

Monetary and Nonmonetary Compensation for High-Value U.S. Department of Defense Civilian Skill Sets

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Preface

Motivated by the concern that the U.S. Department of Defense (DoD) could have difficulty recruiting and retaining civilians to man the U.S. Space Force, we compare monetary and nonmonetary compensation between the DoD civilian and private sectors for five workforces with high-value skill sets. These workforces were chosen by the sponsor and deemed likely to be in high demand for manning the U.S. Space Force. The workforces of interest are aerospace engineers and four workforces within the broader umbrella of the defense acquisition workforce: business and financial management, program management, procurement, and engineering and science. We use administrative and survey data to compare characteristics and income across the DoD civilian and private sectors for the five workforces, ultimately estimating DoD civilian and private-sector income trajectories, while controlling for differences in demographic characteristics. In addition, we use survey data and case studies to explore how nonmonetary compensation differs across the two sectors. Finally, we review existing authorities available to DoD to recruit and retain civilians with high-value skill sets.

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Summary

The U.S. Space Force was established as part of the National Defense Authorization Act for 2020 (Pub. L. 116-92), and the manning of this branch will require civilians with high-value skill sets. The U.S. Department of Defense (DoD) is concerned that there will be difficulty recruiting and retaining civilian talent for the U.S. Space Force. As a consequence, DoD needs a better understanding of how DoD civilian compensation compares with private-sector compensation. In this report, we compare monetary and nonmonetary compensation between the DoD civilian and private sectors. We focus on five workforces deemed by the sponsor as having high-value skill sets and being of particular interest because they are likely to be in high demand for manning the U.S. Space Force. The workforces of interest are aerospace engineers and four workforces within the broader umbrella of the defense acquisition workforce: business and financial management, program management, procurement, and engineering and science. Because the U.S. Space Force is newly established, it remains to be seen whether recruiting and retention of civilians in these workforces will be a problem. Yet compensation comparisons between the DoD civilian and private sectors will serve as useful benchmarks, identifying instances in which DoD civilian compensation might fall short. We also note that, although we focus in this report on high-value skill sets relevant to the U.S. Space Force, these workforces are valuable in other DoD contexts. More generally, the methodology that we use in our research could be applied to other workforces.

We use a three-pronged approach that consists of comparing monetary compensation, comparing nonmonetary compensation, and exploring authorities that are available to DoD as a federal employer.

Comparing Monetary Compensation

First, we analyze differences in monetary compensation across DoD civilian and private-sector workers in our workforces of interest. Using administrative and survey data, we compare demographic characteristics, finding that DoD civilians in our workforces of interest generally have higher educational attainment and more years of potential experience (YOPE) than private-sector workers. We also use administrative and survey data to construct regression models to estimate income trajectories, controlling for demographic characteristics. We find that average income among DoD civilians is competitive with or exceeds that in the private sector for three defense acquisition workforces—business and financial management, procurement, and engineering and science. However, for the remaining two workforces—aerospace engineering and defense acquisition program management—DoD falls short of the private sector. Looking at different subgroups within the workforces of interest, we find that, for most workforces, the

results vary—particularly by educational attainment, by agency, among the top three largest subagencies, and among three locality pay areas of interest to the sponsor.

For the workforces nationwide, we find broad consistency in results for the lowest and highest education groups. Regression-adjusted predicted income among DoD civilians with less than a bachelor’s degree generally exceeds that of their private-sector counterparts. The opposite is true for those with a master’s degree or more, where predicted average income among DoD civilians typically falls short compared with the private sector, and the difference between DoD civilian and private-sector predicted average income increases with YOPE. These findings hold when we examine each workforce in the locality pay areas of Los Angeles–Long Beach, California (CA), and Washington-Baltimore-Arlington (DC-MD-VA-WV-PA),¹ but not for workforces in the Denver-Aurora, Colorado (CO), locality pay area. These results suggest that, although DoD might have difficulty recruiting and retaining highly educated civilians at the nationwide level and for some local areas, more research is needed to understand differences in compensation between the DoD civilian and private sectors at the local level. Moreover, we find that DoD civilians covered by demonstration project pay plans—which allow for alternative personnel systems to address hiring, recruiting, and retention—generally have income that is competitive with or higher than the private sector, but the share of DoD civilians covered by demonstration projects varies across the workforces.

Comparing Nonmonetary Compensation

Second, we use survey data and case studies of large private employers to explore differences in nonmonetary compensation. Because of data limitations, our nonmonetary compensation comparisons are not at the same level of granularity as the monetary compensation comparisons. Whereas for the monetary compensation comparisons we compare specific workforces of interest across the DoD civilian and private sectors, our nonmonetary compensation comparisons are aggregated either by workforce (e.g., comparing science, technology, engineering, and mathematics [STEM] and non-STEM workforces) or by sector (e.g., the public or federal sector versus the private sector). Nonetheless, the comparisons that we make provide useful information regarding the potential differences in nonmonetary compensation across our workforces of interest in the DoD civilian and private sectors.

Our findings suggest that the federal government provides more-generous benefits in some cases and less-generous benefits in others. For example, survey data show that public-sector workers have less influence over their working arrangements and are less likely to take vacations than private-sector workers. In addition, the employer case studies imply that private-sector

¹ *Washington-Baltimore-Arlington* is the name of the locality and refers to Washington, D.C.; Baltimore, Md.; and Arlington, Va. The locality also includes parts of West Virginia and Pennsylvania. DC-MD-VA-WV-PA = Washington, D.C.; Maryland; Virginia; West Virginia; Pennsylvania.

employers might provide more-generous childcare and eldercare subsidies and certain health-related benefits and that they might offer benefits that are not available in the public sector, such as stock incentives. However, the employer case studies suggest that the federal government is more generous than private employers in terms of education-related benefits and availability of life insurance. The federal government also provides both a defined-contribution retirement program and a defined-benefit retirement program—unlike private employers, which offer only a defined-contribution plan. Providing a defined-benefit plan, which is an important component of nonmonetary compensation, has been shown to be the main reason why total compensation in the federal government exceeds that in the private sector (Falk, 2012). These findings underscore the importance of considering *total* compensation—not just *monetary* compensation—when comparing across the DoD civilian and private sectors.

Exploring Authorities

Third, we summarize authorities available to DoD, as a federal employer, to recruit and retain talent. These authorities include hiring authorities, which allow for expedited and streamlined hiring processes for select workforces or candidates; compensation authorities, which allow for targeted, additional monetary compensation; and demonstration projects, which allow for alternative personnel systems to address hiring, recruiting, and retention. Unfortunately, the data used in this study provide only limited visibility on the use of hiring authorities or compensation authorities. However, we are able to observe DoD civilians in our workforces of interest who are covered by demonstration projects. As mentioned, we find that income among DoD civilians covered by demonstration projects is in line with or even higher than in the private sector, while income among individuals covered by other pay plans, including the standard General Schedule (GS) system, is lower than in the private sector. More research is needed to understand the extent to which hiring and compensation authorities are used for our workforces of interest, whether the use of demonstration projects could be expanded, and whether new authorities might be needed to improve recruiting and retention.

Summary of Findings

To summarize, our analysis shows the following results:

- Average income among DoD civilians is competitive with or exceeds that in the private sector for three of the defense acquisition workforces—business and financial management, procurement, and engineering and science.
- Average income among DoD civilians falls short of the private sector for the remaining two workforces—aerospace engineering and defense acquisition program management.

- At the nationwide level across all workforces of interest, DoD civilian average income generally exceeds that in the private sector among those with less than a bachelor's degree and falls short of the private sector among those with a master's degree or more. However, these findings do not hold for all of the local areas studied in this report.
- Average income among DoD civilians covered by demonstration projects is in line with or even higher than the private sector, while income among individuals covered by other pay plans, including the standard GS system, is lower than in the private sector.
- In terms of nonmonetary compensation, the federal government provides more-generous benefits in some cases and less-generous benefits in others.

Implications

Returning to the broader view, we note that this research is motivated by the concern that DoD might have difficulty recruiting and retaining civilians with high-value skill sets. Therefore, we compare monetary and nonmonetary compensation among the DoD civilian and private sectors. Although this is useful to understand, it is only part of the picture. We note that empirical evidence on the extent to which there are recruiting and retention problems in our workforces of interest, such as analysis of job openings and turnover data, would shed light on the scale of the problem. Moreover, there are likely other drivers that influence individuals' decisions to work in the public or private sector. These include differences in recruiting and hiring processes or harder-to-quantify aspects of federal employment, which can be positive (e.g., a desire to serve the nation) or negative (e.g., a lengthy hiring process, government shutdowns, pay freezes, or frequent leadership turnover following a change in the federal administration). Future research along these lines is needed to give DoD a better understanding of how individuals make their employment decisions and what impact that has on DoD's ability to recruit and retain talent.

Finally, we note that the demand for high-value skill sets is not static. In this report, we document differences in compensation between the DoD civilian and private sectors using recent historical data. In the future, these differences could persist, widen, or shrink. Therefore, we note that, when contemplating changes in DoD civilian compensation, policymakers should consider how demand for high-value skill sets—and also what constitutes *high-value*—might change over time for both DoD and the private sector.

Given this broader context, we conclude with two recommendations:

1. **We suggest that DoD investigate the merits of expanding the use of demonstration projects.** Our results show that income among DoD civilians covered by demonstration projects is competitive with or greater than that in the private sector, unlike with DoD civilians covered by other pay plans.

2. **We recommend that new research be conducted to (1) quantify the usage of existing hiring and compensation authorities to recruit and retain DoD civilians with high-value skill sets, (2) further investigate differences in monetary compensation at the local level, and (3) empirically demonstrate the extent to which recruiting and retaining DoD civilians with high-value skill sets is a problem.** Before recommendations can be made concerning whether new authorities are needed, we must understand how much existing authorities are being used and the size and scope of the problem—nationwide and at the local level—that they are designed to resolve.

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Abbreviations

AcqDemo	Acquisition Demonstration
ACS	American Community Survey
ALP	American Life Panel
AWCS	American Working Conditions Survey
BLS	U.S. Bureau of Labor Statistics
CA	California
CO	Colorado
CPS	Current Population Survey
DCAA	Defense Contract Audit Agency
DC-MD-VA-WV-PA	Washington, D.C.; Maryland, Virginia, West Virginia, Pennsylvania
DFAS	Defense Finance and Accounting Service
DHA	Direct Hiring Authority
DMDC	Defense Manpower Data Center
DoD	U.S. Department of Defense
EAP	Employee Assistance Program
EEOC	U.S. Equal Employment Opportunity Commission
FY	fiscal year
GAO	U.S. Government Accountability Office
GS	General Schedule
NDAA	National Defense Authorization Act
OES	Occupational Employment Statistics
OPM	U.S. Office of Personnel Management
S&I	special and incentive
SOC	Standard Occupational Classification
STEM	science, technology, engineering, and mathematics
YOPE	years of potential experience

1. Introduction

The U.S. Space Force was created by the National Defense Authorization Act (NDAA) for 2020 (Pub. L. 116-92, 2019). To man the U.S. Space Force, the U.S. Department of Defense (DoD) will need to hire civilians with high-value skill sets. Because of concern that it will have difficulty recruiting and retaining civilian talent for the Space Force, DoD needs a better understanding of how its civilian compensation compares with private-sector compensation. In this report, we compare monetary and nonmonetary compensation between the DoD civilian and private sectors, focusing on five existing workforces deemed to have high-value skill sets necessary for manning the Space Force and of particular interest to the sponsor of this study. The workforces of interest are aerospace engineers and four workforces within the broader umbrella of the defense acquisition workforce: business and financial management, program management, procurement, and engineering and science. Although this report focuses on these workforces of interest, the methodology used to compare monetary and nonmonetary compensation between DoD civilians and the private sector can be easily applied to other workforces.

Table 1.1 shows the occupations that constitute the four defense acquisition workforces, shown by U.S. Office of Personnel Management (OPM) occupation title. We note that aerospace engineering, while a workforce of interest to the sponsor on its own, is also included in the sponsor's definition of *defense acquisition engineering and science workforce*.

Table 1.1. Occupations That Constitute the Four Defense Acquisition Workforces

Defense Acquisition Workforce	Occupations (OPM Titles)	
Business and financial management	Financial administration	Budget analysis
	Financial clerk and technician	Budget clerical and assistance
	Accounting	Financial analysis
	Auditing	
Program management	Program management	Logistics
	Management and program analysis	Supply program management
Procurement	General business and industry	Purchasing
	Contracting	Industrial specialist
	Industrial property management	Support services administration
	Property disposal	Quality assurance
Engineering and science	General engineering	Chemical engineering
	Safety engineering	Industrial engineering
	Fire protection engineering	General physical sciences
	Materials engineering	Physics

Defense Acquisition Workforce	Occupations (OPM Titles)
Civil engineering	Hydrology
Environmental engineering	Chemistry
Mechanical engineering	Metallurgy
Electrical engineering	Geology
Computer engineering	Cartography
Electronics engineering	Operations research
Biomedical engineering	Mathematics
Aerospace engineering	Mathematical sciences
Naval architecture	Computer science
Agricultural engineering	

NOTE: The selection of defense acquisition occupations and grouping into four categories follows the sponsor's direction and is based largely on occupational grouping from a RAND Corporation report about the defense acquisition workforce (Gates, 2009).

Because the Space Force is newly established, it is unclear whether recruiting and retention of civilians in these workforces—and, therefore, any compensation differences—will be a problem.² However, comparing compensation between DoD civilians and the private sector for each of these workforces provides useful benchmarks to identify where DoD civilian compensation might fall short when compared with the private sector. Furthermore, we note that, although we focus on high-value skill sets relevant to the Space Force, these workforces are valuable in other service and DoD contexts. More generally, the methodology that we use in this study can be applied to other workforces.

Prior research has compared compensation between federal workers and private-sector workers. Most studies show that some federal workers receive higher wages than their counterparts in the private sector, but this difference can vary depending on education level or job type (Bradley, 2012). For example, recent RAND research focusing on the science, technology, engineering, and mathematics (STEM) workforce estimates a \$2,600 pay penalty for federal STEM workers when comparing their compensation with that in the private sector (Edwards et al., forthcoming). Still, researchers generally acknowledge that accounting for nonmonetary compensation—often referred to as *benefits*—is a challenge in these comparisons (Bradley, 2012). In fact, a 2012 Congressional Budget Office report found that total compensation is higher in the federal government than in the private sector, and the main driver is benefits, not wages (Falk, 2012). This is primarily because the defined-benefit retirement savings plan offered by the federal government is becoming increasingly rare in the private sector. In addition to having more benefits, federal workers have been found to work shorter

² We note that a recent RAND study on a related topic looks at the career fields that will be necessary for the success of the Space Force, as well as which career fields could be fully sustained by the Space Force and which might need supplementation from the U.S. Air Force (Spiras et al., 2020). Although this study does not focus explicitly on monetary and nonmonetary compensation, it does discuss some relevant aspects of personnel policy.

hours (Edwards et al., forthcoming). Moreover, studies rarely consider such benefits as paid time off and flexible work schedules, yet recent research indicates that nonwage job characteristics, such as benefits, play a role in job choice (Maestas et al., 2018).

Although there is research comparing compensation between federal and private-sector workers, less is known about how compensation of DoD civilian workers compares with that of private-sector workers. In two recent RAND projects, researchers compared DoD civilian and private-sector compensation for specific occupations. The first project is a study on Air Force civilian compensation and benefits that is focused on hard-to-fill and mission-critical occupations, including aircraft operations, air traffic controllers, human resources management, information technology management, cyber, and aircraft mechanics (Groeber, Keller, et al., forthcoming). Overall, the study found lower monetary compensation in the Air Force than in the private sector for several of these occupations. The second project is an ongoing study on the DoD Cyber Excepted Service and how to improve compensation to increase management flexibility and retain cyber talent. Similar to our study, the Cyber Excepted Service study compares wages across the career between DoD civilians in seven cyber work roles and comparable private-sector workers, controlling for demographic characteristics. Although the results vary across the career trajectory and by cyber work role, preliminary analysis suggests that DoD civilians in the selected cyber work roles generally earn more than private-sector workers do through the middle of the career, after which point earnings converge.

This research complements the two recent RAND studies by comparing compensation between the DoD civilian and private sectors for the five workforces of interest mentioned earlier. In Chapter 2, we analyze administrative and survey data to compare demographic characteristics between the DoD civilian and private sectors for each workforce of interest and examine the distribution of DoD civilian workers by agency, top three subagencies, pay plan, and three locality pay areas of interest. Next, in Chapter 3, we return to the administrative and survey data and compare monetary compensation between the DoD civilian and private sectors for each workforce, estimating income trajectories using regression models that control for demographic characteristics. In Chapter 4, we explore how nonmonetary compensation differs, using survey data and case studies of large private employers. In Chapter 5, we gather information on existing OPM hiring authorities, compensation authorities, and demonstration projects to describe the tools available to DoD to recruit and retain civilians with high-value skill sets. Finally, in Chapter 6, we conclude by discussing the implications of our findings and describe where additional research is needed.

2. Workforce Characteristics

In this chapter, we compare the characteristics of the DoD civilian and private-sector workforces for each workforce of interest. We begin with a description of methods—the data sources used and characteristics examined—followed by a description of data on workforce size and workforce characteristics.

Methods

To examine workforce characteristics, we use two sources of data. For DoD civilians, we use administrative data from the 2010–2018 September files of the Defense Manpower Data Center (DMDC) Civilian Master File. For the private sector, we use data from the 2010–2018 U.S. American Community Survey (ACS) (Ruggles et al., 2020).³ In both cases, we limit our sample to workers with at least 35 hours worked per week and who make at least a full-time minimum-wage salary.⁴

In the remainder of this chapter, we present data on workforce size and how it has changed from 2010 through 2018. Next, we display differences—across workforce and across sectors—in key demographic characteristics: educational attainment, years of potential experience (YOPE),⁵

³ The ACS also covers workers in the nonprofit and state- and local-government sectors. These sectors differ from the private sector in two key dimensions: income and demographic characteristics. Therefore, they should be analyzed separately from the private sector. However, there is insufficient sample size in the ACS for nonprofit and state- and local government-sector workers in the workforces of interest. So, we exclude nonprofit and state- and local-government workers from our analysis. Also, we considered using another data source for private-sector workers, the U.S. Current Population Survey (CPS). The CPS is used to calculate official unemployment statistics, and its Annual Social and Economic Supplement includes questions, which are not included in the ACS, about employer-provided retirement benefits and paid leave. However, the CPS sample size is smaller than that of the ACS, making estimates more variable, especially for smaller occupations, such as aerospace engineers.

⁴ To create a proxy for full-time minimum wage, we restrict to workers with income of at least \$12,687.50, which is equal to federal minimum wage of \$7.25 per hour, multiplied by 35 hours per week, multiplied by 50 weeks. For DMDC, we also drop less than 2 percent of the sample made up of individuals who were paid more often than biweekly to more accurately estimate an annualized version of gross pay. We describe this process in more detail in Chapter 3. Also, we note that both data sources include workers who may be considered *executives* (e.g., Senior Executive Service employees in the DMDC data and managers in the ACS data) and *nonexecutives* (e.g., General Schedule [GS] employees in the DMDC data and non-managers in the ACS data). We have the ability to distinguish between executives and nonexecutives in the DMDC data. However, we do not draw this distinction, because we are unable to do the same in the ACS data.

⁵ We use YOPE—defined by age and educational attainment—in lieu of years of actual work experience because we do not observe years of work experience in the data. (Note that the DMDC data include a measure of years of service, but that does not account for any experience outside the federal sector.) YOPE equals age minus 27 for those with an advanced degree, age minus 24 for those with a master’s degree, age minus 22 for those with a bachelor’s degree, age minus 20 for those with an associate’s degree, and age minus 18 for those with some college or less.

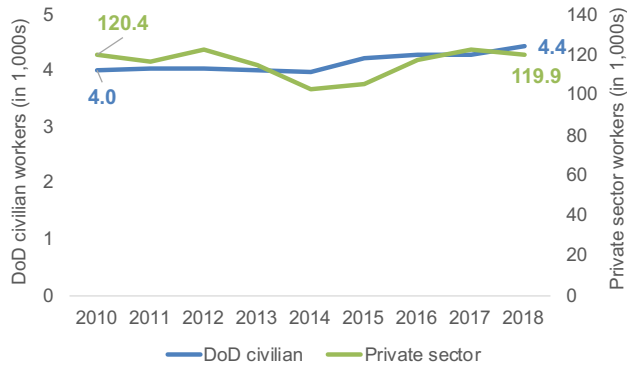
gender, race/ethnicity, and veteran status. For these demographic characteristics, we show data from two points in time—2010 and 2018—bookending our sample period. Finally, for the DoD civilian sector, we present data on some DoD-relevant workforce characteristics—the distribution of workers by agency, by subagency, by pay plan, and among three locality pay areas of interest—again, for 2010 and 2018.

Workforce Size

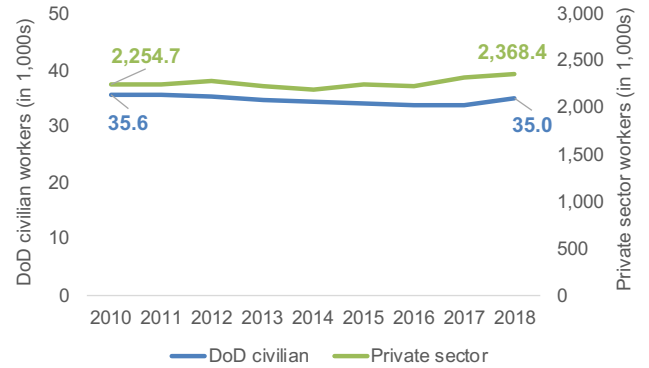
Figure 2.1 shows the size of the workforce for our sample period, 2010–2018, by workforce of interest and sector (i.e., DoD civilian sector and private sector). Note that, because workforce size varies dramatically across workforces and across sectors, the scales on the y-axes in Figure 2.1 vary as well. For the workforces that we studied, the general trend from 2010 through 2018 was one of workforce growth. Yet there are notable differences in the time trends by workforce and by sector, as we discuss next.

Among aerospace engineers, the DoD civilian workforce grew by about 10 percent, from roughly 4,000 in 2010 to roughly 4,400 in 2018, while the private-sector workforce shrank by less than 1 percent, from roughly 120,400 in 2010 to roughly 119,900 in 2018. The first of the four defense acquisition workforces—business and financial management—saw a modest decline in the DoD civilian sector of 2 percent, from roughly 35,600 in 2010 to roughly 35,000 in 2018, and an increase in the private sector of 5 percent, from 2,254,700 in 2010 to 2,368,400 in 2018. The remaining defense acquisition workforces saw sizable increases over the sample period. The program management workforce grew by 11 percent in the DoD civilian sector, from roughly 52,900 in 2010 to roughly 58,600 in 2018, and by 49 percent in the private sector, from roughly 627,900 in 2010 to roughly 932,800 in 2018. The procurement workforce grew by 7 percent in the DoD civilian sector, from roughly 45,800 in 2010 to roughly 48,900 in 2018, and by 22 percent in the private sector, from roughly 715,400 in 2010 to roughly 870,900 in 2018. Finally, the engineering and science workforce grew by 8 percent in the DoD civilian sector, from roughly 82,200 in 2010 to roughly 88,600 in 2018, and by 28 percent in the private sector, from roughly 1,650,500 in 2010 to roughly 2,107,300 in 2018.

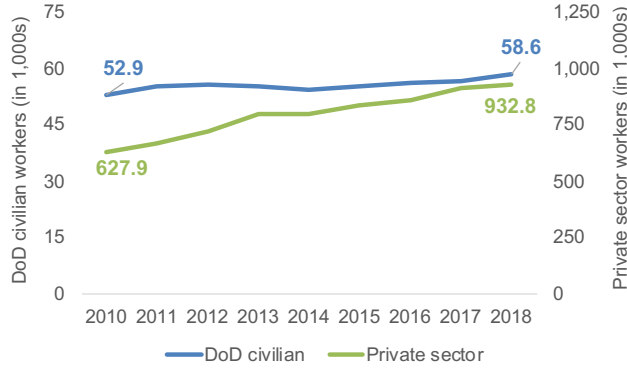
Figure 2.1. Workforce Size by Workforce of Interest and Sector, 2010–2018



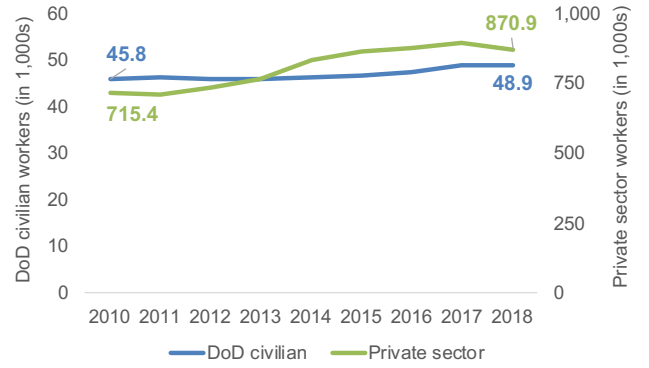
(a) Aerospace engineering



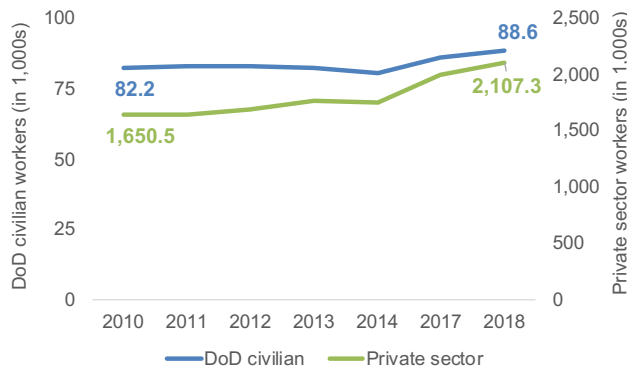
(b) Defense acquisition business and financial management



(c) Defense acquisition program management



(d) Defense acquisition procurement



(e) Defense acquisition engineering and science

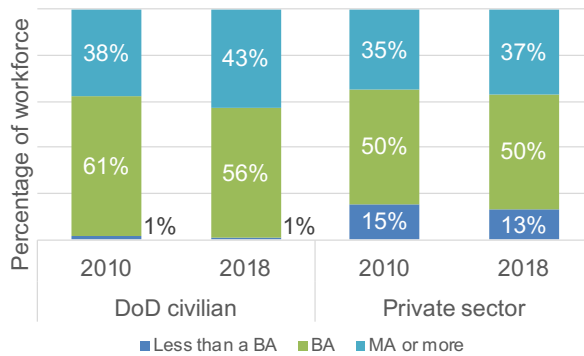
SOURCES: 2010 and 2018 DMDC Civilian Master File and the ACS (Ruggles et al., 2020).

Educational Attainment

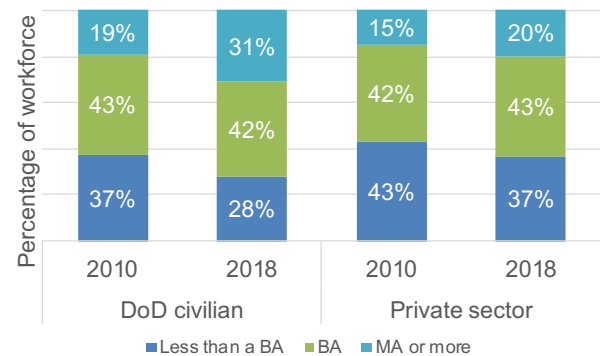
Figure 2.2 shows educational attainment by workforce and by sector in 2010 and 2018. For all five workforces and sectors, we see that educational attainment increased between 2010 and 2018, with a lower share of the workforce with less than a bachelor's degree in 2018 than in 2010. Yet there are interesting differences when we compare within workforces and sectors.

Looking across workforces, we can immediately see growth in the share of DoD civilians with a master's degree or more between 2010 and 2018 for each workforce of interest. Also, we see that aerospace engineering and engineering and science have the highest educational attainment among the workforces, with no less than half of the workforce holding a bachelor's degree and 31 percent or more of the workforce holding a master's degree or more. Moreover, looking across sectors, the DoD civilian workforce has higher educational attainment across all workforces in 2010 and 2018, save one workforce—program management. For three workforces (aerospace engineering, procurement, and engineering and science), the higher educational attainment in the DoD civilian sector in both 2010 and 2018 is driven by differences in all three levels of educational attainment—a lower share with less than a bachelor's degree and a higher share with a bachelor's degree or a master's degree or more. In contrast, for the fourth workforce in which educational attainment is higher in the DoD civilian sector (business and financial management), the higher educational attainment in the DoD civilian sector in both 2010 and 2018 is driven by differences at the two extremes—a lower share with less than a bachelor's degree and a higher share with a master's degree or more, but a nearly identical share with a bachelor's degree. Finally, the story is mixed for program management: The DoD civilian workforce has a higher share with less than a bachelor's degree and a lower share with a bachelor's degree in both 2010 and 2018. However, in 2010, the program management DoD civilian workforce had a lower share with a master's degree or more, while the opposite was true in 2018, with a higher share of the DoD civilian workforce holding a master's degree or more.

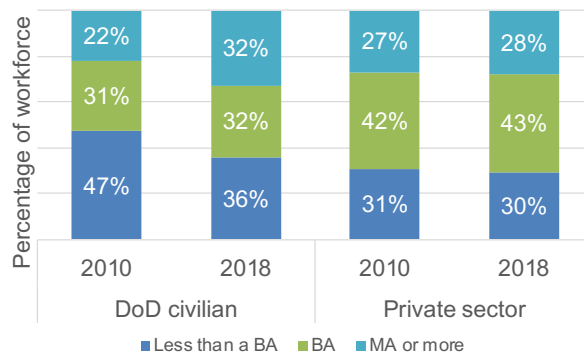
Figure 2.2. Educational Attainment by Workforce of Interest and Sector, 2010 and 2018



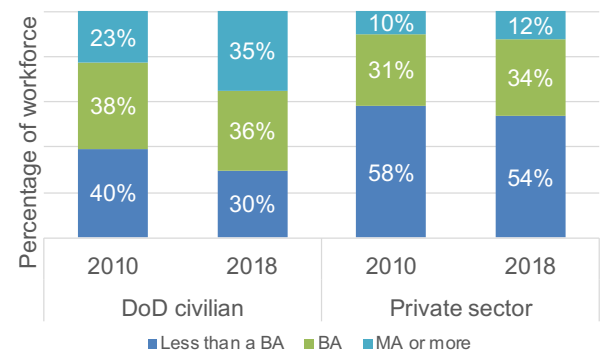
(a) Aerospace engineering



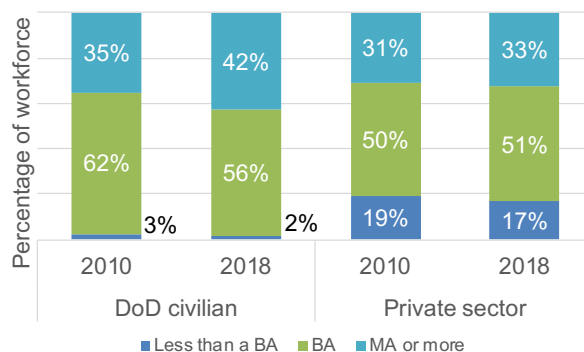
(b) Defense acquisition business and financial management



(c) Defense acquisition program management



(d) Defense acquisition procurement



(e) Defense acquisition engineering and science

SOURCES: 2010 and 2018 DMDC Civilian Master File and the ACS (Ruggles et al., 2020).

NOTE: Numbers might not sum to 100 within each year because of rounding error.

Years of Potential Experience

Figure 2.3 shows YOPE profiles by workforce and by sector in 2010 and 2018. Each figure includes a line labeled *even spread*, which represents a workforce that is evenly distributed

across the YOPE groups—there are seven groups (i.e., 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, and 30+ YOPE), so each of the groups in the even spread line constitutes one-seventh (14 percent) of the workforce. Using the even spread line as a reference point allows us to more readily observe whether parts of the YOPE profile are overrepresented (i.e., the slope is steeper than the slope of the even spread line) or underrepresented (i.e., the slope is flatter than the slope of the even spread line).

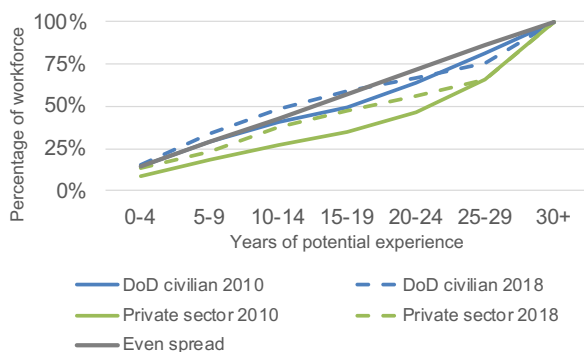
To make this concept more concrete, we walk through the data for aerospace engineering. Among aerospace engineers in the DoD civilian workforce in 2010, we see that the 10–14 YOPE group was underrepresented (9 percent versus the even spread, 14 percent), while the 25–29 and 30+ YOPE groups were overrepresented (17 percent and 19 percent, respectively, versus the even spread, 14 percent), demonstrating that the distribution of workers in this workforce is skewed toward those with more experience. By 2018, the profile shifted such that the 5–9 and 30+ YOPE groups were overrepresented (18 percent and 25 percent, respectively, versus the even spread, 14 percent), while the 15–19, 20–24, and 25–29 YOPE groups were underrepresented (10, 8, and 9 percent, respectively, versus the even spread, 14 percent).

However, Figure 2.3 shows that the extent of under- or overrepresentation of YOPE groups is considerably larger in the private sector. Among private-sector aerospace engineers in 2010, the 0–4, 5–9, 10–14, and 15–19 YOPE groups were underrepresented (8, 10, 9, and 8 percent, respectively, versus the even spread, 14 percent), while the 25–29 and 30+ YOPE groups were overrepresented (19 percent and 35 percent, respectively, versus the even spread, 14 percent). By 2018, the profile shifted such that the 5–9 and the 30+ YOPE groups were overrepresented (18 percent and 25 percent, respectively, versus the even spread, 14 percent), while the 15–19, 20–24, and 25–29 YOPE groups were underrepresented (10, 8, and 9 percent, respectively, versus the even spread, 14 percent).

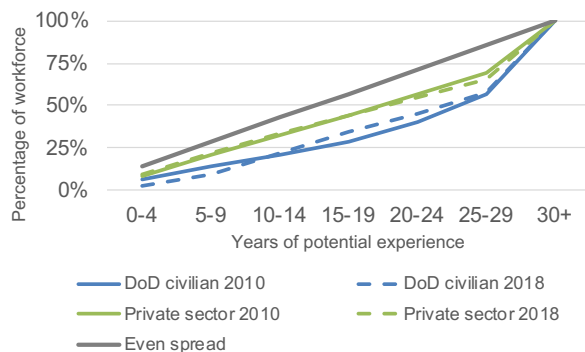
Viewed as a whole, Figure 2.3 shows that, across all workforces and sectors, YOPE profiles generally are skewed toward the more-senior portions of the YOPE distribution. However, comparing across 2010 and 2018, we see that YOPE profiles have become less senior, moving closer to an even spread over time. Still, in 2018, we see that workers with high YOPE remain overrepresented across all workforces of interest. For aerospace engineering and defense acquisition engineering and science, the overrepresentation of workers with high YOPE is coupled with an overrepresentation of workers with low YOPE and counterbalanced by an underrepresentation of workers with midrange YOPE. In contrast, for the other three defense acquisition workforces, we see that overrepresentation of workers with high YOPE is accompanied by a slight underrepresentation of workers across the rest of the YOPE distribution. The underrepresentation of mid-career civilians might be indicative of difficulty recruiting or retaining mid-career civilians in these workforces of interest. Moreover, comparing across workforces, we see that the defense acquisition program management YOPE profile is the most senior, followed by defense acquisition workforce business and financial management and procurement (which have similarly shaped YOPE profiles), aerospace engineering, and, finally,

defense acquisition engineering and science. We also note that the DoD civilian sector is generally more senior than the private sector, with the exception of aerospace engineering, for which the opposite is true.

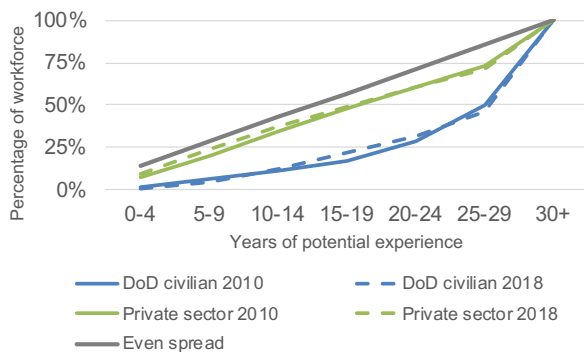
Figure 2.3. YOPE by Workforce of Interest and Sector, 2010 and 2018



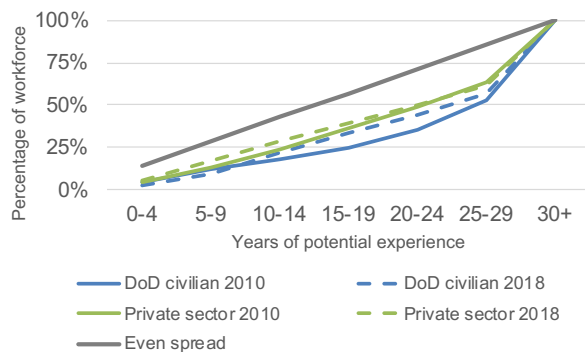
(a) Aerospace engineering



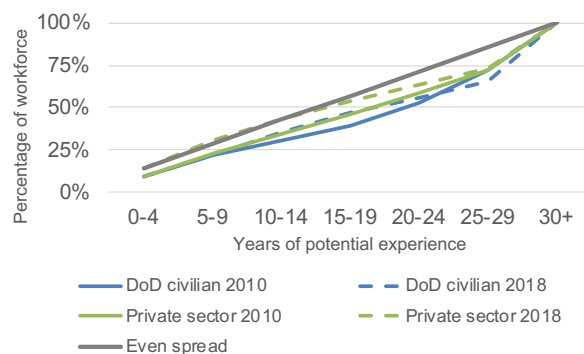
(b) Defense acquisition business and financial management



(c) Defense acquisition program management



(d) Defense acquisition procurement



(e) Defense acquisition engineering and science

SOURCES: 2010 and 2018 DMDC Civilian Master File and the ACS (Ruggles et al., 2020).

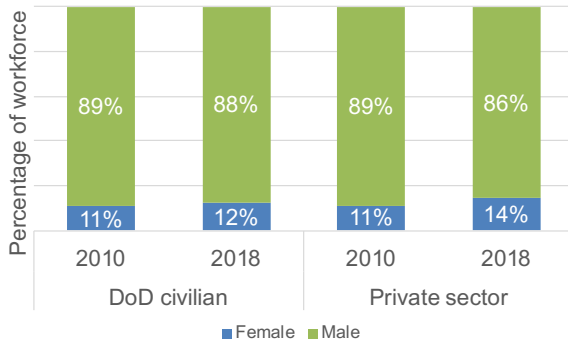
Gender

Figure 2.4 shows gender mix by workforce and by sector in 2010 and 2018. Over this period, the female share in these workforces is fairly flat, regardless of sector. Indeed, we see growth in the female share for some workforces and a decline for others, but by no more than 3 percentage points in either direction. Still, in the two workforces in which females are the overwhelming minority, a few percentage points represents a nontrivial percentage change—for aerospace engineering, the female share grew 16 percent (from 11 percent to 12 percent) in the DoD civilian sector and 30 percent (from 11 percent to 14 percent) in the private sector between 2010 and 2018; for engineering and science, the female share grew 13 percent (from 16 percent to 18 percent) in the DoD civilian sector and 21 percent (from 16 percent to 19 percent) in the private sector over the same time period.

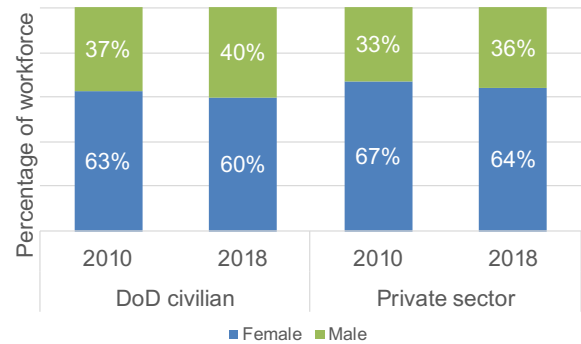
Across all of the workforces, aerospace engineering and engineering and science have the lowest female shares, as shown in Figure 2.4. Program management and procurement are closer to parity—around 40- to 50-percent female. And women are the majority in business and financial management, with 60–67 percent of the workforce being female.

Across sectors, the differences in the female share are modest—again, typically no more than 4 percentage points. Procurement is the exception: The female share of the DoD civilian procurement workforce was 5 percentage points lower than that of the private-sector procurement workforce in 2010 and 9 percentage points lower in 2018.

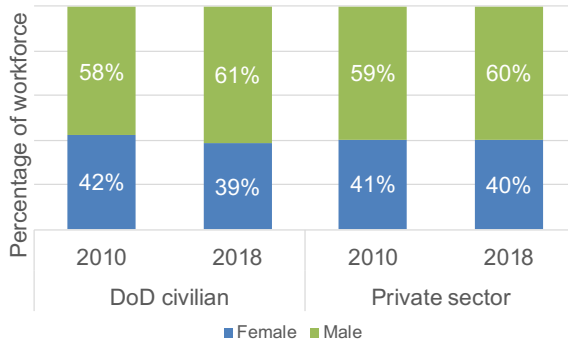
Figure 2.4. Gender by Workforce of Interest and Sector, 2010 and 2018



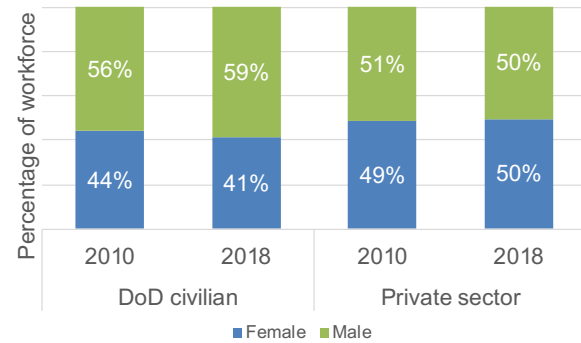
(a) Aerospace engineering



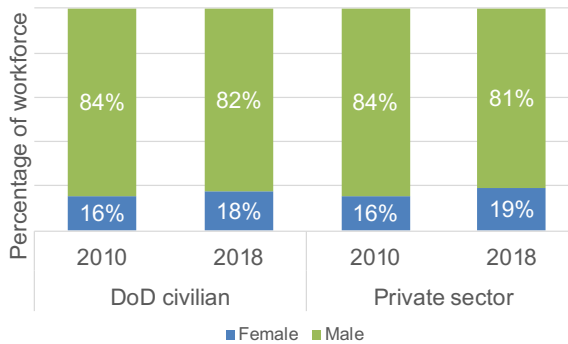
(b) Defense acquisition business and financial management



(c) Defense acquisition program management



(d) Defense acquisition procurement



(e) Defense acquisition engineering and science

SOURCES: 2010 and 2018 DMDC Civilian Master File and the ACS (Ruggles et al., 2020).

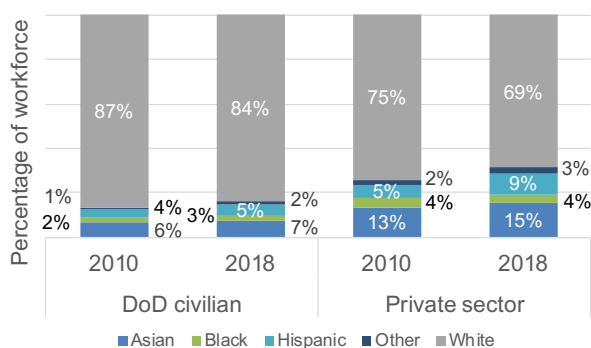
NOTE: Numbers might not sum to 100 within each year because of rounding error.

Race/Ethnicity

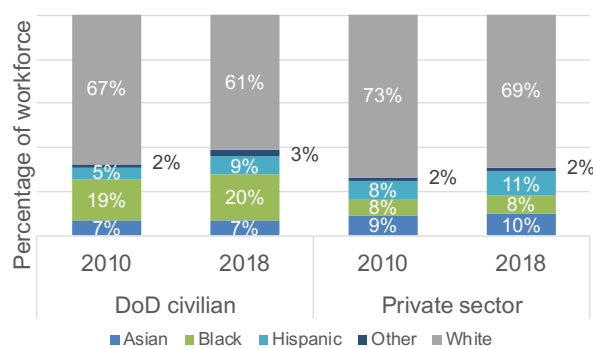
Figure 2.5 shows the racial/ethnic mix by workforce and sector in 2010 and 2018. Across all workforces and sectors, the white share of the workforce fell slightly between 2010 and 2018, by

3 to 6 percentage points, while each of the other racial/ethnic group shares grew slightly. However, we also observed interesting variation by workforce.

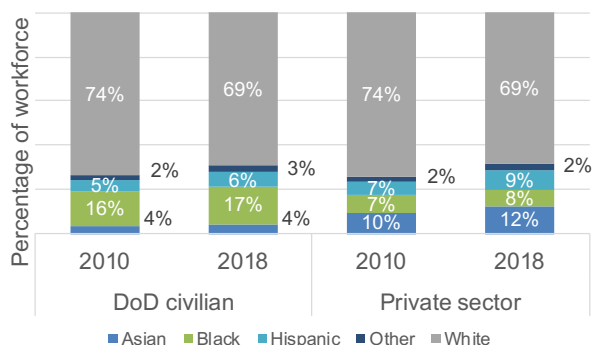
Figure 2.5. Race/Ethnicity by Workforce of Interest and Sector, 2010 and 2018



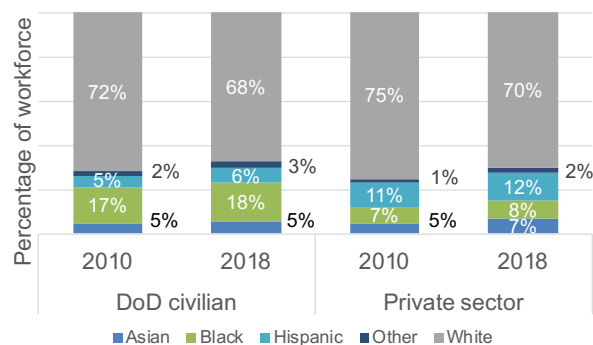
(a) Aerospace engineering



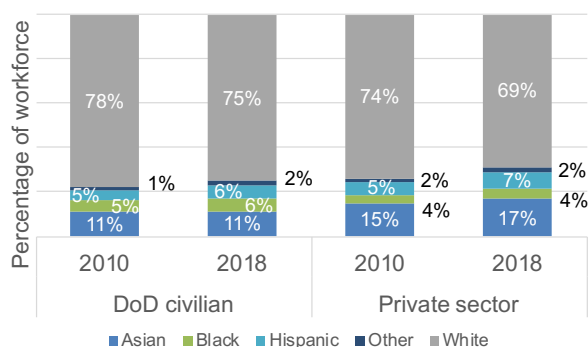
(b) Defense acquisition business and financial management



(c) Defense acquisition program management



(d) Defense acquisition procurement



(e) Defense acquisition engineering and science

SOURCES: 2010 and 2018 DMDC Civilian Master File and the ACS (Ruggles et al., 2020).
NOTE: Numbers might not sum to 100 within each year because of rounding error.

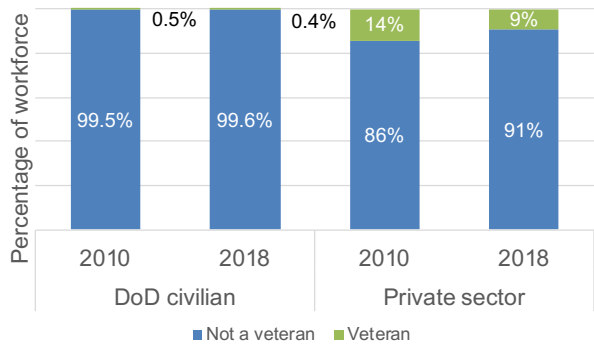
Compared with the DoD civilian aerospace engineering workforce, the private-sector aerospace engineering workforce has a lower white share (e.g., 69 percent versus 84 percent in 2018) and a higher Asian share (e.g., 15 percent versus 7 percent in 2018). The same is true for the defense acquisition engineering and science workforce. For the defense acquisition business and financial management and procurement workforces, the private sector has a higher white share (e.g., 69 percent versus 61 percent in 2018 for business and financial management) and a lower black share (e.g., 8 percent versus 20 percent in 2018 for business and financial management) than the DoD civilian sector. Finally, for the defense acquisition program management workforce, the private sector has a lower black share (e.g., 8 percent versus 17 percent in 2018) and a higher Asian share (e.g., 12 percent versus 4 percent in 2018) than the DoD civilian sector.

Veteran Status

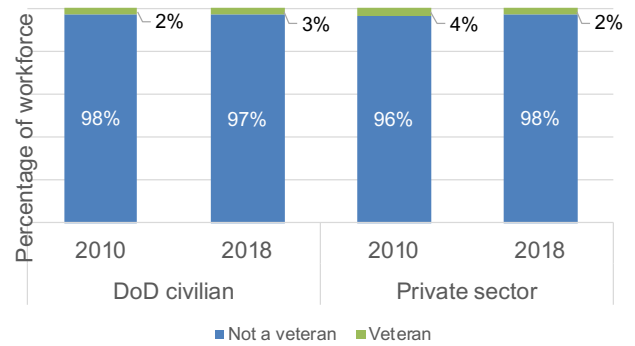
Figure 2.6 shows veteran status by workforce and by sector in 2010 and 2018. Over this period, the veteran share has generally increased but by small margins. The veteran share appears to be low overall; across all five workforces and the two sectors, no more than 14 percent of the workforce in 2010 and 9 percent of the workforce in 2018 were veterans. Yet the veteran share in the U.S. population was just 7 percent in 2018 (Vespa, 2020). And in some of the workforces and sectors—most notably the private-sector aerospace engineering workforce and the DoD civilian defense acquisition program management workforce—the veteran share exceeds the national share.

Across the workforces, 1 percent or less of the DoD civilian aerospace engineering and engineering and science workforces were veterans in 2010 and 2018. For private-sector aerospace engineering and engineering and science, the veteran share is larger—14 and 10 percent were veterans in 2010, respectively, falling to 9 and 6 percent in 2018, respectively. Business and financial management, program management, and procurement differ slightly in their levels of veteran share—with business and financial management having the largest veteran share (between 7 and 9 percent, depending on sector and year)—yet all three show small differences when the DoD civilian and private sectors are compared.

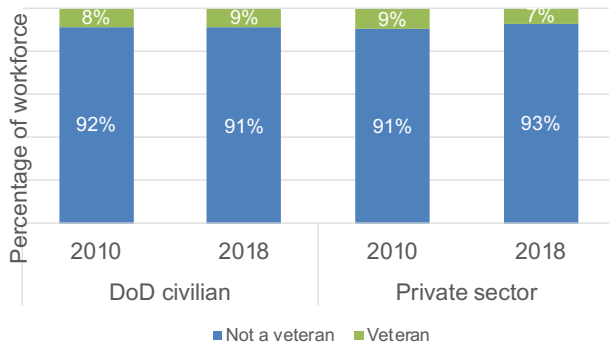
Figure 2.6. Veteran Status by Workforce of Interest and Sector, 2010 and 2018



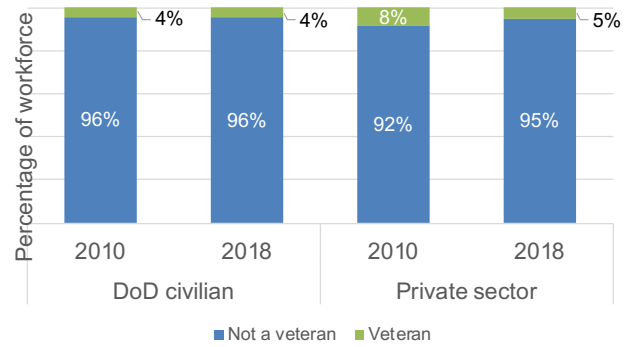
(a) Aerospace engineering



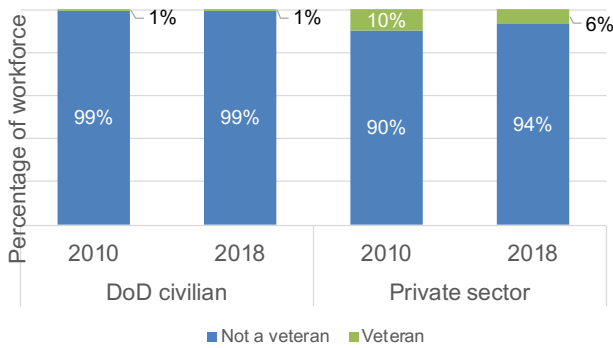
(b) Defense acquisition business and financial management



(c) Defense acquisition program management



(d) Defense acquisition procurement



(e) Defense acquisition engineering and science

SOURCES: 2010 and 2018 DMDC Civilian Master File and the ACS (Ruggles et al., 2020).
NOTE: Numbers might not sum to 100 within each year because of rounding error.

Agency, Subagency, and Pay Plan

This section focuses on the DoD civilian workforce and showcases some DoD-specific aspects of employment: agency, subagency, and pay plan. Figure 2.7 shows how civilian workers

are distributed across DoD agencies (i.e., U.S. Air Force, U.S. Army, U.S. Marine Corps, U.S. Navy, and other DoD agencies).⁶

The Navy has the largest share of the aerospace engineering workforce—44 percent in 2010 and 50 percent in 2018. The agency with the second-largest share of the aerospace engineering workforce is the Air Force—35 percent in 2010 and 32 percent in 2018. The Army constitutes no more than 18 percent of the aerospace engineering workforce, and other DoD agencies just 3 percent. There are no DoD civilian aerospace engineers working for the Marine Corps.

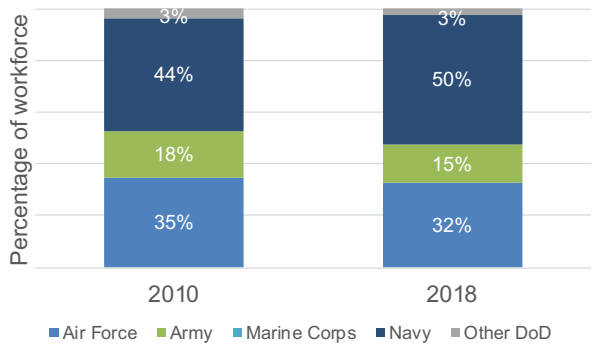
The distribution of civilian workers across DoD agencies is similar for two of the four defense acquisition workforces: business and financial management and procurement. In those workforces, roughly one-fifth to one-quarter work for the Army and for the Air Force, roughly one-fifth work for the Navy, a very small share (no more than 3 percent) works for the Marine Corps, and the remaining one-third work for other DoD agencies.

For defense acquisition program management, 37 and 31 percent work for the Army in 2010 and 2018, respectively, while 28 and 32 percent work for the Navy in 2010 and 2018, respectively. The remaining shares are nearly identical across 2010 and 2018—21 percent work for the Air Force, no more than 4 percent work for the Marine Corps, and just over 10 percent work for other DoD agencies.

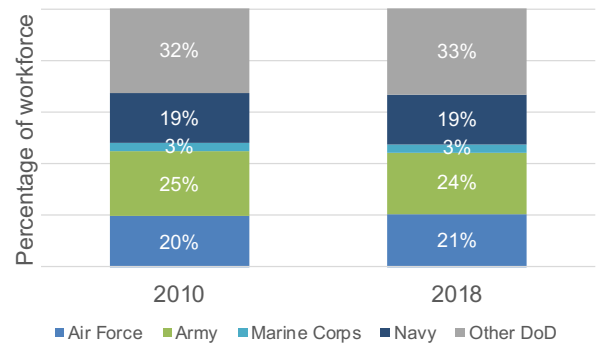
Finally, for the defense acquisition engineering and science workforce in 2010 and 2018, just under half work for the Navy, approximately one-third work for the Army, and roughly one-fifth work for the Air Force. Small percentages—1 percent and 5 percent—work for the Marine Corps and for other DoD agencies, respectively.

⁶ For reference, among the entire 2018 DoD civilian workforce sample, we found that 24 percent work for the Air Force, 34 percent work for the Army, 2 percent work for the Marine Corps, 27 percent work for the Navy, and 13 percent work for other DoD agencies. (Recall that the sample is limited to those who work with at least 35 hours per week and who make at least a full-time minimum-wage salary.)

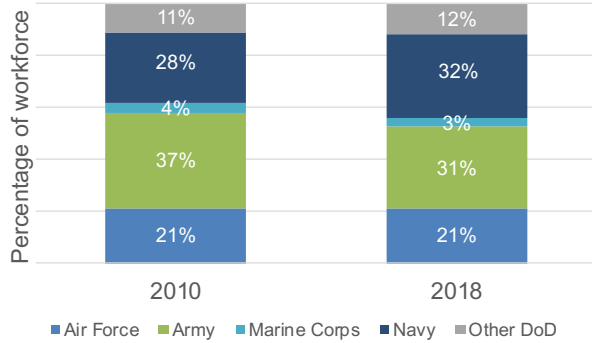
Figure 2.7. Agency Distribution by Workforce of Interest Among U.S. Department of Defense Civilians, 2010 and 2018



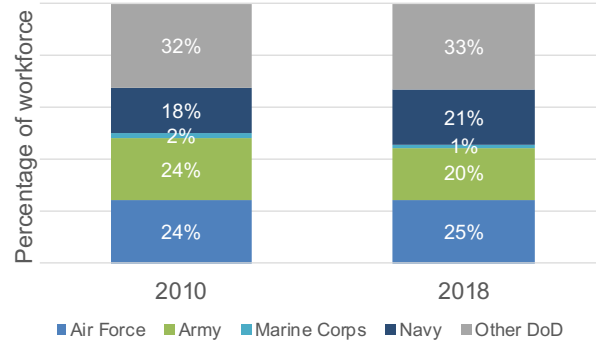
(a) Aerospace engineering



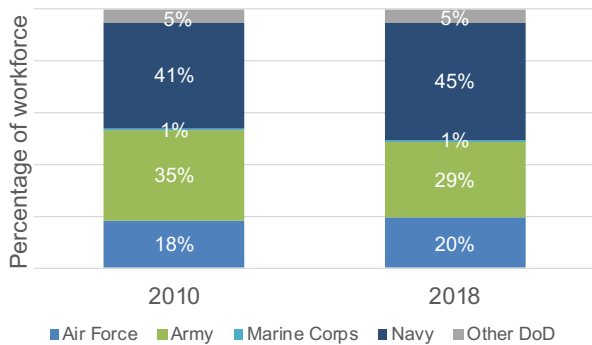
(b) Defense acquisition business and financial management



(c) Defense acquisition program management



(d) Defense acquisition procurement



(e) Defense acquisition engineering and science

SOURCES: 2010 and 2018 DMDC Civilian Master File and the ACS (Ruggles et al., 2020).

NOTE: Numbers might not sum to 100 within each year because of rounding error.

Next, Table 2.1 shows how the DoD civilian workforce is distributed across subagencies within an agency. The table highlights the subagencies that employ the largest numbers of DoD civilians across the Air Force, the Army, the Navy, and other DoD agencies; the Marine Corps is

excluded because the DMDC data do not report subagency for the Marine Corps and, regardless, the Marine Corps constitutes a very small share of the sample (as shown in Figure 2.7). Although each agency has a multitude of subagencies that employ DoD civilians in the workforces of interest, for brevity, the table shows just the top three subagencies for each agency, where the top three are identified using the 2018 share of the overall agency workforce.

In many instances, the top three subagencies make up the majority of the overall agency workforce. For aerospace engineers, the top three subagencies together constitute 87 percent or more of the overall agency workforce in 2010 and in 2018, regardless of agency. In each case, the top subagency alone constitutes no less than 80 percent of the overall agency workforce. For the defense acquisition workforces, the top three subagencies generally make up a smaller share of the overall agency workforce than is the case for aerospace engineering—from a low of 29 percent (program management for the Army) to a high of 89 percent (procurement for other DoD agencies) in 2018. Moreover, in the defense acquisition workforces, the share of the workforce in the top three subagencies is spread out more across those subagencies. Unlike for aerospace engineering, where the top subagency represents at least 82 percent of the overall agency workforce in 2018, for the defense acquisition workforces, in 2018, the top subagency share ranges from 11 percent (program management for the Army) to 69 percent (engineering and science for the Air Force) of the overall agency workforce.

Table 2.1. DoD Civilian Top Three Subagencies by Agency and Workforce of Interest: Percentage of the Agency Workforce, 2010 and 2018

Workforce	Agency	Subagency	Percentage of the Agency Workforce	
			2010	2018
Aerospace engineering	Air Force	Air Force Materiel Command	84	85
		National Air and Space Intelligence Center	0	10
		Air Force Civilian Career Training	3	3
		<i>All Air Force subagencies</i>	<i>100</i>	<i>100</i>
	Army	U.S. Army Research, Development and Engineering Command	87	90
		U.S. Army Test and Evaluation Command	4	4
		U.S. Army Aviation and Missile Command	3	3
		<i>All Army subagencies</i>	<i>100</i>	<i>100</i>
	Navy	Naval Air Systems Command	80	82
		Naval Sea Systems Command	11	10
		Office of Naval Research	4	4
		<i>All Navy subagencies</i>	<i>100</i>	<i>100</i>

Workforce	Agency	Subagency	Percentage of the Agency Workforce	
			2010	2018
Defense acquisition business and financial management	Other DoD	Defense Contract Management Agency	88	82
		Defense Advanced Research Projects Agency	5	10
		Defense Technology Security Administration	4	5
		<i>All other DoD subagencies</i>	<i>100</i>	<i>100</i>
	Air Force	Air Force Materiel Command	35	33
		Air Force Audit Agency	9	7
		Air National Guard Units (Title 32)	4	7
		<i>All Air Force subagencies</i>	<i>100</i>	<i>100</i>
	Army	Army National Guard Units (Title 32)	10	15
		U.S. Army Corps of Engineers	14	14
		U.S. Army Installation Management Command	12	8
		<i>All Army subagencies</i>	<i>100</i>	<i>100</i>
	Navy	Naval Air Systems Command	17	19
		Naval Sea Systems Command	10	12
		Assistant for Administration, Under Secretary of the Navy	8	8
		<i>All Navy subagencies</i>	<i>100</i>	<i>100</i>
	Other DoD	Defense Finance and Accounting Service (DFAS)	42	41
		Defense Contract Audit Agency (DCAA)	35	35
		Office of Inspector General	7	5
		<i>All other DoD subagencies</i>	<i>100</i>	<i>100</i>
Defense acquisition program management	Air Force	Air Force Materiel Command	45	4
		Air National Guard Units (Title 32)	10	10
		Air Combat Command	6	7
		<i>All Air Force subagencies</i>	<i>100</i>	<i>100</i>
	Army	Army National Guard Units (Title 32)	9	11
		U.S. Army Acquisition Support Center	7	9
		U.S. Army Corps of Engineers	8	9
		<i>All Army subagencies</i>	<i>100</i>	<i>100</i>
	Navy	Naval Air Systems Command	23	24
		Naval Sea Systems Command	19	23

Workforce	Agency	Subagency	Percentage of the Agency Workforce	
			2010	2018
Defense acquisition procurement		Space and Naval Warfare Systems Command	9	11
		<i>All Navy subagencies</i>	<i>100</i>	<i>100</i>
		Defense Logistics Agency	35	35
		Defense Contract Management Agency	11	12
		Defense Information Systems Agency	12	11
	Other DoD	<i>All other DoD subagencies</i>	<i>100</i>	<i>100</i>
	Air Force	Air Force Materiel Command	55	55
		Air Force Civilian Career Training	5	8
		U.S. Space Command	9	6
		<i>All Air Force subagencies</i>	<i>100</i>	<i>100</i>
	Army	U.S. Army Contracting Command	40	41
		U.S. Army Corps of Engineers	13	15
		Army National Guard Units (Title 32)	6	6
		<i>All Army subagencies</i>	<i>100</i>	<i>100</i>
	Navy	Naval Air Systems Command	15	18
		Naval Sea Systems Command	16	18
		Naval Facilities Engineering Command	19	14
		<i>All Navy subagencies</i>	<i>100</i>	<i>100</i>
	Other DoD	Defense Contract Management Agency	47	45
		Defense Logistics Agency	34	34
		Defense Commissary Agency	10	10
		<i>All other DoD subagencies</i>	<i>100</i>	<i>100</i>
Defense acquisition engineering and science	Air Force	Air Force Materiel Command	69	69
		Air Combat Command	4	4
		U.S. Space Command	7	4
		<i>All Air Force subagencies</i>	<i>100</i>	<i>100</i>
	Army	U.S. Army Research, Development and Engineering Command	36	36
		U.S. Army Corps of Engineers	33	33
		U.S. Army Test and Evaluation Command	7	6
		<i>All Army subagencies</i>	<i>100</i>	<i>100</i>

Workforce	Agency	Subagency	Percentage of the Agency Workforce	
			2010	2018
	Navy	Naval Sea Systems Command	40	40
		Naval Air Systems Command	22	25
		Space and Naval Warfare Systems Command	10	10
		<i>All Navy subagencies</i>	<i>100</i>	<i>100</i>
	Other DoD	Defense Contract Management Agency	25	30
		Missile Defense Agency	23	23
		Defense Information Systems Agency	20	14
		<i>All other DoD subagencies</i>	<i>100</i>	<i>100</i>

SOURCE: Author's calculations using 2010 and 2018 DMDC Civilian Master File.

NOTE: Top three subagencies identified using 2018 data.

Finally, we explore how the prevalence of demonstration projects varies across agencies (Table 2.2). This is of interest because demonstration projects are afforded more compensation flexibilities than standard pay plans (e.g., GS), as we discuss in Chapter 4. As with Table 2.1, Table 2.2 includes data for the Air Force, the Army, the Navy, and other DoD agencies and excludes data for the Marine Corps because they constitute such a small share of the sample (see Figure 2.7).

Table 2.2. Prevalence of Demonstration Projects by Agency and Workforce of Interest: Percentage of the Agency Workforce, 2010 and 2018

Workforce	Agency	Percentage of the Agency Workforce Demonstration Projects	
		2010	2018
Aerospace engineering	Air Force	28	77
	Army	82	94
	Navy	14	58
	Other DoD	0	3
Defense acquisition business and financial management	Air Force	0	10
	Army	3	8
	Navy	4	19
	Other DoD	0	2
Defense acquisition program management	Air Force	0	12
	Army	4	17
	Navy	7	35
	Other DoD	0	11

Workforce	Agency	Percentage of the Agency Workforce Demonstration Projects	
		2010	2018
Defense acquisition procurement	Air Force	1	23
	Army	6	18
	Navy	4	17
	Other DoD	0	10
Defense acquisition engineering and science	Air Force	17	59
	Army	27	41
	Navy	34	63
	Other DoD	0	28

SOURCE: 2010 and 2018 DMDC Civilian Master File.

Comparing 2010 with 2018, we see that the prevalence of demonstration projects has grown dramatically over time. The exceptions are aerospace engineering and defense acquisition business and financial management workforces in other DoD agencies, where the demonstration projects had persistently low prevalence (0 percent in 2010, and 3 percent and 2 percent in 2018, respectively). Among the rest of the workforce-agency combinations, the demonstration project share grew between 5 percentage points (defense acquisition business and financial management in the Army) and 49 percentage points (aerospace engineering in the Air Force).

Looking across agencies, we see that demonstration projects are generally less prevalent in other DoD agencies compared with the Air Force, Army, and Navy. And, narrowing our focus to just the Air Force, Army, and Navy, we see that demonstration projects are more prevalent in aerospace engineering and defense acquisition engineering and science workforces than in the other defense acquisition workforces. For example, in 2018, 58 to 94 percent of the aerospace engineering civilian workforce and 41 to 63 percent of the defense acquisition engineering and science civilian workforce in the Air Force, Army, and Navy were in demonstration projects. In contrast, for Air Force, Army, and Navy defense acquisition business and financial management, program management, and procurement, the 2018 demonstration project share does not exceed 35 percent.

Locality Pay Area

Federal civilian employee salaries vary depending on *locality pay area*—i.e., location—to account for differences in cost of living. There were three locality pay areas of interest to the sponsor that were chosen based their potential relevance for staffing the U.S. Space Force:

Denver-Aurora, Colorado (CO); Los Angeles–Long Beach, California (CA); and Washington-Baltimore-Arlington, DC-MD-VA-WV-PA⁷ (henceforth referred to as *Washington, D.C.*).⁸

Table 2.3 shows percentages of each workforce in these three locality pay areas in 2010 and 2018. There were small or no changes in these percentages between 2010 and 2018. Among the three locality pay areas of interest, the largest share for each workforce was in the Washington, D.C., locality pay area, ranging from 13 percent for the defense acquisition procurement workforce to 27 percent for the defense acquisition program management workforce in 2018. Smaller shares of each workforce were in the Los Angeles–Long Beach locality pay area, with the percentage in 2018 ranging from 3 percent in the defense acquisition program management workforce to 10 percent in the aerospace engineering workforce. Finally, the percentage of each workforce in the Denver-Aurora locality pay area is no more than 1 percent across the workforces in 2018.

Table 2.3. Percentage of Workforce by Locality Pay Area of Interest, 2010 and 2018

Workforce	Locality Pay Area	Percentage of the Workforce	
		2010	2018
Aerospace engineering	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA	27	25
	Los Angeles–Long Beach, CA	9	10
	Denver-Aurora, CO	0	0
Defense acquisition business and financial management	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA	20	20
	Los Angeles–Long Beach, CA	4	4
	Denver-Aurora, CO	1	1
Defense acquisition program management	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA	25	27
	Los Angeles–Long Beach, CA	3	3
	Denver-Aurora, CO	0	0
Defense acquisition procurement	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA	13	13
	Los Angeles–Long Beach, CA	4	4
	Denver-Aurora, CO	0	1

⁷ This refers to Washington, D.C.; Baltimore, Md.; and Arlington, Va. DC-MD-VA-WV-PA = Washington, D.C.; Maryland; Virginia; West Virginia; Pennsylvania.

⁸ The sponsor originally expressed an interest in Colorado Springs, Colorado, as one of the three locality pay areas of interest. However, we were unable to include it in our locality pay area analysis because there are very few observations of this locality in the DMDC data, and it is not included in the ACS data. Instead, we include the nearby Denver-Aurora, Colorado, locality pay area. As we explain further in Chapter 3, the sample size is still quite small for the Denver-Aurora locality pay area, which Table 2.3 shows for the DMDC data.

Workforce	Locality Pay Area	Percentage of the Workforce	
		2010	2018
Defense acquisition engineering and science	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA	23	23
	Los Angeles–Long Beach, CA	7	7
	Denver-Aurora, CO	0	0

SOURCE: 2010 and 2018 DMDC Civilian Master File.

Summary

To close this chapter, we summarize the findings of our comparison of the DoD civilian and private-sector workforces of interest along the following dimensions: workforce size, educational attainment, YOPE, gender, race/ethnicity, and veteran status. In addition, we summarize the DoD-civilian-only findings on the distribution of workers by agency, subagency, and pay plan.

Workforce Size

The workforces of interest generally grew from 2010 through 2018, with some noteworthy differences by workforce and by sector:

- The aerospace engineering workforce grew by about 10 percent in the DoD civilian sector, while it shrank a modest 0.5 percent in the private sector.
- The defense acquisition business and financial management workforce saw a modest 2-percent decline in the DoD civilian sector and a 5-percent increase in the private sector.
- The defense acquisition program management workforce grew by 11 percent in the DoD civilian sector and by 49 percent in the private sector.
- The defense acquisition procurement workforce grew by 7 percent in the DoD civilian sector and by 22 percent in the private sector.
- The defense acquisition engineering and science workforce grew by 8 percent in the DoD civilian sector and by 28 percent in the private sector.

Educational Attainment

Educational attainment increased between 2010 and 2018 across all workforces and sectors, with a lower share of the workforce having less than a bachelor's degree in 2018 than in 2010. Across workforces, aerospace engineering and engineering and science have the highest educational attainment among the workforces, with no less than half of the workforce holding a bachelor's degree and 31 percent or more of the workforce holding a master's degree or more. Moreover, looking across sectors, the DoD civilian workforce has higher educational attainment for all workforces in 2010 and 2018, save one workforce—defense acquisition program management.

Years of Potential Experience

We find that YOPE profiles are generally skewed toward the more-senior parts of the YOPE distribution, regardless of workforce or sector. Comparing across 2010 and 2018, we do see that YOPE profiles have become less senior over time. Yet, in 2018, workers with high YOPE remain overrepresented, and those with midrange YOPE remain underrepresented, which might be indicative of difficulty recruiting or retaining mid-career civilians in these workforces of interest. Moreover, when comparing across workforces, we see that the defense acquisition program management YOPE profile is the most senior, followed by defense acquisition workforce business and financial management and procurement, aerospace engineering, and defense acquisition engineering and science. We also note that the DoD civilian sector is generally more senior than the private sector, with the exception of aerospace engineering, where the opposite is true.

Gender

The share of women is fairly flat over time, regardless of workforce or sector. Women are the overwhelming minority in two workforces: aerospace engineering and defense acquisition engineering and science. Women are also the minority in the defense acquisition business and financial management workforce, but less so. Finally, the defense acquisition program management and procurement workforces are closer in gender parity. When we look across sectors, we see that the differences in the share of women between the DoD civilian and private sectors are modest, with the exception of the defense acquisition procurement workforce, where the share of women is 5–9 percentage points lower in the DoD civilian sector.

Race/Ethnicity

Comparing the racial/ethnic mix by workforce and sector in 2010 and 2018, we see that the white share fell slightly, while other racial/ethnic group shares each grew slightly. This is the case for all workforces and sectors. Looking within workforces and across sectors, we see that, for aerospace engineering and defense acquisition engineering and science, the private sector has a lower white share and a higher Asian share than the DoD civilian sector. For the defense acquisition business and financial management and procurement workforces, we see that the private sector has a higher white share and a lower black share than the DoD civilian sector. Finally, for the defense acquisition program management workforce, we see that the private sector has a lower black share and a higher Asian share than the DoD civilian sector.

Veteran Status

We find that the veteran share of the workforce generally has increased, but by small margins, between 2010 and 2018. Although the veteran share might appear low overall, in some of the workforces and sectors, it exceeds the national share, which was 7 percent in 2018 (Vespa,

2020)—particularly among the private-sector aerospace engineering workforce and the DoD civilian defense acquisition program management workforce. Lastly, there are trivial differences in the veteran share across the DoD civilian and private sectors.

Agency, Subagency, and Pay Plan

For aerospace engineering, the Navy constitutes roughly half of the workforce; the Air Force, roughly one-third; the Army, less than one-fifth; and other DoD agencies, 3 percent. There are no DoD civilian aerospace engineers working for the Marine Corps. Two of the four defense acquisition workforces—business and financial management and procurement—have similar agency distributions: the Army and Air Force each are roughly one-fifth to one-quarter of the workforce; the Navy, roughly one-fifth; the Marine Corps, no more than 3 percent; and other DoD agencies, one-third. For defense acquisition program management, roughly one-third work for the Army, roughly one-third work for the Navy, roughly one-fifth work for the Air Force, no more than 4 percent work for the Marine Corps, and roughly one-tenth work for other DoD agencies. Finally, for the defense acquisition engineering and science workforce, just under half work for the Navy, approximately one-third work for the Army, roughly one-fifth work for the Air Force, and no more than 5 percent work for the Marine Corps or other DoD agencies.

In terms of subagencies, for aerospace engineers, the top three subagencies make up 96 percent or more of the overall agency workforce, regardless of agency. Moreover, in each case, the top subagency alone constitutes at least 82 percent of the overall agency workforce. For the defense acquisition workforces, the top three subagencies generally constitute a smaller share of the overall agency workforce. Also, the share of the workforce in the top three subagencies is spread out more across those subagencies; in 2018, the top subagency share ranges from 11 to 69 percent of the overall agency workforce.

Finally, regarding pay plans, we note that the prevalence of demonstration projects has grown dramatically over time, by as much as 49 percentage points across workforces and agencies. Also, demonstration projects are far less prevalent in other DoD agencies compared with the Air Force, Army, and Navy. And, when we narrow our focus to just those three services, we note that demonstration projects are more prevalent in the aerospace engineering workforce (ranging from 58 to 94 percent in 2018) and the defense acquisition engineering and science workforce (ranging from 41 to 63 percent in 2018) than in the other defense acquisition workforces (which never exceeds 35 percent).

Taking into consideration what we found in this chapter—specifically, how characteristics differ across time, workforces, and sectors—in the next chapter, we examine how competitive DoD monetary compensation is relative to the private sector.

Locality Pay Area of Interest

When examining the distribution of each workforce across the three locality pay areas of interest: Denver-Aurora, Colorado; Los Angeles–Long Beach, California; and Washington, D.C.,

we find that there are sizable portions in the Washington, D.C., locality pay area, with the share ranging from 13 percent to 27 percent in 2018. Compared with the shares in Washington, D.C., the shares in the Los Angeles–Long Beach pay area are smaller and range from 3 to 10 percent in 2018. Finally, the data show that no more than 1 percent of each of the workforces were in the Denver-Aurora locality pay area in 2018.

3. Monetary Compensation

In this chapter, we compare monetary compensation between DoD civilians and private-sector employees for each workforce of interest to help understand how competitive DoD is with the private sector in terms of pay. There are three main sections of analysis in this chapter. First, we use regression analysis to estimate income trajectories for DoD civilians and their private-sector counterparts, while controlling for the workforce demographic characteristics described in Chapter 2. Second, for DoD civilians, we use available institutional detail and compensation data to do additional regression analysis to understand how the income trajectories vary by subagency and pay plan and to examine the prevalence of special pays in these workforces. Third, we compare income trajectories between the DoD civilian and private sectors within our three locality pay areas of interest: Denver-Aurora, Colorado; Los Angeles–Long Beach, California; and Washington, D.C.

Methods

We use three sources of data for the monetary compensation analysis. The first is DMDC Civilian Master and Pay File data, which we use to estimate compensation among DoD civilians.⁹ The second is the ACS (Ruggles, 2020), which we use to estimate compensation among private-sector workers. The third data source is the U.S. Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES) program, which provides detailed data on salaries by occupation from a survey of employers (BLS, undated). To identify occupations in the workforces of interest across the three data sets, we use the U.S. Equal Employment Opportunity Commission (EEOC) Federal Sector Occupation Cross-Classification table, which maps OPM occupation codes, BLS Standard Occupational Classification (SOC) codes, and U.S. Census occupation codes to one another.

To compare income between DoD civilians and private-sector workers, we first run regressions separately for each workforce and sector. For DoD civilians, regressions are estimated using the DMDC data, and a separate regression is estimated for the aerospace engineering workforce and each of the four defense acquisition workforces. For private-sector workers, regressions are estimated using the ACS data and, similar to the method we use for DoD civilians, five separate regressions are estimated, one for each workforce of interest.

We estimate linear regressions, with the dependent variable equal to the natural log of income. For the DoD civilian-sector regressions, we use a single income variable that accounts

⁹ We note that data handling and analysis were done in accordance with RAND’s Human Subjects Protection Committee procedures.

for basic pay and any other pays and allowances, such as locality pay or awards and incentives.¹⁰ For the ACS private-sector regressions, the outcome variable includes wages, salaries, commissions, cash bonuses, tips, and other monetary compensation.¹¹ The regressions include demographic controls for veteran status, race/ethnicity, gender, and education; year dummy variables; and five-year splines of YOPE.

The regressions also include a dummy variable to indicate whether an individual is in the workforce of interest (e.g., aerospace engineer, defense acquisition business and financial management workforce), which allows average income to vary by whether individuals are in the workforce of interest. We also include interaction terms between the workforce dummy variable and year dummy variables and between the workforce dummy variable and YOPE splines. The former accounts for differences in income by year and the workforce of interest, while the latter allows the relationship between income and YOPE to vary by workforce of interest. Finally, we include interactions among the workforce dummy variable, year, and YOPE splines to allow the relationship between income and YOPE to vary by workforce of interest and year. The regression coefficient estimates are reported in Appendix A.

Next, using the regression output, we predict average income trajectories by YOPE, which capture how income grows over a career, controlling for the other factors included in our regression model. We create average income trajectories for each demographic subgroup (e.g., white women with a bachelor's degree and no military service) to isolate how income varies with YOPE while controlling for these demographic characteristics. From there, we calculate the weighted average of the income trajectories, setting the weights equal to the 2018 sample share for each demographic subgroup, to create income trajectories by level of educational attainment and for the workforce overall. We do this for both the DoD civilian and private-sector workforces.

For DoD civilians, we create a second set of income trajectories by agency, subagency, and pay plan. To create these trajectories, we rerun the baseline regression once with the addition of indicators for agency and once with the addition of indicators for the top three subagencies for each agency. Among the numerous subagencies that we observe in the data, we focus on the top three because, as shown in Chapter 2, they generally constitute a majority of the sample. For the subagency regressions, we do not show results from the Marine Corps, because the DMDC

¹⁰ We use the variable for gross pay, with several adjustments, from the DMDC Civilian Pay File. First, gross pay is reported by pay period, not annually. For cases in which a worker was employed as a DoD civilian for a partial year, we scale up their income based on the number of pay periods they worked in comparison with the total number of pay periods in a given fiscal year. The total number of pay periods is 26 in most years. However, in fiscal year (FY) 2012, it was 25; and in FY 2006, FY 2013, and FY 2017, it was 27. For less than 2 percent of the sample, the number of times an individual was paid exceeds the number of pay periods in that fiscal year. We remove these individuals from our sample so that we can calculate annualized income. Also, for less than 4 percent of the sample, our computed annualized income is less than the individual's annual basic pay. In these cases, we replace the computed annualized income with annual basic pay.

¹¹ We use the variable *INCWAGE* from the ACS.

Civilian Master and Pay files do not report subagency for the Marine Corps, and because the share of civilians working for the Marine Corps is small (no more than 3 percent across the workforces of interest). We also run the agency regressions with interactions between agency and an indicator for being paid under a demonstration project. As we discuss in more detail in Chapter 5, demonstration projects are afforded more compensation flexibilities than standard pay plans (e.g., GS), and, therefore, differences in pay across the DoD civilian and private sectors may vary with pay plan.

Finally, we compare predicted average income between the DoD civilian and private sectors within three locality pay areas of interest: Denver-Aurora, Colorado; Los Angeles–Long Beach, California; and Washington, D.C. Focusing on these locality pay areas causes the sample size to reduce to a point where it is not possible to include all of the covariates described in the regression specification. Specifically, we drop the interactions between workforce-of-interest dummy variables and the other covariates and instead use a simpler regression specification that includes the workforce-of-interest dummy variables; demographic controls for veteran status, race/ethnicity, gender, and education; year dummy variables; and five-year splines of YOPE.¹² As a result, the locality pay area analysis assumes that relationship between income and YOPE does not vary by workforce of interest, apart from a level difference that might come about because of the workforce-of-interest dummy variables. Moreover, the locality pay analysis regression specification does not allow the relationship between income and year to vary by workforce of interest. Because the regression specifications are different, we caution against comparing the predicted average income results for the three selected locality pay areas directly with the results from the main analysis.

Before proceeding to the results, we should discuss an additional methodological consideration. Prior research has documented that individual-level surveys suffer from underreporting of income (Moore, Stinson, and Welniak, 2000). As a result, incomes reported in the ACS might be systematically lower, because of underreporting of income in surveys, than in an administrative data file, such as the DMDC Civilian Pay File. To address this, we turn to the OES, which, as a survey of employers, is considered the gold-standard data source for measuring income. We use the OES, in conjunction with the ACS, to create adjustment factors to account for potential underreporting of income in the ACS in a method similar to the one used in Groeber, Keller, et al., forthcoming. These adjustment factors are then applied to the predicted income trajectories estimated in the ACS regression analysis to provide a range of income for each private-sector workforce.

To create the adjustment factors, we first make the ACS sample similar to that of the OES by restricting to full- and part-time workers with nonzero incomes in the private and nonprofit

¹² Regression coefficients from the locality pay area regressions are available upon request.

sectors.¹³ Next, we calculate the ratio of 2018 OES median income and 2018 ACS median income. For the aerospace engineering workforce, which consists of one occupation code, the adjustment factor is equal to this ratio. In contrast, the four defense acquisition workforces consist of multiple occupations. To create an adjustment factor for each of the four defense acquisition workforces, we first calculate the ratios of the 2018 OES median income and 2018 ACS median income at the occupation level. Then, we set the adjustment factor equal to the weighted average of these ratios, using the proportions in each of the individual occupations within each workforce as the weights. These proportions are calculated using the ACS regression analysis sample.

Table 3.1 shows the adjustment factors for each workforce.¹⁴ These vary from 1.14 for the aerospace engineering workforce to 1.27 for the procurement workforce. These factors represent our best approximation for the degree of underreporting of ACS income among the workforces of interest. When we compare predicted average income between DoD civilians and the private sectors, we use the adjusted predicted average income as our reference point for the private sector. Figures with both the unadjusted and adjusted predicted average income for the private sector can be found in Appendix C.¹⁵

Table 3.1. Adjustment Factors to Account for Potential Underreporting of Income in the American Community Survey, by Workforce

Workforce	Adjustment Factor
Aerospace engineers	1.14
Defense acquisition	
Business and financial management	1.17
Procurement	1.27
Program management	1.19
Science and engineering	1.15

Aerospace Engineering Workforce

We first show how average income over time varies between DoD civilians and private-sector workers in the aerospace engineering workforce. In Figure 3.1, the black line shows the

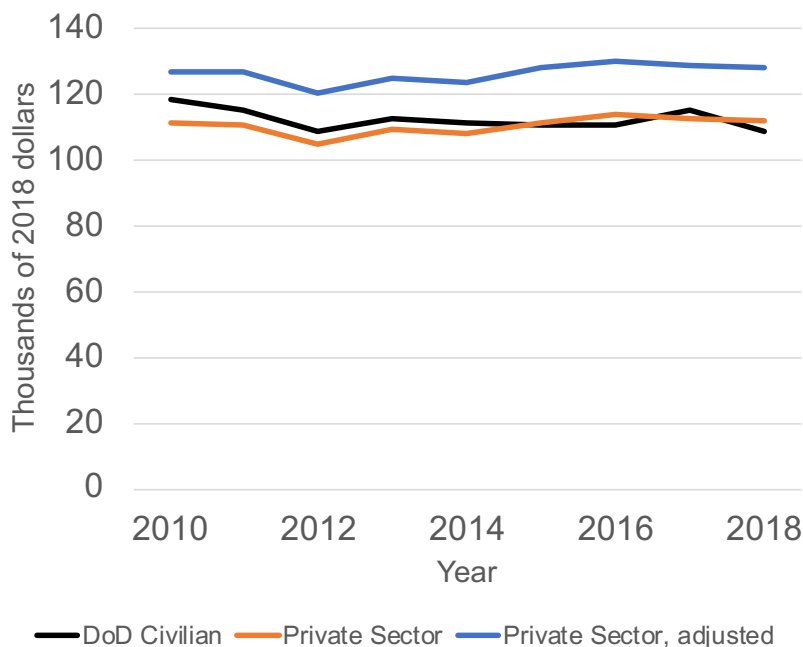
¹³ The OES program surveys private-, nonprofit-, and public-sector employers. Salaries for private- and nonprofit-sector workers are grouped together, while salaries for public-sector workers are reported separately.

¹⁴ At the sponsor's request, a more detailed table with income adjustment factors at the occupation-code level was created (see Appendix B). This table also contains a crosswalk for the occupation codes used across the data sets.

¹⁵ Comparisons of unadjusted and adjusted private-sector predicted average income show significant differences for the defense acquisition procurement workforce, which has the largest income adjustment factor. For the other workforces, the 95-percent confidence intervals for unadjusted and adjusted income overlap for the overall workforce or when divided into subgroups by educational attainment.

income trajectory for DoD civilians, the orange line shows the income trajectory for private-sector workers, and the blue line shows the income trajectory for private-sector workers after adjusting for underreporting of income.

Figure 3.1. Average Income by Year and Sector Among the Aerospace Engineering Workforce

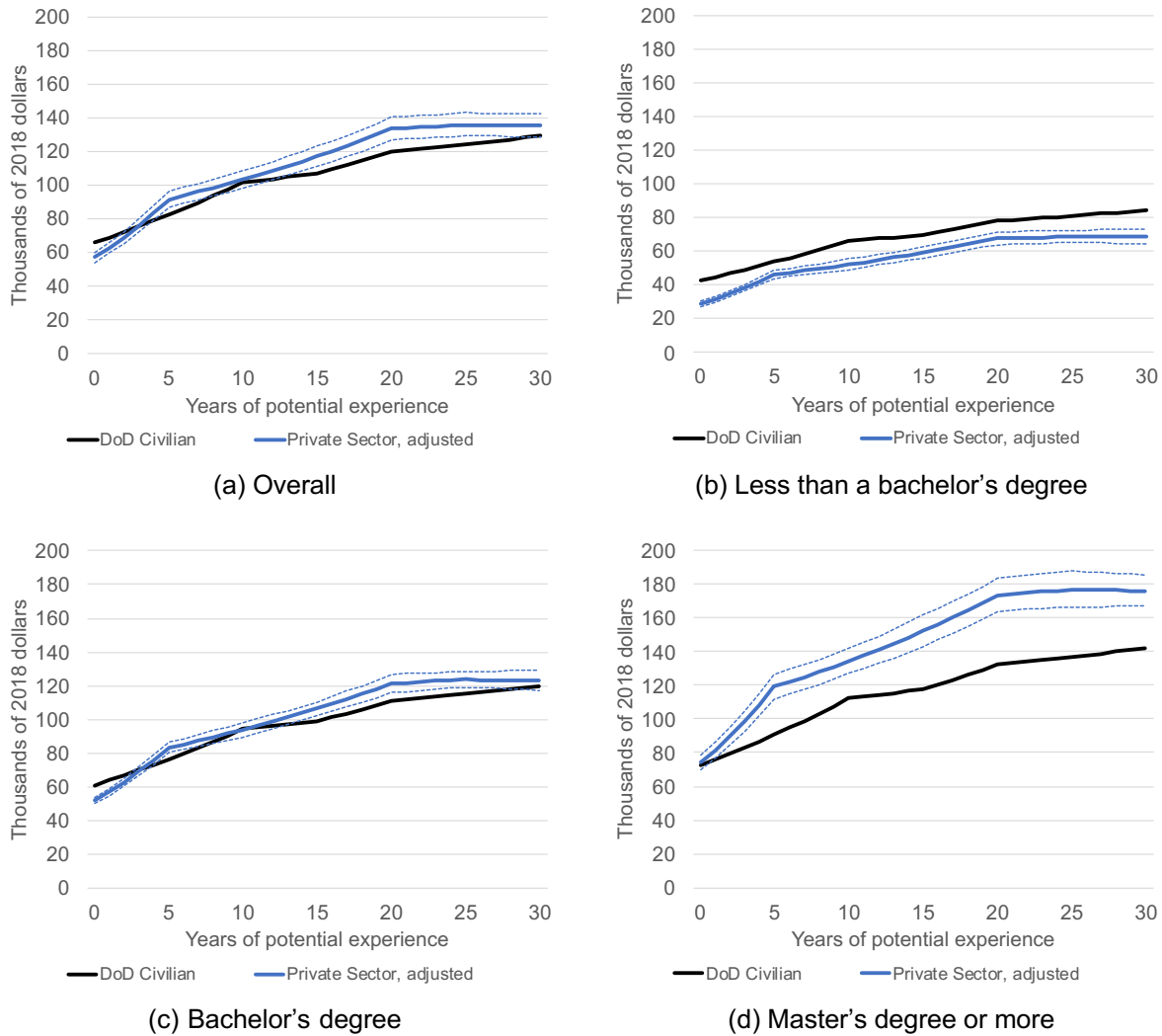


SOURCES: 2010–2018 DMDC Civilian Master and Pay File data, 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

As Figure 3.1 shows, average income for DoD civilians is persistently less than adjusted private-sector income across all years in our sample. Average income among aerospace engineers in the DoD civilian sector was greater than unadjusted private-sector income up until 2015. In 2018, average income among DoD aerospace engineers was \$109,000, compared with an average income of \$112,000 (unadjusted) and \$128,000 (adjusted) among private-sector aerospace engineers.

Figure 3.2 presents predicted average income by YOPE, where the dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income. When DoD civilian predicted average income falls within the 95-percent confidence interval of predicted adjusted private-sector income, then we conclude that DoD civilian predicted average income is not statistically different from private-sector predicted average income. We show results for the workforce overall and by educational attainment to reveal whether differences between DoD civilian and private-sector income over the career trajectory vary by education.

Figure 3.2. Predicted Average Income by YOPE Among Aerospace Engineering Workforce



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

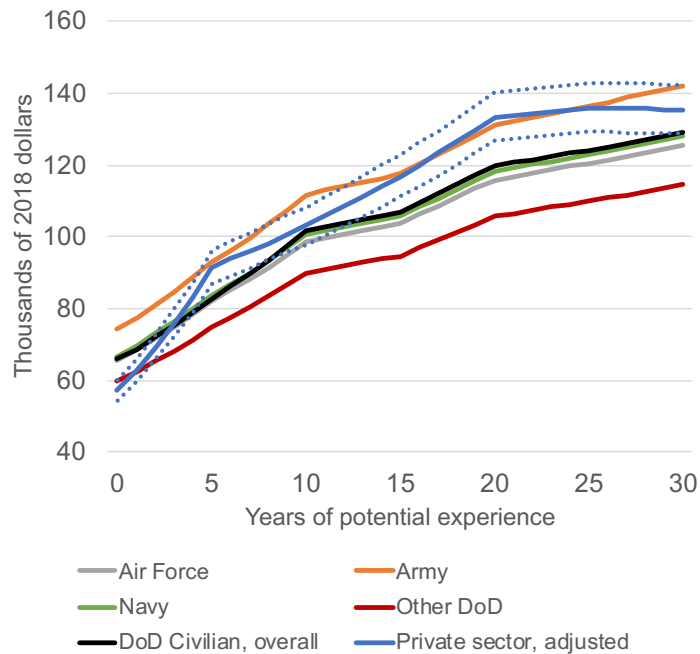
Starting with the overall workforce results (panel a), we see that, with the exception of the first few YOPE, predicted average income for DoD civilians bounces in and out of the 95-percent confidence interval for predicted average income for private-sector workers overall. The same is true for those with a bachelor's degree (panel c). This means that there are portions of the career trajectory where predicted average income for DoD civilians is in line with the private sector—specifically, 2–3, 8–12, and 30 YOPE for the overall workforce and 3, 8–12, and 29–30 YOPE for those with bachelor's degrees. For all other YOPE, predicted average income for DoD civilians falls short of the private sector. The exception is the first year or two of the career trajectory, in which DoD civilian predicted average income is higher than that in the private

sector, being above the 95-percent confidence interval for private-sector predicted average income.

In contrast, when comparing DoD civilian and private-sector predicted average incomes for the other two educational attainment groups, we find that predicted average income among aerospace engineers with less than a bachelor's degree (panel b) is statistically significantly higher in the DoD civilian sector than in the private sector, while the opposite is true for aerospace engineers with a master's degree or more (panel d). Moreover, the gap between DoD civilian and private-sector predicted average income among those with a master's degree or more grows with YOPE, suggesting that DoD might experience difficulty retaining and recruiting more-experienced aerospace engineers.

We continue to compare DoD civilian and private-sector income by disaggregating the DoD civilian workforce by agency. Figure 3.3 shows these results. In our data, we observe aerospace engineers in the Air Force, the Army, the Navy, and other DoD agencies, but not in the Marine Corps. As the figure shows, the predicted average income for DoD civilian aerospace engineers in the Air Force (gray line) and the Navy (green line) are nearly indistinguishable from the predicted average income for the overall DoD civilian aerospace engineering workforce (black line). Given that the Air Force and the Navy constitute the largest shares of the aerospace engineering workforce (a total of 82 percent in 2018), it makes sense that the predicted average incomes for these two agencies are essentially the same as the predicted average income for DoD civilians overall. The Army and other DoD agencies stand apart from the Air Force and the Navy. Predicted average income for DoD civilian aerospace engineers in the Army (orange line) is competitive with the private sector—either slightly above or within the 95-percent confidence interval for predicted average income in the private sector. In contrast, the predicted average income for aerospace engineers in the other DoD agencies (red line), who make up only 3 percent of the aerospace engineering DoD civilian workforce, is considerably and statistically significantly below the private sector, with the exception of the first couple of years of the career trajectory.

Figure 3.3. Predicted Average Income by YOPE and Agency Among the Defense Aerospace Engineering Workforce



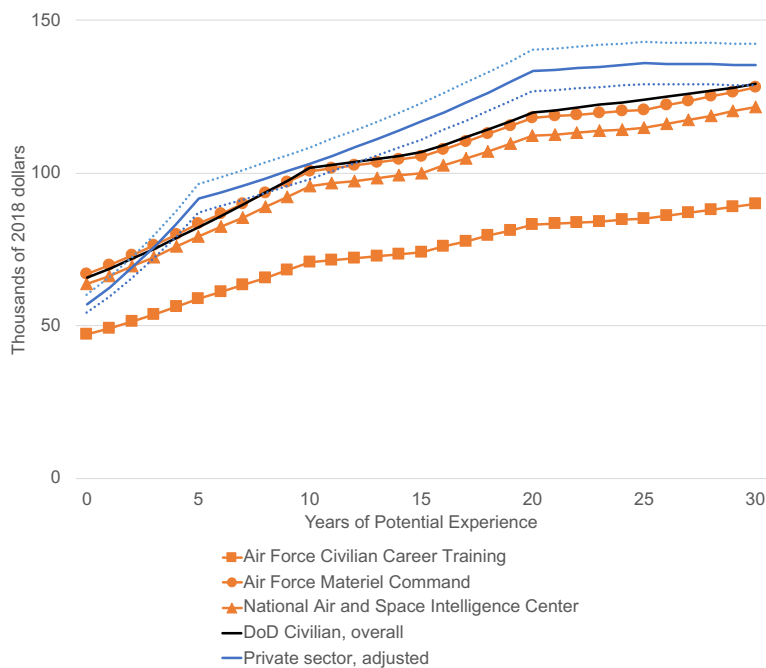
SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

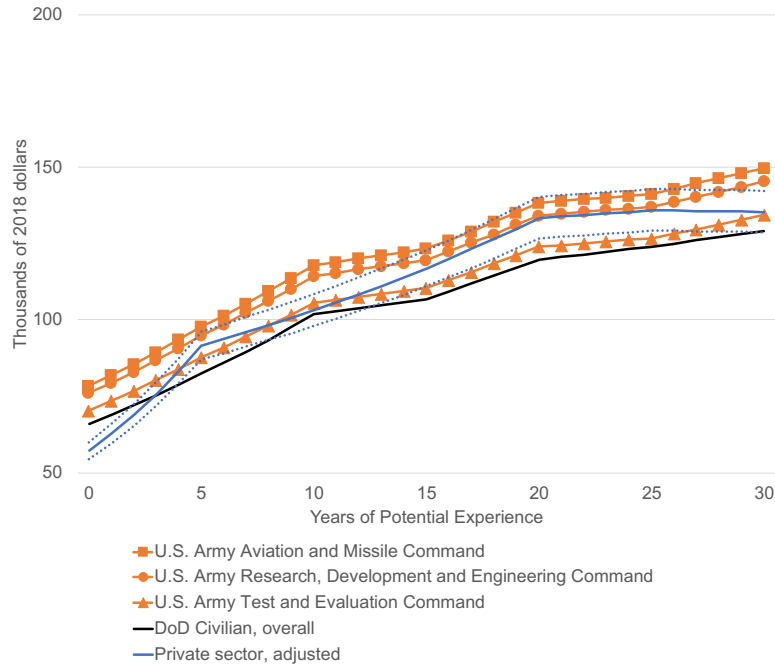
We further examine how DoD civilian predicted average income compares with that in the private sector by focusing on the top three subagencies for each agency, revealing an interesting variation in Figure 3.4 that was masked at the agency level. Within the Air Force, the predicted average income for aerospace engineers working for the Air Force Civilian Career Training, which made up 3 percent of the workforce in 2018, is markedly less than the other two top subagencies. For the Army, predicted average income among aerospace engineers working for two of the top three Army subagencies, which made up 94 percent of the 2018 workforce, is competitive or slightly higher than that in the private sector. In contrast, the predicted average income for those with 15–26 YOPE working for the U.S. Army Test and Evaluation Command falls just below the 95-percent confidence interval of predicted average income for the private sector, suggesting that this particular subagency might have difficulty recruiting or retaining mid-career civilians for the aerospace engineering workforce. Within the Navy, two of the top three subagencies have similar predicted average incomes that are competitive with the private sector. The exception is the Naval Air Systems Command—the largest subagency, at 82 percent of the workforce in 2018—where predicted average income falls significantly below that in the private sector from 4 YOPE onward. Other DoD aerospace engineers working in two of the top three subagencies, the Defense Advanced Research Projects Agency and the Defense

Technology Security Administration, have predicted average income that is significantly higher than in the private sector, while the predicted average income of those working in the Defense Contract Management Agency—the overwhelming majority employer of aerospace engineers working in other DoD agencies—falls short of private-sector predicted average income.

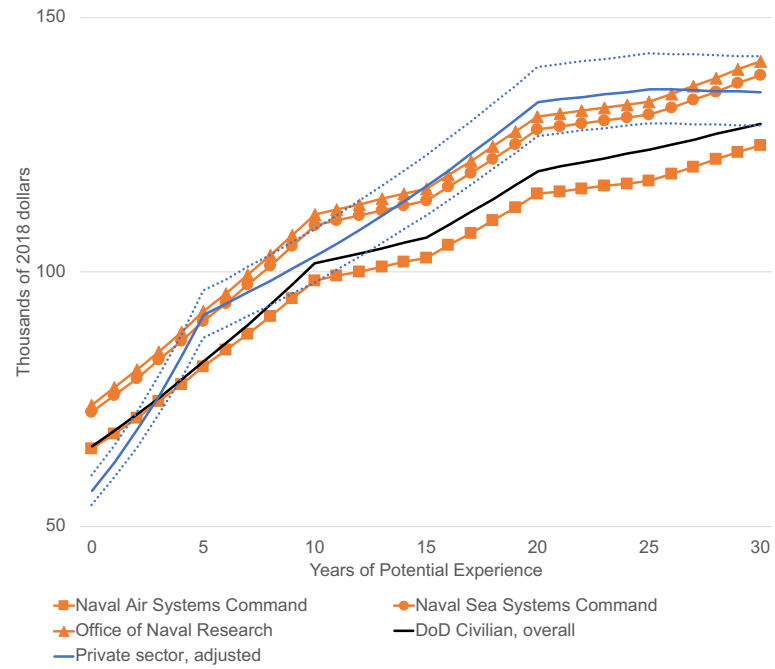
Figure 3.4. Predicted Average Income by YOPE and Top Three Subagencies Among the Defense Aerospace Engineering Workforce



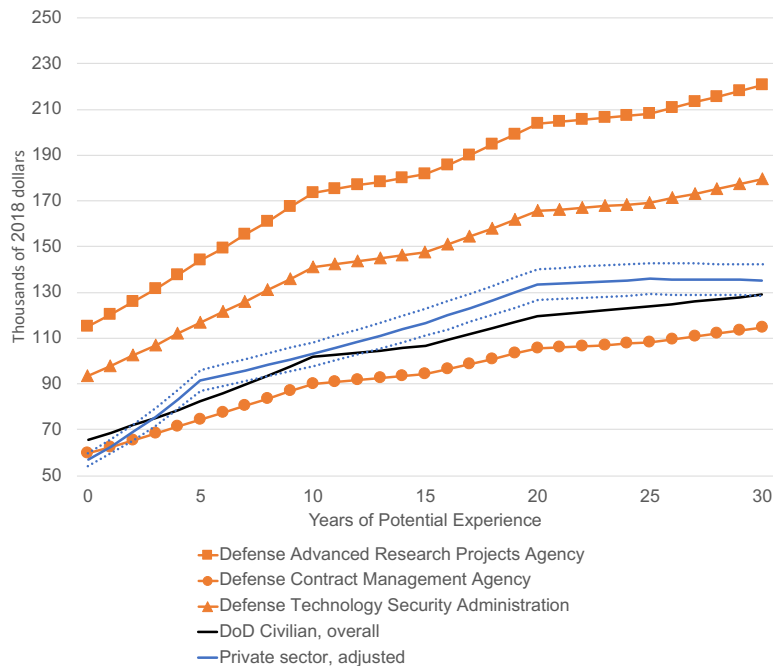
(a) Air Force



(b) Army



(c) Navy



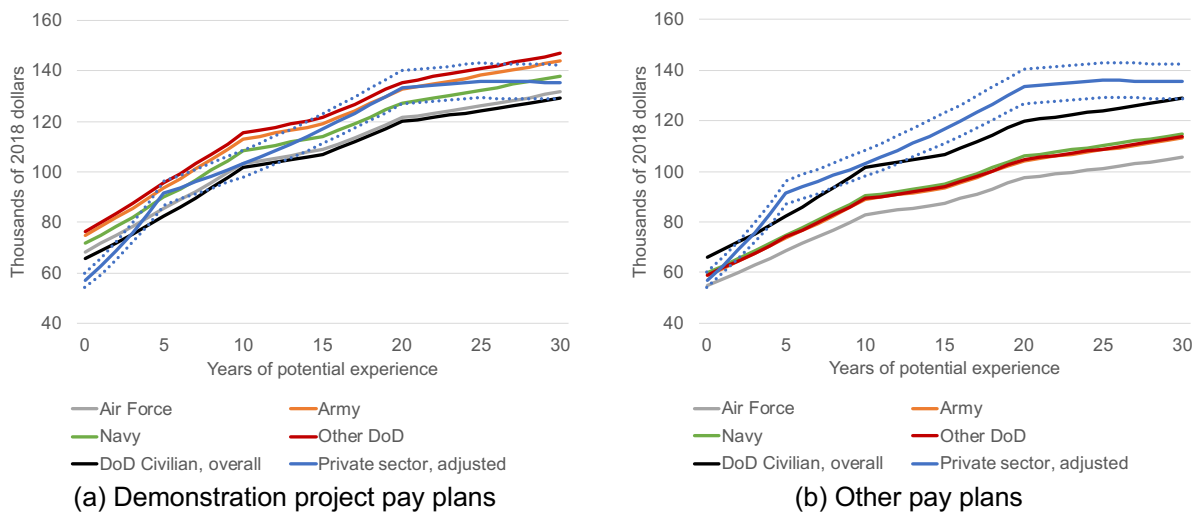
(d) Other DoD

SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Finally, we examine whether the DoD civilian and private-sector average income comparisons by agency differ by pay plan. The monetary compensation difference between the DoD civilian and private sectors might vary across those paid under a demonstration project and those paid under a different pay plan because demonstration projects have more compensation flexibilities compared with standard pay plans. Figure 3.5 shows this comparison—demonstration project pay plan versus other—with the DoD civilian income trajectory disaggregated by agency, because, as we observed in Chapter 2, the use of demonstration project pay plans varies by agency, from 3 percent in other DoD agencies to 94 percent in the Army. As expected, predicted average income is higher for those covered by demonstration projects than for those covered by other pay plans, regardless of agency. Predicted average income among aerospace engineers covered by demonstration projects is generally competitive with that in the private sector, while predicted average income among aerospace engineers covered by other pay plans falls significantly short of that in the private sector.

Figure 3.5. Predicted Average Income by YOPE, Agency, and Pay Plan Among the Defense Aerospace Engineering Workforce, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

To summarize, for aerospace engineers with a master’s degree or more, the regression-adjusted predicted average income results are consistent with the trend seen in the raw average income data—DoD civilian income is generally below the private sector—across the entire career trajectory, with the difference growing by YOPE. The results are mixed for the overall workforce and those with a bachelor’s degree; in some parts of the career trajectory, predicted average income for DoD civilians is in line with that in the private sector, and, in other parts, it falls short, particularly in the middle part of the career. For those with less than a bachelor’s degree, predicted average income is higher in the DoD civilian sector than in the private sector. Examining income by agency reveals that although predicted average income for civilian aerospace engineers working for the Air Force or Navy is similar to that of DoD civilians overall, predicted average income for those working for the Army is competitive with that in the private sector, while predicted average income for those working for other DoD agencies is generally much lower than that in the private sector. Across the top three subagencies within the Army, the Navy, and other DoD agencies, we find that predicted average income in certain subagencies is competitive with the private sector and falls short in others. Finally, we find that predicted average income for DoD civilians covered by demonstration project pay plans is generally competitive with that in the private sector, while predicted average income of those covered by other pay plans falls short.

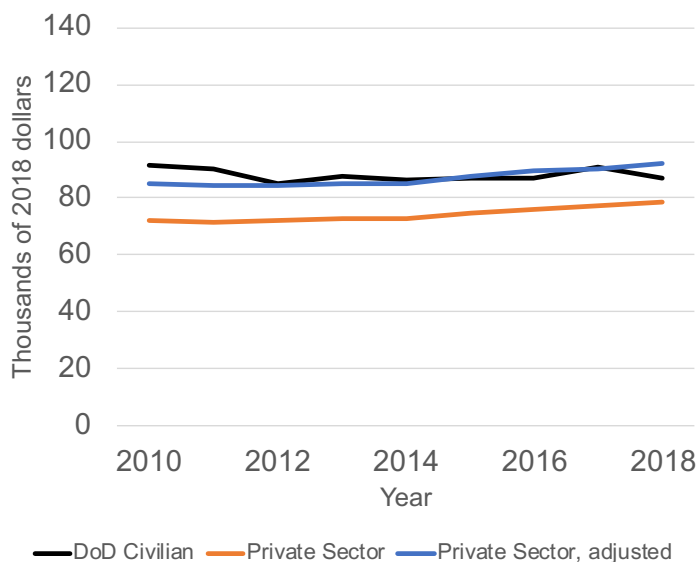
Defense Acquisition Workforce

Next, we turn to our comparison of monetary compensation between the DoD civilian and private sectors within the defense acquisition workforce. The structure of the analysis is the same as that for aerospace engineers: First, we compare average annual income by year; second, we compare predicted average income over a career trajectory; and, finally, we examine variation in predicted average income within the DoD sector by agency and pay plan to see how these earnings trajectories compare with those of the private sector. We discuss the results separately for each of the four subgroups within the defense acquisition workforce: business and financial management, program management, procurement, and engineering and science.

Business and Financial Management

When we compare average income in the business and financial management workforce between the DoD civilian and private sectors, we find that DoD civilian average income started off higher than private-sector adjusted average income in 2010 but ended up lower in 2018, as shown in Figure 3.6. In 2018, average income in the DoD civilian sector was \$87,000, while the adjusted average income in the private sector was \$92,000.

Figure 3.6. Average Income by Year and Sector Among the Defense Acquisition Business and Financial Management Workforce

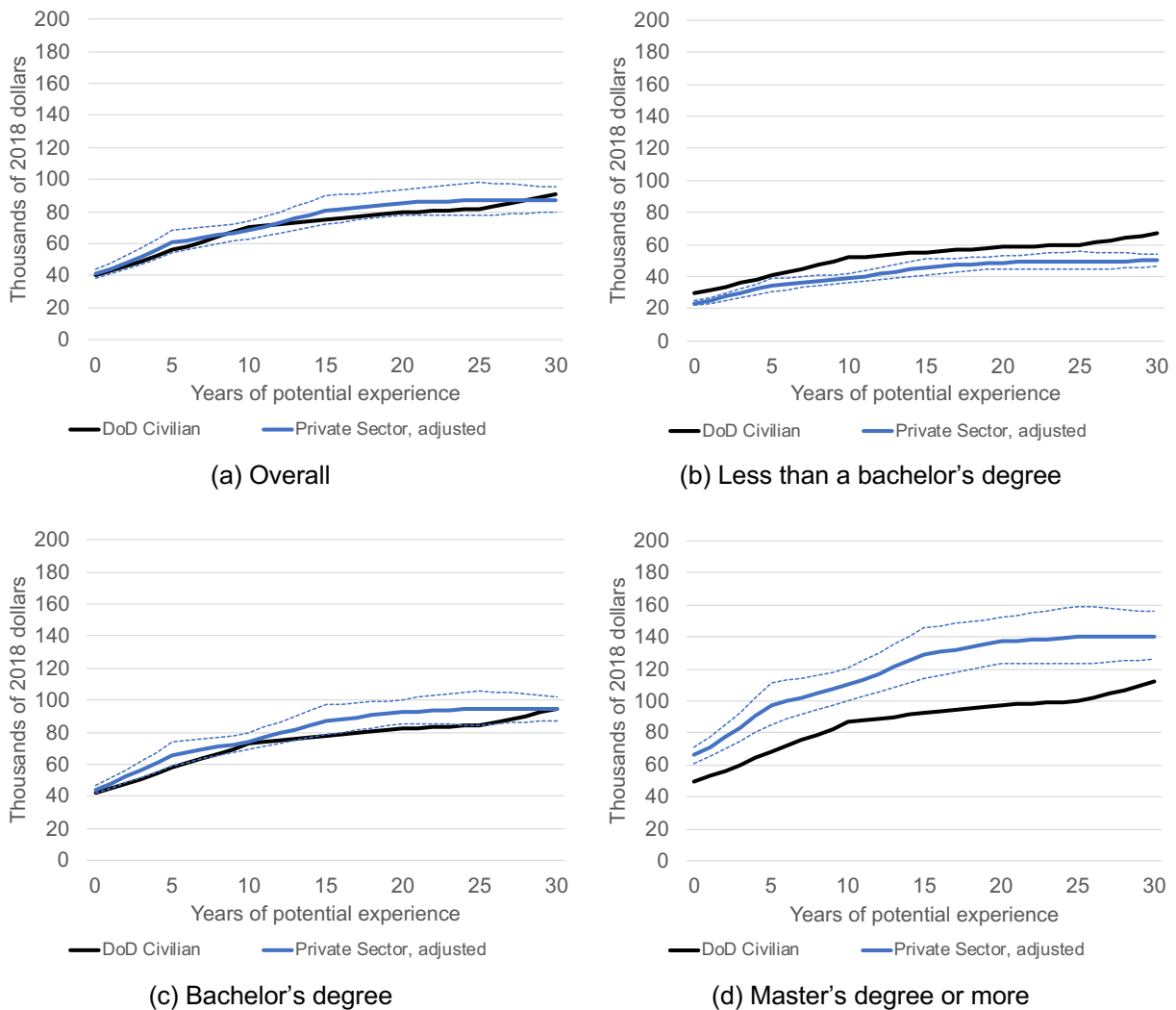


SOURCES: 2010–2018 DMDC Civilian Master and Pay File data, 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

Next, in Figure 3.7, we compare predicted average income between the DoD civilian and private sectors within the business and financial management workforce. We find that overall predicted average income for the business and financial management workforce is not

statistically different for the DoD civilian and private sectors (panel a). However, there are differences when we examine predicted income by educational attainment. In particular, we find that DoD civilian predicted average income statistically significantly exceeds private-sector predicted average income among those with less than a bachelor's degree (panel b). In contrast, DoD civilian predicted average income remains statistically significantly less than private-sector predicted average income among those with a master's degree or more (panel d) across the entire career trajectory. These large differences in predicted average income suggest that DoD might experience difficulty recruiting and retaining the most-highly educated civilians in the business and financial management workforce across all levels of experience, from those just entering the labor force to those with many years of experience. For those with a bachelor's degree (panel c), DoD civilian predicted average income is in line with that for the private sector among those with YOPE ranging from 7 to 14 years and 25 years and beyond. In other parts of the YOPE profile, DoD civilian predicted average income among those with a bachelor's degree is statistically significantly lower than that in the private sector.

Figure 3.7. Predicted Average Income by YOPE Among the Defense Acquisition Business and Financial Management Workforce, 2018



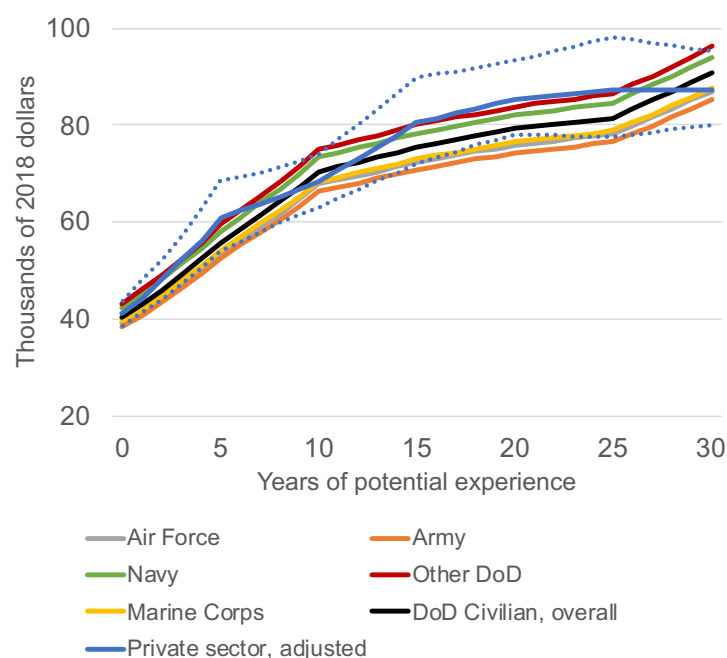
SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

When we examine the predicted average income for DoD civilians by agency, we find that there is little variation across agencies within the business and financial management workforce (Figure 3.8). Furthermore, we note that predicted average income of the Air Force is roughly the same as the Marine Corps, with the Marine Corps line covering the Air Force line in Figure 3.8. Predicted average incomes for DoD civilians in the Navy or other DoD agencies, which together made up 52 percent of the business and financial management workforce in 2018, are equivalent to that in the private sector for most of the 30-year career. Predicted average incomes for DoD

civilians in the Air Force, Army, or Marine Corps are either in line with or just below the 95-percent confidence interval of private-sector predicted average income.

Figure 3.8. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Business and Financial Management Workforce, 2018



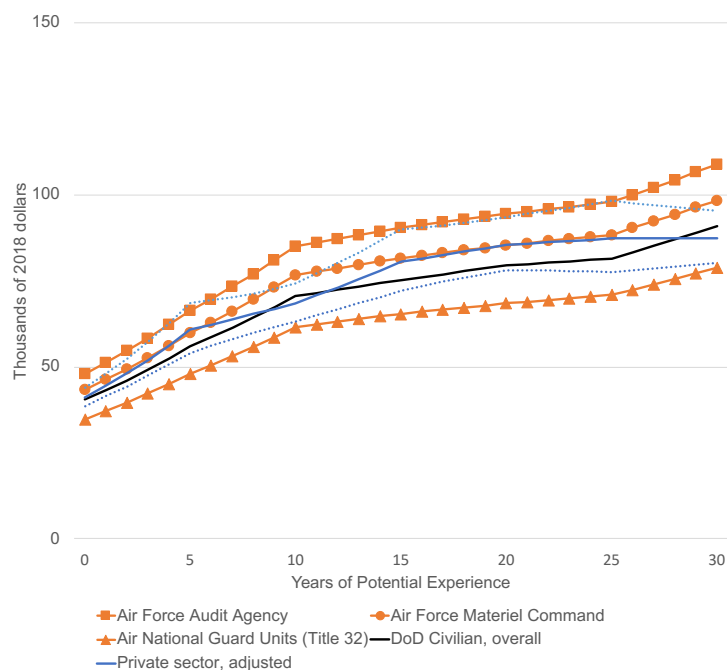
SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

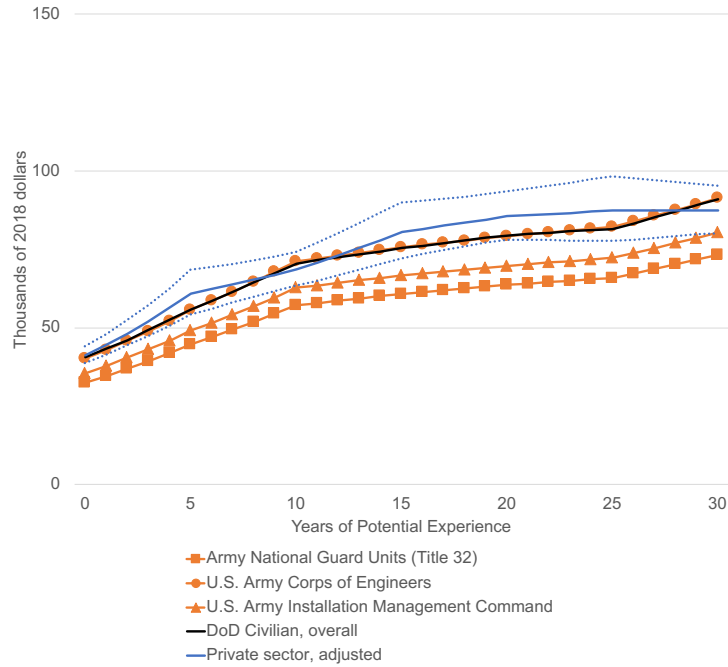
Next, we compare predicted average income for DoD civilians in the top three subagencies with predicted average income for private-sector workers and find some interesting variation within agencies in Figure 3.9. Within the Air Force, predicted average income of civilians working for the Air Force Audit Agency or the Air Force Materiel Command, which together constituted 40 percent of the workforce in 2018, is equivalent to or statistically significantly greater than that in the private sector. Predicted average income for those working for the Air National Guard Units (Title 32), which made up 7 percent of the workforce in 2018, is statistically significantly lower than that in the private sector. Civilians working for the U.S. Army Corps of Engineers (14 percent of the workforce in 2018) have predicted average income that is competitive with the private sector. Those working for the other two top subagencies, the Army National Guard Units (Title 32) and the U.S. Army Installation Management Command, which together make up 23 percent of the 2018 workforce, have predicted average incomes statistically significantly below that in the private sector. DoD civilians working for the top three subagencies in the Navy have predicted average income that is either equivalent to the private

sector (Naval Air Systems Command) or statistically significantly greater than the private sector (Assistant for Administration, Under Secretary of the Navy, and Naval Sea Systems Command). Predicted average incomes among the top three subagencies of other DoD agencies vary widely and range from being statistically significantly greater than the private sector (Office of Inspector General) to generally equivalent to the private sector (DCAA) to statistically significantly less than the private sector (DFAS). DFAS and DCAA represent large shares of the 2018 workforce, at 41 and 35 percent, respectively, compared with Office of the Inspector General, which represents only 5 percent of the 2018 workforce.

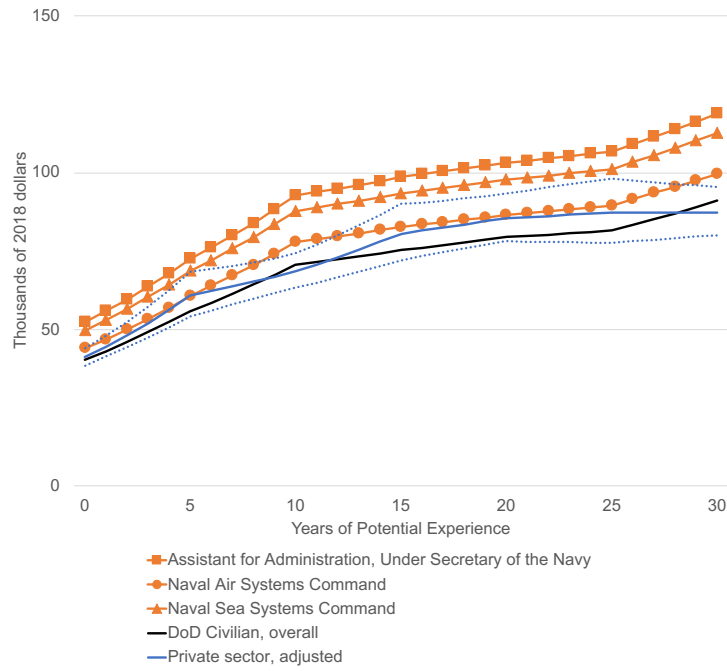
Figure 3.9. Predicted Average Income by YOPE and Top Three Subagencies Among the Defense Acquisition Business and Financial Management Workforce, 2018



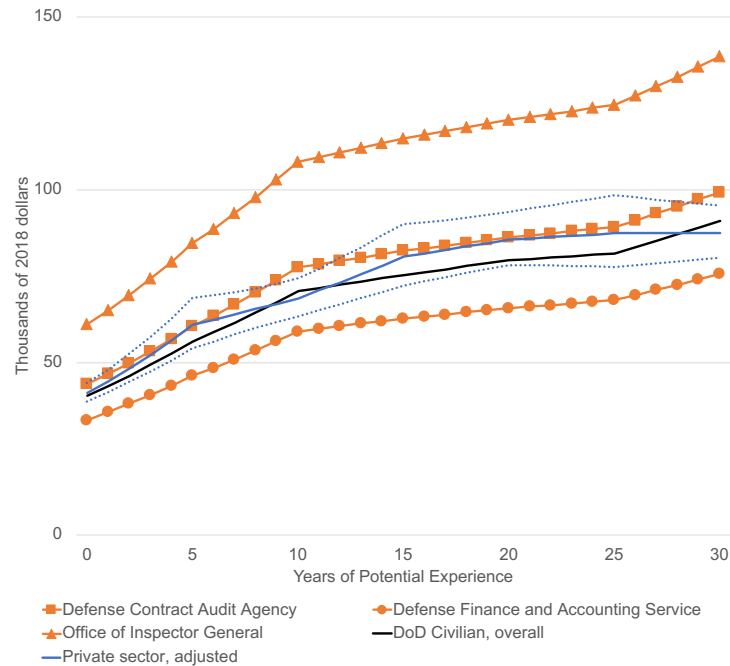
(a) Air Force



(b) Army



(c) Navy



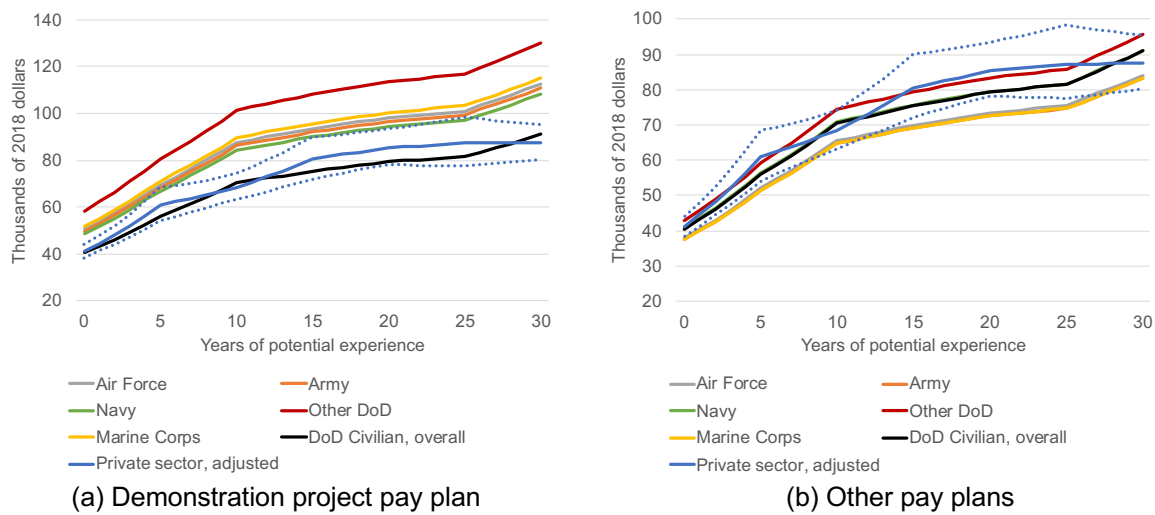
(d) Other DoD

SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Finally, as shown in Figure 3.10, we divide DoD civilians further by agency and pay plan to see how predicted average income for these subgroups compares with that in the private sector. However, we note that demonstration project pay plans cover a minority of DoD civilians across agencies, ranging from 2 percent among other DoD agencies to 19 percent among the Navy. Across the agencies, predicted average income for those covered by a demonstration project generally exceeds that for the private sector. DoD civilians covered by pay plans other than demonstration projects in the Air Force, Army, and Marine Corps are generally predicted to make statistically significantly less income than those in the private sector. DoD civilians in the business and financial management workforce who work for the Navy or other DoD agencies have predicted average income in line with or statistically significantly greater than private-sector predicted average income, regardless of pay plan.

Figure 3.10. Predicted Average Income by YOPE, Agency, and Pay Plan Among the Defense Acquisition Business and Financial Management Workforce, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

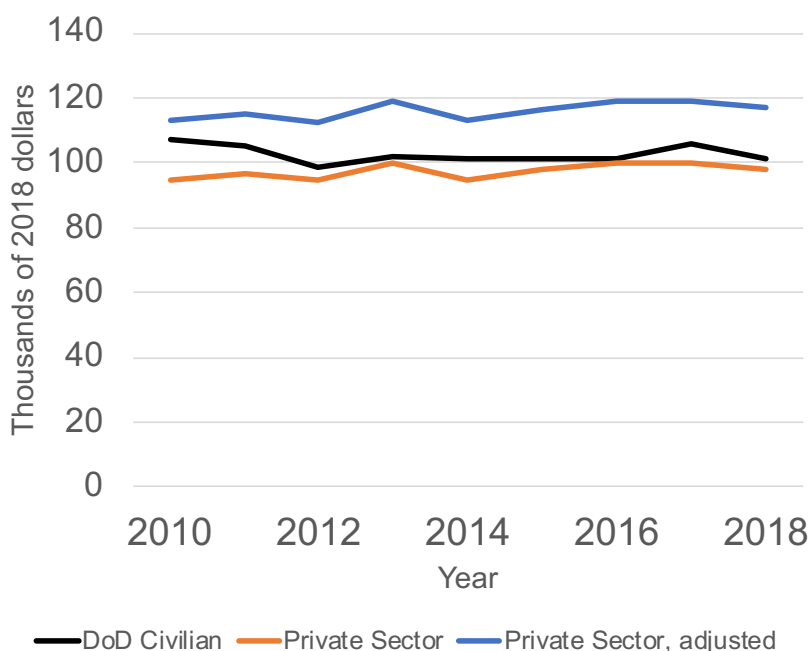
To summarize, our analysis shows that both the raw income trends and the regression-adjusted predicted average income overall for DoD civilians in the defense acquisition business and financial management workforce are comparable with those in the private sector. Disaggregating by educational attainment, we see that DoD civilians with less than a bachelor's degree have persistently higher incomes than those in the private sector, while those with a master's degree or more have persistently lower incomes. Results for DoD civilians with a bachelor's degree are mixed, with DoD civilian predicted average income being in line with the private sector in certain YOPE and falling short in others. When we examine predicted average income by agency, we find that it is comparable with that in the private sector among civilians working for the Navy or other DoD agencies. In contrast, the results are mixed for those working for the Air Force, Army, or Marine Corps, with predicted average income being comparable with that in the private sector in some YOPE and falling short in others. For civilians working across the top three subagencies within the Air Force, the Army, and other DoD agencies, predicted average income of those working in certain subagencies is equivalent to or greater than that in the private sector. For those working in other subagencies within the Air Force, the Army, and other DoD agencies, predicted average income is significantly lower than that in the private sector. Although we show that civilians working for the Navy or other DoD agencies have average predicted income in line with or greater than that in the private sector regardless of pay plan, we find that predicted average income of DoD civilians covered by demonstration project pay plans in the Air Force, Army, and Marine Corps generally exceeds that in the private sector,

while those covered by other plans have predicted average income below that in the private sector.

Program Management

Comparing average income in the program management workforce between the DoD civilian and private sectors, we see that average income for DoD civilians is lower than the adjusted average income in the private sector across all years (Figure 3.11). In 2018, DoD civilian average income in the program management workforce was \$101,000, compared with \$117,000 for the private sector.

Figure 3.11. Average Income by Year and Sector Among the Defense Acquisition Program Management Workforce

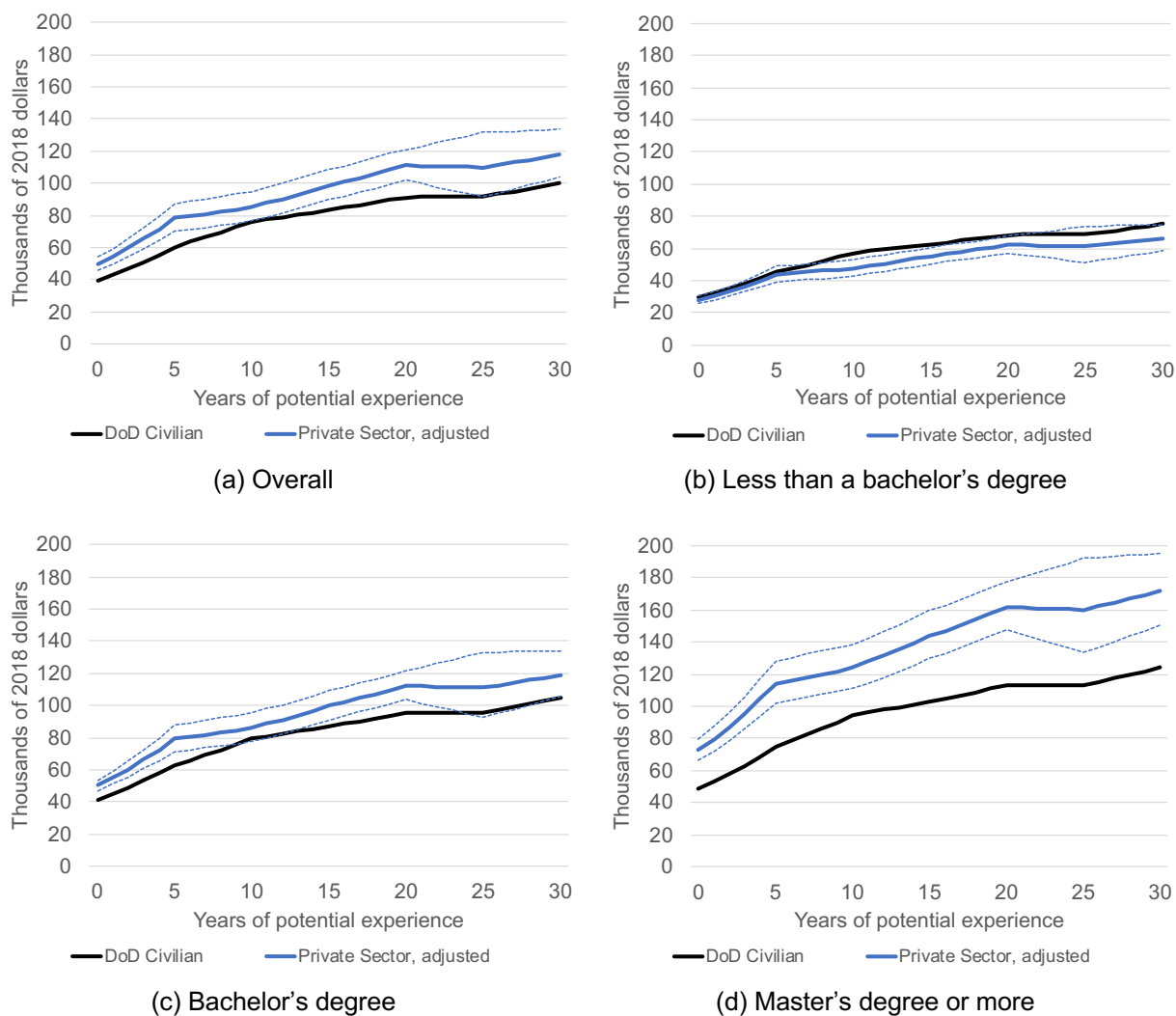


SOURCES: 2010–2018 DMDC Civilian Master and Pay File data, 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

Overall, DoD civilians in the program management workforce are predicted to make statistically significantly less than those in the private sector over the course of a 30-year career, as shown in panel a of Figure 3.12. Again, there are cross-sector differences in predicted average income by educational attainment. Among those with less than a bachelor's degree, predicted average income in the DoD civilian sector either is equivalent to or exceeds predicted average income in the private sector (panel b), while DoD civilians with a master's degree or more make statistically significantly less than their counterparts in the private sector, with the difference increasing with YOPE (panel d). For those with a bachelor's degree (panel c), predicted average

income is statistically significantly less in the DoD civilian sector than in the private sector, except for 10–11 and 24–28 YOPE.

Figure 3.12. Predicted Average Income by YOPE Among the Defense Acquisition Program Management Workforce, 2018



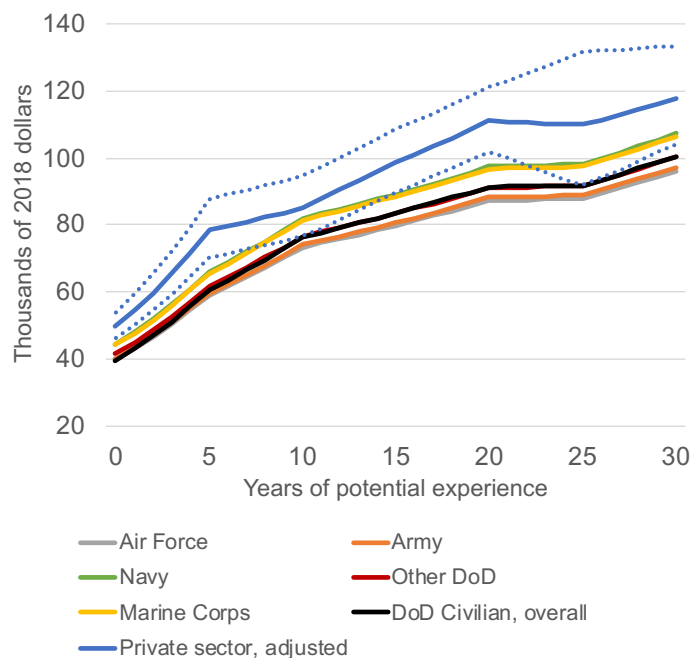
SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Next, we compare DoD civilian predicted average income by agency with that for the private sector. Figure 3.13 shows that, similar to the income trajectory for DoD civilians overall, DoD civilians in each agency are predicted to make statistically significantly less, on average, than those in the private sector. However, there are two exceptions. Predicted average incomes for DoD civilians working for the Marine Corps or the Navy, who together make up 35 percent of

the workforce, are not statistically different from that in the private sector for 8–14 and 23–30 YOPE.

Figure 3.13. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Program Management Workforce, 2018



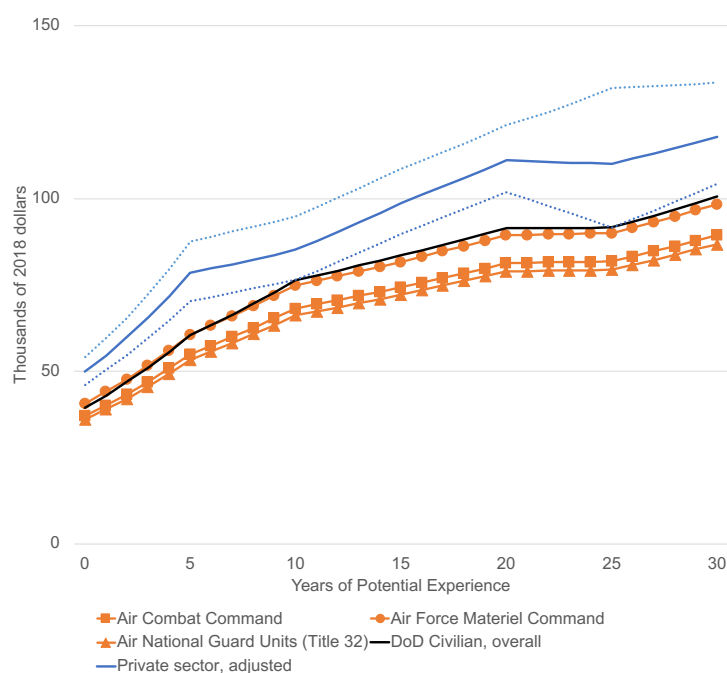
SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

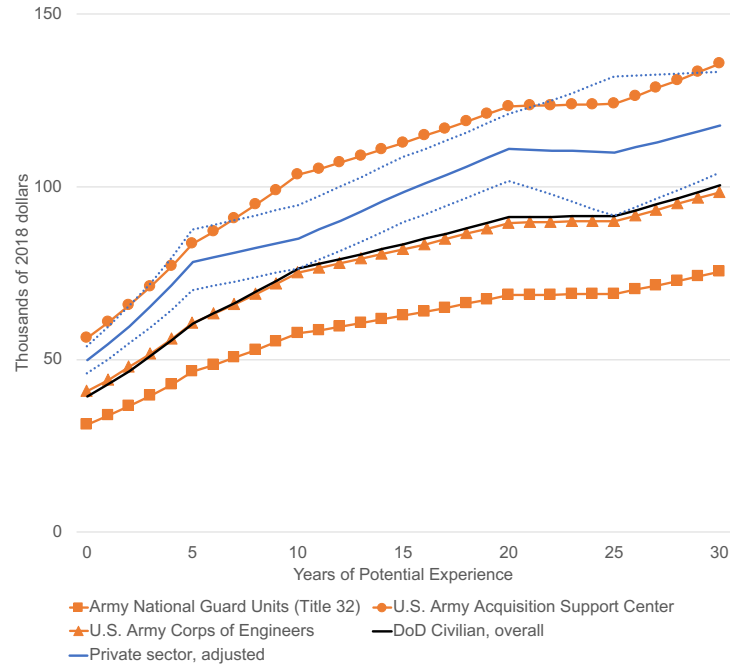
When we examine predicted average income by the top three subagencies, as shown in Figure 3.14, we find that the predicted average income is statistically significantly lower for those working in each of the top three subagencies within the Air Force, relative to the private sector. However, the results are more varied for the other services. For the Army, civilians working for the U.S. Army Acquisition Support Center, which constituted 9 percent of the 2018 workforce, have predicted average income that is in line with or greater than that in the private sector. In contrast, predicted average income of civilians working for the Army National Guard Units (Title 32) or the U.S. Army Corps of Engineers, which together employed 20 percent of the 2018 workforce, is significantly less than that in the private sector. Within the Navy, predicted average income moves from being in line with that in the private sector to falling just below the 95-percent confidence interval of private-sector income for those working for the Naval Air Systems Command (24 percent of the 2018 workforce). Civilians working for the Naval Sea Systems Command or the Space and Naval Warfare Systems Command, which together made up 34 percent of the 2018 workforce, have predicted average income that is in line

with that in the private sector. Finally, among the top three subagencies among other DoD agencies, civilians working in the Defense Information Systems Agency, the smallest of the top three subagencies at 11 percent of the 2018 workforce, have predicted average income that is competitive with the private sector, while predicted average income of those working for the other two top DoD subagencies—the Defense Contract Management Agency and the Defense Logistics Agency, which together employed almost half of the 2018 workforce—is generally significantly lower than that in the private sector.

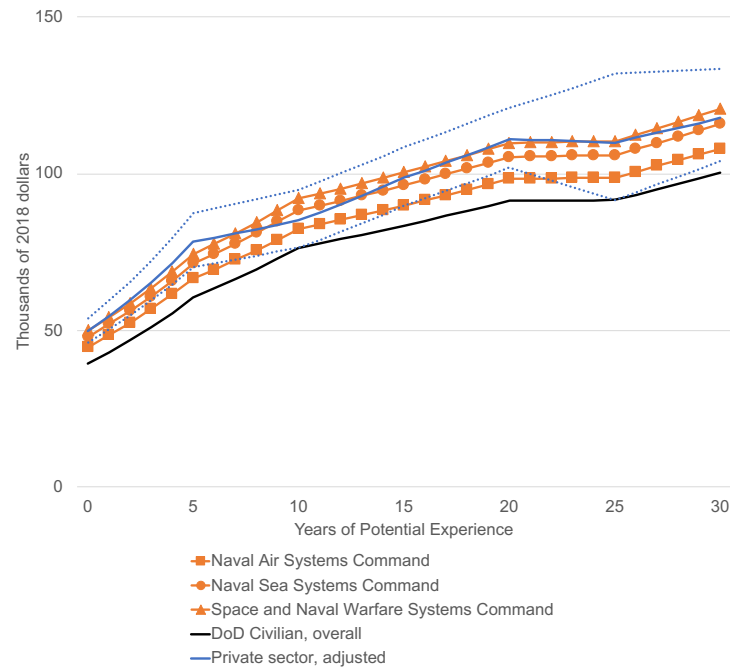
Figure 3.14. Predicted Average Income by YOPE and Top Three Subagencies Among the Defense Acquisition Program Management Workforce, 2018



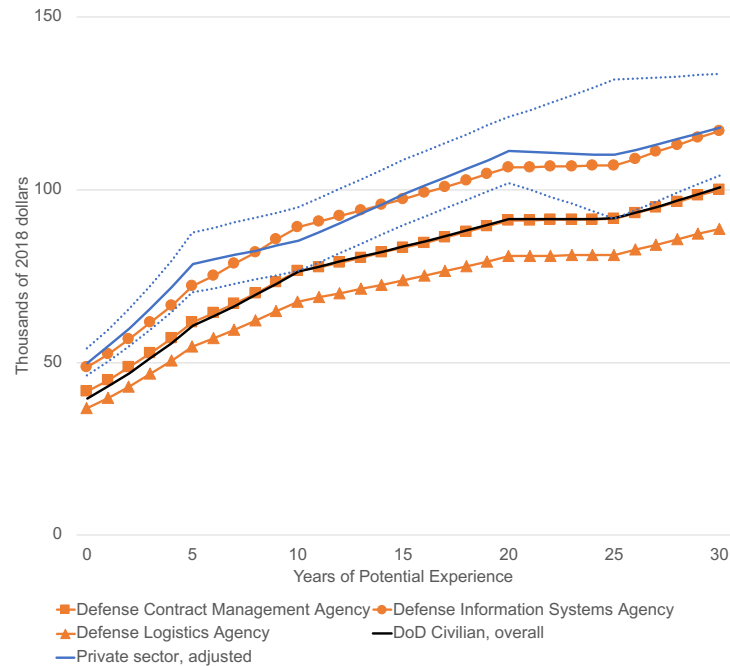
(a) Air Force



(b) Army



(c) Navy



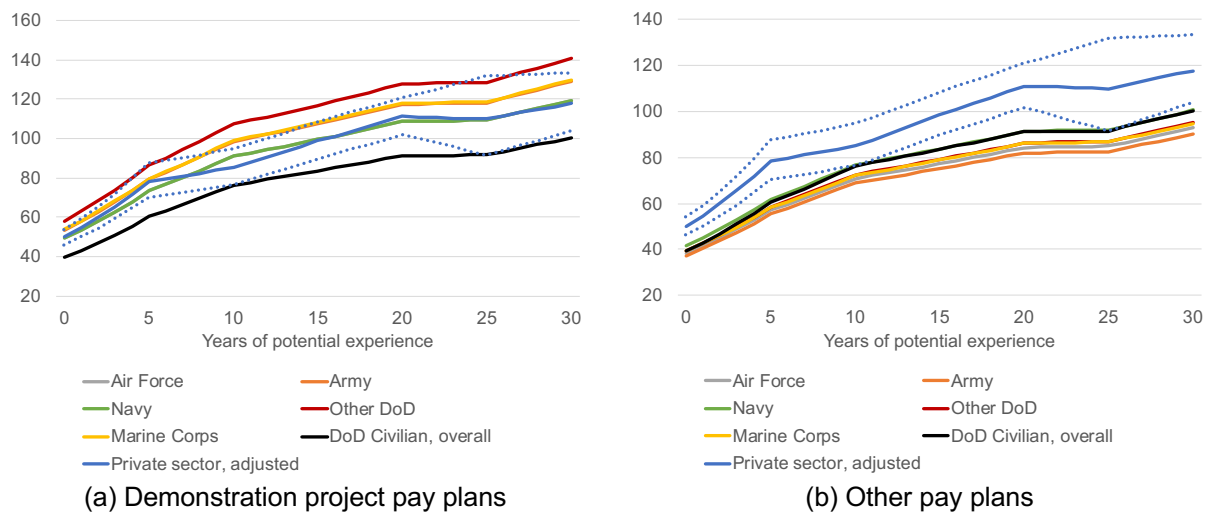
(d) Other DoD

SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Finally, as shown in Figure 3.15, we further divide DoD civilians by agency and pay plan and compare the predicted average income of these subgroups with that in the private sector. Again, when we look across agencies, we find that predicted average income of those covered by demonstration project pay plans is in line with that in the private sector, with the exception of those working for other DoD agencies, where predicted average income statistically significantly exceeds private-sector predicted average income. Because a minority of the program management workforce is covered by demonstration projects (11 to 35 percent across the agencies), overall DoD predicted average income is driven by those under other pay plans. Therefore, similar to DoD civilians overall, the predicted average income of DoD civilians covered by other pay plans in this workforce is statistically significantly less than that in the private sector over the course of a 30-year career.

Figure 3.15. Predicted Average Income by YOPE, Agency, and Pay Plan Among the Defense Acquisition Program Management Workforce, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

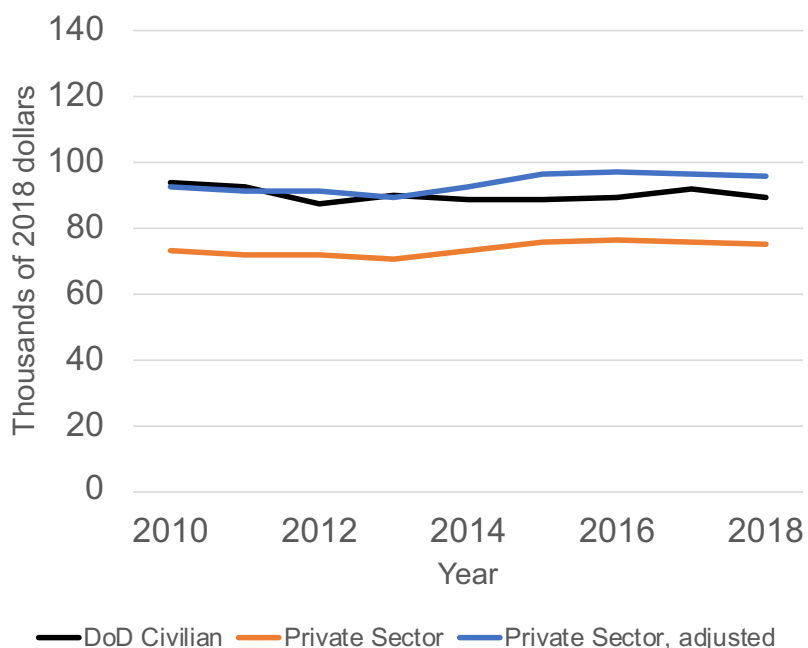
NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

To summarize, both the raw income trends and the regression-adjusted predicted average income for the defense acquisition program management workforce are lower in the DoD civilian sector than in the private sector. We find that, similar to the predicted average income for the other workforces, predicted average income for DoD civilians with less than a bachelor's degree is equivalent to or greater than predicted average income in the private sector, while among those with a master's degree or more, predicted average income for DoD civilians falls short of that in the private sector. For those with a bachelor's degree, predicted average income is lower in the DoD civilian sector than in the private sector. Similar to the results overall, DoD civilian predicted average income by agency is generally less than private-sector predicted average income. Moreover, when we look at the top three subagencies for each agency, we see that predicted average income of DoD civilians is generally less than that in the private sector for those working in the top three Air Force subagencies. In contrast, across the top three subagencies within the Army, the Navy, and other DoD agencies, the results vary; at times, predicted average income is below, in line with, or above private-sector predicted average income, depending on the subagency. Finally, DoD civilians covered by demonstration project pay plans have a predicted average income that is in line with that in the private sector—with the exception of those in other DoD agencies, where predicted average income exceeds that in the private sector. Predicted average income for DoD civilians covered by other pay plans falls short of that in the private sector.

Procurement

For the procurement workforce, we see in Figure 3.16 that DoD civilian and adjusted private-sector average incomes were roughly equal until 2013, when DoD civilian average income dropped below the adjusted private-sector average income. By 2018, DoD civilian average income for the procurement workforce was \$89,000, while the private-sector adjusted income was \$96,000.

Figure 3.16. Average Income by Year and Sector Among the Defense Acquisition Procurement Workforce

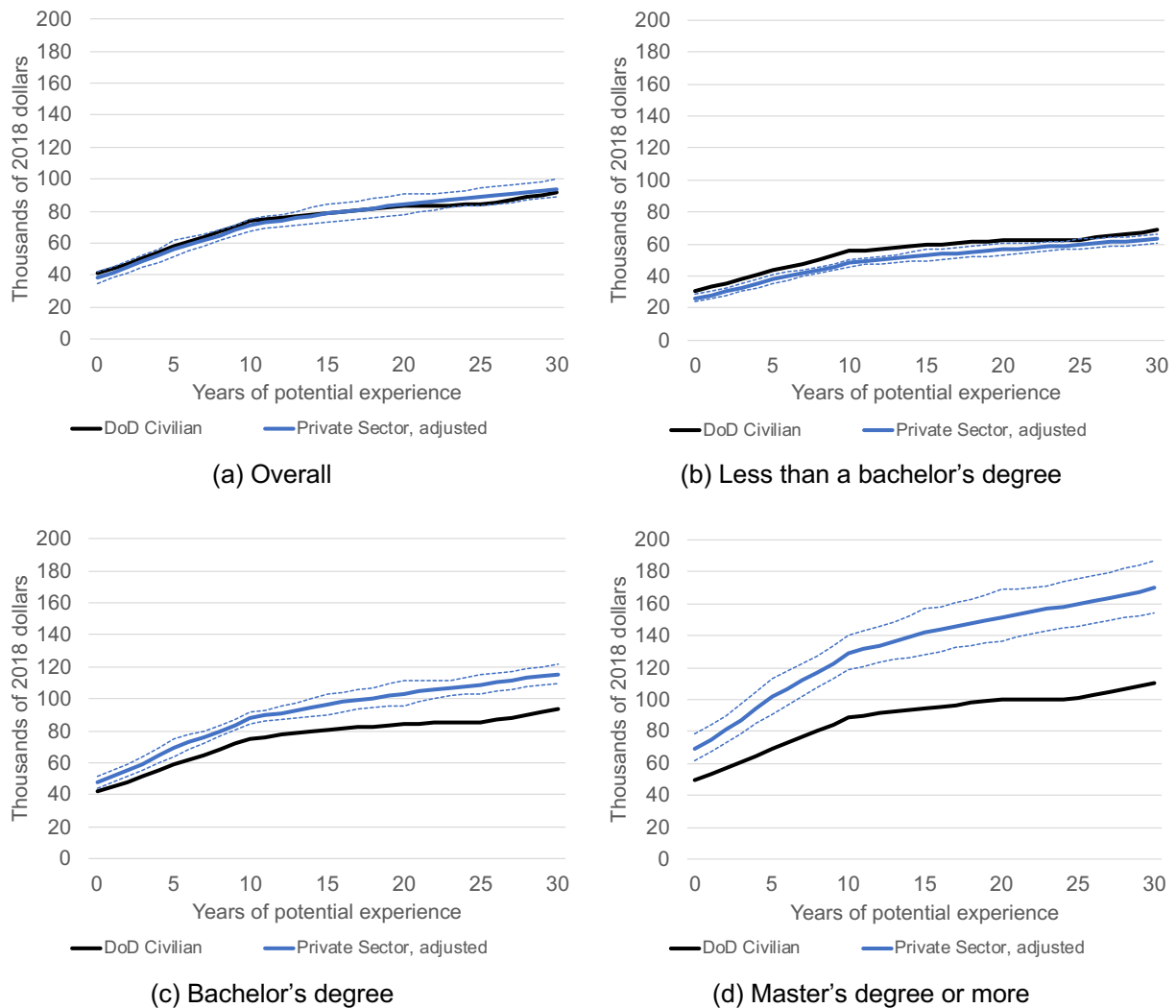


SOURCES: 2010–2018 DMDC Civilian Master and Pay File data, 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

Next, we find that overall predicted average income is equivalent between the DoD civilian and private sectors (panel a of Figure 3.17). When we divide the sector into subgroups by educational attainment, we find that DoD civilian predicted average income statistically significantly exceeds that in the private sector among those with less than a bachelor's degree (panel b) but is statistically significantly less than that in the private sector among those with a bachelor's (panel c) or master's degree or more (panel d).¹⁶ As with the other workforces, the difference between DoD civilian and private-sector predicted average income among those with a master's degree or more grows with YOPE.

¹⁶ The one exception is that DoD civilian predicted income is equivalent to that in the private sector, at 25 YOPE, for those with less than a bachelor's degree.

Figure 3.17. Predicted Average Income by YOPE Among the Defense Acquisition Procurement Workforce, 2018

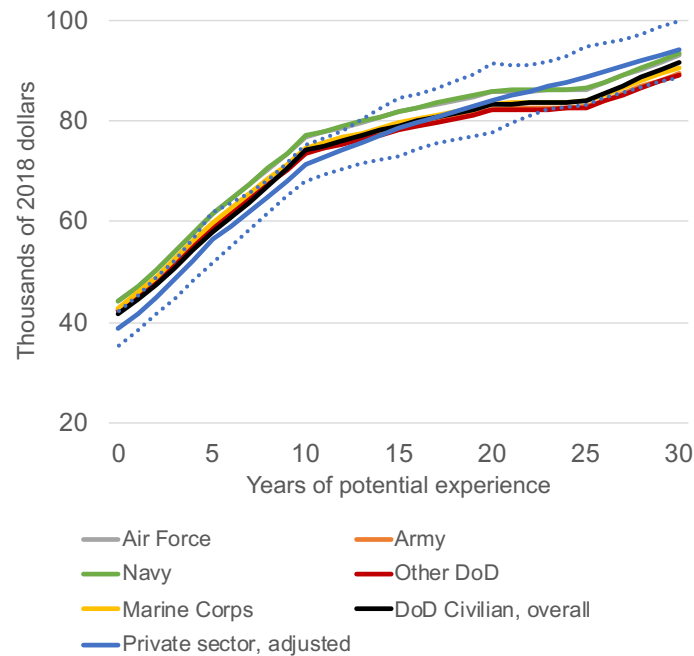


SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.18 shows that there is little variation in predicted average income when we divide DoD civilians into agencies. For each agency, predicted average income is line with that in the private sector.

Figure 3.18. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Procurement Workforce, 2018



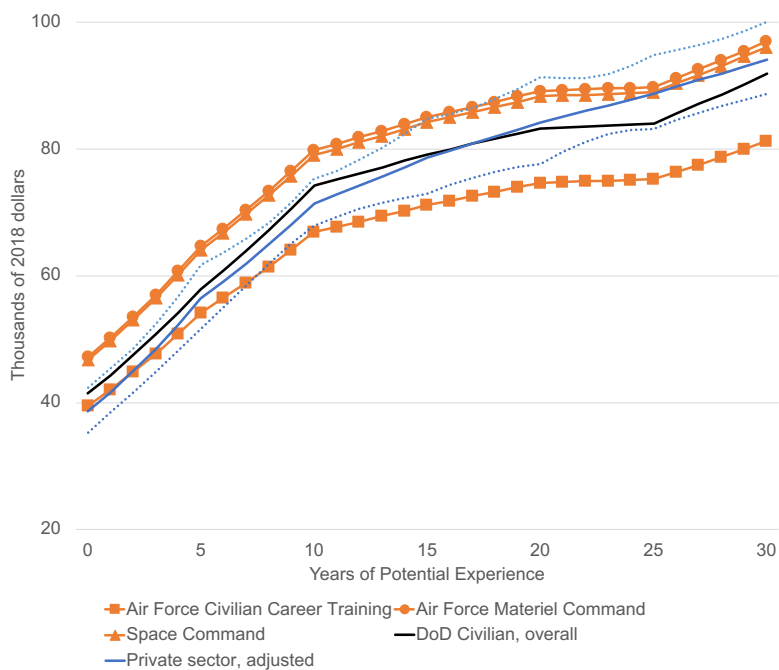
SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

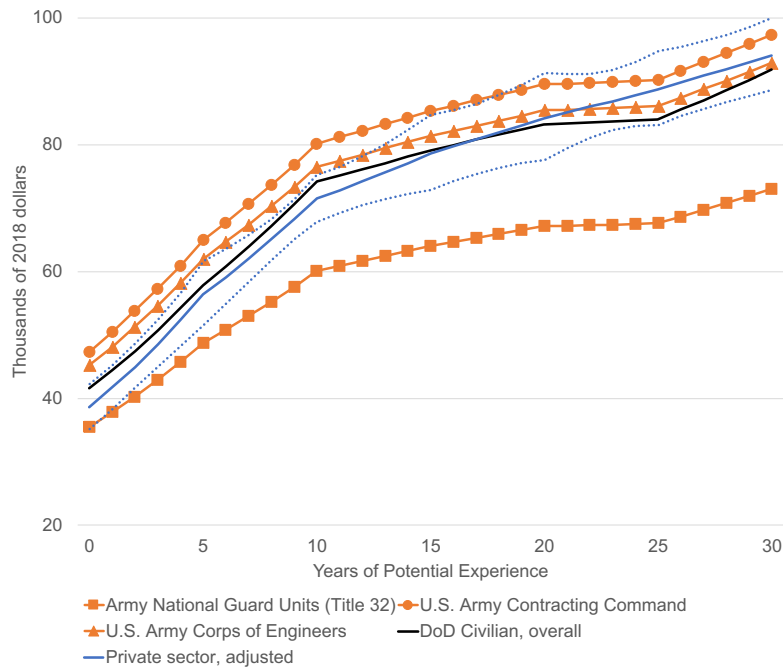
However, when we examine predicted average income among the top three subagencies, we find interesting variation, as shown in Figure 3.19. Within the Air Force, predicted average income of civilians working for the Air Force Materiel Command or the Space Command, which together make up 61 percent of the 2018 workforce, is significantly higher than that in the private sector for the first half of the career and in line with the private sector for the second half of the career. In contrast, predicted average income of civilians working for Air Force Civilian Career Training is in line with the private sector for 0–7 YOPE and significantly less for the remainder of the 30-year career. Within the Army, predicted average income of civilians working in the U.S. Army Contracting Command or the U.S. Army Corps of Engineers—the two largest subagencies, which together employ 56 percent of the 2018 workforce—is in line with or greater than that in the private sector, while predicted average income of civilians working in the U.S. Army National Guard Units (Title 32) is significantly lower than that in the private sector. Predicted average income for those in the top three subagencies in the Navy is equivalent to or greater than that in the private sector, with predicted average income for those working for the Naval Sea Systems Command, which employed 18 percent of the 2018 workforce, being statistically significantly greater than that in the private sector over the entire career trajectory. For other DoD agencies, predicted average income of civilians working for the smallest of the

top three subagencies, the Defense Commissary Agency, is significantly less than that in the private sector and much lower than predicted average incomes for workers in the other two top subagencies—the Defense Contract Management Agency and the Defense Logistics Agency, which together employed 79 percent of the 2018 workforce.

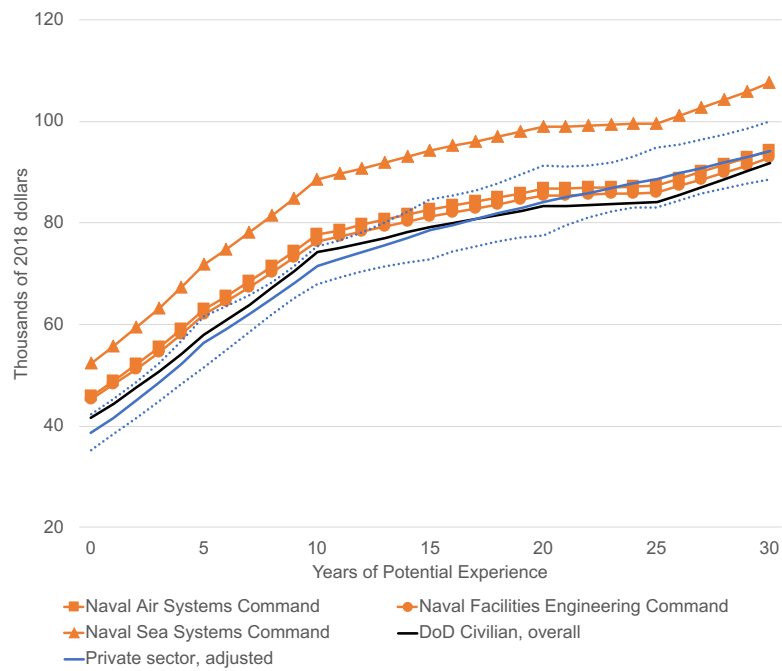
Figure 3.19. Predicted Average Income by YOPE and Top Three Subagencies Among the Defense Acquisition Procurement Workforce, 2018



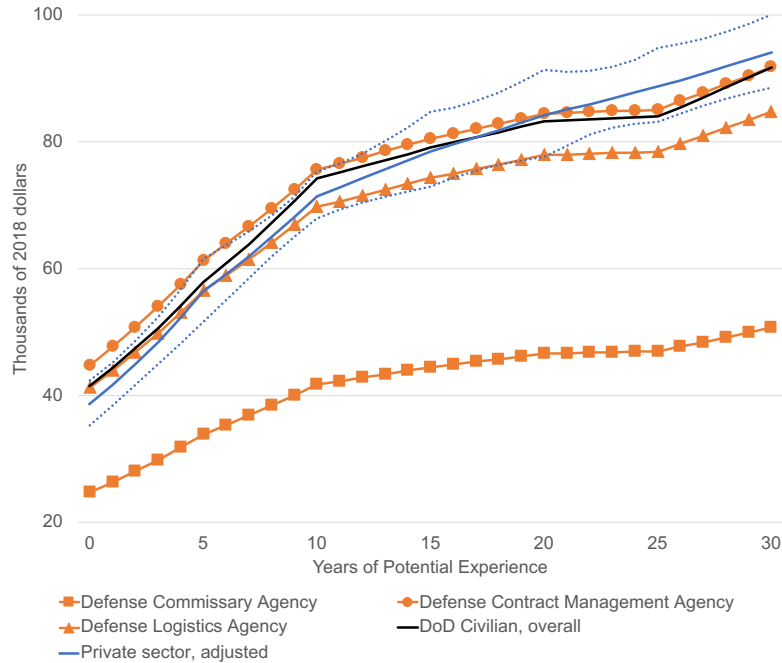
(a) Air Force



(b) Army



(c) Navy



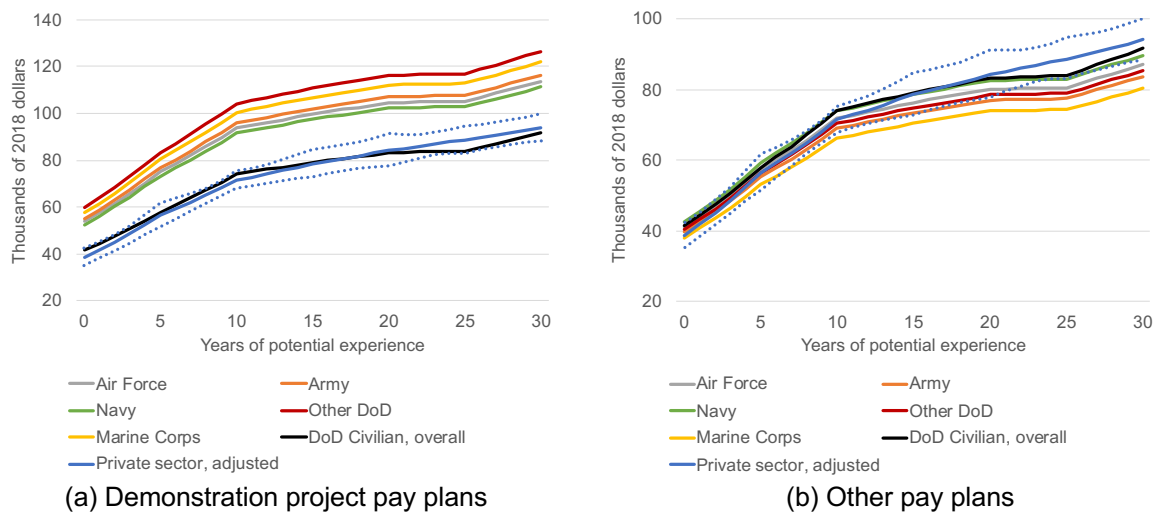
(d) Other DoD

SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.20 further divides DoD civilians by agency and pay plan. Panel a shows that those covered by demonstration project pay plans have predicted average incomes statistically significantly greater than that in the private sector. However, because most DoD civilians in the procurement workforce are not covered by demonstration project plans (77 to 90 percent across agencies), the overall results by agency are driven by workers covered by other pay plans (panel b). These results show that predicted average income in the DoD civilian sector is generally in line with that in the private sector, regardless of agency.

Figure 3.20. Predicted Average Income by YOPE, Agency, and Pay Plan Among the Defense Acquisition Procurement Workforce, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

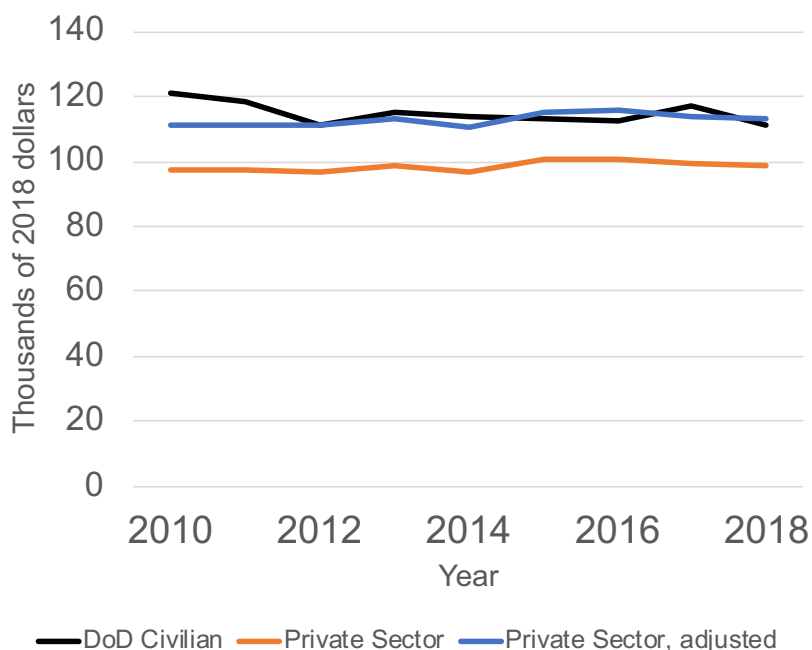
To summarize, for the defense acquisition procurement workforce, we find that the raw income trends and regression-adjusted predicted average income over a career are roughly equivalent between DoD civilians and the private sector. When we examine predicted average income by educational attainment, we find that, for those with less than a bachelor’s degree, DoD civilian predicted average income generally exceeds that in the private sector, but the opposite is true—i.e., DoD civilian predicted average income is less than in the private sector—for those with a bachelor’s degree or with a master’s degree or more. Separating DoD civilians by agency shows little variation in predicted average income; the overall result, that DoD civilian and private-sector predicted average incomes are roughly equivalent, holds. