | 0.723 | 0.719 |
| WS-11 | 64,552 | 0.723 | 0.725 | 0.724 |
| WL-15 | 64,854 | 0.725 | 0.725 | 0.725 |
| WL-14 | 65,446 | 0.725 | 0.725 | 0.725 |
| WS-12 | 65,800 | 0.725 | 0.726 | 0.726 |
| GS-12 | 69,299 | 0.726 | 0.877 | 0.802 |
| WS-14 | 70,449 | 0.877 | 0.878 | 0.878 |
| WS-13 | 70,461 | 0.878 | 0.879 | 0.879 |
| WS-15 | 75,008 | 0.879 | 0.880 | 0.879 |
| WS-16 | 80,922 | 0.880 | 0.880 | 0.880 |
| GS-13 | 81,886 | 0.880 | 0.956 | 0.918 |
| WS-17 | 85,135 | 0.956 | 0.956 | 0.956 |
| WS-18 | 87,504 | 0.956 | 0.956 | 0.956 |
| GS-14 | 98,047 | 0.956 | 0.985 | 0.970 |
| GS-15 | 116,344 | 0.985 | 0.998 | 0.991 |
| SES | 146,636 | 0.998 | 1.000 | 0.999 |

# REFERENCES


Asch, Beth J., and John T. Warner, *A Policy Analysis of Alternative Military Retirement Systems,* Santa Monica, Calif.: RAND, MR-465-OSD, 1994.

Congressional Budget Office, *Contracting Out: Potential for Reducing Federal Costs,* Washington, D.C., 1987.

Freudenheim, Milt, "Health Care Costs Edging Up and a Bigger Surge Is Feared," *New York Times,* January 21, 1997.

General Accounting Office (GAO), *DoD Force Mix Issues: Converting Some Support Officer Positions to Civilian Status Could Save Money,* Washington, D.C., Letter Report, GAO/NSIAD-97-15, October 23, 1996.

———, *DoD Force Mix Issues: Greater Reliance on Civilians in Support Roles Could Provide Significant Benefits,* Washington, D.C., GAO/NSIAD-95-5, October 1994.

———, *The Federal Employees' Retirement System: Potential Changes in Agency Retirement Costs Following an Open Season,* Washington, D.C., Testimony, GAO/T-GGD-98-27, November 5, 1997.

———, *OMB Circular A-76: DoD's Reported Savings Figures Are Incomplete and Inaccurate,* GAO/GGD-90-58, March 15, 1990.

Goldberg, Matthew S., et al., *Cost Analysis of the Military Medical Care System: Final Report,* Alexandria, Va.: Institute for Defense Analyses, IDA Paper P-2990, September 1994.

Keating, Edward G., Frank Camm, and Christopher Hanks, *Sourcing Decisions for Air Force Support Services: Current and Historical Patterns*, Santa Monica, Calif.: RAND, DB-193-AF, 1997.

Mace, Don, and Eric Yoder, eds., *Federal Employees Almanac*, Reston, Va.: Federal Employees News Digest, 1996.

Marcus, Alan J., *Analysis of the Navy's Commercial Activities Program*, Alexandria, Va.: Center for Naval Analyses, CRM 92-226, July 1993.

Palmer, Adele, James Bigelow, Joseph Bolten, Deena Dizengoff, Jennifer Kawata, H. Garrison Massey, Robert Petruschell, and Michael Shanley, *Assessing the Structure and Mix of Future Active and Reserve Forces: Cost Estimation Methodology*, Santa Monica, Calif.: RAND, MR-134-1-OSD, July 1992.

Palmer, Adele, and David Osbaldeston, *Incremental Costs of Military and Civilian Manpower in the Military Services*, Santa Monica, Calif.: RAND, N-2677-FMP, July 1988.

