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Comparing Military and Civilian Compensation Packages

James E. Grefer

4825 Mark Center Drive • Alexandria, Virginia 22311-1850

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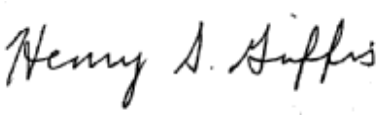

Henry S. Griffis, Director
Defense Workforce Analyses
Resource Analysis Division

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Introduction

The 10th Quadrennial Review of Military Compensation (QRMC) has been charged with providing an evaluation of the adequacy of military compensation. To this end, they have asked CNA to conduct a 2006 military versus civilian pay comparability analysis. Pay comparability studies for previous QRMCs have focused on how the current cash compensation of both enlisted members and officers compares with that of relevant civilian comparison groups. An area that hasn't been fully examined is how *benefits* compare across military and civilian personnel. This study for the 10th QRMC includes that comparison.

Without the inclusion of benefits, the value of a pay comparability study is limited. When benefits are left out, the current *levels* of compensation can't accurately be compared, even if there is still value in comparing the *trends* in compensation. Including benefits allows comparisons of the actual levels of compensation. This provides the extra value of allowing us to determine whether servicemembers are compensated at a level that is comparable to that of their civilian peers. And, if servicemembers' compensation exceeds that of their civilian peers, it provides a good news story that needs to be publicized to enhance recruitment and retention.

Estimating value of benefits

The challenge is that estimates of the total value of in-kind and deferred benefits are notoriously difficult to make. Attempts to estimate the total value of benefit packages include using employer costs or expected market prices. But, while these estimates provide important information, they are not the same as estimates of *value*.

Employer costs, for example, will vary among firms due to differences in ability to negotiate prices, differences in employee demographics and health status, differences in group rate or volume discount pricing, and other factors unrelated to value for employees. Widening the gulf between costs and value, the Department of Defense (DOD) itself produces many of the in-kind benefits that servicemembers receive. In this context, costs will reflect production methods and efficiencies that are not related to value to servicemembers.

Estimating differences in the value of benefits

While estimating *total* value might not be practical or give us the information we need, we *can* capture the relative value of the benefit packages by estimating *differences* in total value of individual benefits, which turns out, in many cases, to be equivalent to cash. Since cash and value are the same, we can use these differences in value to more accurately compare total compensation levels.

To illustrate, consider the health insurance benefit. Servicemembers receive their medical care for little or no out-of-pocket costs. Their civilian counterparts receive medical care, but not all of them have employer-paid health insurance, and even those who do typically pay a portion of the costs themselves. By being in the military, servicemembers are able to avoid these out-of-pocket costs. Those cost savings are the difference in the relative value of the health insurance benefits. An accurate comparison to civilian cash compensation would be the military cash compensation plus at least the health cost avoidance.

In addition to the health care benefit, we looked at two other benefits. First, we estimated the expected annual tax advantages that servicemembers receive because they don't pay state and FICA[1] taxes on their housing and subsistence allowances and because servicemembers can often avoid paying any state taxes through their ability to choose their state home-of-record. Finally, we estimated the

1. FICA is the Federal Insurance Contributions Act tax for Social Security and Medicare old-age benefits.

difference in the relative expected discounted value of the military and civilian retirement benefit.

We add the value differences of these three important benefits to Regular Military Compensation (RMC), and call this amount "Military Annual Compensation" or "MAC". It is MAC that we compare to civilian cash compensation. Because the value of benefits is found to be greater for service members than for equivalent civilians, the value of MAC is greater than RMC. Thus, comparing only RMC with civilian cash underestimates the true value difference of the military compensation package.

We also took a look at some of the other, less traditional benefits, such as the Montgomery GI Bill Education benefit and the DOD child care subsidy. Although these benefits are valuable to the service members who use them, the value of these benefits are highly contingent upon service members doing something that is unrelated to just working in the military (for example, having children). In order to be included in MAC, a benefit must be unconditionally available to all service members, and a function only of continued active duty in the military.

For similar reasons, we concluded that the military annual leave and holiday benefit should not be included in MAC. Although, on the surface it appears that the military leave and holiday policy is greater than comparable civilian policies, our analysis found that the value differential between military and civilian leave policies is likely to be subsumed by the fact that military personnel tend to work at least as many days per year, in spite of the more generous leave policy. Additionally, since work loads change dramatically with changes in military OPTEMPO, and varies widely among service members in high OPTEMPO periods, the value of the annual leave is not consistent among service members or across time periods.

Results

We first compared military and civilian cash compensation, in the traditional way. Regular Military Compensation (RMC) for enlisted is compared with the 70th percentile earned income of full-time, full-year civilian workers who have some college or an Associate

degree. We used civilian ages 21 to 40 to represent years of service (YOS) 1 through 20. For officers, we compared RMC with cash earnings of civilians who have a Bachelor degree or better from ages 23 to 42.

Enlisted servicemembers make, on average, around $4,700 more in cash annually than comparable civilians—ranging from about $1,000 to just over $10,000 in a 20-year enlisted career. Officers receive an average of $11,500 more annually in cash earnings; the range is from $4,200 to over $21,600 over 20 years of service. To RMC we add the benefits-value differences to correctly estimate officer and enlisted MAC, which are the amounts that should be compared with civilian cash earnings.

We found that, enlisted servicmembers receive state and FICA tax advantages of $1,900 to over $3,300 annually, and officers receive from $2,200 to over $5,300 annually.

Servicemembers pay little or no out-of-pocket expenses for their health care. The average full-time, full-year worker who is comparable with enlisted personnel pays from around $2,800 to $4,500 annually in out-of-pocket costs for health care throughout his or her career. Civilians that are equivalent to officers pay roughly $2,400 to nearly $4,200 annually for their health care.

We also estimated and compared the annual expected discounted value of the military and civilian retirement programs. For enlisted personnel, the difference between their retirement and that of their civilian counterparts ranges from below zero for the first 8 years of service, to nearly $8,800 at the 20th year of service. For officers, the differences below zero from YOS 1 to YOS 4; after that, the values rise to about $20,600 annually at the 20th year.

Conclusion

“Regular Military Compensation”, or RMC, compared quite favorably with the cash compensation of the 70th percentile of civilians in our 2006 estimates. However, not including the benefits-value differences causes us to understate the true value of annual compensation by an

average of $8,700 for enlisted personnel and nearly $13,400 for officers. What that means is that the total compensation packages, including both cash and benefits, are on average about $13,365 more for enlisted personnel than their civilian equivalents, and an average of $24,875 more for officers than their civilian counterparts.

As a result, we found that MAC compares favorably with the cash compensation of the 80th percentile of officer and enlisted equivalent civilians.

It is unclear whether servicemembers know that their benefit packages are generous when compared appropriately with their civilian counterparts. Estimating the difference is complicated, and servicemembers will usually underestimate its true value. Further, it is common practice for people to simply compare the cash part of compensation; however, the correct comparison with civilian cash compensation is not just military cash compensation but military cash plus the benefits-value differences. Published comparisons of compensation should include these amounts, and the full value of these benefits should be communicated to servicemembers.

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Introduction

The 10th Quadrennial Review of Military Compensation has been charged with providing an evaluation of the adequacy of military compensation. To this end, they have asked CNA to conduct a military versus civilian pay comparability analysis. Pay comparability studies for previous QRMCs, such as [1], have focused on how both enlisted members' and officers' current cash compensation compares with the current cash compensation of relevant civilian comparison groups. An area that hasn't been fully examined is how benefits compare across military and civilian personnel. This study for the 10th QRMC includes that comparison.

Without the inclusion of benefits, the value of a pay comparability study is limited. When benefits are left out, the current levels of compensation can't accurately be compared, even if there is still value in comparing the trends in compensation. Including benefits allows comparisons of the actual levels of compensation. This provides the extra value of allowing us to determine whether servicemembers' compensation is comparable to that of their civilian peers.

Hosek and Sharp [2] use military Basic Pay to compare relative growth of military pay and civilian pay from 1983 to 1998. They use these measures to forecast "gaps" in military pay growth out to 2010. However, most researchers agree that, even when comparing cash, one cannot simply look at the military's Basic Pay. Housing and food allowances are equivalent to cash, and, because these allowances are not taxable income, they provide a tax advantage that is also akin to cash. Together, they form what is called Regular Military Compensation (RMC).

Even as far back as 1944, Malvern Hall Tillitt [3] compared the after-expenses "net pay" of junior servicemembers, whose gross pay was $600 per year, with that of civilians whose income averaged $3,600 per year. Taking into account typical civilian expenditures on items that

servicemembers receive at no cost (housing, food, medical care, etc.), he concluded that the typical enlisted servicemember actually had more left over at the end of the month than the comparable civilian.

Volume 1, chapter 1, of the *Ninth Quadrennial Review of Military Compensation* [1] used DOD compensation costs to gauge the proportions of costs that are cash and benefits. In chapter 2, the QRMC compared the average RMC to various percentiles of civilian wages over the length of a servicemember's career in 2000. They found that enlisted RMC compared closely with the median wages of civilian workers with some college, and officer RMC compared with the 70th percentile of the wages of civilian workers with college degrees. This was mostly true in the first 20 years of service. After 20, military RMC far outstripped wages of comparable civilians with similar years of experience.

One important reason why traditional comparisons of military and civilian compensation have focused on cash rather than cash plus noncash benefits is that the cost and value of cash are roughly the same. When comparing compensation packages, *value* is really what we want to estimate. Later in this section, we go into some detail about why costs and market prices of in-kind benefits, while informative, are not ordinarily very good estimates of value.

Another reason why traditional comparisons look at only cash is that measuring the total value of any given benefit is often impractical. Attempts have been made. The Center for Naval Analyses (CNA) completed a study [4] that estimated hypothetical market prices of Navy and civilian benefits. Market prices are often treated as "value," and they may be at a market level. But it's not clear that servicemembers value their benefit packages at market price since, for various reasons, they don't actually pay that—not even indirectly.

The trouble is that comparisons of cash compensation ignore differences in the relative values of noncash benefits and are akin to assuming that they are the same. They are not the same, however. Researchers frequently acknowledge that military personnel receive "generous" benefits. Later in this paper, we discuss the many attempts to estimate just how generous.

Cost is not equal to value

What about using cost as a measure of the value of noncash benefits? Some researchers, including the CNA authors of [5], have estimated the "expenditures" or "cost" to the Department of Defense of providing benefits. The Congressional Budget Office (CBO) estimated that DOD spent roughly $99,000 per servicemember for compensation in 2002, about $55,000 (or roughly 56 percent) of which was in the form of noncash benefits [6]. CBO considered these four types of benefits:

- Health care for active duty and dependents, health care for retirees and dependents
- Retirement pay
- Installation benefits, such as recreation and childcare
- Department of Veterans Affairs (VA) benefits, such as the GI Bill, and VA health benefits.

Grefer, Miller, and Gregory [5] confirmed most of this expenditure, roughly, but made a case that most VA health benefits were not really benefits, but a type of compensation for work-related injury (i.e., a "workman's comp"), and so estimated the U.S. Navy compensation expenditure at about $84,000 per Sailor, of which about 42 percent ($35,000) was in the form of noncash benefits.

Reference [6] also shows that, at the same time, the average civilian employer spent less than 20 percent of total compensation costs on noncash benefits. Of course, this included all civilian full-time workers, many of whom receive very few benefits. This is not necessarily proof, because, as we've said, cost is not equal to value. However, it is suggestive that military benefits are more generous than civilian benefits, and it leads to our current study.

While an understanding of average costs is informative, costs are not the same as value. And, in a comparison of civilian and military compensation, value is what we care about. With regard to employer costs, different employers will often have varying costs to provide the same benefit to their employees, due to demographic differences of their employees, differences in their ability to negotiate low prices, and

other factors that are unrelated to the value that employees place on the benefits.

DOD even produces some of its servicemembers' noncash benefits itself. For example, DOD produces most of the medical care and almost all of the installation benefits, such as gyms and childcare. And, of course, as [7] showed, the U.S. Defense Health Program and civilian medical providers produce medical care at very different costs. Yet, there is no evidence that servicemembers and demographically similar civilian workers value medical care at different levels.

In comparing compensation packages, we care about the "value" of military compensation relative to civilian compensation.

Market prices are not necessarily the same as value either

Market price is often considered a reasonable proxy for value. Again, in a competitive market, the market price equals the average value to both the employer and the employee. Miller and Levy [4] attempt to estimate a set of market prices of benefits received by military, civilian government, and civilian private-sector employees.

However, "market prices" of benefits, no matter how well estimated, do not always represent value to the employees of these benefits. For example, it is employers, not employees, that are the actual demanders of the health care packages purchased in the marketplace. As a result, the employer's price of the health care benefit is typically a function of factors not connected to the individual employee, such as group rate pricing strategies of health insurance firms and the demographic and relative health distribution of employees.

Benefits-equal approach

As we'll describe later, we use a method for deriving value that we call a "benefits-equal" comparison. The insight in this approach is that, in order to compare military and civilian compensation, it is not necessary to measure the value of the benefits that are similar between servicemembers and civilians; it is the value of benefits that differ that matters.

Our approach works by using information we have about the *difference* in the relative value of individual benefits between military and civilian workers. We use the difference in value because it is often easier to calculate and quantify than the total value, and because the result is something that is equivalent to cash and so is more closely akin to value. Health care is again a good example. Although we can't really estimate the total value of the health care benefit, we know that civilians must pay a portion of the cost of their health plans that servicemembers don't. If we add this portion to servicemembers' cash compensation, we have a benefits-equal comparison. In addition to the health care benefit, we look at two other benefits-value differentials, which result in cash equivalent payments that should be reported atop the military cash compensation.

In what follows, we first update the traditional comparisons of cash compensation with 2006 data. Then, we look at three benefits:

1. The costs that civilians must pay for their health care that servicemembers avoid, which is a benefit to servicemembers
2. The cash equivalent advantage that servicemembers receive because they don't pay state or FICA taxes on much of their income
3. The military retirement plan.

We add the differences in relative value of these benefits to the military cash compensation and compare this with the civilian cash compensation to obtain a benefits-equal comparison.

What is MAC?

"Benefits-equal" defines the method by which we arrive at the final military compensation amounts to compare with equivalent civilians. The top line of the benefits-equal calculations is what we'll call "Military Annual Compensation" or MAC. To be clear with our definitions, RMC is the military's cash compensation, while MAC is equal to the RMC plus the value differentials of the primary benefits in the military's total compensation packages. From here on, we'll refer to "benefits-equal comparisons" when discussing the methodology, and MAC when referring to the final dollar amounts.

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Cash compensation comparisons

Background

Cash compensation for the military is called Regular Military Compensation. This is the amount that is usually compared with civilian wages. Many studies have estimated cash compensation. The CBO study [6] estimated that average RMC in 2002 among all servicemembers was about $43,000 in 2002 dollars, and was about 44 percent of total compensation.[2] The Ninth QRMC in 2002 [1] estimated average cash compensation at closer to $57,000—around 70 percent of total compensation. Of course, that study included some cash bonuses that the CBO estimate didn't, such as the enlisted Selective Reenlistment Bonus (SRB). The CNA estimate of average (per-servicemember) total cash compensation for Navy personnel, based on the 2002 Active Duty Pay File, was roughly $48,300, also in 2002 dollars [5].

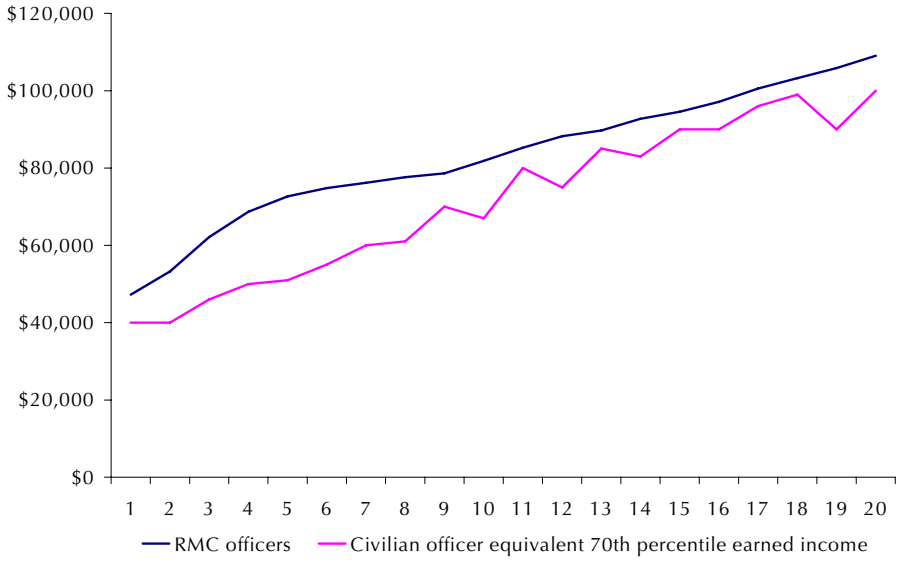
While these per capita estimates of cash compensation are useful, they left out important information. They don't consider differences in compensation between officers and enlisted or between senior and junior members of the same corps; they were simply total DOD expenditures divided by the total number of servicemembers. Reference [5] went a step further in 2004 by creating diagrams of career earnings profiles of officers and enlisted alongside those of civilians with comparable age and education levels. The profile was made up of data points, each representing an average of earnings among workers with the same level of experience. For military people, experience is measured in years of service (YOS); for civilians, age is a proxy for experience beginning at age 21 for enlisted equivalent or 23 for officer equivalent civilians, depending on education level.

2. The consumer price index (CPI) for 2006 is 1.14 when the 2002 index is equal to 1. Thus, $43,000 in 2002 dollars is equal to approximately $49,100 in 2006 dollars. Throughout this paper, except in this paragraph, and unless otherwise noted, amounts will be in 2006 dollars.

Comparing military and civilian cash compensation

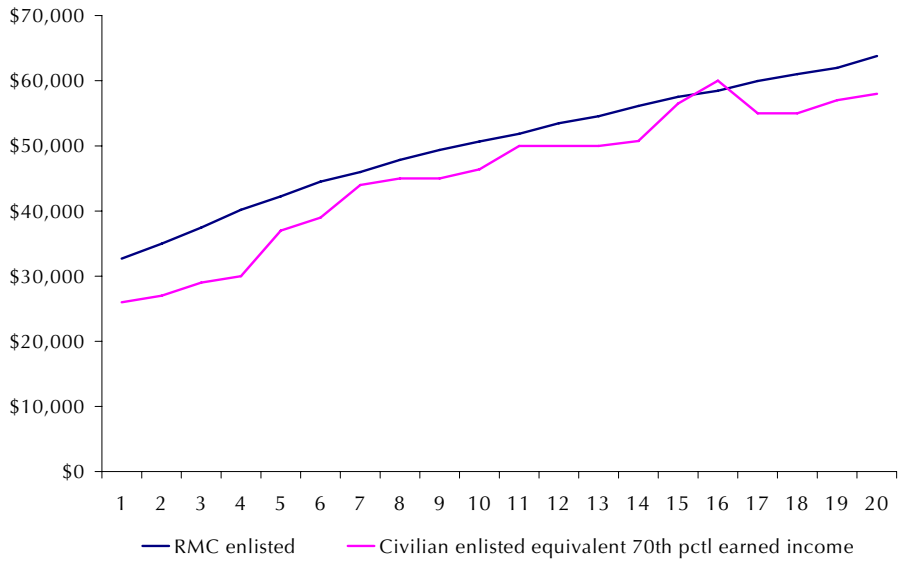
In figures 1 and 2, we update the military and civilian career cash earnings profiles of [5] using 2006 data for all four services (recall that [5] used 2002 data for the U.S. Navy only). The cash compensation for military is RMC, composed of Basic Pay (BP), Basic Allowance for Housing (BAH), Basic Allowance for Subsistence (BAS), and the federal income tax advantage. We start with personnel data from the Defense Manpower Data Center (DMDC) Active Duty Personnel File for calendar year 2005.[3] To calculate RMC, we use each member's rank and YOS and the BP tables for the Basic Pay portion. We used each servicemember's ZIP code, family status/size, and rank to estimate BAH. BAS is a fixed amount for officers and enlisted. And, finally, we used this plus the servicemember's family information to calculate a federal income tax advantage on his or her BP plus BAH plus BAS.

Figure 1. Expected RMC for "representative" officers over 20 years compared with civilian workers with Bachelor's degree or better in 70th-percentile earned income (CY06)



3. Note here that our object is to compare military and civilian compensation for 2006. We used the 2005 military personnel files to obtain military rank and year-of-service distributions because the study had begun as a 2005 study. We recently updated the dollar amounts to 2006, by using 2006 values of basic pay, housing and subsistence allowances, the 2006 tax codes, and 2006 data for all dollar amounts used for estimating the values of benefits.

Figure 2. Expected RMC for "representative" enlisted over 20 years compared with civilians with some college up to Associate degree in 70th-percentile earned income (CY06)



Our measure of the civilian cash compensation is earned income for full-time, full-year wage earners. Using data from the 2006 Current Population Survey (CPS), we calculate earned income as total income minus "unearned" income, such as interest and capital gains income. We weight earned income by gender because gender distribution is different in the military (roughly 85:15) than it is in the working private sector (roughly 55:45) and because, on average, full-time, full-year working women still earn a little less than comparable men.

We place military personnel into two groups, officers and enlisted, with years of service from 1 to 20. We compared them with civilians who had similar education levels and age groups. Enlisted equivalent civilians were those who had some college or an Associate degree, from age 21 to 40. Officer-equivalent civilians were those who had a Bachelor degree or higher and were age 23 to 42. We compared the average RMC at each year of service with civilian 70th-percentile earned income at each age.[4]

As we see in figure 1, military officers' cash compensation compares favorably with that of their civilian counterparts over most of an entire military career. On average, military officers earn $11,500 more per

year than their civilian counterparts over a 20-year career. Their cash compensation (RMC) ranges from about $4,500 more at the beginning of their careers to a peak of $21,600 more at the 5-year mark, and then moves to a range of $4,000 to $15,000 more in the last years of service.

For the enlisted servicemembers (figure 2), cash compensation is substantially greater than for civilians with some college over all but YOS 16, when the difference is negative.[5] The average annual difference for enlisted is about $4,700 when compared with civilians with some college. The range is from $2,000 to $10,200, except for the one year (YOS 16).

The differences between military and civilian cash compensation appear to be somewhat greater across the entire military career than they were in the 2004 study [5]. Three potential factors contribute to this difference. First, in the 2004 study, we looked at male civilians only. In this study, however, we weighted civilian men *and* women by factors of approximately .85 and .15 to more closely resemble the military distribution of men and women. This can make the civilian wages appear a little lower than if the comparison involves only men because even today, full-time working men make more on average than full-time working women of similar education levels and age. Second, the original study was Navy only. In this study, we looked at all four services. There is no theoretical reason why one service would make more on average than another. It's possible that differences in promotion timing and continuation rates could contribute to differences in average RMC.

4. The 70th-percentile income level means that 70 percent of the comparable civilian population makes less. The 70th-percentile civilian wage is chosen to reflect the desire of the DOD to attract "youths with higher aptitudes, excellent health, and no criminal records" [1, ch. 2].

5. According to the 2006 data, enlisted personnel received an average $1,500 *less* than comparable civilians in their 16th year of service. This amount is different enough from the other values that it appears to be a statistical anomaly... and though we keep it in the charts, we will treat it as an anomaly in our discussions throughout this paper.

The biggest difference in the military income profile is due to two aspects of military compensation. First is the DOD policy that automatically leads to higher annual increases in military wages than for civilians. This is a result of the FY 2000 Defense Authorization Act, which directed that annual raises in military Basic Pay from 2001 through 2006 should be set one-half of a percentage point above private-sector wage growth, as measured by the government's Employment Cost Index (ECI). Consequently, military Basic Pay rose about 21 percent from 2000 to 2006. Similarly, as a result of a decision in 2000 to raise BAH to the point that servicemembers have zero out-of-pocket housing costs, there has been a 24-percent increase in BAH over the same period. This increase in BAH would also result in a roughly similar increase in the Federal Tax Advantage, and thus total RMC. Compare this with increases in the Employment Cost Index (ECI), which rose by 19 percent over the same period.

Comparisons of cash compensation are useful, but they offer comprehensive comparisons only if the values of the benefits packages are equal. However, we'll show that the values of benefits are not equal. For example, the military health care package is quite generous compared with the typical civilian's. DOD offers complete medical coverage with no insurance premium sharing or other out-of-pocket expenses, such as coinsurance, deductibles, and copayments. Most civilian workers also receive health insurance, but most pay a portion of the premium and some other out-of-pocket expenses. The difference should be shown on the compensation graph by adding these costs as compensation to military people, or subtracting them from the civilian compensation. Here we opt for the former, even if the latter might be more accurate, because we aim to better illustrate to servicemembers the added value of the benefit package.

In subsequent sections, we will estimate the value of the total compensation package to servicemembers relative to their civilian counterparts. We will look at three components of military compensation: the military health care package, the military tax advantage, and the military retirement package. We'll compare them with what the average civilian, in the same demographic categories, can expect to receive. The difference in the relative values of each will be added to the RMC to present a more accurate picture of the value of the compensation package to servicemembers.

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Benefits-equal comparisons of compensation

Simple comparisons between servicemembers' and civilians' cash compensation packages ignore differences in the value of benefits packages. As we've seen, military spending on benefits has been estimated at 30 to 45 percent of total compensation—compared with civilian employers, whose spending on workers' benefits packages is estimated to be 17 to 20 percent of compensation. While suggestive, this not necessarily proof that military benefits are more generous than civilian benefits.

What sets benefits-equal comparisons apart?

Our goal here is to compare the *value* of the benefit package. As we've said, however, estimates of the cost of benefits are not equivalent to estimates of their value. Health insurance provides a good example of this fact, and of our benefits-equal method of comparing compensation. Civilian employers provide health insurance to employees; DOD provides medical coverage to servicemembers and their families. But civilian and DOD medical providers have different methods and goals in provision of medical care and, consequently, will have different costs (or market prices) for what will appear to be roughly the same benefit to employees and servicemembers.

If both civilians and servicemembers were to receive what they consider to be the same level of medical care, but civilians have to pay part of the cost, that payment would be the difference in the value of the military and civilian health care benefits. If we took that amount and added it to servicemembers' "cash compensation," that would be an appropriate comparison with civilian cash compensation because the remaining value of the health care benefit would be the same for both. *That is what we call a benefits-equal comparison*.

In this study, we will generate a benefits-equal comparison to compare military and civilian compensation packages. We will estimate

the difference in value in three of the more valuable benefits that workers and servicemembers receive. We add the differences in value to servicemembers' cash amounts. At the end, the top line of the military compensation chart will be the benefits-equal level of compensation for servicemembers, what we will call Military Annual Compensation (MAC). That means that the value of any benefit over and above this line is matched by civilian workers. It is MAC that will provide a more accurate comparison with the cash compensation of comparable civilians.

Three components of compensation we'll look at are:

1. *The health care benefit.* While servicemembers may have a sense that the military health care benefit is generous, it is important to explore just how much a comparable benefit would cost them in the private sector.
2. *The military tax advantage.* This is complicated, partly because the tax code itself is complicated, and partly because calculating the full benefit of a tax-free income source is complicated. In addition, the advantage varies widely among servicemembers, depending on their family size, duty station, and home of record, as well as their rank and YOS.
3. *The retirement benefit.* This is complicated for two reasons. First, it is a deferred benefit, so its value must be discounted. Second, a servicemember must serve out 20 years to be eligible for the benefit, so we must consider the probability that he or she will make 20 years.

In the sections that follow, we look at each of these benefits and quantify the value of the compensation package.

A note on the adequacy of compensation

In this study, we are estimating the total value of the compensation package. Here we answer the question, How much are servicemembers making compared with equivalent civilians? It is essential to this work that we make it clear that we are not addressing the question of whether the amounts we estimate are adequate. That question can only be answered by studying military recruiting and retention.

Economic theory tells us that workers choose among employers by looking at a package of hedonic characteristics, including such things as working conditions, safety, and satisfaction gained by the work itself. They then will make tradeoffs between some of these hedonic characteristics and compensation, where compensation includes both pay and benefits. As a consequence of these tradeoffs, if two jobs are the same in all respects, but one job requires some risk to life and limb, for example, the latter will need to pay a higher compensation than the first in order to attract workers. The additional compensation is called a "risk premium."

Military service is just such a job. Within job subcategories, such as “electronics technician,” military work also entails hardships, such as periodic deployment away from home, and occasionally it will involve genuine risk to life and limb. Consequently, all else equal, the military will probably need to pay more to attract and keep a sufficient number of personnel.

This raises the question, Is the difference large enough to attract and keep sufficient officers and enlisted? To answer, one would need to look at military recruitment and retention and see if the military has been successful at those endeavors, given current levels of compensation [8]. CNA has done that. For example, in studies of military physicians, Christensen et al. and Brannman et al. [9, 10] constructed survival models of physician and nurse retention as a function of Regular Military Compensation, military incentive special pay, and the military retirement program and their effect on the probability that a physician or nurse would stay an additional year, given his or her current YOS.

In 2003, Hansen and Wenger conducted a cost-benefit study of using Selective Reenlistment Bonuses to retain enlisted personnel of various technical specialties [11]. They found that, for most specialties, the cost of the SRB and the added personnel costs that accrue on seniority were higher than the benefit of higher retention and experience levels of the enlisted technicians. The inference from the study was that SRB, which is the part of compensation over which individual services have some control, was not being used optimally.

These models, and others like them, can help DOD to determine the amount of risk premium it would need to pay, at various conditions of the national economy and states of war.

In our current study, we might postulate that the difference between military and civilian compensation is, at least in part, a premium that DOD pays to attract quality personnel. We certainly recommend that DOD continue to study the relationship between compensation and recruitment and retention. However, we reiterate that this study, and other studies that measure compensation, is only the beginning of that story. To accurately measure all military and civilian compensation is a critical step, and, here, we introduce a rigorous method of estimating and examining the magnitude of the differences themselves. It is for the next study to assess the adequacy of the differences.

The military tax advantage

Not all of the total military cash compensation is subject to taxation. In the extreme, when a servicemember is stationed in a combat zone, none of his wage is taxed. More important, or least more widespread, is the income tax advantage that a military person receives because BAH and BAS are not subject to federal, state, local, or FICA taxes, regardless of duty station.

The amount of this tax savings can be substantial. For enlisted servicemembers, BAH and BAS averaged around 28 percent of total cash compensation in 2006. For officers, the allowances averaged about 22 percent of total cash compensation. If these payments were taxed, DOD would have to pay considerably higher gross pay to make military personnel indifferent between being taxed and not taxed on allowances. The difference between the gross pay a serviceperson receives and the amount he or she would have to receive if allowances were taxed to have the same net pay is called the tax advantage (TA).

Box 1. Federal income tax advantage

To illustrate, consider a stylized example. Suppose a military person receives $20,000 in untaxed pay, and the marginal federal income tax rate is a simple 20 percent. In this case, the servicemember receives a federal income tax break of $20,000 * .2 = $4,000, and his federal income tax advantage is $4,000 / (1 - .2) = $5,000. That means that he would need to receive $25,000 taxed at 20 percent to be indifferent to that and receiving the $20,000 untaxed. Throughout this section, we will build on this example to illustrate the parts of the tax advantage that are not included in published figures. The federal income tax advantage is included in RMC.

We have four objectives in the military tax advantage section of this paper. First, we describe the sources of the military tax advantages and discuss the extent to which this is a benefit to servicemembers.

Next, we'll discuss in detail the differences between the estimates of the TA used in RMC and the more comprehensive TA calculations, which would also include the state TA and the FICA TA. CNA created a program that estimates this for all 41 states that have a tax; we'll use this program to estimate the state TAs for all servicemembers.

Third, we will present a few examples of so-called typical servicemembers and their estimated TAs under each of the above cases. We will also present tables of average TAs by rank for each of the cases.

Third, we describe some illustrations of the different types of TAs, and discuss the expected amounts to servicemembers of all the different types.

Finally, we explore who—among government organizations, servicemembers, and U.S. citizens—benefits and who pays by having some military income be untaxable.

The tax advantage as a benefit to servicemembers

The U.S. Department of the Treasury publishes estimates of the federal income tax advantage in its annual "Green Book," a set of tables that outline the Regular Military Compensation [12]. RMC includes only the federal income TA because it is relatively consistent among servicemembers. The state TA varies among military residents of states with different tax codes. The difference between the FICA tax and potential lost benefits varies among servicemembers to the extent that they differ in military careers and in civilian careers after the military.

Even with respect to the federal income TA, RMC does not consider differences among servicemembers' BAH due to different housing costs across the United States. Thus, the TA estimate in the RMC is more correctly understood as something akin to an expected value of a lower bound of the servicemember's TA. It is an expected value because DOD uses a weighted average across military housing areas to provide an estimate of the expected BAH by rank, from which the federal TA is estimated. It is a lower bound because it includes only federal TA, and not the FICA or state TAs.

The purpose of publicizing the military tax advantage is to convey to servicemembers the true value of their compensation packages when comparing them with those of their civilian counterparts. Although economic theory suggests that after-tax pay is all one should care about, it is typical among Americans to compare gross pay with their colleagues. In the civilian world, this is reasonable since all are subject to the same tax codes. However, in comparing civilian pay with military pay (much of which is not taxed), one would be more accurate to compare the civilian gross pay with the military gross pay plus the TA.

The TA is not like other benefits to the servicemember in the sense that it isn't a payment in-kind. And since, by definition, the member's *net* pay would be the same amount with or without the TA (as shown in the simple example above, $20,000), he or she should in theory be indifferent between having the tax advantage and having the cash. In fact, that's why the federal income tax advantage is considered part of cash compensation rather than part of the benefit package. However, as in many financial matters, the reality of the TA is much more complicated than its definition or our simple illustration suggests. For practical purposes, complex tax situations among servicemembers and complicated tax codes often make it difficult to determine what the marginal tax rate is, which is needed to calculate the TA. In addition, many servicemembers will trade their BAH and BAS cash allowances for payment in-kind. Moreover, for Social Security Administration (SSA) taxes, current tax relief could mean some lost future benefits. Questions arise in these cases about how the TA should be calculated or even about how it should be viewed.

The TA is a "benefit" to servicemembers to the extent that they would prefer having the TA to having a higher gross pay and being taxed on all cash compensation. Although theory might suggest that servicemembers should be indifferent, we will show that, under various conditions and when they know the correct amount of the TA, servicemembers will strictly prefer having the TA. (For an example of this, see Box 4. Also, we explore the extent to which servicemembers and DOD are indifferent in the subsection entitled "Difference and indifference in the tax advantages").

However, if they don't know or understand the full value of their TA, servicemembers may believe that they are underpaid relative to their civilian counterparts. Servicemembers might underestimate the amount of the TA for two reasons. First, the tax-savings, which is part of, but not the same as the TA, is relatively simple to calculate, and can often be mistaken for the TA. Second, as in many economic calculations, the "average" is often confused for the marginal. However, with the tax advantage, the average tax rate is usually less than the marginal, and using it will cause the tax advantage to be underestimated.

Further, it is unlikely that there could be any policy change to replace the TA with higher gross pay. Because of the wide variance in the TA amount among servicemembers, it would be technically and politically difficult, perhaps even impossible, to do this. Thus, it is important to calculate the TA for each servicemember as accurately as feasible, and to find a way to inform him or her of this amount.

Components of the military tax advantage

The RMC tables from the Treasury Department's "Green Book" [12] contain a reasonably accurate estimate of the expected federal income tax advantage for servicemembers by rank, years of service, and family size. In estimating the untaxed allowance income, the RMC uses a weighted average of BAH amounts by rank and by military housing area. The RMC tables also contain estimates of servicemembers' FICA tax, which would be an appropriate inclusion to servicemembers' tax advantages. Yet this component, along with the state TA, represents a large amount of the TA that isn't shown in the tables for various reasons.

State tax advantage

Military personnel are usually taxed by the state of their legal residence, described in the servicemember's personnel record as his or her home of record. However, 14 states either have no income tax or exempt military income from state taxation (see table 1). Six states tax military income only when the state is both the servicemember's home of record and duty station. Another six states exempt some military income from taxation. The remaining 24 states and the District of Columbia tax the Basic Pay of each of its legal military residents, regardless of servicemember's duty station.

Table 1. State income tax rules for military personnel[a]

Tax rule	State
States without income taxes	Alaska
	Florida
	Nevada
	New Hampshire
	South Dakota
	Tennessee has no tax on wage income
	Texas
	Washington
	Wyoming
States that do not tax military income	Arizona
	Illinois
	Michigan
	Montana
States that do not tax military income for members stationed outside the state	California
	Idaho
	New York
	New Jersey
	Oregon also exempts the first $3,000 for resident members stationed in Oregon
	Vermont
	Pennsylvania
States that exempt some military income from taxation	Arkansas exempts first $6,000 in BP
	Indiana exempts the first $2,000
	Maryland exempts the first $15,000 if stationed OCONUS
	North Dakota exempts the first $1,000
	Oklahoma exempts the first $1,500
	Virginia exempts BP up to $15,000; exemption declines dollar for dollar up to $30,000 in BP
Military personnel whose home of record is in one of the remaining 24 states plus DC are taxed as residents	

a. Sources: Reference [13] and the following website, which has links to the departments of taxation for all 50 states: http://www.taxsites.com/state.html.

Box 2: Federal plus state income tax advantage

Consider the serviceperson in our stylized example from Box 1. Recall that he receives $20,000 in untaxed income, which, at a federal tax rate of 20 percent, gave him a federal income tax savings of $4,000 and a federal tax advantage of $5,000. Suppose he lives in a state with a simple tax rate of 5 percent. His state income tax break is $1,000. His total federal plus state income tax savings is $4,000 + $1,000 = $5,000, and his federal plus state tax advantage is $5,000 / (1 - .25) = $6,667. Compare this to his federal income tax advantage of $5,000 and you can see the extent to which the real tax advantage is underestimated for many servicepeople whose home of record is a taxed state.

There are two types of the state tax advantage. The first exists for the same reason the federal income tax advantage exists—because the BAH and BAS are not taxable. In this case, to the extent that servicemembers are required to pay a state tax, they don't have to pay it on their allowances, and so a state income tax advantage obtains. Conceptually, this TA exists because some of the income servicemembers receive, specifically the BAH and BAS, is treated differently from the rest of their income.

The second type exists because servicemembers themselves are treated differently by states than civilians are. Civilians, although they are required to file tax returns in their state of residence, are typically required to pay tax to the state in which they earn their taxable income. There are exceptions to this rule. Some states have reciprocal agreements with neighboring states to tax their own residents, even though they may work in the neighboring state.

Servicemembers are required to pay tax to the state of their home of record, regardless of the state in which they are stationed. In addition, servicemembers have some limited freedom to choose a home of record; they may choose 1 of the 14 states that do not have an income tax or that do not tax military income.

After recruit training, servicemembers may change their home of record when they change duty stations and keep that home of record for the remainder of their active duty if they choose. Often, if they are stationed at one of the nine no-tax states, or one of the five that don't tax military income, they will make that their permanent home of

record. That will vary among servicemembers to the extent that they prefer not paying state taxes to participating in services that some states provide to legal residents.

For example, California can be a relatively high-tax state; however, it also has a relatively progressive tax system, and its colleges and universities offer large discounts to its residents. In some cases, especially for lower ranked enlisted servicemembers whose tax burden could be relatively small, the servicemember might place a higher value on the college discounts than the tax amount, even when the military would pick up three-quarters of the tuition costs. Because of this tradeoff, we expected there to be a higher proportion of enlisted than officers choosing as their home of record states that tax military income. We found that about 38.5 percent of enlisted but only 25.4 percent of officers who are stationed in California pay California taxes.

The degree to which servicemembers choose no-tax states as their home of record could also vary to the extent that they have had rotations that place them in no-tax states. Nationally, we found that almost 35 percent of enlisted, but only about 17 percent of officers, pay any state tax. This is also consistent with the average officer staying in the military longer than the average enlisted and rotating through more assignments.

Table 2 shows the combinations of states for which servicemembers live and work. They pay tax to their home of record. If their duty station is a taxed state, they receive a state tax advantage that is a function of the tax they otherwise would pay at the duty station state. We see in table 2 that 42.7 percent of servicemembers receive a TA. Another 53.1 percent of servicemembers receive no state TA because either their home of record and duty station are the same or both the home-of-record state and duty-station state are no-tax states. Finally, 4.3 percent of servicemembers' homes of record are in tax states, while their duty stations are in no-tax states. They are currently paying a tax to the home-of-record state; however, they are eligible to change their home of record to the duty station, and would avoid state tax if they did so. Consequently, they receive a negative tax advantage—that is, they are unnecessarily paying a state tax.

Table 2. Home-of-record and duty-station combinations

Item	Description of combination	Percentage
1	Home of record and duty station are the same state — If home of record is a no-tax state, there is no tax paid, and so no TA. — If home of record is a tax state, servicemember pays tax on home of record; so no TA	17%
2	Home of record and duty station are taxable states — Servicemember pays home-of-record tax; so no TA.	27.3%
3	Home of record is a no-tax state, duty station is a tax state — Servicemember pays no tax; TA comes from the tax that otherwise would be paid at duty station.	42.7%
4	Neither home of record nor duty station is a taxable state — Servicemember pays no tax; there is no TA.	8.8%
5	Home of record is a taxed state, duty station is a no-tax state — Servicemember pays tax to home-of-record state; would pay no tax if changed home of record to duty-station state; TA is negative.	4.3%

CNA has developed a program that calculates the state tax advantage for all 41 states that have an income tax. Table 2 shows our estimates of the average TA for military residents of Virginia, Texas, and California, and then the average TA for all military personnel by officer / enlisted.

State taxes, and thus the state TAs, can be substantial sums of money. In table 3, we see that, although only about 42.7 percent of military personnel receive a state TA, for those that do, the U.S. average enlisted state TA is over $1,000, and for officers the average is over $2,800 per year. Of course, when a servicemember's duty station and home of record is a no-tax state, such as Texas, there is no state tax advantage—this is one reason why this is a complicated benefit.[6]

6. A special thanks to Mr. David Gregory whose programming and communication skills made all these complex tax advantage calculations possible.

Table 3. TA estimates of average total, federal, state, and FICA

	Tax advantage (dollars)		
Location	Total	Federal	State and FICA
United States			
Enlisted	5,129	2,600	2,529
Officer	9,762	5,310	4,452
Virginia tax state			
Enlisted	6,009	2,544	3,465
Officer	12,229	6,022	6,207
Texas no-tax state			
Enlisted	3,577	2,530	1,047
Officer	5,095	4,987	1,108
California tax state			
Enlisted	5,055	2,766	2,289
Officer	9,390	4,261	5,129

FICA tax advantage

The Federal Insurance Contribution Act required workers to pay 6.2 percent of gross income up to $94,200 for Social Security (in 2006) and another 1.45 percent of all gross income for Medicare.[7] See box 3 for an extension of our ongoing example.

Box 3: Federal income tax plus FICA tax advantage

In our ongoing example, because he doesn't pay FICA tax on $20,000 of his income, the servicemember receives a federal income tax plus FICA tax savings of $20,000 * .2765 = $5,530 and thus a federal plus FICA tax advantage of $5,530 / (1 - .2765) = $7,644. Compare this with the federal income tax only TA of $5,000. Note that, in this scenario, the servicemember receives an annual FICA TA of $2,644 and would lose approximately $15 to $100 per year of discounted Social Security benefits, at a 10-percent personal discount rate, depending on YOS.

7. The Social Security wage base, that is, the maximum income taxable for Social Security in 2006, it was $94,200; for 2007, it was $97,500; and for 2008, it will be $102,000.

In return for years of payments into the system, workers expect to receive a supplemental pension and medical care coverage once they reach eligible age, as early as age 62. There are other benefits, such as a disability insurance plan, and a supplemental pension for spouses of beneficiaries who earn substantially less than the primary earner.

The extent to which military personnel don't pay into the Social Security Administration portion of the FICA system means that they might lose Social Security benefits years later. The loss is not dollar for dollar to servicemembers. The first reason that SSA payments and benefits are not dollar for dollar is that not all years of income count equally to the benefit calculations. Often, SSA payments in the early years of a person's career will have little or no effect on future benefits. This is because of the SSA's "rule of 35": the average of a beneficiary's highest 35 years of income, indexed by inflation, is used in the calculation. Many young servicemembers will total 45 or more years in their working lives. Many of them will serve only one or two military terms. In these cases, FICA payments could have no effect on benefits at all, and the entire tax break will be considered a tax advantage.

The second reason, for most, is that the effects of the tax break won't be felt until many years in the future. Total Social Security benefits have averaged about 2.5 to 3 percent return on SSA payments from 1960 to the present.[8] By itself, this suggests that a servicemember with a personal discount rate of around 3 percent should be indifferent between having the TA and having the future benefits. As we show in Box 4, the discounted value of the lost benefits becomes very small, even at a personal discount rate of 10 percent.

Note also in table 3 that, enlisted and officers in Texas have very similar TAs, unlike the others, in which officers receive about one and a half to twice the TA of enlisted. The reason is that, while federal and

8. Studies (such as [14]) have shown that returns on Social Security tax payment vary widely by income level, length of career, and generation. For example, the actual range of returns has been as high as 12 percent for low-income wage earners and as low as -0.05 percent for very high wage earners. Estimated returns for middle-income-level beneficiaries are about 2.5 to 3 percent.

Box 4: FICA tax advantage vs. lost Social Security benefits

Because of the potential for lost SS benefits and present-value (PV) discounting, discussions of the FICA TA are complicated and controversial. We argue that, because of the 35-year rule[a] and PV discounting, most servicemembers place a much higher value on the TA than on lost benefits.[b] We present an example. This example is *not* from our ongoing stylized set of examples. Here we use an estimated earnings profile of an average career enlisted servicemember, calculate his actual federal and FICA TA, and estimate his actual lost SS benefits using the SS benefits formula [15].

Consider a servicemember who joins the military at age 19 and learns one of the military's relatively high tech skills. He makes E-7 at about YOS 16 and retires at YOS 22. After retiring from the service, he joins the private sector in a job using similar skills. He remains in the private sector until he retires at age 65, and begins collecting SS benefits.

On one hand, he saves about $25,000 in FICA taxes over his military career. This results in an average annual FICA TA of over $1,600 annually, and a total FICA TA in his career of over $32,000.

On the other hand, as a result of paying less FICA tax, he loses about $67 per month, or about 4 percent of potential benefits, from age 65 to about age 80 (from SS actuarial tables), for almost $12,000 in total lost benefits. This amounts to a $32,000 TA against a $12,000 loss in benefits, are in current dollars. The difference is large because, for the first 10 years of his career, his military income didn't even count toward calculation of the SS benefit due to the 35-year rule.

If we also consider personal discounting of future benefits, the difference between the perceived value of the current TA vs. lost future benefits becomes even more significant. At a personal discount rate of 5 percent, the discounted value of the tax advantage (looking out from YOS 1 to YOS 22) falls to around $19,000. However, the discounted value of lost benefits that won't begin for another 40 years or so falls to nearly $2,200. At a personal discount rate of 10 percent, the discounted values of the TA and the lost benefits fall to $12,700 and $220, respectively. Thus, this servicemember would give lost SSA benefits a low value, perhaps very nearly zero, at relatively low personal discount rates.

a. Social Security benefits are a function of the average of the highest 35 years of work, indexed by inflation. This is the 35-year rule.

b. We would like to thank Dr. Ann Parcell of CNA for her help in motivating our thinking about how the FICA TA should be compared with lost SS benefits.

state governments have large deductions and progressive tax rates, FICA taxes the first dollar of income and has a flat rate of 7.65 percent of income and an income ceiling of $92,400 (in 2006), above which no income is taxed. Consequently, for many junior enlisted, much their allowance income taxed at a low rate, and so they receive a small income tax advantage. For many senior officers, much of the BAH and BAS will lie above Social Security limit, so receive a small FICA tax advantage.

In table 3, we also present a detailed look at the difference between the amount of the FICA TA and the discounted value of lost SS benefits over the career of a typical enlisted servicemember.

Summary and results

The RMC tables do a good job of publishing estimates of the federal income tax advantage, which is the part of the military tax advantage that is consistent among servicemembers of the same rank and family size. However, it is only one part of the total tax advantage for most servicemembers. Also, parts of the true TA are the FICA and the state TAs. These components of the TA are not included in the RMC tables because calculations are complicated by the fact that (a) not all servicemembers live in states that tax military income, and (b) reduced FICA payments can mean lost Social Security benefits in the future.

As a result, we think of the RMC tables as publishing the expected value of the lower bound of the true TA. It is expected value because they use a weighted average of servicemembers' BAH to calculate the federal portion of the TA, and it is lower bound because it includes only the federal income tax component of the true TA, because it is the one component that all servicemembers receive.

In figures 3 and 4, we show RMC plus the state and FICA TAs for enlisted and officers, respectively, over their 20-year career path. On average, the federal-income-tax-only advantage causes RMC to underestimate cash compensation for enlisted and officers by 3 to 5 percent each year for those who live in taxed states. The FICA tax advantage alone contributes an average of 2.5 to 4 percent of servicemember's total compensation.

Figure 3. Components of compensation for enlisted, by years of service

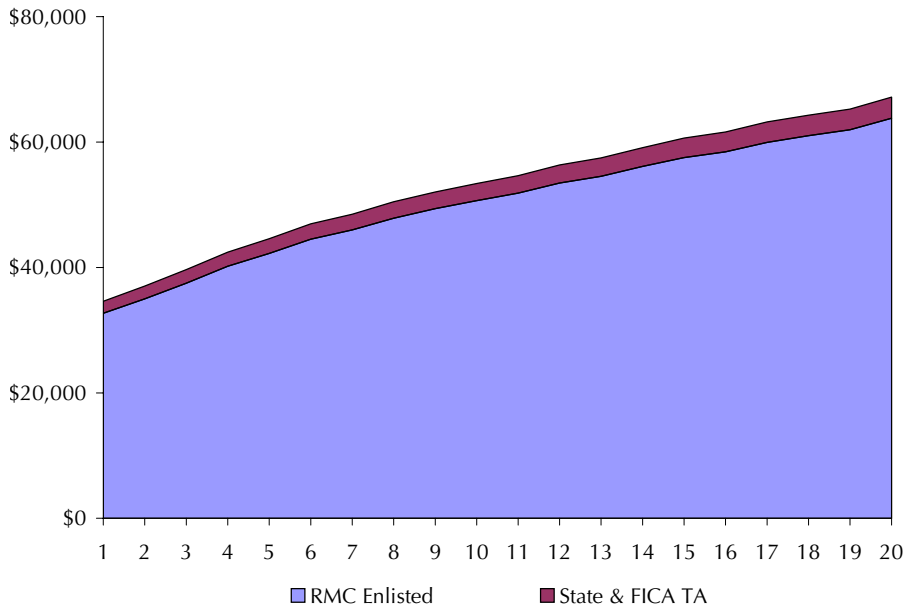
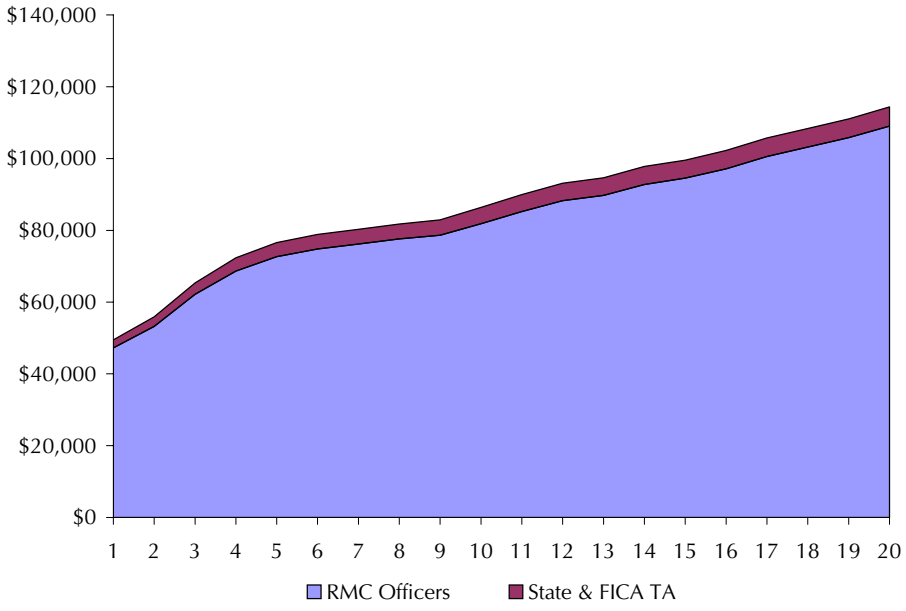


Figure 4. Components of compensation for officers, by years of service



As we show in figure 3, enlisted personnel are earning a tax advantage that is, on average, $1,900 to nearly $3,400 more than the amount published in the RMC tables. Officers are earning over $2,200 to $5,300 more, on average, than what is published, due to the FICA and state income tax advantages.

It is likely that servicemembers underestimate the true TA because they perceive tax-savings rather than the tax advantage and because people tend to think about average rather than marginal tax rates. To the extent that this is true, servicemembers may think that they are underpaid, relative to their civilian counterparts. One solution is to provide additional information about the full TA.

Difference and indifference in the tax advantages

One question about the tax advantages is this: Which people and organizations benefit when part of servicemembers' cash compensation is tax free? By definition of the TA, servicemembers receive the same net pay regardless of whether allowances are taxed. This would imply that they should be indifferent. Of course, the issue is more complex than that. We construct an economic model in which we show that servicemembers will generally be indifferent over parts of the TA but not others. Also, there are other players in the TA game. For example, DOD gains from parts of the military TA to the extent it can pass on the cost of the TA to another player.

We'll look at each component of the tax advantage in the aggregate to gauge who gains and who loses—and to what extent.

The federal income tax advantage revisited

Consider taking our ongoing stylized example and aggregating it to a national level. Here, instead of 1, there are 100 servicemembers all receiving $20,000 in untaxed earnings. In addition, there are 1,000 civilian taxpayers, each earning $25,000 but paying 20 percent, or $5,000 in federal income taxes. In this example, civilians and servicemembers alike net $20,000.

The players in this stylized aggregate nation are:

- The military personnel, who maximize their net pay
- The civilian taxpayers, who maximize government services and minimize taxes, and optimize the relative proportions of defense and other government services
- The DOD, which maximizes the size of its total force
- National and state lawmakers, who maximize government services they provide and minimize taxes they impose on the citizens, and keep their budgets in balance.

In this first part, the federal income tax is the only tax. The entire defense budget is for military cash compensation, none of which is taxed.

Federal revenue in this world is $5 million (1,000 * $5,000 per taxpayer). Of that, the portion that goes to defense is $2 million (100 * $20,000 per servicemember). Thus, $3 million of federal revenue goes toward "other" government services. The federal-income-tax-only TA to each servicemember is ($20,000 * .2) / (1 - .2) = $5,000, meaning that DOD would have to pay servicemembers $25,000 if their income were taxed at 20 percent so they would net $20,000.

Now consider a change in policy in which military people are taxed on their $20,000 income. For simplicity, we assume that the policy change is costless, both financially and politically (a stretch, we know). DOD would have to pay servicemembers $25,000, and the military budget would have to rise by $0.5 million, to $2.5 million, in order to keep the same size force ($25,000 * 100 servicemembers). The total federal budget would rise from $5 million to $5.5 million ($2.5-million defense budget plus $3 million for "other" services).

Tax receipts, however, would rise by $0.5 million as well because now all 100 servicemembers are paying $5,000 in taxes. Thus, taxes don't have to be raised on civilians to meet the new demands.

What would be the effect on each of the players of changing the policy from military compensation being untaxed to being taxed? Servicemembers should be indifferent because they receive $20,000 net cash compensation in either case. DOD should be indifferent

because it has a force strength of 100 military people in either case. Taxpayers should be indifferent because their tax burden is the same, and the mix of defense and "other" government services they receive is also the same. Finally, lawmakers should be indifferent because their overall budget remains in balance.

The FICA tax advantage

While all players appear to be indifferent to the federal income tax TA, that is not the case with the FICA TA. The FICA TA is complicated by two issues. First, unlike federal taxes, FICA taxes lead to direct benefit gains to servicemembers far in the future. This raises the question of how much a future dollar of Social Security benefit is valued compared with a current dollar of tax advantage. Further, FICA taxes paid in different years of a person's career do not count proportionately toward the SS benefit because of the rule of 35. Second, part of the FICA tax is paid by the employer (here by DOD) by way of a payroll tax while future benefits accrue or are lost by the servicemember. We discuss each of these issues in turn.

Current tax advantage vs. future benefits

First, reduced FICA taxes for servicemembers can result in some lost SS benefits later in their lives. The true tax advantage is the difference between the current tax advantage and lost SS benefits.

Present-value discounting, however, would cause the TA and the lost benefits to be valued at different rates. If the TA caused future benefits to be reduced dollar for dollar, PV discounting would mean that servicemembers would strictly prefer the TA to the benefits. From 1960 to 2000, beneficiaries have typically seen about a 2.9-percent return on their FICA taxes. That would imply that, if servicemembers' personal discount rate were 2.9 percent, they would be indifferent between receiving the TA and receiving the additional benefits.

It is unlikely that young servicemembers have this low a discount rate, as evidenced in a natural experiment that occurred in the military drawdown of the early 1990s whereby military people were offered contract buyouts and were presented a choice of either a multiyear annuity or a lump-sum cash amount that was discounted by far more

than the interest rate. The authors of [16] estimated that the average personal discount rate was between 25 and 35 percent for enlisted, and between 10 and 18 percent for officers. These estimates are on the order of four to ten times the magnitude of the 2.9-percent expected returns on FICA taxes.

More directly affecting the difference between the current TA and future benefits is a rule used by the SSA by which benefits are calculated using beneficiaries' greatest 35 years of income. If the typical servicemember expects a working life of 45 years, FICA contributions for the entire first term and much, if not all, of the second might not have any effect on future SS benefits. In this case, the entire TA is benefit to the servicemember.[9] For these reasons, we conclude that servicemembers would strictly prefer the tax advantage to lost benefits.

The employer's payroll tax

The second issue is that employers pay half of the FICA tax in the form of a payroll tax. Consequently, DOD receives part of the tax advantage. This is further complicated by the economic theory that employers can shift part of the payroll tax back to the servicemembers in the form of lower wages, and that the portion they can backshift depends on the relative elasticity of supply and demand for the labor that servicepeople provide.

Much of the economic literature suggests that employers are able to backshift most, or all, of the payroll tax in the form of lower wages. This would occur if the supply of labor were perfectly inelastic—in other words, when workers would supply the same amount of labor regardless of the size of the payroll tax.

It is unlikely that this result would hold with respect to the military FICA tax advantage. Those studies look at aggregate effects of

9. Social Security also has survivor and disability insurance. Eligibility requires the beneficiary to have paid FICA for at least 40 quarters. Some of the benefits can be reduced if a servicemember dies or becomes disabled before working 35 quarters. This would increase the value of lost benefits. The market price for those benefits is small, however; for simplicity, we abstract from the secondary SS benefits.

changes in payroll tax policy. In the aggregate, everyone pays the same payroll tax, so that workers have few choices when firms change wages as a result of the payroll tax. It is the existence of only a few choices that cause labor to be highly inelastic. This wouldn't necessarily follow if just one organization were to change payroll tax policy (for example, DOD). In this case, servicemembers could more easily change from military to civilian if a policy change caused their net income to fall as a result of backshifting of payroll tax.

Further, the studies looked at marginal changes in the payroll tax, such as those that occurred throughout the 1980s (less than 1 percent of income). The average effect of the FICA tax on the military TA is over $1,825 for enlisted and over $2,130 for officers. In the event of a policy change in which servicemembers would pay FICA and DOD a payroll tax on allowances, it would be unlikely that DOD could backshift those amounts by reducing wages.

Moreover, DOD, as a demander of labor, is not nearly as vulnerable to market forces as private-sector firms are. While firms might have relatively elastic demand for labor, DOD demand is largely politically driven and would have much less elastic demand for personnel.

Note that, if the supply of servicemembers were perfectly inelastic, and thus DOD were able to backshift the entire amount, the entire 15.3 percent of FICA plus the employer payroll tax would be considered in TA calculations for servicemembers. The point of this part of the discussion is that it is probably not correct to assume that DOD can shift the entire burden of the payroll tax onto servicemembers. Nonetheless, even an organization such as DOD, in which demand for personnel is largely politically driven, probably can shift some of the payroll tax back to servicemembers via lower wages; to the extent that it does, the true TA will be even larger than our estimates—without reducing the servicemembers' Social Security benefits at all.

Our conclusion about the FICA tax advantage is this. Unlike the situation with the federal income tax advantage, not all players are necessarily indifferent between having and not having the FICA TA. Servicepeople are *not* indifferent because they value current dollars much more highly than future dollars. DOD is *not* indifferent because it can use FICA payroll tax savings to pay a larger force. Taxpayers

probably *are* indifferent because the amounts from the FICA TA are too small a part of the system to affect current beneficiaries of Social Security. Lawmakers probably *are* indifferent because the Social Security system will, in the long run, pay out all its revenues plus the interest it receives on those revenues while holding them for later payout. To the extent that this is true, lawmakers will be indifferent between receiving the FICA tax revenues from servicemembers and later paying out the benefits, or giving the TA. Note that this holds only if the amounts are small enough that the TA will not affect the system itself. Given that the FICA TAs for all servicemembers sum to less than $3 billion while the Social Security Administration budget was around $500 billion in 2006, we expect that this is the case.

The state income tax advantage

About half of enlisted and 28 percent of officers were required to pay state taxes in 2006. These servicemembers, like their fellow state residents, use such state services as parks and recreation facilities and medical, legal, health, and safety services. To the extent they don't pay state taxes, they enjoy these services at reduced cost relative to their fellow residents. The amounts can be substantial. Virginia's income tax is almost 6 percent for income over $17,000. California charges up to 9.3 percent for income over $43,467.[10] Thus, RMC significantly underestimates the true tax advantage.[11]

The players in the state tax advantage are not necessarily indifferent even in theory. Unlike the federal TA, there is an externality. The nature of the externality is this: DOD is able to pass the cost of the TA on to the governments of the states that charge an income tax.

10. California is typically considered a high-tax state. Its tax code, however, is highly progressive; many enlisted don't pay very high state tax rates relative to officers or even other enlisted in different taxed states.

11. To include the state tax advantage in the RMC, DOD would have to have a separate series of compensation tables for each taxable state—41 in all. Nonetheless, the state TA is a sizable amount of money for many servicemembers, and should be noted.

Going back to our stylized example, recall from Box 2 that each servicemember's federal plus state tax advantage, at a state tax rate of 5 percent, was $6,667—an additional $1,667 being due to the state tax. In our aggregation of the example to a national level, suppose a policy change caused the servicemembers' incomes to be taxed. DOD would have to pay servicemembers $26,667 so they would receive the same net pay of $20,000 as before. The defense budget would rise from $2 million to around $2.667 million. Yet federal revenues would rise to only $2.5 million. The other $0.167 million of additional taxes would go to the states rather than to DOD. Unless it could convince the states to share that revenue, DOD would have to ask national taxpayers to pay additional taxes to make up the difference, or else suffer a reduced force size because they had to reduce military incomes.

Thus, servicemembers would be indifferent only if DOD were able to get the other $0.167 million, either from the states or from national taxpayers. Otherwise, servicemembers would have to take a pay cut—their gross pay would rise, but by less than the total federal plus state tax advantage. As a result, the size of the force would likely fall, and both servicemembers and DOD would be less well off.

Consequently, servicemembers and DOD will prefer the tax advantage, while state residents and state lawmakers should prefer having the tax revenue from military personnel to giving them the tax advantage. Without the TA, state residents could have either lower state taxes or higher state services. National taxpayers and lawmakers, however, should prefer giving servicemembers the TA because with it they get a larger defense force while passing some of the costs on to states.

Note that the Federal Government compensates state and local government for some of the services they provide servicemembers stationed there. For example, DOD compensates local school districts—via the Department of Education—for attendance by military dependents. This strengthens the statement that amount of the state TA externality depends on the extent to which military personnel use unreimbursed state and local services.

Health care benefit comparisons

Military personnel have a relatively generous health care plan. Under TRICARE Prime, active duty servicemembers and their families receive essentially free medical care through a restricted list of providers. In contrast, civilian employees, most of whom receive employer-paid health benefits, nonetheless usually pay a portion of the insurance premiums and often additional copays and deductibles from the medical services themselves.

One could compare military and civilian health care plans in various ways. One way would be to compare costs of providing the benefits. Military health care, however, is provided largely through operations run by DOD, while civilian care is market based. Production costs can be very different, and they change over time in different ways [6, 7].

Another potential method, at least from an economic standpoint, would be to compare hypothetical "market prices" for comparable health plans for comparable demographics. This method can work to the extent that price is a measure of value rather than production costs. But health care prices are not easily measured and can vary by place and time for unseen reasons. Both the cost and price methods have been used in CNA and CBO analyses [4, 6, 7].

In this study, following our benefits-equal method of compensation comparisons, we look at what costs military personnel avoid paying by being part of the military health plan. Here we estimate the average amount a civilian worker would expect to pay, in terms of insurance premiums and out-of-pocket expenses, in order to receive roughly the amount of health care coverage of the average servicemember.[12]

12. Servicemembers pay essentially nothing out-of-pocket, so they probably obtain more medical care than comparable civilians do. We abstract from this by assuming that everyone receives the same amount. This will cause us to underestimate the full value of the military health care benefit and estimate what amounts to a "lower bound" value.

Background on DOD and civilian health care benefits

The purpose of this subsection is to discuss a variety of technical characteristics of the military and the typical civilian health care plans. Our original goal in this part of the study was to see if, and to what extent, there were qualitative differences between the two. The primary revelation was that there really is no evidence of differences in quality, other than the fact that, because their medical care is "free," servicemembers probably use more of it. Thus, we believe that the real value differences between them are captured by the out-of-pocket costs that civilians must pay.

The military health plan

The DOD health care benefit is administered through the TRICARE program. Beneficiaries typically choose from three options: Prime, Extra, and Standard. All active duty personnel are automatically enrolled in the TRICARE health maintenance organization (HMO) option, Prime; other DOD beneficiaries who are not eligible for Medicare coverage are eligible to enroll if Prime is available where they live. The Prime benefit is provided through military treatment facilities (MTFs)—DOD-operated hospitals and clinics—and networks of participating civilian medical providers. Active duty personnel and their family members pay no fee to enroll, whereas retirees and their dependents who enroll in Prime must pay an annual enrollment fee of either $230 for individual coverage or $460 for family coverage. Prime enrollees are given priority for care at MTFs [17].

Those beneficiaries who do not enroll in Prime can still seek care at MTFs on a space-available basis or can receive care from civilian providers and submit claims to TRICARE Extra or Standard, which will pay for a majority of their health care costs. The difference between Extra and Standard is that Extra is administered through a network of civilian providers with whom TRICARE has negotiated reduced payment rates. When beneficiaries use Extra network providers, they pay a smaller portion of total health care costs in the form of copays. A beneficiary need not enroll in order to use Extra or Standard. If a beneficiary has coverage from another source (for instance, from another employer), he or she can use Standard as a second payer. As

we stated earlier, all active duty servicemembers are enrolled in TRICARE Prime, as are almost all of their dependents. Because we are primarily focusing on the benefits provided to active duty members and their dependents, we will focus on TRICARE Prime in our analyses that follow.

Health insurance coverage offered to civilian workers

Despite double-digit increases in health insurance premiums over each of the past 5 years, group health insurance coverage continues to be one of the most common fringe benefits provided by private-sector employers. According to a Kaiser Family Foundation survey [18], 61 percent of all firms offered some form of group health insurance to their employees [19]. This percentage varied significantly by size of firm. Only 48 percent of the smallest firms (i.e., fewer than 10 employees) offered a health insurance benefit in 2006, whereas 87 percent of medium-sized firms with 25 to 49 employees and 98 percent of large firms with more than 200 employees offered this benefit. These numbers have fallen a little since 2000, indicating that the gains in health care coverage that were garnered during the 1990s, when the labor market was particularly tight, have eroded somewhat.

Among those firms that do not offer health insurance, the major reasons given for this decision are that (1) premiums are too high, (2) their employees typically have coverage from another source, and (3) they can attract employees of sufficient quality without offering health insurance.

Among those firms that do offer health insurance, plan cost is becoming an increasingly critical factor in the choice of which plan(s) to offer. In 1999 and 2001, 72 percent of all survey respondents indicated that plan cost was a very important factor in choosing which plans to offer. By 2003, 80 percent indicated that plan cost was very important. Other factors, such as accuracy and speed of claims payment and measurable employee satisfaction, have become less important since 1999. Such factors as accreditation status and Health Plan Employer Data and Information Set (HEDIS) performance scores of medical practitioners have never been indicated by employers as being very important when deciding on which plans to offer.

Group health insurance premiums in the private sector have been rising steadily for the past few years. These costs rose by 11 percent in 2004, and 9.2 percent in 2005, and 7.7 percent in 2006. Overall, there has been a cumulative increase of almost 86 percent since 2000. Compare this with a 18 percent increase in the U.S. price level, and about 50 percent increase in average wages. This high rate of inflation has been similar for most types of plans. In 2006, for example, HMO and POS premiums increased by about 8.6 percent, and Preferred Provider Organization (PPO) premiums had increased by about 7.3 percent. Conventional fee-for-service premiums rose by less than 5 percent. By 2006, these recent increases had led the average cost of a single coverage plan to be $4,242 and of a family plan to be $11,480.

Of these total premium costs, employees pay an average of about 16 percent for single coverage and 27 percent for family coverage. Looking at this by type of plan, we see that in 2006 the typical employee annual premium costs were as follows:

Type of plan	Single coverage	Family coverage
HMO	$590	$3,079
PPO	$637	$2,915
Conventional	$569	$2,247
POS	$634	$3,226

These are premium costs and do not include other costs that are paid out of pocket in the form of deductibles and copayments for care when it is actually received.

The comparisons

CNA has completed several studies that compare the DOD health care benefit with health care benefits provided to civilian workers, both public and private. In [17], CNA compared the DOD health care benefit with plans offered under the Federal Employee Health Benefit Program (FEHBP) and private-sector plans in terms of:

- Coverage of health care services
- Projected out-of-pocket costs when beneficiaries receive medical care

- Estimated market price of the benefits, for worker and retiree health care.

Concerning the health care plan design and projected out-of -pocket costs, CNA had three findings:

1. DOD offers plans to its active duty members and their dependents that require no premium payments. This is very different from the civilian world, including employees of the federal government.

2. Even before the passage of the 2001 National Defense Authorization Act (NDAA 2001), active duty personnel and their dependents faced significantly lower out-of-pocket expenses—including premiums—than their counterparts in the private sector.[13]

3. The total military health care benefit, which includes the value of the retiree health benefit, was priced at about 37 percent higher than what is provided to federal civilians and about 47 percent higher than that provided to private-sector workers. Note that the 2000 study was completed before the introduction of TRICARE For Life (TFL), which greatly enhanced the value of the retiree health care benefit.

In [4], CNA updated the results of the earlier study. The purpose of that study was to take into account the changes that had occurred in the private and federal sectors and the effects of NDAA 2001. In the first section, CNA provided a comprehensive comparison of the benefits provided to DOD beneficiaries through TRICARE with those medical benefits provided to federal civilian employees through the FEHBP program and to private-sector employees. The authors began with the qualitative description of the plans for such services as outpatient care, inpatient care, and prescription drugs. Because all health care plans offer a wide variety of benefits, often with a fairly bewildering array of costs, they then determined what the benefits meant to the plans' beneficiaries in terms of cost. To do this, they cal-

13. Since the passage of NDAA 2001, active duty personnel and their dependents who enroll in TRICARE Prime have faced virtually no out-of-pocket costs for care provided by either military or civilian providers.

culated the out-of-pocket cost to the beneficiary of a fixed set of health care services under TRICARE and FEHBP plans.

The results indicated that, if you were to include premium costs, the TRICARE plans offer richer overall coverage. Table 4 summarizes the results from that work. The first column provides average out-of-pocket costs (including premiums) for TRICARE Standard and FEHBP Blue Cross/Blue Shield (BCBS) standard option coverage for care from nonpreferred (or nonnetwork) providers. The second column compares results for TRICARE Extra with BCBS coverage care from preferred (or network) providers. The last column compares TRICARE Prime with coverage provided by the 28 most popular FEHBP HMO plans. For the DOD plans, we provide out-of-pocket estimates for the different plans offered to active duty dependents and retirees since coverage for these two groups of beneficiaries differs. The results are clearly in favor of DOD's TRICARE plans in terms of overall richness of coverage. Again, we point out that the results indicate that the average employee would be better off under the TRICARE plans than under the comparable FEHBP plans. Premium differences, rather than other out-of-pocket costs, constitute the biggest driver in this result.

Table 4. Comparing average total out-of-pocket costs of DOD beneficiaries and civilian federal employees (FEHBP)[a]

Sector	Option 1	Option 2	Option 3
DOD	Standard	Extra	Prime
Active duty and dependents	$399	$373	$0
Retirees	$438	$412	$334
Civilian FEHBP	Fee for service	PPO	HMO
	$2,132	$1,505	$1,077

a. Source: [17].

The value of the health care benefit to active duty personnel

We have shown that DOD offers a generous health care benefit to its beneficiaries, especially to its active duty servicemembers and their

dependents [4 and 17]. Here, we quantify the value of the health care benefit to active duty personnel in terms of the premiums and other out-of-pocket costs that they would have to pay in the private sector. We base our approach on the notion that active duty personnel and their families have access to free medical care through TRICARE's HMO option, Prime. They pay no premiums, and other out-of-pocket health care costs are virtually nonexistent. Most workers in the private sector, if they are offered a plan at all, must pay a share of the premium expenses for the plans they choose. Also, they usually have to pay for at least a small portion of their medical care costs themselves, due to the designs of their plans. Our approach has two steps.

First, we estimated the premium costs that military personnel avoid. To do this, we determined how much it would cost to buy each member an HMO plan in the private sector. The premium that the servicemember would have to pay depends on the likelihood of being offered a plan by an employer or of qualifying for public coverage. If offered employer-provided health insurance (EPHI), the servicemember would only have to pay an employee's share of the premium. If not, premium costs would include the total cost of the HMO plan. Those who would qualify for public coverage would pay nothing.

In the second step, we estimated the out-of-pocket costs that military personnel would expect to pay in the private sector using data on the out-of-pocket costs of civilian HMO enrollees as well as data on the demographics of the military personnel and their families.

Quantifying premium cost avoidance

In quantifying premium cost avoidance, we used data on full-time, full-year civilian workers from the 2006 CPS data to model the probability that a civilian worker would fall into each of the following two coverage categories as a function of age, gender, marital status, and educational attainment (enlisted or officer equivalent):

1. *Access to paid health coverage.* Workers belonged to this category if they held an EPHI plan, were covered by an EPHI plan held by a fellow family member, or lacked access to EPHI but were covered by a public plan (not including DOD or VA coverage).

2. *Family or single plan when covered*. Workers were classified as family plan if they were married or had children; otherwise, they were classified as single coverage.

We used the results of this model to project the probability that each servicemember in the personnel file would fall into each of these coverage categories. Figures 5 and 6 present the estimates for enlisted personnel and officers by years of service.

We see that, among junior enlisted personnel, there would be a significant probability—over 30 percent—that they would have no access to either EPHI or public coverage for the first few years of experience. The more senior the enlisted servicemembers, the more likely they would be to have access to EPHI in the civilian sector. This likelihood usually increases with age. Among the officers, however, even junior officers would have about a 75- to 80-percent chance of having access to EPHI or government coverage. This increases very rapidly with seniority for officers as well, reaching a maximum of nearly 90 percent after about 5 years of experience. The differences in projected coverage among officers and enlisted can be attributed to a large extent to the differences in educational attainment as well as differences in age; new officers tend to be slightly older than new enlisted personnel. Also, various forms of compensation tend to be highly correlated. We already saw that officers would earn more in wage and salary earnings in the private sector. It is no surprise that they also have better access to employer-paid health insurance.

Costs for health care are much higher for civilians who don't have paid health care. For example, according the Medical Expenditure Panel Survey of 2006 (MEPS), the average medical expenditure for people who have no insurance is over $4,000. Even for those who buy their own insurance, the average price for health insurance is $4,242 for single coverage, and $11,480 for family [18]. And that's an overall average price. It doesn't consider those who can't join a group plan or have an expensive prior condition.

Figure 6 shows, for all those civilians who are covered, the percentage covered by a family plan vice a single coverage plan. We see that both officers and enlisted have a low probability of needing a family plan in the early years of their careers. However, the probability quickly rises from around 24 to 50 percent by YOS 8 and to nearly 80 percent

Figure 5. Probability of paid coverage, either by employer, spouse's employer, or government by experience

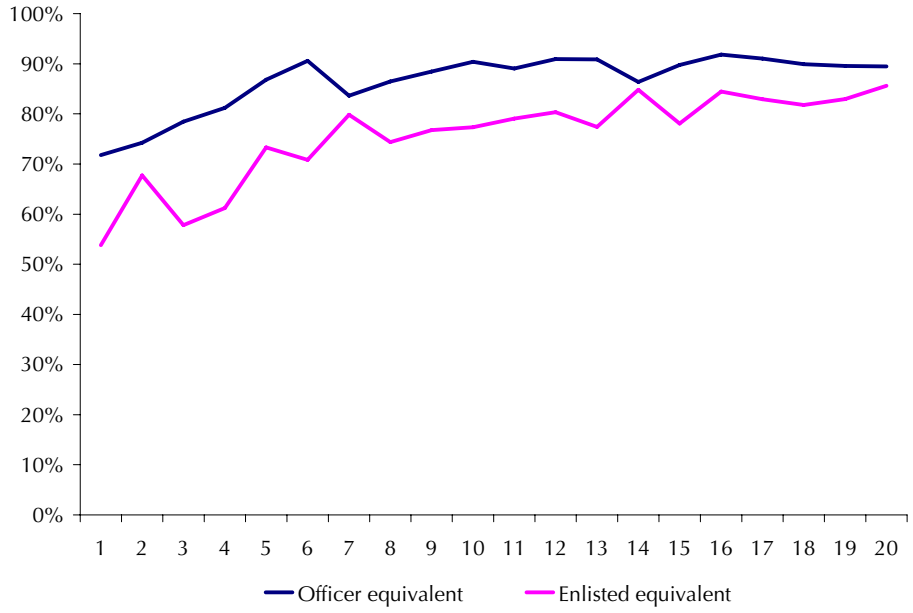
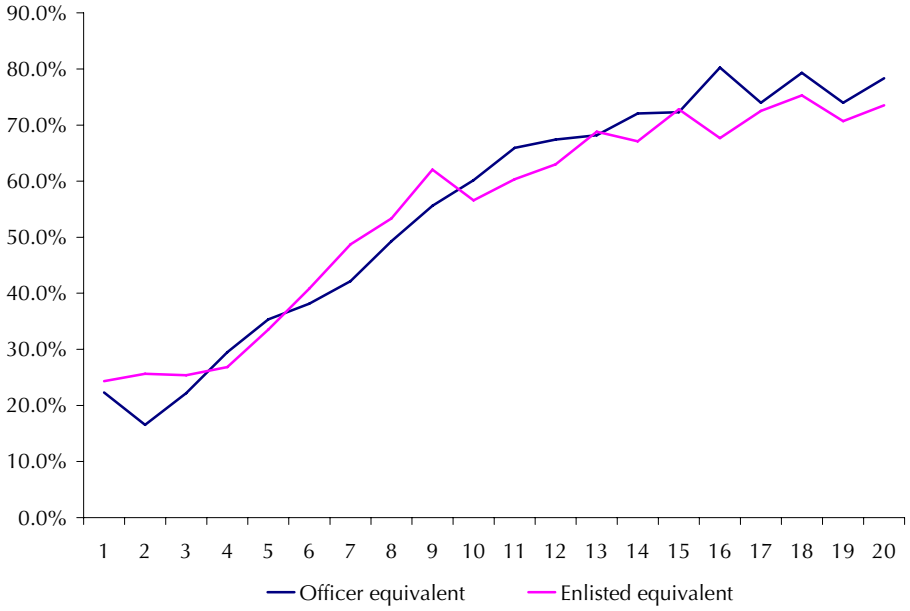


Figure 6. Probability of family coverage for officer and enlisted equivalent civilians by experience



by YOS 16 for officer equivalent civilians. For enlisted equivalent civilians, the range is from 24 percent to 50 percent by YOS 8, and rises to about 70 percent by YOS 15. Family plans are expensive—$11,480 annually compared with $4,242 for single coverage.

Using these estimates of probabilities of coverage and family status, we calculated an estimate of premium avoidance. First, we gathered HMO premium information for 2006 provided by the Kaiser Family Foundation [18].[14] In 2006, the average HMO plan offered by employers cost roughly $4,049 for single coverage and $11,278 for family coverage. Employees typically had to pay the following shares: $590 for individual coverage and $3,079 for family coverage.

The algorithm we use to estimate total out-of-pocket (OOP) costs, or what we term "premium-avoidance" (V), is:

$$V = \pi * (\textit{premium share} + \textit{other OOP}) + (1 - \pi) * (\textit{total premium cost} + \textit{other OOP})$$

where:

π	=	the probability of employer-paid health coverage
premium share	=	that average share of the group rate premium that those with employer-paid HMO coverage pay
total premium cost	=	the average price of an HMO plan.

"Other OOP" is the average amount of deductibles, coinsurances, and copayments for medical treatments that people pay under an HMO plan. We assume that everyone has these costs, whether they or their employer pays for the HMO plan.

To illustrate how we estimated premium avoidance for each person in the military personnel file, consider the following examples.

14. We use 2006 premium costs to be consistent with earlier sections of this report. Note that our civilian wage and salary earnings estimates were also reported in 2006 dollars.

Example 1

The first person is a servicemember with no dependents. We have estimated that, if he were working in the civilian sector, he would have a 78-percent chance of having access to EPHI, a 2-percent chance of having public coverage, and a 20-percent chance of having access to neither. Given our HMO premium data, we calculate that, if he had access to employer coverage, he could buy an HMO plan and would pay just the employee share of the premium, which is $590. If he did not have access to employer or public coverage, however, he would have to pay at least $4,49 for the HMO plan. If he had public coverage, he would be covered at no cost. On average, we would expect this single person to pay $1,270 for an HMO plan (premium = 0.78 x $590 + 0.20 x $4,049).

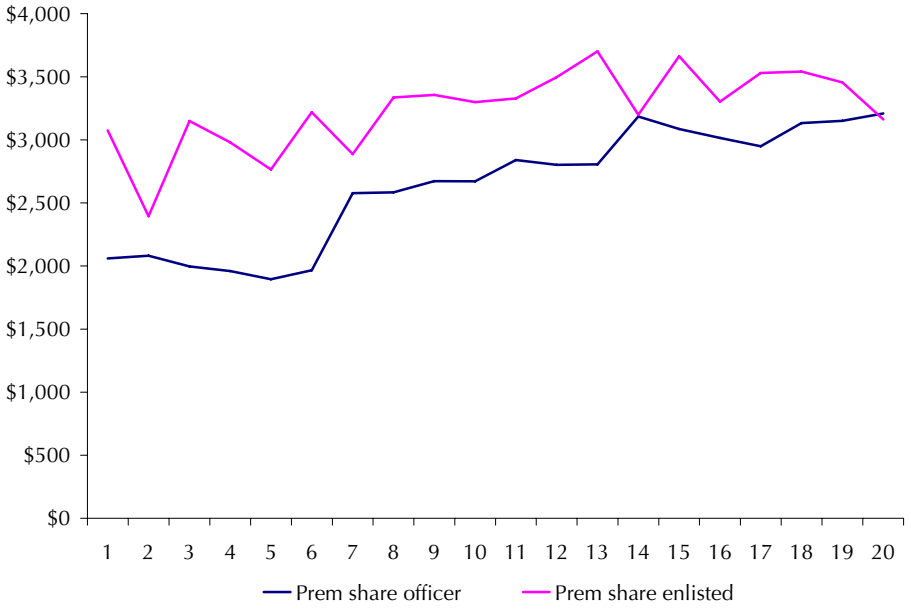
Example 2

The second person is a servicemember with dependents. We have estimated that, if he were working in the civilian sector, he would have a 78-percent chance of having access to employer-paid coverage, a 2-percent chance of having public coverage, and a 20-percent chance of having access to neither. Given our HMO premium data, we calculate that, if he had access to employer coverage, he could buy an HMO family plan and pay only the employee share of the premium, which is $3,079. If he did not have access to EPHI or public coverage, however, he would have to pay at least $11,278 for the HMO plan. If he had public coverage, he would be covered at no cost. On average, we would expect the person to pay $4,656 for a family HMO plan (premium = 0.78 x $3,079 + 0.20 x $11,278).

In figure 7, we present our estimates of average premium cost avoidance by years of service for officers and enlisted personnel. Among young enlisted, we estimate premium cost avoidance to be about $2,920 on average. Among the more senior enlisted (those with 8 or more YOS), the cost avoidance is only a little greater ($3,410) because while most of them have dependents and would have to buy expensive family plans in the civilian sector, the younger enlisted equivalent civilians are less likely to be covered by employers. Among junior officers, the estimated premium cost avoidance is roughly $2,070 to over $2,600. Among the more senior officers, the premium cost

avoidance is even greater, ranging from almost $2,600 to $3,200 annually, again because the senior officers are more likely to have family plans, while junior offices are *not* much less likely to be covered. Overall, the officers' premium cost avoidance is lower because officers would be more likely than their enlisted counterparts to have access to EPHI in the civilian sector, and less likely to have to buy a family plan.

Figure 7. The average premium costs that military personnel would have to pay out of pocket for an HMO plan in the private sector by YOS (2006 dollars)



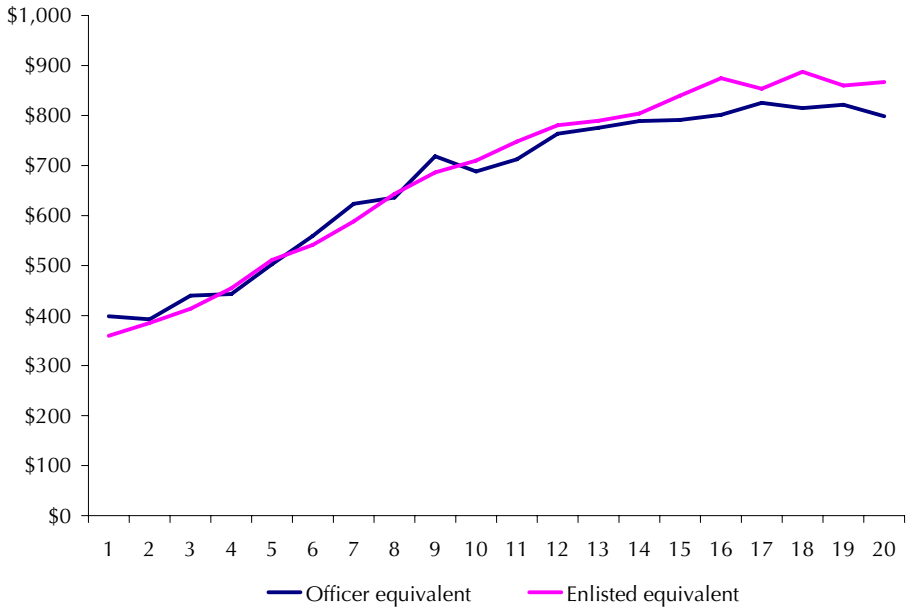
Out-of-pocket costs for civilian HMO enrollees

To this point, we have focused on the premiums that military personnel would have to pay for HMO plans similar to TRICARE Prime. Another big difference between the two is that, under Prime, active duty personnel and their dependents do not have to pay any other OOP costs for care received from network providers, whereas civilian HMO enrollees typically face at least some. Such OOP costs are deductibles (usually a fixed amount annually), coinsurance (usually

a percentage of the medical fees), and copayments (typically a fixed amount per visit or hospital stay). To estimate these, we used the 2006 MEPS annual report on people who were covered by their employers for the entire calendar year. In addition, we use the CPS data for marital status and number of children covered by their insurance.

We present our estimates of "other" out-of-pocket costs in figure 8. We see that the health care benefit not only saves the servicemember from significant premium payments when compared with the civilian sector but also saves him or her a significant amount in terms of OOP expenses for services consumed. These avoided OOP costs are especially significant for mid- and late-career military personnel. Both officers and enlisted with 10 years of service avoid an average of over $650 in OOP expenses.

Figure 8. Total "other" out-of-pocket expenses avoided by enlisted and officers, by YOS



Adding in the premium costs to estimate total OOP expenditure avoidance, an enlisted servicemember with 5 YOS avoids a total of just over $3,200 in premium and OOP costs, and one with 10 YOS avoids

a total of nearly $3,400 in such costs. An officer with 5 YOS avoids a total of $2,400 in premium and other OOP costs, while an officer with 10 YOS avoids almost $3,400 in total premium and OOP costs.

Military health care as "cost of business"

There is an ongoing debate among DOD researchers about whether, and to what extent, military medical care is a "cost of doing business" rather than a compensation benefit to servicemembers. I've been asked in this study to comment on that, and speculate about its impact on our benefits-equal estimates. There are really two issues here. The first is the concept the cost is not equal to value. The second is that our BE estimates include only the medical care about which we are certain servicemembers value as a benefit. We address both issues here.

Cost not equal value redux

Suppose, in the most dramatic case, that servicemembers place a zero dollar value on the medical care that is needed to repair combat wounds or to maintain a fit and healthy force. In other words, whether DOD spent one dollar or $10,000 per person on combat medical care, it would have no effect on recruitment or retention and servicemembers would not consider this as part of their compensation.

Nonetheless, if we were using DOD health care costs to estimate the compensation benefit, these costs would include both the value of the medical benefit AND the cost of combat related medical care, and would overestimate the value of the health benefit to servicemembers. This is a good illustration of how estimates of cost do not equal estimates of value.

Values included in the BE comparisons

The second issue is the question of which "values" we include in the health care part of our BE estimates. To make this clear, it is the difference between what military and civilian personnel must pay out of pocket for the amount of medical care that CIVILIANS receive.

To be sure, it is likely that military personnel receive more medical care than comparable civilians. This is partly because the risk of injury and sickness is higher in the military, both in and out of combat. This is what renders much of its medical care a "cost of military business." Also, servicemembers probably use more medical care because they pay no out-of-pocket fees for their medical treatments, making the effective price of medical care far less than it is for most civilians. We don't estimate how much more medical care servicemembers use; but economic theory suggests that they would use more. Additionally, servicemembers would place some value on this additional medical care, perhaps not a value that is equal to its cost, but some positive value, nonetheless.

However, our BE estimates don't include either the cost or value of the additional medical care servicemembers receive due to the risk of military life or because their medical care is free. We include only the medical care that the average civilian receives and ostensibly value, and which servicemembers would likely demand if they were to be civilians.

Effect on benefits-equal calculations

We don't think that DOD's "cost-of-doing-business" factors into our benefits-equal calculations. This is because our estimates don't rely on DOD cost estimates, nor do they consider the additional medical care military people probably receive that civilians don't.

Total addition to military compensation due to health care cost avoidance

In the final analysis, civilians in similar demographics as military personnel can expect to pay at least a portion of their health insurance premiums and some other out-of-pocket expenses. Military personnel do not, and this cost avoidance should be considered part of their compensation package. As we show in figure 9, the amount ranges from about $2,800 to over $4,300 for enlisted. Officers avoid costs of about $2,400 to $4,000. We continue our benefits-equal analysis by adding these amounts as a layer to each of the earnings profile charts for officers and enlisted personnel (figures 10 and 11).

Figure 9. Total out-of-pocket costs for officer and enlisted-equivalent civilians by experience

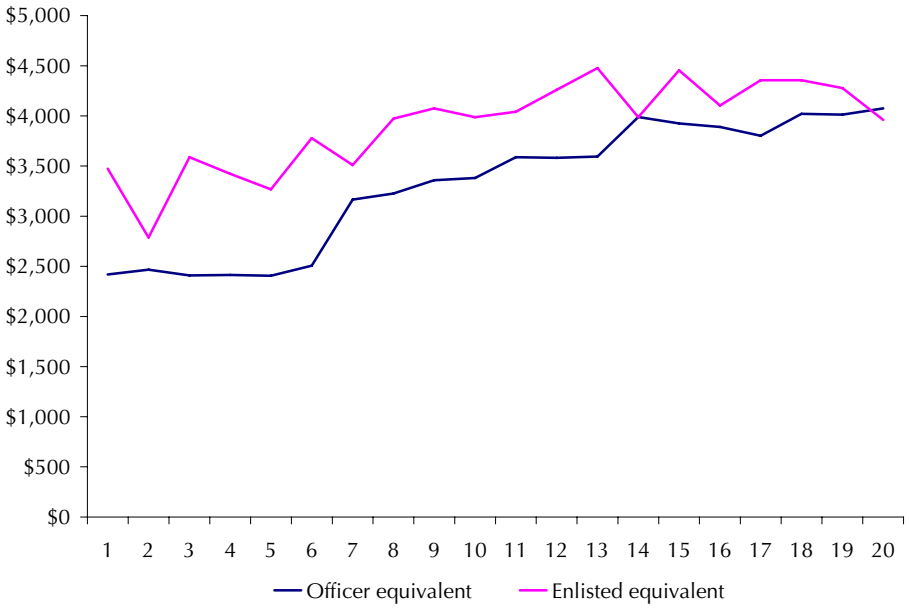


Figure 10. RMC + FICA and state TA + health care cost avoidance—enlisted

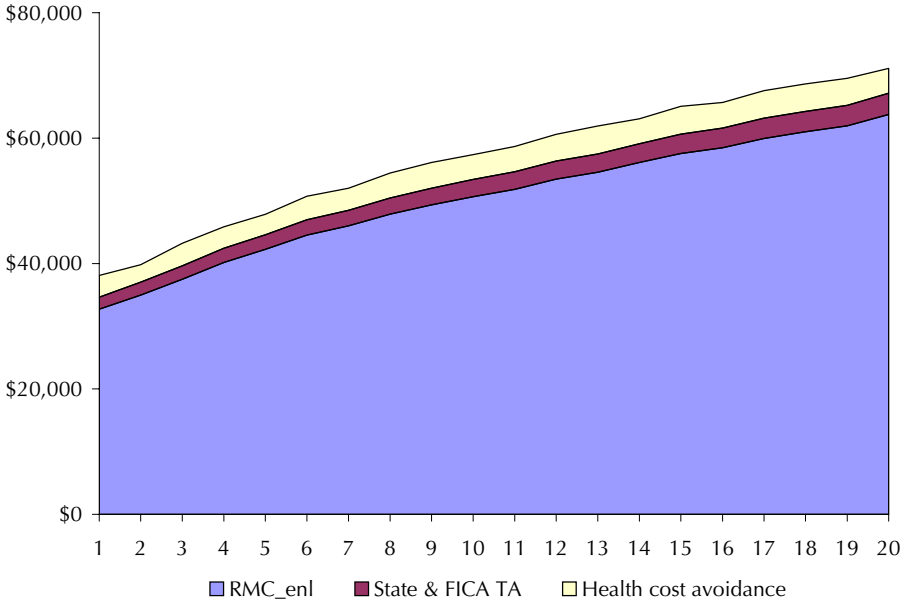
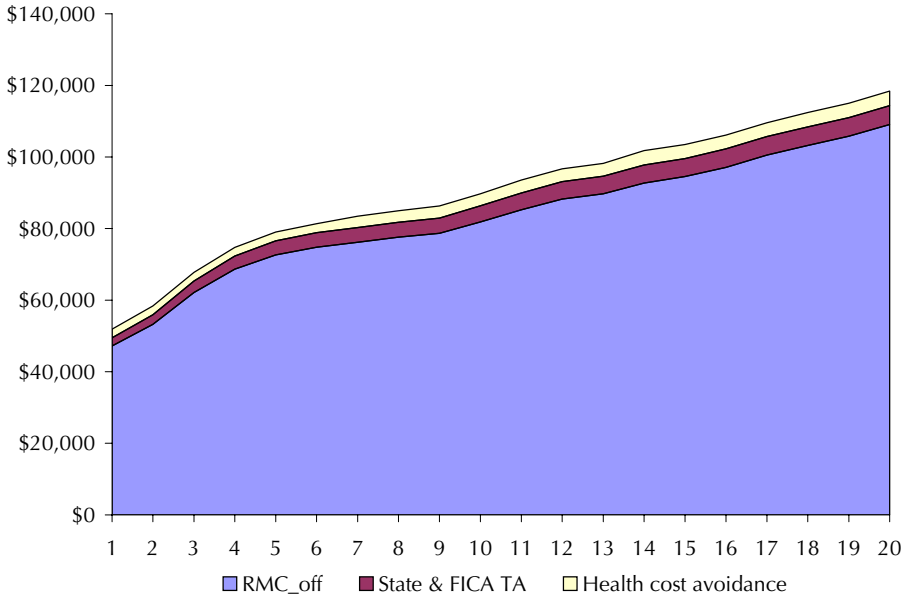


Figure 11. RMC + FICA and state TA + health care cost avoidance—officers



The reason enlisted have higher expected premiums and other out-of-pocket expenses than civilians is that they're less likely than college-educated civilians to be covered by employer-paid health insurance on the outside. They are also more likely to have families in later years and thus require family insurance plans, which are expensive.

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Retirement benefit comparisons

The military retirement is unusual compared with typical civilian plans in two important ways. First, it is almost completely a defined-benefit plan, when most civilian employers are trending toward defined-contribution plans. Second, servicemembers are not vested in the plan until the moment they are eligible to retire at 20 YOS. This compares with civilian defined-benefit plans in which employees are typically vested within 5 years of employment. The result is that the value of the military plan is a function not only of the servicemember's income but also of the probability that he or she will stay in the service long enough to become eligible, at any given year of service.

The annual value of the military retirement plan is the discounted value of the expected accrual amount needed to accumulate the lump-sum present value of the retirement annuity. This lump-sum present value is then discounted by a personal discount rate, whereas DOD would discount it by an interest rate. The accrual is an amount that would be necessary to accumulate that lump sum. The expected accrual amount is calculated using the matrix of probabilities by YOS that servicemembers will stay for the entire 20 years necessary to become eligible for retirement.

We take a moment here to reemphasize that our purpose is to estimate the *value* of the military retirement, reiterating that cost and value are not the same. For example, DOD knows that, for each servicemember who retires, it must have some amount of money in a metaphorical pot from which it can pay the retirement annuity. This pot of money is called a lump-sum present value of the retirement annuity. Present value in this case is calculated by discounting each of the annual payments by some interest rate. Servicemembers will discount future payments by an amount that is equal to the interest rate plus an amount that indicates their preference for current dollars over future dollars. The discount rate that servicemembers use is called their *personal discount rate*.

DOD must then accumulate that lump sum by accruing some percentage from each servicemember's pay. Again, though, DOD knows that it can earn the interest rate from these accruals. Servicemembers, knowing that the retirement is not available to them until far into the future, discount the accruals by their personal discount rate.

Civilians also discount their retirement benefits by a personal discount rate. What we estimate here is the difference in the annual discounted value of the military and civilian retirement packages.

The military retirement benefit in brief

An active duty member's potential retirement benefit is to an extent determined by when he or she entered the military. There are currently three possible systems:

1. For those who entered active duty before 1980, the person who retired with 20 YOS received an immediate annuity of 50 percent of his or her Basic Pay as of the time of retirement. If he or she stays beyond 20 years, the annuity increases by 2.5 percent of Basic Pay per year up to year 30. Thus, an active duty member retiring after 30 years would receive an immediate annuity worth 75 percent of Basic Pay at time of retirement. We estimate that less than 1 percent of the military fall in this category.
2. For those who entered active duty between 1980 and 1986, the benefit is similar to the one just described. The only real difference is that retirement pay is based on the highest average Basic Pay for 36 months of a servicemember's career (typically the last 3 years before retirement). Otherwise, the rules are the same. This is known as the High-3 retirement plan. We estimate that about 5 percent of servicemembers are in this category.
3. Those who entered active duty after 1986 have one additional choice. When they are in their 15th YOS, these active duty members can choose between taking the standard High-3 plan or taking a $30,000 bonus and joining what is known as the Redux retirement plan. Under Redux, the servicemember who retires with 20 YOS receives an immediate annuity of 40 percent of the highest average Basic Pay for 3 years of his or her

career (again, typically the last 3 years). If he or she stays beyond 20 years, this annuity increases by 3.5 percent of the High-3 per year up to year 30. Thus, an active duty member choosing the Redux plan would receive the same percentage of High-3 basic pay for his or her annuity as one choosing the High-3 plan if they both stayed in the military for 30 years. Under Redux, however, the annual Cost of Living Adjustments (COLAs) are not as high as the traditional High-3 plan. Consequently, while the servicemember will receive the same annuity in the first year of retirement, he or she will receive less for some years afterwards. (See [20] for a thorough discussion of the relative values of the standard High-3 and the Redux retirement plans.)[15]

A distinctive and controversial feature of the military retirement system is that active duty members who leave the military before they reach 20 years receive no retirement benefits whatsoever from DOD. This type of "cliff" vesting is not legal in the private sector. The Employee Retirement Income Security Act of 1974 (Public Law 93-406, 88 Stat. 829, September 2, 1974), commonly known as ERISA, does not require that employers offer retirement benefits, but it does require that those who offer retirement benefits vest their employees to 80 percent within 5 years and to 100 percent at 7 years of tenure, depending on whether the vesting is cliff vesting or graduated vesting. Although this legislation does not apply to DOD, military personnel who separate after they have served 20 years receive a lucrative retirement benefit and begin to receive it at a young age—in some cases in their late thirties or early forties.[16]

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15. Recent changes in the law now allow some servicemembers who serve past 30 years to continue increasing their retirement by 2.5 percentage points yearly. What this means is that one who serves exactly 40 years will receive 100 percent of his or her High-3 average Basic Pay. If he or she continues to 41 years, he or she will receive 102.5 percent of High-3.

16. The average enlisted person is eligible to retire at age 40 and would expect to collect retirement payments for 38 years if he or she were to retire then. For officers, the average age of retirement eligibility is 42 with an expectation of payments for 36 years [20].

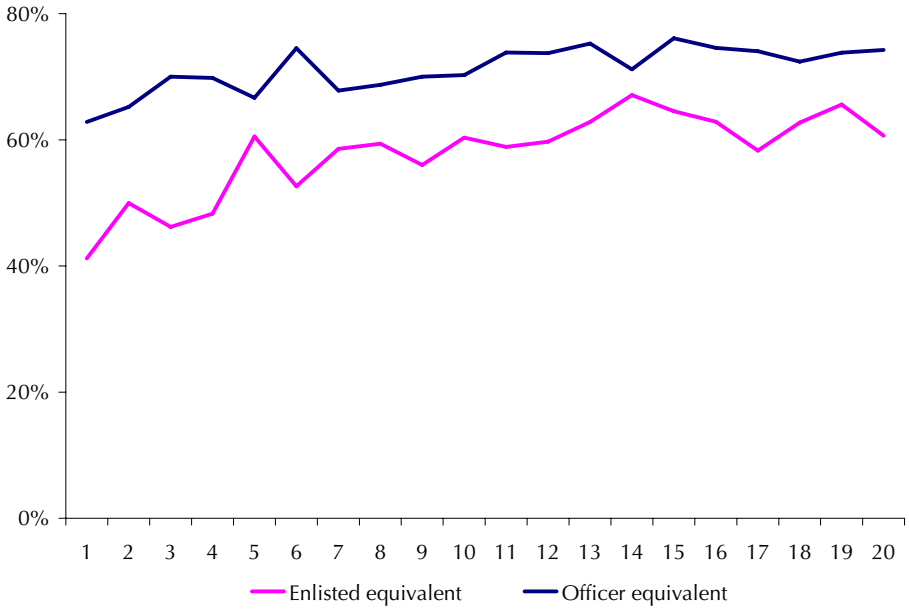
In addition to the defined-benefit retirement system just described, active duty members also have access to Thrift Savings Plans (TSPs) similar to those offered to federal employees. These plans resemble 401(k) plans that are common in the private sector. The biggest difference of the TSP benefit provided to active duty members is that DOD does not match any TSP contributions. Thus, the benefit to the servicemember is that he or she is able to contribute more money into a tax-deferred retirement plan (the TSP) than he or she would otherwise be allowed to contribute annually into a typical individual retirement account (IRA).

Retirement benefits in the private sector

According to the Bureau of Labor Statistics (BLS) [21], 61 percent of all workers had access to a retirement plan in 2006, 21 percent had access to a defined-benefit plan, and 55 percent had access to a defined-contribution plan.[17] Access to plans varied by characteristics of the workers and the establishments in which they worked. For instance, white-collar workers are more likely to be offered retirement benefits (76 percent) than are blue-collar (65 percent) and service workers (36 percent). Also, workers who earn more are more likely to be offered retirement plans. Finally, workers in larger establishments are more likely (78 percent) than those in smaller establishments (45 percent) to be offered retirement plans. See figure 12 for an exposition of a career wide probabilities that an officer equivalent or enlisted equivalent worker will have an employer-paid pension plan. Here we see that more highly education workers are more likely to have a paid plan throughout their career.

17. A *defined-benefit* plan is one in which an employer promises a pension of some type to the employee and invests in financial markets to pay for that. In a *defined-contribution* plan, such as a 401(k) or a 403(b), the employer gives some amount of money to the employee (often tied to an employee match), who invests in financial markets toward his or her own retirement fund. The primary differences are twofold. First, market risk is largely absorbed by the employer in a defined-benefit plan, while the risk is on the employee with a defined-contribution plan. Second, ownership in the defined-contribution plan is typically given fully to the employee quickly or even immediately. Often, an employer owns a defined-benefit plan, at least partially, for some number of years.

Figure 12. Probability of a civilian worker having employer paid retirement plan



An important trend in private-sector retirement benefits is the move from defined-benefit plans (such as DOD's) to defined-contribution plans. Since 1986, the number of defined-benefit plans has steadily declined from 173,000 to 56,405 in 1998. In contrast, the number of defined-contribution plans has increased steadily from the mid-1970s through the late 1990s to a grand total of 673,626 plans. By 1998, defined-contribution plans made up 92 percent of all retirement plans offered in the private sector [22, 23]. The most common types of defined-contribution plans are profit sharing and thrift savings plans. Among these types of plans, 401(k) plans are the most common, numbering over 320,000 in 2000. When one includes plans with 403b and 457 arrangements, which are similar to 401(k) plans, these make up 97 percent of all defined-contribution plans offered by large and medium-sized firms [24].

Defined-benefit plans

As we stated earlier, roughly 21 percent of all private-sector workers are offered a defined-benefit plan. Most firms (80 percent) that offer

such plans vest their workers at 5 YOS, and 20 percent of these firms require some employee contribution to the plan [24]. A typical worker retiring at age 60 or 61 with roughly 25 years of tenure on the job and an annual salary of $45,000 would expect his or her pension annuity to cover roughly one-third of his or her final salary.

Defined-contribution plans

Many more employees have access to defined-contribution plans. Employers contribute funds into almost all of these plans. According to Watson Wyatt Worldwide, 60 percent of firms that offer defined-contribution plans provide matching contributions, typically based on contributions made by employees into their own plans. For instance, an employer might match an employee's contribution dollar for dollar in a one-to-one match. There are often limits on matching contributions. For instance, a firm may match an employee's contributions on a one-to-one basis up to a limit of 5 percent of earnings. While the majority of firms provide only matching contributions, 8 percent of firms provide only nonmatching contributions, and 30 percent provide both matching and nonmatching contributions. Only 2 percent of the firms provide no contributions at all to these plans. The typical defined-contribution plan has employers contributing from 3 to 5 percent of earnings, and employees becoming vested within a year of being hired.

The funds in defined-contribution plan accounts can be invested in several different types of assets, including equity funds, bond funds, balanced funds (bonds plus equities), own-company stock, money funds, and guaranteed investment contracts. According to EBRI, the funds in all 401(k) plans in 2000 were distributed as follows:

- 48 percent in equity funds
- 10 percent in bond funds
- 11 percent in balanced funds
- 13 percent in own-company stock
- 4 percent in money funds
- 13 percent in guaranteed investment contracts [23].

The average 401(k) plan account balance in 2006 was roughly $121,200. As table 5 also shows, 401(k) account balances have grown since 2000, in all age groups. Workers who are at or near retirement age and who have longer tenures with their employers tend to have the largest 401(k) account balances with their present employers. Those in their sixties tended to have account balances roughly $157,800. Employees in their fifties with tenures of longer than 20 years tended to have account balances of a little over $190,000.

Table 5. Average 401(k) account balances by age group in 2000 and 2006[a]

	Average 401(k) account balance (2006$)	
Age group	2000	2006
20s	$5,986	$28,248
30	$23,904	$61,368
40s	$61,715	$108,262
50s	$99,006	$148,927
60s	$141,723	$157,727
Overall	$81,557	$121,202

a. Source: EBRI Issue Brief Number 308 (August 2007).

But while the information in table 5 reveals how use of 401Ks have increased since 2000, this study is about employer contributions to 401Ks, since that is part of compensation. In table 6, we show how 401(k) accounts grow larger where saving of employer contributions begins earlier in a person's career. For example, an average enlisted equivalent civilian who begins receiving employer contributions of 3.3 percent of income at 21 can expect to receive and accumulation of about $78,000 to $118,000 by age 60 depending on whether the average rate of return on his or her investments were 3, 4, or 5 percent annually. But, if he or she did not begin saving until age 35, he or she would be instead expected to accumulate only $47,000 to $61,000 by age 60.

Note that in the tables we assume that the employer contributions amount to 3.3 percent of total earnings for those who are offered a

plan, which is the national average employer contribution according to [24]. In table 6, we present results given various assumptions on real rates of return and the age at which workers join the civilian labor force. The accumulated balances at retirement age increase with education level because both earnings and the likelihood of retirement plan participation increase with education.

Table 6. Projected retirement account balances (in thousands of dollars) at age 60 by education level including only employer contributions of 3.3 percent of cash income

Age entering civilian market	Real rate of return on 401(k)		
	3%	4%	5%
Enlisted equivalent			
21	$78.0	$95.6	$118.2
25	$72.3	$87.5	$106.6
30	$58.9	$69.2	$81.6
35	$46.8	$53.4	$61.1
Officer equivalent			
23	$130.6	$158.5	$193.8
27	$118.9	$142.0	$170.6
32	$100.7	$117.4	$137.5
37	$80.1	$91.0	$103.7

So, what should we take away from these results? One question concerns active duty members who leave the military before reaching the 20-year point. How much would they have lost in retirement benefits that would have accrued in the private sector? An enlisted servicemember who leaves the military after 5 years could potentially lose 7.8 to 10.9 percent of the total value of his or her employers' total contribution toward retirement, depending on his or her level of education and assumptions on the real rate of return.[18] An enlisted person who

18. We include only the lost retirement income from employer contributions because active duty members currently are offered a thrift savings plan option, though with no contribution from DOD. They can still contribute earnings on their own in the same way they would in a private-sector 401(k) plan. So, all they are forgoing are the matching contributions they would expect to receive from a civilian employer.

leaves the military after 10 years could potentially lose between 32 and 44 percent of potential 401K accumulated savings.

For officers, those who leave the military after 5 years could expect to lose 9.9 to 13.6 percent of the total value of an employer's potential contributions toward retirement. Officers who leave after 10 years could expect to lose 30 to 40 percent. Officers on active duty who retire after 20 years, in addition to their military retirement, should still be able to accumulate roughly $58,900 to $71,000 of their civilian employer contributions toward retirement by the time they reach age 60 at these savings rates.

Estimating the value of the retirement plan

Here we estimate the expected annual value of the military and civilian retirement plans and add the difference in their values to our layer analysis. This calculation has three complicating factors.

First, because retirement is a deferred benefit, one must consider how the benefit is discounted. Each person has his or her own personal discount rate, which may vary over time and with changes in personal characteristics, such as education. We looked at more than one personal discount rate, and we discuss those in the next subsection. However, in the final analysis, we used 10.5 percent for officers and 12.5 percent for enlisted.

Second, servicemembers and civilians receive different types of retirement plans. As discussed earlier, the military plan is a defined-benefit plan, in which a servicemember is not vested until he or she serves 20 years. As a result, when we estimate the annual value of the military retirement plan, we must consider the probability that a given servicemember will stay long enough to become eligible for it. We used continuation rates from the DMDC data on military personnel to estimate an expectation that a servicemember will reach 20 YOS given his or her current YOS. Discounting and changing probabilities of eligibility imply that servicemembers will give the retirement plan relatively little value in their early years and much greater value in later years of their careers.

Conversely, most civilians who are offered paid retirement receive a defined-contribution plan, which the employer pays into a fund that is owned by the employee. Even those who receive a defined-contribution plan are vested, by law, very early in their careers—usually after just a few years. In these cases, civilians actually "own" their retirement benefit to some extent throughout much of their careers. Consequently, we choose to assume probability equals 1 that they will receive the retirement benefit.[19]

We define the annual value of the retirement plan as the expected discounted annual set-aside needed to accrue the lump-sum present value of the retirement annuity. This method considers the probability that a servicemember will become eligible for the retirement program and the fact that the servicemember discounts money to be received in the future (see the appendix for details on calculating the value of the retirement plan). It's the "value" of the plan in the sense that it is the amount of money the employer (either military or civilian) is expected to "give" the servicemember that year, and for which he or she is indifferent to receiving that and receiving cash.

Our method has three steps:

1. Estimate a lump-sum present value of the sum of retirement annuity payments at the year of retirement, given how long the employee is expected to live after retirement.
2. Calculate how much money must be set aside each year, as a proportion of his or her income in order to accumulate that amount at expected rates of return, expected levels of income, and expected probability of remaining in the service long enough to become eligible for retirement.
3. For servicemembers, we discount the set-aside amount by the personal discount rate of 10.5 percent for officers and officer equivalent civilians, and 12.5 percent for enlisted and enlisted equivalent civilians.

19. As an exercise, we calculated the value of the military retirement package under an assumption that probability was equal to 1 after the first 5 years. The value changed only a little, suggesting that discounting dominates the retirement value algorithm.

A discussion of the justifications and implications of using these discount rates is in the next section. A detailed description of our methodology and the specific algorithms we used to estimate the retirement benefit is in our technical appendix.

Justifying our personal discount rate assumptions

In this study, we used a 10.5-percent discount rate for officers (and equivalent civilians) and 12.5 percent for enlisted (and equivalent civilians) in calculating value of the military retirement plan and the civilian's defined-benefit plans. We also assumed that the value of the defined-contribution portion of the civilian plans is the same as cash. We justify our assumptions in this subsection.

There have been many attempts over the years to estimate a personal discount rate. For example, there are experiments with real money, such as the Denmark Experiment by Harrison, Lau, and Williams in 2002 [25], which found average discount rates of around 28 percent. The authors of this study postulated that small money amounts and students' perceptions that there was a high risk of default by the experimenters could have elicited a high interest rate requirement to take the delayed payments.

There are natural experiments, such as the study of the military drawdown [16]. Many servicemembers were offered monetary incentives to leave the service. Those who took it were offered either a lump sum or one of two annuity packages. Using the choices of the servicemembers, the authors estimated average discount rates of 10.4 to 18.7 percent for officers and 35.5 to 53.6 percent for enlisted, depending on which statistical model was used. These are remarkably high rates, especially among the enlisted personnel. The authors attribute demographic characteristics, such as youth, low education, and small family size for about half the difference between officers and enlisted. We postulate also that the prospect of unemployment among the servicemembers could have created the perception they will become a high credit risk, at least temporarily, and thus many of them were attracted to the lump-sums that were offered.

Findings by Quester and Shuford in a study of servicemember's choice of the standard High-3 retirement plan or the Redux cash bonus retirement plan suggest that those estimates of discount rates

are quite high [20]. These authors estimate that, if servicemembers did have an 18-percent discount rate, we would expect a Redux plan take rate of 90 percent or more. Since only about 60 percent took the Redux bonus, this suggests a much lower discount rate. In addition, after reference [20] was published, Redux bonus take rates fell, probably as a result of the information provided by the study. This further confirms personal discount rates with respect to the retirement program something lower than 18 percent.

Finally, we look at a 1984 survey of servicemembers by Black [26], who asked about members' preferences in receiving retirement pay—either a lump-sum cash amount or one of several annuity types, from a short multi-year, to a long multi-year, to a lifetime annuity. The servicemembers claimed preferences that would imply average discount rates of 10.5 for officers and 12.5 for enlisted.

We use the lower rates for the following reasons. We think that people have a lower discount rate with respect to their retirement programs. As we've seen, the Black experiment suggests this. Also, the fact that people keep balances in their 401(k)s and 403(b)s also suggests this. The big advantage of a 401(k) and / or 403(b) benefit is the tax advantage that accrues because the gains received are tax deferred. This is equivalent to receiving a higher interest rate on the funds in the account. For example, if a person has a marginal tax rate of 33 percent and receives an average return on his or her 401(k) of 5 percent, it is equivalent to receiving a 7.5-percent rate of return. In this sense, the value of the funds is greater than cash. To receive this tax advantage, however, the owner of the funds must keep the money in the account. Thus, the funds are discounted by a personal discount rate. We've estimated that the tax advantage is equivalent to cash at quite a low discount rate—a rate approximately equal to the expected rate of return. However, coupled with the ability to withdraw at anytime with only a small penalty, and with the expectation of low tax rates after retirement, the value of the 401K will be reasonably close to cash.

Results and implications of our assumptions

Does using discount rates of 10.5 and 12.5 percent cause us to overestimate or underestimate the value of the military retirement benefit? If servicemembers have a higher discount rate, the values we estimate of the deferred retirement benefit are high. We can see this in figures 13 and 14.

Figure 13. Illustrative graphics of notional annual values of military retirement plans at personal discount rates of 10.5 for officers and 12.5 percent for enlisted

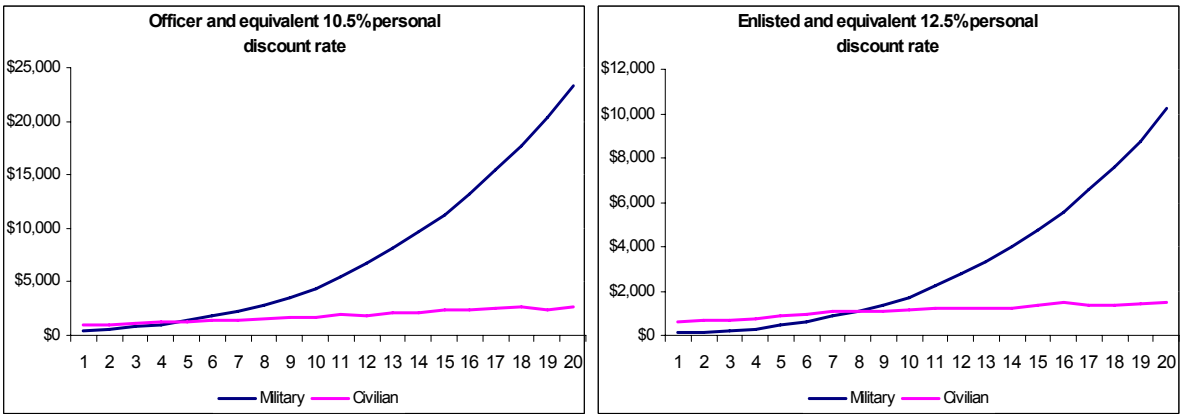


Figure 14. Illustrative graphics of notional annual -values of military retirement plans at personal discount rates of 15 for officers and 18 percent for enlisted

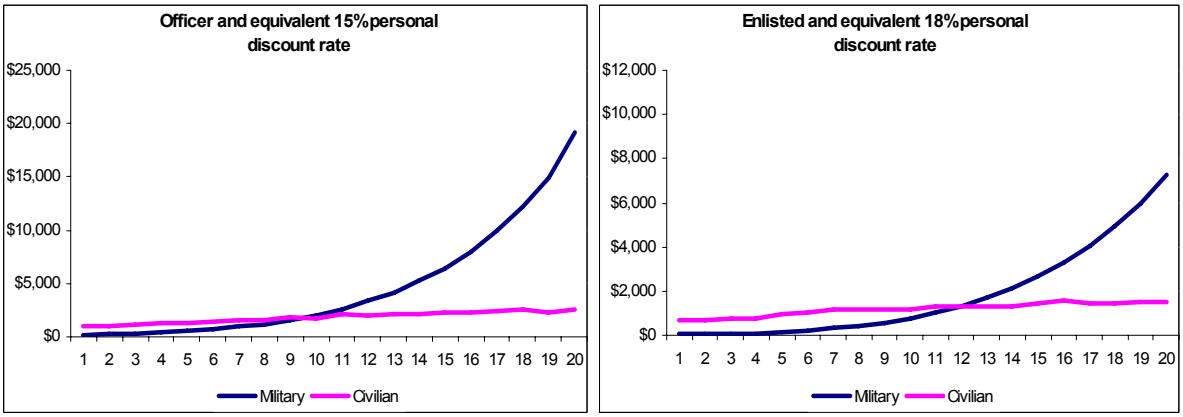


Figure 13 shows that, at a discount rate of 10.5 percent, the retirement package for officers is roughly $200 to $500 *less* than for civilian-equivalent personnel for the first 4 years. The annual value of the military retirement begins to rise slowly for a few years and then takes off, until it is worth over $20,600 *more* at year 20. The retirement for enlisted personnel, discounted at 12.5 percent, is valued from $200 to $500 *less* than the civilian equivalent through the first 7 YOS, and then grows to nearly $8,800 *more* at year 20.

When the discount rate is increased to 15 percent for officers and 18 percent for enlisted, however (see figure 14), we see that the relative value of the military retirement plan falls quite a lot. For the first 9 years, the officers' plan is valued between roughly $900 to $300 *less* than the civilian plan, before the value grows to just $16,500 *more* in YOS 20. For enlisted, the plan is valued between $640 to $260 *less* than the civilian plan for *11 years*, and then grows to just over $5,700 *more* in YOS 20. The reason is that, most of the civilian plan is made up of employer contributions to a 401(k) or 403(b), which is valued nearly as cash, whereas the military plan is totally deferred until YOS 20 and then is paid as a lifetime annuity. Consequently, the military plan is heavily discounted for the first half of each servicemember's career.

Based on our review of the research on personal discount rates, we have concluded that there is much uncertainty surrounding the estimation of such rates. However, the literature suggests that people apply smaller discount rates on retirement savings than they do for high-risk decisions inherent to experimental games or severance packages. Because we place greater weight on the research pertaining to savings for retirement, we think our assumptions of 10.5 percent for officers and 12.5 percent for enlisted are reasonable.

The military services have calculated that they must set aside approximately 27 percent of each servicemember’s Basic Pay for the retirement plan. It is entirely appropriate for the military to set aside a constant proportion of a member’s income each year since it is saving for the total number of future retirees, not individual members.

But this constant annual proportion of income, while a good measure of current “cost” to the military, is not a good measure of “value” to the servicemembers. It doesn’t take into account the changing probability that an individual servicemember will become eligible for military retirement, nor does it consider the fact that people value current money more highly than future money.

The civilian’s retirement plan

About 61 percent of all civilian workers (and roughly 70 percent of college graduates) receive an employer-sponsored retirement plan. Of those, about 78 percent receive a defined-contribution retirement

plan from their employers, and one-third of civilians receive a defined-benefit plan. The average size of the total accumulated employer contributions for the typical college graduate who begins working at age 23, and whose defined-contribution plan earns an average annual rate of interest of 5 percent, is roughly $192,800 (see table 6). For the average civilian worker with some college, who begins work at age 21, that amount is around $118,200. We will use these numbers to make conservative comparisons of civilian and military retirement plans.

The typical defined-benefits plan provides about one-third of the worker's salary, beginning at age 65. If the average person who reaches age 65 lives another 15 years [27], the undiscounted lump sum value of the benefit at the year of retirement is roughly $300,000 for enlisted equivalent workers and about $450,000 for officer equivalent workers. However, when that amount is discounted over the many years before they are eligible to receive the benefit, the annualized value is only about $400 to $1,000 for officer equivalent, and $250 to $580 for enlisted equivalent civilians.

The value of the plan at any given year before retirement is the amount that the employer would have to contribute in that year, which, like its military counterpart, is a portion of the worker's salary. Unlike the military's plan, however, we assume that the civilian set-aside itself is a constant portion of his or her salary since the probability of becoming eligible to receive the pension is 1.[20]

The results

The military retirement differential is the difference between the expected discounted set-aside amounts for the military and civilian retirement plans. Because of the low probabilities of servicemembers reaching 20 years in their early years, and the high probabilities of that in their later years, we expect the differential to be very low at the beginning of a servicemember's career and very high near the end (see figures 15 and 16).

20. Although we don't address the issue here, it is likely the case that, because of job changes and employer incentives, the proportion of income set aside for retirement changes from time to time over the worker's career.

Figure 15. Enlisted and equivalent civilian retirement

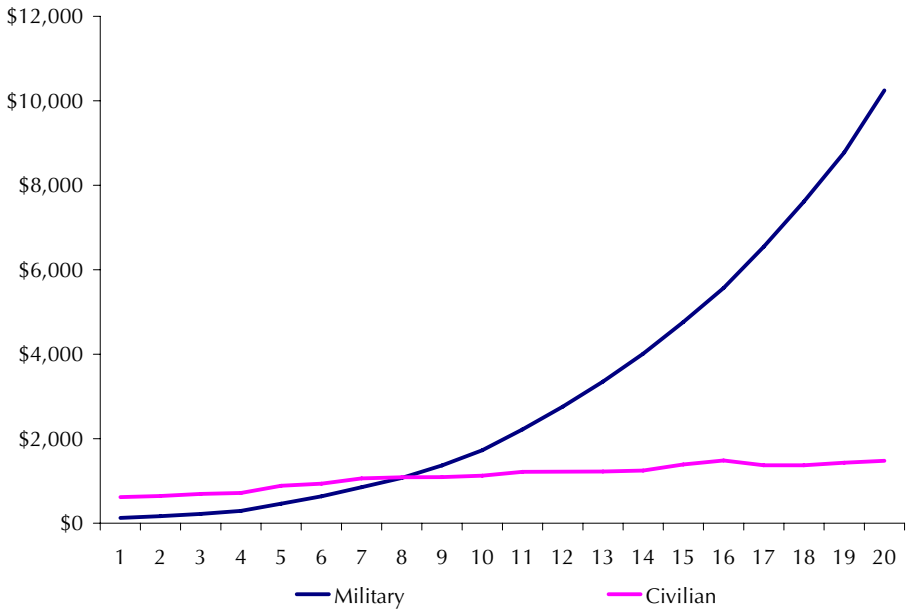
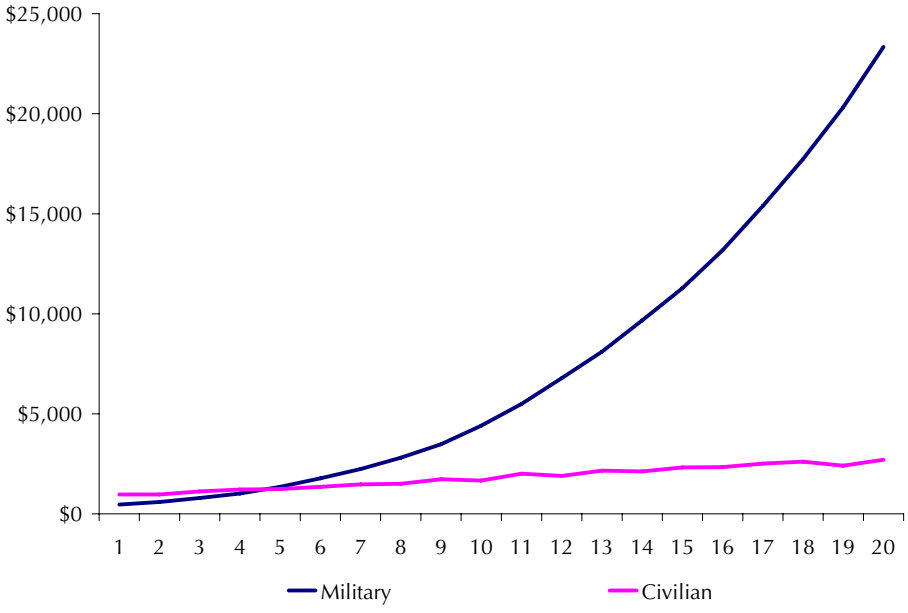


Figure 16. Officer and equivalent civilian retirement



As expected, the annual retirement value differential for both enlisted and officers is very small—well below zero to just a few hundred dollars more than civilians in the first 8 years of service for enlisted. For senior enlisted, because the probability of reaching 20 YOS becomes increasingly larger, and the discounting becomes increasingly smaller, the value grows exponentially—from $280 in YOS 9 to nearly $8,800 more than comparable civilians at YOS 20. Similarly for officers, the annual value of the retirement plan grows from just $430 more than comparable civilians at YOS 6 to about $20,600 more at YOS 20.

The very large change in the value of the military plan happens for two reasons. First, at early years of service, the probability that an average enlisted person will stay in the military long enough to become eligible for retirement is only in the 12- to 20-percent range, whereas it reaches 90 percent by YOS 15. Second, in the early years, the value is discounted far into the future; at later years, it is discounted only a few years into the future. Of the civilian plans, defined-contribution is not burdened by changing probabilities or heavy discounting. The money in the plan quickly becomes owned by the worker, with only some limitations on its use, so increases in its value come primarily from changes in the worker's income and personal discounting.

We continue our benefits-equal analysis by adding the amounts from the retirement plans as a layer to each of the earnings profile charts for officers and enlisted personnel (figures 17 and 18).

Figure 17. RMC + military TA + HC cost avoidance + retirement value differential for enlisted

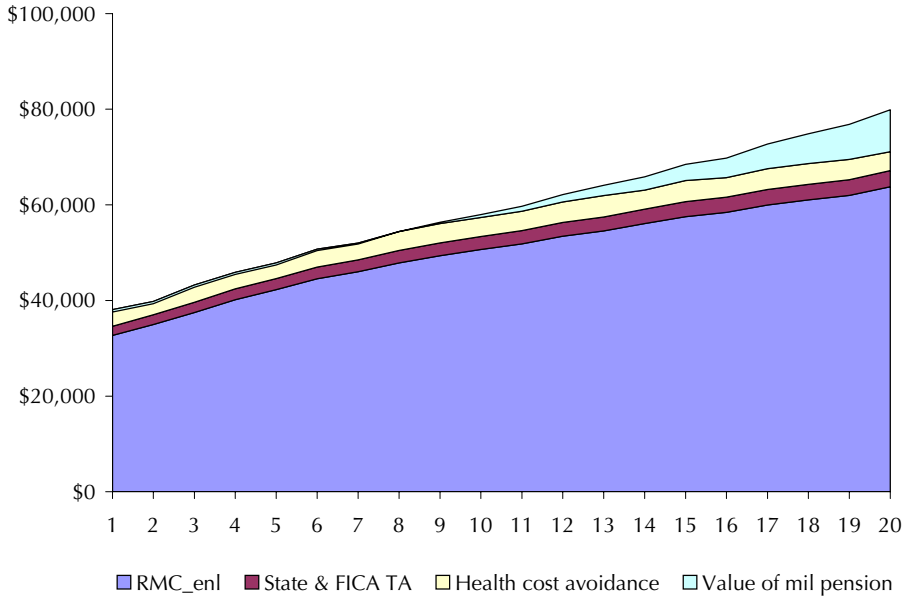
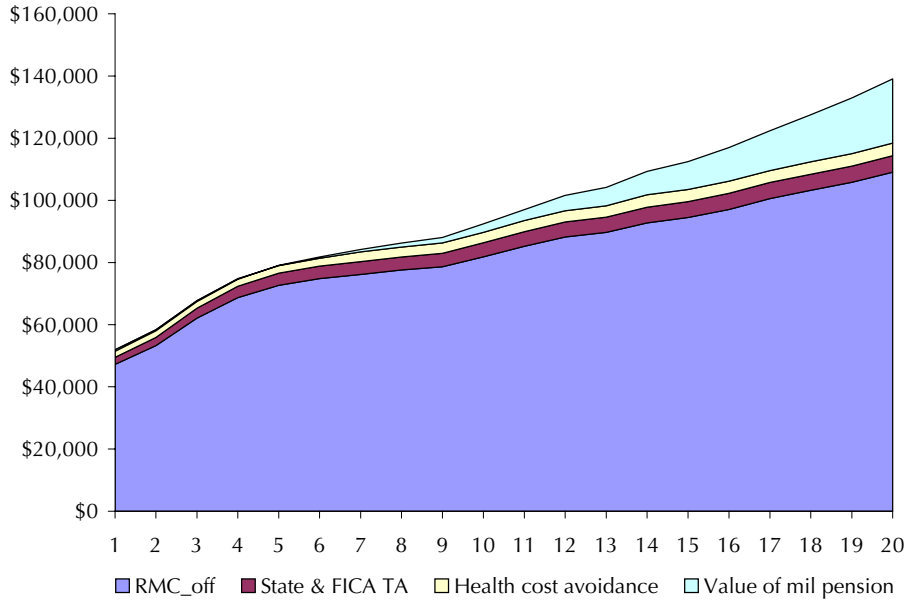


Figure 18. RMC + military TA + HC cost avoidance + retirement value differential for officers



Assessing the value of other military benefits[21]

The QRMC asked us to assess the value of other non pecuniary benefits to servicemembers. In addition to the tax advantages, health care, and retirement benefits, DOD offers the Montgomery GI Bill (MGIB) education benefit; commissary and base exchange privileges; Morale, Welfare, and Recreation (MWR) benefits; and annual leave and paid holidays. These are benefits because they are valued by many servicemembers, but that doesn't necessarily mean they should be a part of Military Annual Compensation (MAC).

To be clear, included in MAC are current and deferred cash compensation plus a few intangibles that are clearly defendable as benefits and traditionally considered part of most compensation packages (i.e., health insurance and pension benefit). For a benefit to be included in MAC, however, most service members must be unconditionally eligible to receive it. If we find that there is a strong contingency aspect to the benefit, we argue that including it in MAC is not justified.

In this section, we examine the value of the following benefits not included in the MAC: the MGIB, the commissary and base exchange privileges, two MWR benefits (childcare and fitness centers), and annual leave and paid holidays. We briefly describe the benefits and the conditions on which their value depends.

For most of these benefits, the contingency aspects are readily apparent, so we discuss them only briefly. Because this characteristic of the annual leave and holiday benefit is not so easily seen, however, we provide detailed research and analysis before concluding that annual leave and paid holidays should not be included in MAC.

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21. We are grateful to Michael Moskowitz for his invaluable help in obtaining and studying literature and data for this analysis, and for his capable assistance. We would also like to thank Dr. Bradley Gray for his insights and help with the quantitative analysis of this section.

Commissary and base exchange privileges, MWR benefits, and the MGIB education benefit

Commissary and base exchange privileges

The commissaries and base exchanges provide goods and services to service members at discounted prices and free of any sales tax. For commissaries, groceries are sold to service members, retirees, and their families at cost plus a 5-percent surcharge. According to the Defense Commissary Agency (DECA) annual report of 2006 [28], "shoppers save an average of more than 30 percent on their purchases compared to commercial purchases...." According to information on the Navy Exchange and Army & Air Force Exchange Service websites [29, 30], exchanges save customers an average of 20 percent compared to private-sector competitors.

Due to time and gas expense of travel, the costs of accessing the commissaries and base exchanges are much lower for service members who live on base than for those who live off base. In fact, many service members do not shop regularly at the commissaries or the base exchanges. For example, in the December 2006 Status of Forces Survey [31, 32], respondents were asked how often, if at all, they had used the commissaries in the previous 12 months. Overall, 89 percent of respondents indicated they had used it at least once, and 56 percent had used it 21 or more times over the past year. As expected, those who live on base used the commissaries more often, with 62 percent using it 21 or more times, compared with 55 percent for those who live off base. In addition, those who live overseas also used commissaries more often, with 72 percent using it 21 or more times, compared with 54 percent for those stationed in the United States. The use of the commissaries does appear to be contingent on where the servicemember is stationed and whether he or she lives on base.

A similar question was asked about use of the exchange, with similar results. Overall, 94 percent of respondents had used the exchange at least once, and 61 percent had used it 21 or more times. Again, there were stark differences between those on base and off base and between those stationed overseas compared with those in the United States. Servicemembers living on base used the exchange much more

frequently, with 71 percent using it 21 or more times compared with 57 percent for those living off base. Overseas respondents indicated that 79 percent used the exchange 21 or more times, compared with 58 percent stationed in the United States.

An additional factor reduces the benefit of the commissary privileges specifically. The fact that many single enlisted servicemembers are compelled to eat in government dining facilities or onboard messes limits the value of this benefit. The Basic Allowance for Subsistence (BAS) pays a monthly stipend for servicemembers to purchase food. In 2007, enlisted servicemembers received $279.88 per month, while officers received $192.74 per month. However, enlisted servicemembers below the rank of E-7 who are assigned to live on base in single quarters and are required to eat at government dining facilities are charged an offset of $7.70 per day. Therefore, much of their potential commissary purchases are replaced by onbase dining facility purchases.

Finally, some bases have only small or sometimes no commissary.[22] For servicemembers at these bases, the commissaries could offer little to no benefit. Further, at some isolated bases, the commissaries and base exchanges could be the only shopping available to servicemembers. In these cases, commissaries and base exchanges are not benefits, but a necessary part of the job.

Because commissary and base exchange privileges appear to be highly contingent on where one lives and, as a result, they are sometimes costly to use, we don't include them in MAC. According to the DCA report, however, potential savings are quite large, at 30 percent compared with their private-sector competitors. Consequently, we think that further study of this benefit is warranted.

Morale, Welfare, and Recreation benefits

The MWR benefits are many, including childcare, health and fitness centers, an assortment of onbase recreation and leisure operations, such as libraries, concert halls and theatres, nightclubs, arts and crafts

22. This information came from informal conversations with DECA HQ.

centers, and self-repair automobile facilities. Here we'll describe just two of them, childcare and fitness centers, for illustrative purposes.

Childcare

DOD provides a limited childcare benefit for some military families.[23] We focus on Child Development Centers (CDCs) in our discussion of military childcare benefits, though Family Child Care homes (FCCs) are also used to provide dependent care. For CDCs, parents pay a fee based on family income rather than on child age, as is prevalent in the private sector for their children to attend day-care. There are programs for children between the ages of 6 weeks and 12 years. In 2004, the average fee for military CDC care was $83 weekly, or $4,316 annually, while the average cost in many civilian communities in 2003 ranged from $4,000 to more than $10,000 annually [34]. In 2007, the National Association of Child Care Resource and Referral Agencies (NACCRRA) [35] reported that childcare costs for an infant in a full-time center could be as high as $14,650 per year.

The childcare benefit appears to be extremely valuable in terms of savings over the private sector for those who use it. The value of this benefit, however, depends on having or planning to have a child. In 2006, about 53 percent of servicemembers had children of any age. Although we don't have data on the ages of their children, about 28 percent of servicemembers who had 5 or fewer years of service had children, suggesting that only a portion of servicemembers had a need for preschool childcare service.

The Defense Manpower Data Center (DMDC) in 2006 asked respondents whether they had used childcare facilities in the last year, and only 20 percent of respondents with dependents had used them even once [31, 32]. Part of the reason for this low use number might come from lack of capacity. The value of the childcare benefit is contingent on the availability of space for the servicemember's child. The NWLC report [34] provides data on childcare capacity as well as a metric for demand by servicemembers and finds that, overall in 2004, DOD was

23. The existence of military childcare programs is codified in Title X, Chapter 88, Subchapter II, "Military Child Care of the United States Code" [33].

meeting only 65 percent of its childcare need (including both CDCs and FCCs). The report discusses how increases in capacity have slowed and demand for childcare has grown, with the increase in deployments creating additional need for childcare.

Though CDCs provide a great value to those who need childcare and are able to use the centers, it is a highly targeted benefit. First, only about 53 percent of servicemembers have children, and a much smaller percentage is likely to have small children. Further, the benefit is useful only until children pass preschool age and then has no value even for those with children. For these reasons, we do not include the childcare benefit in MAC.

Fitness centers

Fitness centers are also often discussed as a benefit for servicemembers. Most military bases and stations have fitness centers that servicemembers are entitled to use. In [31, 32], less than 2 percent of respondents indicated that a fitness center was not available at their permanent duty station, and this was true for those stationed both in the United States and overseas. Servicemembers are not charged a membership fee to use the facilities, while gym memberships in the private sector cost an average of $50 per month, with a signup fee typically added on in the beginning [36].

However, the value one places on military installation fitness and sports centers is conditioned on servicemembers actually using them. Also, those who prefer other exercise opportunities, such as organized sports or offbase workout facilities, don't give them much value. Similar to commissaries and exchanges, the benefit of a fitness center is greater to those who live on base near the facilities since those living off base must travel to use the facilities. In [31], respondents indicated that 83 percent had used a fitness center at least once over the past year—86 percent for respondents living on base and 82 percent for those living off base.

In addition, estimating the value of fitness and sports centers is complicated by the fact that the military has a fitness requirement for servicemembers. Here, the use of the centers is, to some extent, tied to characteristics of the job, rather than a fringe benefit. Thus, in the

same way that we don't value office space or a personal computer in our office as a benefit, we should not include all of the value of these centers as a part of compensation. To the servicemembers for whom the conditions are just too costly, the choice isn't between these benefits or others of equal value, but to use them or receive nothing in their place. To them, these so-called benefits have zero value.

The fitness centers are a nice lifestyle benefit. However, they are strongly contingent on one's desire to use these types of facilities. Further, since physical fitness is a requirement for all servicemembers, we argue that they could be considered a tool of the job, rather than a benefit. For these reasons, we don't include them in MAC.

The Montgomery GI Bill education benefit

We first examine the education benefits included in the MGIB. Only servicemembers who think they might go to college will value this benefit. In addition, while servicemembers often are eligible to use the MGIB while still on active duty, the MGIB will only pay the tuition and not the full benefit. But because the Tuition Assistance program pays full tuition while servicemembers are still active, the MGIB is used after separating. Note that only those who are honorably discharged are eligible [37].

To be eligible for the education benefits, a servicemember must pay an up front fee of $1,200 (paid in 12 monthly installments in the first year of service). If a servicemember enrolls in a qualifying institution, he or she will receive up to $1,101 per month for those who leave the service and attend full-time college for up to 36 months. That means the benefit has a potential value of $39,636. To measure the value of future education payment to an active duty servicemember, we apply a 10-percent personal discount rate. As a result, the potential present value of the MGIB will depend on each servicemember's planned military career.

For example, consider the junior servicemember who plans to leave the service in 3 years. Assume that he also plans to attend full-time university for 36 months after he leaves the military. Applying the discount rate of 10 percent, the present value of the full MGIB education benefit to him is just around $27,000, substantially less

than the nearly $40,000 undiscounted cash value of the benefit. Now consider a more senior servicemember who plans to stay another 12 years until retirement and then attend full-time university for 36 months. If this servicemember also has a 10-percent personal discount rate, the present value of the MGIB education benefit is about $11,500. Consequently, the MGIB education benefit has even less value to him than to his junior colleague.

Another issue to consider is the fact that less than half of those eligible for the benefit end up using it [38]. Further, the fact that those who are eligible have paid the initial $1,200 fee in their first year of service implies that they originally believed they might use the benefit and, therefore, that it has some option value to them even if they eventually don't use the benefit. Thus, the potential value of the MGIB benefit is uncertain, even to those who plan to use it. That said, the fact that they were willing to pay the $1,200 up front fee indicates that, even though they never actually took advantage of the MGIB, they did value its potential benefit.

The MGIB education benefit is a strongly contingent on being used by servicemembers who leave the service and attend full time college. In addition, it appears to be highly uncertain since most servicemembers pay the up front $1,200 fee and yet do not use the benefit. As a consequence, we don't include it as part of MAC. For those who do use it, however, it can be quite valuable. Further, even for those who don't ultimately use the benefit, there can be value in its potential use, shown by the fact that they pay the fee. We recommend further study of this benefit.

Conclusion

The commissary and base exchange privileges, the childcare benefit, and the MGIB education benefit can be generous for those who use them and while they are being used. Only a relatively small proportion of servicemembers use them, however, and the expected annualized value of these benefits is small, so we don't include them as part of MAC. Still, we recommend additional study on these benefits, especially the commissary and base exchange privileges and the MGIB education benefit.

Value of annual leave and paid holiday differential

Introduction

Another benefit we examine is the holiday and vacation benefit. It is traditional and seemingly straightforward to simply subtract military and civilian leave policies. Military people receive 30 days of leave and 10 holidays each year. About 90 percent of full-time civilian workers receive vacation days and some holidays as well. The annual leave policies in their benefit packages vary by tenure and range from 8 to 19 leave days plus an average of about 8 paid holidays per year. Thus, it appears as if military people have a more generous leave policy, which could be worth some portion of their wage times the number of additional days they receive.

However, findings from this study indicate that this straightforward approach may be misleading. First, annual leave for military people includes weekends. This means that when servicemembers take time off for annual leave, the number of days that counts against the benefit is the total number of days they are gone, including weekends.[24] Civilian vacation policies usually don't include weekends.

More importantly, when comparing leave and holiday policies what really counts is not the policies themselves, but how many days servicemembers have to work in the year compared with civilians. To clarify, if you and I work the same number of days in a year, to a great

24. It is possible for a servicemember to allot leave days so that only weekdays count against the 30. For example, the servicemember could stay in town Saturday and Sunday, take leave Monday through Friday, and then come back the following weekend. In this example, the servicemember is charged only 5 days of leave. Although some servicemembers will undoubtedly follow this pattern, it is likely that servicemembers mostly use their leave in conjunction with weekends, as do most civilians. Consequently, for practical purposes, we assume that the leave benefit is 30 days minus weekends.

extent it doesn't matter that my firm's leave policy is more generous. For practical purposes, we have the same number of days off with pay.

In the following subsections, we'll develop this line of thought about how annual leave should be evaluated, and how it leads to the conclusion that the military annual leave and holiday policy, while it provides some useful benefit to servicemembers and the military, should not be included as part of MAC at this time.

Measurement of hours worked: do military people work more than comparable civilians?

The military leave policy appears to be more generous than civilian policies. But, do servicemembers work fewer days than their military counterparts? We rely on both published research and some preliminary empirical analysis to get at the answer this question.

The number of actual days worked for civilians is equal to the number of potential workdays minus the number of weekend days, minus the number of leave days and holidays off. For military people, actual days worked are potential workdays minus leave days (since their leave policy includes weekends), minus weekends and holidays off.

Simply looking at leave policies is the same as assuming that military and civilians have identical workweeks when not on leave or holidays. We can use the following algorithm to calculate the number of days worked for military and civilian personnel under the assumption of identical workweeks. We do that here to give us a base from which we can compare the important parameter—days worked.

Everyone begins with 365 potential days of work. From that, military people receive 30 days of annual leave and 10 holidays off with pay. The leave days include weekends, so we subtract the 30 days of annual leave from 365 potential workdays to get:

365 - 30 = 335.

Subtracting weekends:

335 * 2/7 96 is the number of potential weekend days off. Then:

335 - 96 = 239.

Finally, subtracting holidays off with pay, we find that servicemembers would have:

239 - 10 = 229 actual workdays.

We now do the same for comparable civilians. Civilians also have 365 potential workdays. If they also normally get weekends off, then the number of weekend days is:

365 * 2 / 7 105.

Subtracting weekends:

365 - 105 = 260.

According to the 2007 BLS survey [39], the average civilian receives roughly 16 vacation days plus 8 holidays, which equals 24 days off with pay.[25] Subtracting this, we find that civilians would have:

260 - 24 = 236 actual workdays.

Under the assumption of identical workweeks, the average servicemember would work 229 days, and the average civilian would work 236 days per year. Thus, in this scenario, the servicemember would receive seven more days off with pay than the average civilian.

But are military and civilian workweeks really identical? In the next section, we explore several reasons and provide some preliminary evidence that runs counter to a conclusion that military people work fewer days per year than comparable civilians.

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25. The median civilian worker has about 10 years of experience and receives 16 days of annual leave. The median military officer has roughly 11.5 years of service, and the median enlisted person has about 5. If we used actual time in service in our algorithms, the comparison number of days of annual leave would change a few days one way or another (for example, the median civilian with 5 years' experience gets about 12.5 days' leave). We've constructed the simple example above to illustrate our concept that the value of annual leave is a function of workdays, rather than annual leave policies.

What factors exist that increase the size of the workweeks to military personnel?

Despite a seemingly generous leave policy, why might military personnel actually work as many hours as, or even more hours than, their civilian counterparts? We describe two responsibilities unique to military service that could explain this counterintuitive result.

Watchstanding duty

Military personnel may be required to stand watch periodically. The types, the duration, and the frequency of watchstanding vary from service to service, and from command to command. For example, Navy ship commands are required to be able to get under way within some period of time, depending on the type of command and the readiness condition under which it is operating. As a result, there must be a contingent of personnel aboard 24/7. The consequence of this is that Navy personnel attached to ships must stand 24-hour watch every few days, depending on the type and manning status of the command, and the readiness state of the Navy.[26]

Similarly, recruit drill instructors and recruit company commanders are required to watch over their companies 24/7 also. Since there are usually only two or three commanders for each company, they must stand watch every second or third day.

Some command types, however, don't do much watchstanding at all. JAG companies might stand watch duty only a couple of days per year [40]. Nonetheless, many servicemembers stand some number of 24-hour watches every year.[27]

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26. From the author's U.S. Navy experience, these types of watches can be every 4 to 6 days.

27. Servicemembers may receive informal compensatory time off after watches, deployments, and exercises, and between permanent duty stations. These "comp" days are considered "free leave," and mitigate the negative effects of the extra hours and days that military people work. Yet, there is no policy regarding how many and how often these days should be offered. Consequently, these will vary among commands, among divisions within a command, and among time periods according to OPTEMPO.

Hours worked while deployed

Deployment and travel away from home can affect utility valuation of a day off. Weekends and holidays away from home are not normally considered as valuable as leisure days at home. They are more akin to being at work—not exactly work, but not really leisure either. Travel away from home also affects the cost of household production. Specifically, duties of the traveling spouse, such as lawn care or appliance repair, must now be purchased on the market. These extra costs will be reduced to the extent that traveling servicemembers are eligible for the Family Separation Allowance (FSA). The FSA gives servicemembers with dependents who are away from their families for more than 30 days $250 per month [41].

Deployments are one important basis of lost leisure due to their requirement that servicemembers travel away from home. According to the Status of Forces (SOF) survey report of 2003 [42], about 8 percent of the forces were deployed at the time of the survey. If the deployment schedule at the time of the survey was representative, it suggests that personnel are deployed one-eighth of their time, perhaps 6 months out of 4 years of service.

There is strong evidence that, when they are deployed, servicemembers work many more hours and days than those stationed in the United States. In a 2006 RAND study of the effects of deployments on retention [43], the authors analyzed the results of the SOF Survey and conducted focus groups to discover the effects on retention of deployments, OPTEMPO and long work hours due to deployments, and being away from home and family. They discovered that, in general, military people worked many hours per day and days per week in difficult conditions and circumstances when they were deployed.

In their focus groups, deployed personnel routinely made the following claims [43]:

- "Deployments have longer hours...constant drills, GQs [general quarters], scenarios...lots of standing watch. And if your watch is at night, you still work days."

- "Drivers [in Iraq] had to drive all day and all night because the convoy had to keep moving and there was no one to switch off with."
- "Often they [servicemembers] got only 5 to 6 hours of downtime per day to do everything—shower, laundry, eat, and sleep. They usually got only 3 to 4 hours of sleep a night for the first 4 months there."
- "Flightline operational tempo is really high on deployment. They have a real mission, work 13- to 14-hour days with few days off."

Servicemembers often receive additional cash compensation when they are deployed. For example, Navy personnel get sea pay. All military personnel who are in a combat zone receive some special pays and get their basic pay tax free, which can amount to thousands of dollars in tax savings. Because these kinds of special pays and tax advantages are not a regular part of all servicemembers' compensation, we don't include them in our estimates of total military cash compensation (see our chapter entitled "Cash Compensation Comparisons"). So it might seem inconsistent to now insist that the extra work they do is compensated by extra annual leave days, when it is also possible that extra work is rewarded with this extra cash compensation.

When deployed, however, servicemembers not only work long hours and extra days but also incur additional costs by being away from family, enduring hardships related to climate differences and lack of normal home accommodations, and often risking bodily harm or even their lives in combat. So, to some extent, the extra cash compensates for these hardships rather than for the extra hours worked. Ultimately, it is an empirical question: to what extent do the extra cash and annual leave days compensate for the extra work and for the extra hardships of servicemembers when they are deployed?

Hours worked when not deployed

Despite the differential in leave and holidays, there is some evidence that suggests that servicemembers may actually work more than comparable civilians, even when they are not deployed, as a result of high

OPTEMPO. We take a look at three information and data sources that show this: (1) the 2003 SOF survey results [42], (2) the 2006 RAND report [43], and (3) the 2006 Current Population Survey (CPS).

Reference [42] asked several questions concerning extra working hours during regular duty days. First, it asks how many days per year military people work "longer than your normal duty day" (i.e., overtime). The range among the four services was between 90.6 and 124.5 days, and the overall average was about 111.3 days per year that servicemembers worked overtime. There was no indication whether or how many of these days were weekend days. However, two factors could come into play here. First, there is no indication whether the survey included 24-hour watch days as a normal duty day or as overtime. Second, since the number of duty days is 365 per year, we might speculate that some of those days were weekend days.

The second question asked about the number of "nights away from your permanent duty station because of military duties." For this question, the responses ranged from 43.4 nights (U.S. Air Force average) to 87.4 nights away (U.S. Army). The overall average was 68.5 nights away from home. There are two factors here that we consider. First, temporary travel for military duty frequently requires servicemembers to work more hours and days than they would at home. Second, leisure days away from home are typically valued less than days at home because as they are in strange location, with people they might or might not consider friends, where access to their preferred activities could be limited or not available.

According to [43], the RAND focus groups claimed that, "Many nondeployed personnel frequently worked long days to support the heightened pace of military operations." In addition, "servicemembers receive no additional compensation or formal recognition for frequently working longer than the usual duty day."

What survey measures on hours worked tell us

The studies described in the last subsection relate to the impact of service-specific obligations on days worked. In this subsection, we take a look at some available data to get a sense for the differences between servicemember and civilian worker in average numbers of

hours worked. To do this, we examine the March supplement to the Current Population Survey (CPS) for 2002 through 2006. Respondents to the surveys are asked to estimate the number of weeks they worked and the average number of hours they worked each week in the previous year (including paid vacation and holidays).

The CPS is designed to be a civilian household survey, but a little less than 1 percent of CPS respondents are in the military, so we separate out this population in order to compare the hours worked between civilian and military employees. Because of its design, however, the CPS includes only servicemembers who live in the United States, in a nongroup household with at least one civilian.

The military respondents to the CPS report working substantially more hours per year than comparable civilians. This was true even when we use statistical methods to control for some of the selection biases that exist for military personnel in the survey. This was true for each of the years we examined (2002 through 2006).

There are several reasons why we don't report these results, and why, given the constraints of this study, we cannot yet rely on analysis of the CPS data for a definitive answer to our analytical question about hours worked.

First, and most important, the depth of the selection bias is such that statistical methods alone are not sufficient. Because the CPS is a civilian survey, military people are represented only incidentally. It forces us to conjecture that those not represented have the same characteristics as those who are.

Second, there is the issue of overtime pay. Many civilians get it. Most military people don't get it, at least not directly. Some military people receive special pays and tax advantages that are indirectly related to the amount they work. However, because these types of military special pays are a function of OPTEMPO and deployment schedules, and because they are paid for reasons unconnected to hours worked, they are not typically considered overtime pay. Still, overtime pay changes the dynamic between workload and the value of annual leave, and so the fact that we can't separate out overtime pay in the CPS renders inferences about comparative work suspect.

Thus, although the results we get from the CPS regarding hours worked are suggestive, they are not definitive.

The effect of OPTEMPO on the value of annual leave

The most important argument against including annual leave and holidays in MAC is that hours and days worked are directly related to OPTEMPO, which is highly variable among servicemembers and across years. Throughout this study, we have held to the view that a component of compensation should be part of MAC only if it is unconditionally available to all servicemembers, as long as they are working, and that its value is not inconsistent among servicemembers and across time. So, as we've said earlier, we did not include special pays because most special pays are available to only a select group of servicemembers (doctors, pilots, those deployed in combat regions), and we don't include the childcare benefit because it is only available to those with preschool children.

The relative value of the annual leave and holiday policy changes with OPTEMPO. This is a direct result of the fact that the relative value of annual leave comes from the difference in the number of days worked, rather than the difference in annual leave policies. The military is currently in a high-OPTEMPO state, but in a future year it might not be. Also, for many servicemembers, working days and weeks are greatly affected by high OPTEMPO; for others, there is much less of an effect.

There are currently no data that definitively measure the number of days all servicemembers work. However, the survey results cited here [42, 43] suggest that deployed personnel work longer and more days than nondeployed personnel Even nondeployed people work longer and more days when deployments are high, and deployments are high when OPTEMPO is high.

Conclusions about the military's annual leave benefit

Our goal was to estimate the dollar value that servicemembers receive as a result of the military's annual leave and holiday policy. According to the policy itself, military people receive an average of about 7 more days of leave and holidays off with pay than comparable civilians do.

However, it isn't correct to simply subtract leave and holiday policies; one should instead subtract the days worked to measure the differences in the value of the leave and holiday benefits. We uncovered evidence that military people work at least as many as and maybe more hours and days than comparable civilians.

Looking at reports by RAND [43] and the DMDC [31, 42], as well as other smaller studies, military people reported working overtime during many duty days, working weekends while standing watch, and working both overtime and weekends while traveling away from their duty station for military purposes. This in itself is evidence that military people work a lot. However, many civilians work a lot of overtime and weekends, too. These reports don't definitively show that military people work more than comparable civilians.

The Current Population Survey (CPS, March Supplement) contains the results of surveys in which both military and civilian respondents are asked to estimate the number of hours they worked in the previous year. In the 5 years we examined, military people consistently reported that they worked many more hours per year than comparable civilians. While the results are suggestive, the inherent selection bias of military people represented in the CPS, and the varying conditions under which military people have to work and are compensated in the survey year, means that much more thorough study of this is in order before one can make definitive inferences about the exact number of extra hours military people work.

We conclude that, between watchstanding, travel away from home, and the extra hours military people are shown to work, it is most likely the case that the 7 extra days of annual leave and holidays that military people receive are, for practical purposes, compensatory time and not an additional benefit that should be part of MAC.

More important, though, the effect of changes in OPTEMPO on military workload and the wide fluctuations in OPTEMPO experienced by military personnel cause the value of the annual leave benefit to be highly variable among servicemembers and across time. As a result, the value of the annual leave and holiday benefit is highly variable among servicemembers, contingent on current OPTEMPO and how OPTEMPO affects each servicemember.

To be clear, it would be quite premature to conclude the military annual leave policy has either a positive or a negative value, or that it can even be measured in dollars in a consistent way. In this part of the study, we have raised more questions than we have answered. A rigorous and thorough study would have to be done on this issue to resolve these questions.

Therefore, we recommend that, at this time, the annual leave and holiday benefit should not be included in MAC.

Summary and Conclusions

Looking at just the 2006 cash compensation from figures 1 and 2, we saw that enlisted personnel receive an average RMC that is about $4,700 more than comparable civilian earnings, ranging from $1,000 to just over $10,200 through one's 20-year military career. Military officers receive an average RMC that is about $11,500 more than comparable civilian earnings, ranging from $4,200 to about $21,600.

However, not including the benefits-value differences causes us to understate the true value of annual compensation by substantial amounts. In figures 19 and 20, we show the 70th civilian cash compensation and compared with officer and enlisted MAC.

Figure 19. Comparing MAC for enlisted personnel and enlisted equivalent civilians

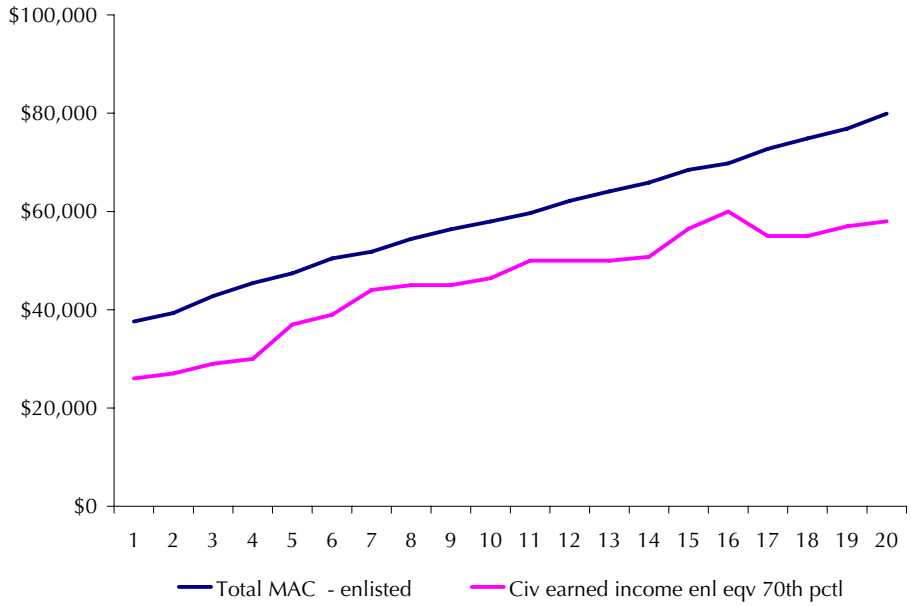
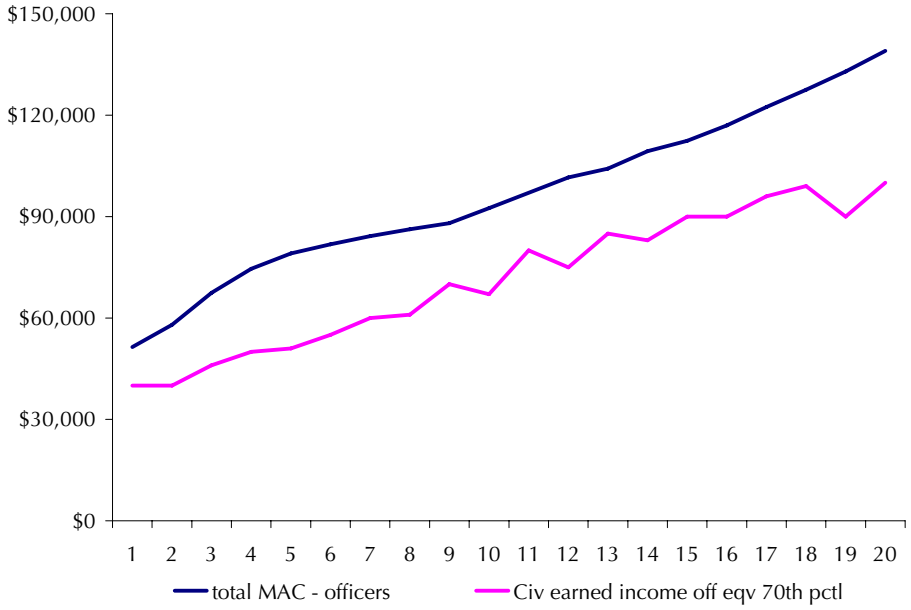


Figure 20. Comparing MAC for officers and officer equivalent civilians



We see that the benefits-value differentials add an average of $8,660 for enlisted and $13,370 for officers, ranging from $4,370 to $16,100 per year for enlisted, and from over $4,160 to $30,000 annually for officers.

What that means is that the total compensation packages for 2006, including both cash and benefits, are on average about $13,360 more for enlisted personnel than their civilian equivalents, rather than just the $4,700 more in cash. For officers, compensation is an average of $24,870 more rather than just the $11,500 more they make in cash.

Note that in figures 19 and 20 we compare MAC with the civilian 70th percentile cash compensation. That's reasonable because we had originally compared RMC with the 70th. But, taking the next logical step, MAC compares favorably with the 80th percentile cash earnings for both officer and enlisted equivalent civilians (figures 21 and 22).

Figure 21. Comparing Enlisted level MAC with civilian cash compensation - 70th, 80th, 95th, and 90th percentiles

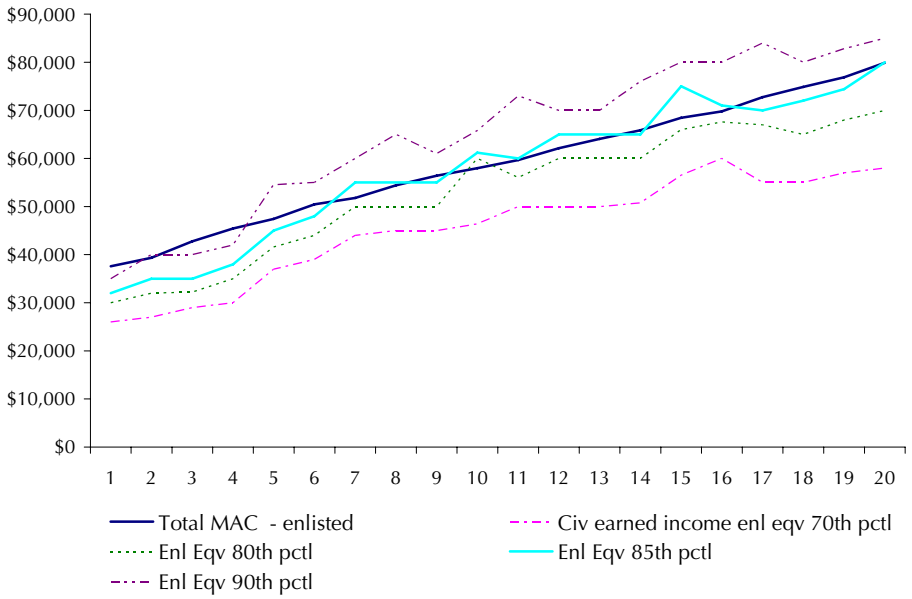
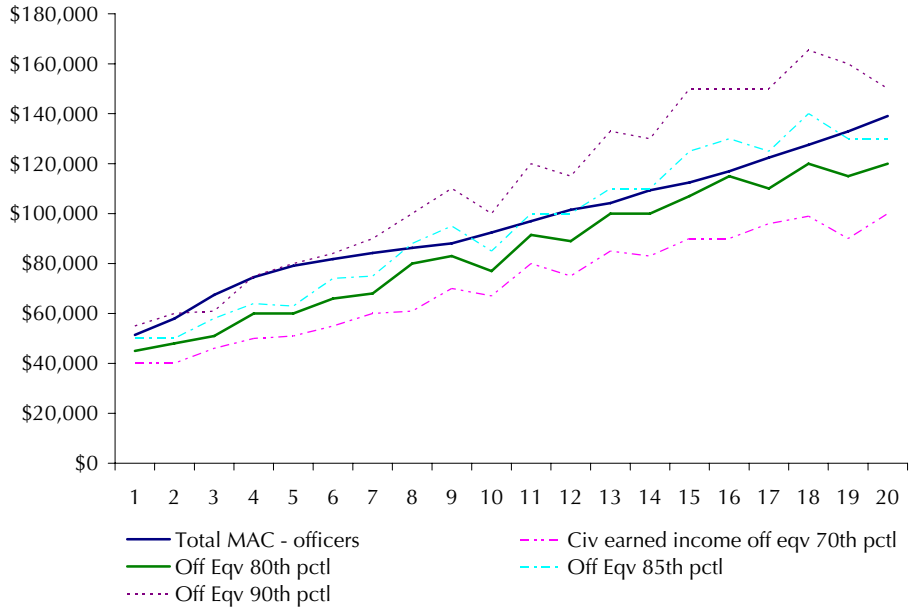


Figure 22. Comparing Officer level MAC with civilian cash compensation - 70th, 80th, 95th, and 90th percentiles



Do servicemembers know the value of their benefits packages?

It is uncertain whether servicemembers are fully aware of the relative generosity of their benefits package. Evidence of this lies in both the choices they make with respect to their retirement plans and the answers they provide in surveys.

For example, the modern military retirement plan includes a choice of two plans. The first is the traditional High-3, in which, at 20 years of service, personnel become eligible to begin receiving 50 percent of the average of the highest 3 years of Basic Pay. The second choice is called Redux, and includes a provision in which they can receive a $30,000 bonus at YOS 15, but then will receive only 40 percent of their average High-3 Basic Pay when they retire at 20 YOS. That tradeoff, plus differences in cost-of-living allowances between the two plans means that, for quite a few years into retirement, the one who chooses the Redux plan receives a much lower annuity in exchange for the earlier bonus.

Quester and Shuford [20] postulated that the Redux plan is, in effect, a loan of $30,000 to the person choosing the plan, and they estimated that the loan was received at an implied average interest rate of 11.3 to 12.9 percent for those who retire at 20 years of service, depending on which calendar year they retired.

There were two interesting outcomes of that study that related directly to this study. First, Quester and Shuford calculated that if personal discount rates were in the 18-percent range, as implied by the Warner and Pleeter study [16], we would expect that over 90 percent of career servicemembers would take the Redux choice. Instead, less than 60 percent made that choice, implying that actual personal discount rates, or at least those related to retirement plans, were substantially less than 18 percent.

Second, after [20] was released, there was a dramatic drop in the number of servicemembers who took the plan. The authors postulated that the decline was a result of the new information regarding the cost of the Redux plan and, perhaps more important, the value of

the traditional High-3 plan. This is important for this study for two reasons:

1. It confirms our premise that people express lower personal discount rates with regard to their retirement plans than they do for many other types of money decisions.
2. It supports our earlier claim that servicemembers might not really know the total value of their benefit packages, and that both they and DOD would benefit by studies like this one that estimate those values.

The other piece of evidence that servicemembers might not know the true value of their benefits comes from results of the 2006 Status of Forces Survey [31]. We postulate this because of the answers from two specific questions. First, members were asked to estimate the cost to the military of providing their benefit packages. In addition to the wide range of answers, most of their answers tended to underestimate the cost. Again, note that cost is not equal to value. Nonetheless, the magnitude of the mistaken estimates of cost still suggests that servicemembers might not really know their value either.

Second, survey participants were asked to gauge the ease with which they could find a job in the private sector that provided "approximately the same income and fringe benefits as you currently have in the military." Between 43 and 63 percent of respondents answered that it would be easy to find such a civilian job. However, given our results that the relative value of military benefits is substantially higher than for comparable civilian jobs, it is highly unlikely that they would find jobs that pay the same. Note that it is possible that the military must pay higher pay and benefits to attract and keep enough people. Again, this question doesn't address the adequacy of military pay and benefits. It merely suggests that servicemembers might overestimate the amount of pay and benefits available to them in the private sector.

Thus, it is not clear whether servicemembers know that their benefit packages are generous when compared appropriately with their civilian counterparts. Estimating the difference is complicated, however, and they will generally underestimate the true value. Further,

although it is a well-known practice for people to simply compare the cash part of compensation, a more accurate comparison with civilian cash compensation is not just military cash compensation but military cash plus the benefits-value differences. Published comparisons of compensation should include these amounts.

Appendix: Estimating the value of the retirement plan

In this appendix, we detail how the military-civilian retirement plan differential is calculated. Recall that we discussed the following complicating factors in our calculations:

- Cliff vesting of the retirement requires consideration of the changing probabilities that servicemembers will reach 20 YOS.
- Retirement is a deferred benefit, so one must consider how the benefit is discounted by individual personal discount rates.
- Retirement plans differ for servicemembers and civilians.

The military plan is a cliff-vested, defined-benefit retirement plan, in which a servicemember is not vested until he or she serves for 20 years. When we estimate the value of the military retirement plan, we consider the probability that a given Sailor will stay long enough to become eligible for it. Civilians are more commonly offered a defined-contribution plan, in which the employer pays into a fund that is owned by the employee. Some participate in a defined-benefit plan in which employers pay pensions after a defined number of years on the job but are vested early in their careers.

The following steps describe our method for estimating the value of the retirement benefit to a servicemember at any given year in his or her career: (1) estimate a lump-sum present value (LSPV) of the retirement annuity payments at YOS 20, given how long the member is expected to live after retirement; (2) calculate how much must be set aside each year, as a proportion of each servicemember's income to accumulate the LSPV at expected rates of return, expected levels of income, and expected probability of reaching 20 YOS; (3) discount this set-aside amount by the personal discount rate estimated by Warner and Pleeter [16]. For civilians, we don't discount the amount.

Here is a notation list for the subsections that follow:

- A_M and A_C are retirement annuity payments for military and civilian personnel, respectively.
- T_M and T_C are lengths of military and civilian careers.
- S_M and S_C are lengths of military and civilian retirements.
- Z_M and Z_C are *undiscounted* lump-sum cash value amounts of military and civilian retirement programs at year of retirement.
- PVZ_M and PVZ_C are the *discounted* present-value lump sum of the military and civilian annuity.
- π_{tM} is the probability that a military servicemember will reach retirement age at current year of service t_M.
- *f*, *r*, and *d* are the federal discount interest rate, expected return on investment (ROI) on civilian retirement set-asides, and personal discount rates, respectively.
- ρ and σ are decision parameters for the proportions of military and civilian incomes to be set aside by employers for their respective retirement programs.
- V_{tM} and W_{tC} are the undiscounted cash value of the military and civilian retirement plans at the current year of service.

The servicemember's retirement plan

Consider the following conditional probability that the servicemember will stay in the military for at least 20 years:

π_{tM} = Prob[serve to retirement|YOS=t_M]

t_M = (0,1,...,T_M).

π_{tM} is the probability that the servicemember will reach 20 YOS and be eligible for the military's retirement program, conditioned on his current year of service.

For the typical enlisted person currently in YOS 0 (i.e., YOS_0), our data from the 2005 Enlisted and Officer Master Files suggest that:

- For enlisted: $\pi_0 = .126$
- For officers: $\pi_0 = .308$.

This implies that more than 12 percent of enlisted people and 30 percent of officers eventually retire and collect a military pension.

Then, at current YOS_6:

- For enlisted: $\pi_6 = .279$
- For officers: $\pi_6 = .388$.

Then, at current YOS_{15}:

- For enlisted: $\pi_{15} = .882$
- For officers: $\pi_{15} = .887$.

This continues until, at current $YOS_{T=19}$, for both officers and enlisted, $\pi_{19} = 1.0$.

Now consider a military retirement annuity:

$A_M * (1 + inf)_{sM}$

$s_M = (1,2,..., S_M$ years of retirement)

inf = the expected annual inflation rate.

The annuity will be paid to the servicemember from the first year of retirement until his death at year S. Since the annuity is indexed to the annual inflation rate, the real value of the annuity is A_M.

But this amount should be discounted by a real personal discount rate since, by law, servicemembers cannot sell the retirement even after it has been earned.[28]

28. Public Law 108-183, Section 702, December 2003, states that "in any case where a beneficiary entitled to compensation, pension, or dependency and indemnity compensation enters into an agreement with another person under which agreement such other person acquires for consideration the right to receive such benefit,...such agreement shall be deemed to be an assignment and is prohibited."

So, the algorithm for calculating the discounted present value of Z_N is usually:

$$PVZ_M = A_M / d * (1 - 1/(1+d)^T),$$

where T is the number of years the servicemember can expect to draw his retirement annuity.

To accumulate PVZ_M over the career of a servicemember, DOD must set aside some percentage, $\pi_{tM}\rho$, of his or her income, RMC_{tM}, so that:

$$PVZ_M = \Sigma\pi_{tM}\rho RMC_{tM}(1 + f)^{(T_M - t_M)},$$

where f is the expected annual return of investment of the pension set-aside, usually the federal real discount interest rate.

Since we know PVZ_M, π_{tM}, RMC_{tM}, and f, we can solve for ρ:

$$\rho = PVZ_M / (\Sigma\pi_{tM}RMC_{tM}(1 + f)^{(T_M - t_M)}).$$

Consequently, the undiscounted value a servicemember would place on the retirement plan during his or her current year of service will be the expected annual set-aside (i.e., the amount of the annual set-aside that would accrue if the conditional probability of reaching retirement age is considered):

$$V_{tM} = \rho\pi_{tM}RMC_{tM}.$$

Since he or she would not see the benefit of these annual set-asides until he or she retired, the discounted value of the set-asides would be:

$$V_{tM} / (1+d)^{(T_M - t_M)},$$

assuming the discount rate were constant at d.

The civilian's retirement plan

As we discussed earlier in our section on private-sector retirement benefits, about 60 percent of civilian workers receive an employer-sponsored retirement plan. Of those, about 78 percent receive a

defined-contribution retirement plan from their employers, and one-third receive a defined-benefit plan. The average size of the total accumulated employer contributions for the typical college graduate who begins working at age 23, and whose defined-benefit plan earns an average annual return of 5 percent, is about $282,800. For the average civilian worker with some college, who begins work at age 21, that amount is around $158,700. We will use these numbers to make conservative comparisons with civilian and military retirement plans.

The typical defined-benefit plan provides about one-third of the worker's salary, beginning at age 61. If the average person who reaches age 61 lives another 18 years [27], the undiscounted lump-sum value of the benefit at the year of retirement is roughly $300,000 for workers and about $450,000 for college graduates.

These sums combined with expectations for their accrual mean that the civilian worker with some college accrues a retirement fund with an expected lump-sum value (Z_C) of :

- Z_C = .5(300,600) + .2(450,000) = $240,300 for Bachelor degree or better graduates
- Z_C = .5(163,700) + .2(300,000) = $141,850 for workers with some college up to Associate degree graduates.

To accumulate Z_C, the employer(s) would have to set aside some proportion of the worker's income (σ) each year[29], so that:

$$Z_C = \Sigma \sigma Y_{tC}(1 + r)^{(T_C - t_C)}$$

and

$$\sigma = Z_C / (\Sigma Y_{tC}(1 + r)^{(T_C - t_C)})$$

T_C = length of civilian worker's career

r = expected annual return on civilian set-aside amounts.

29. Recall that we assume that, for civilians, the probability (π) of receiving the benefit is 1.

The value of the plan at any given year before retirement is the amount that the employer would contribute to the plan in that year, which, like its military counterpart, is a portion of the worker's salary. In this exercise, we will assume that it is a constant portion of his or her salary.[30] Unlike the military counterpart, however, it is not a function of any probability of retiring with the company. Instead, it is a function of the probability that the employee has an employer-paid retirement plan. As we discussed earlier, most retirement plans are defined-contribution plans, meaning the contribution amounts are quickly, if not immediately, owned by the employee. Defined-benefit plans do not immediately accrue to the employee, but vestment laws require that the they do so within relatively short lengths of time after employment.

The annual value of the civilian retirement plan would be:

$W_{tC} = \sigma Y_{tC}$.

The data

Following is a list of the data sources to get estimates for A_M, A_C, S_M, S_C, Z_M, Z_C, RMC_{tM}, Y_{tC}, π_{tM}, *f, r,* and *d.*

Variables Z_M and Z_C are the lump-sum cash values of the military and civilian retirement plans at the year of retirement. For the military, $Z_M = A_M * T_M$.

The military retirement annuity, A_M, is 50 percent of the servicemember's High-3 Basic Pay at the time of retirement if he or she retires at 20 YOS. Z_M is the lump-sum value of the stream of these annuity payments. For simplicity, we assume in our estimates that every servicemember retires at 20 YOS at the average RMC, as we've done throughout this paper.

30. It is probably the case that, because of job changes and employer incentives, the proportion of income set aside for retirement changes over the worker's career.

For civilians, Z_C is the sum of the accumulation of employer contributions to a defined-contribution retirement plan and the lump-sum value of the stream of annuity payments in a defined-contribution plan. The data for probability of employer-paid retirement coverage comes from the 2005 CPS.

Variables S_M and S_C are the respective lengths of the servicemember's and the civilian's retirement, from the first year to his or her death. Assuming that service personnel have life spans and expectancies similar to their civilian counterparts (debatable perhaps, since service life carries with it many life-shortening hardships), the average enlisted servicemember who retires at age 40 will collect annuity payments for approximately 38 years. Similarly, an average officer who retires at age 42 will collect payments for about 36 years. The average civilian who retires at age 61 will collect retirement payments until his expected death at age 79.

RMC_{tM} is Regular Military Compensation. In the military earnings profile, it is the average RMC for enlisted servicemembers or officers at each year of service. Data come from the 2005 Active Duty Personnel Master File. We use rank and YOS to determine Basic Pay, we use ZIP code to Military Housing Areas to BAH rate table to estimate BAH, and we use family status and size along with the Federal Income Tax code to estimate the federal tax advantage.

Y_{tC} is the estimated annual income of civilian workers at year t_C—either those with Bachelor degrees or better as officer-equivalent civilians or those with some college up to Associate degrees for enlisted-equivalent civilians. Data come from the 2005 Current Population Survey (CPS).

π_{tM} is the estimated probability that enlisted servicemembers or officers will stay in the military for 20 years, given that they are currently in YOS = t_M. Data come from the 2005 U.S. Military Enlisted and Officer Personnel Master Files and are for active duty members.

f is the Federal Reserve Discount Interest Rate, which is what DOD uses as the expected return on investment of the military Retirement Accrual Funds. We use the average of *real* discount rates from 1990 through 2005. (The real rate is approximately equal to the nominal

rate minus inflation). Data for the nominal discount rate came from the home website of the Federal Reserve Bank of Minneapolis; annual inflation rates came from the *Statistical Abstract of the United States,* 2006 [27].

d is an estimate of the average personal discount rate of the enlisted servicemembers and officers and their civilian counterparts. We've tried three estimates of *d*. As our basis, we use $d = 0.1$ Then we used an estimate from Warner and Pleeter [16], who estimated an average rate of about 25 to 35 percent for enlisted and civilians with some college and 12 to 18 percent for officers and civilian college graduates.

Finally, T_M and T_C are the respective lengths of a servicemember's or a civilian worker's career. This is the period in which the employer pays into his or her retirement plan. We have estimates of the average size of the retirement pot in a defined-contribution plan for civilian workers who start at various ages. The data come from the 2005 CPS. For our value calculations, we compare military personnel with civilian workers who start at age 21 for enlisted equivalent and at age 23 for officer equivalent.

The algorithms for the average annual value of the military and civilian retirement benefits are:

$V_{tM} = \pi_{tM}\rho RMC_{tM}$ for military servicemembers

$W_{tC} = \sigma Y_{tC}$ for civilian workers (because for civilians $\pi_{tC} = 1$).

The retirement differential is

$V_{tM} - W_{tC}$.

Because of low probabilities of servicemembers reaching 20 years in their early years, and high probabilities in their later years, we expect the V_{tM} to be low at the beginning of their careers and high near the end. We expect that W_{tC} will grow over time but at a much slower rate since it is discounted far into the future. Results for these calculations are seen in figures 15 and 16 and are layered onto our benefits-equal charts shown in figures 17 and 18.

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