Robbert, Albert A., Susan M. Gates, and Marc N. Elliott, *Outsourcing of DoD Commercial Activities: Impacts on Civil Service Employees*, Santa Monica, Calif.: RAND, MR-866-OSD, 1997.

Robbert, Albert A., Brent R. Keltner, Kenneth J. Reynolds, Mark D. Spranca, and Beth A. Benjamin, *Differentiation in Military Human Resource Management*, Santa Monica, Calif.: RAND, MR-838-OSD, 1997.

Rostker, Bernard, Harry Thie, James Lacy, Jennifer Kawata, and Susanna Purnell, *The Defense Officer Personnel Management Act of 1980: A Retrospective Assessment*, Santa Monica, Calif.: RAND, R-4246-FMP, 1993.

Tighe, Carla E., James Jondrow, Samuel D. Kleinman, Martha Koopman, and Carol Moore. *Outsourcing Opportunities for the Navy*, Alexandria, Va.: Center for Naval Analyses, April 1996.

Tighe, Carla E., Derek Trunkey, and Samuel Kleinman, *Implementing A-76 Competitions*, Alexandria, Va.: Center for Naval Analyses, CAB 96-24, May 1996.

U.S. Department of Defense (DoD), *Commercial Activities Program,* DoD Directive 4100.15, Washington, D.C., March 10, 1989.

———, *Commercial Activities Program Procedures,* DoD Instruction 4100.33, Washington, D.C., September 9, 1985 (with changes dated May 8, 1992; June 12, 1995; and October 6, 1995).

———, *Defense Health Program. Justification of O&M Estimates, Fiscal Year 1998/1999, Volume I,* Washington, D.C., 1997.

———, *Enlisted Personnel Management System,* DoD Directive 1304.20, Washington, D.C., December 19, 1984.

———, *FY 1997 Manpower Requirements Report,* Washington, D.C., July 1996a.

———, *FY 1997 Military Manpower Training Report,* Washington, D.C., June 1996b.

———, *Guidance for Manpower Programs,* DoD Directive 1100.4, Washington, D.C., August 20, 1954.

———, *Identity Cards Required by the Geneva Conventions,* DoD Instruction 1000.1, Washington, D.C., January 30, 1974.

———, *Improving the Combat Edge Through Outsourcing* (Report to Congress in response to Section 357 of the National Defense Authorization Act for Fiscal Year 1996), Washington, D.C., March 1996c.

U.S. Department of the Air Force, *FY 1998/99 Biennial Budget Estimates: Military Personnel, Air Force,* February 1997a.

U.S. Department of the Air Force, *FY 1998/99 Biennial Budget Estimates: Air Force, Vol. II,* February 1997b.

U.S. Department of the Army, *FY 1998/99 Biennial Budget Estimates: Military Personnel, Army,* February 1997a.

U.S. Department of the Army, *FY 1998/99 Biennial Budget Estimates: Operation and Maintenance, Army Data Book, Vol. II,* Washington, D.C., February 1997b.

U.S. Department of the Navy, *FY 1998/99 Biennial Budget Estimates, Justification of Estimates: Military Personnel, Navy,* Washington, D.C., February 1997a.

U.S. Department of the Navy, *FY 1998/99 Biennial Budget Estimates, Justification of Estimates: Military Personnel, Marines,* Washington, D.C., February 1997b.

U.S. Department of the Navy, *FY 1998/99 Biennial Budget Estimates, Justification of Estimates: Operation and Maintenance, Navy Data Book,* Washington, D.C., February 1997c.

U.S. Office of Management and Budget (OMB), *Circular No. A-76 Revised Supplemental Handbook: Performance of Commercial Activities,* Washington, D.C., March 1996.

———, *Performance of Commercial Activities,* Washington, D.C.: Circular No. A-76 (Revised), August 1983.

U.S. Office of Personnel Management (OPM), *Work Years and Personnel Costs: United States Government, Fiscal Year 1995,* Washington, D.C., HRSS 95-09, 1996.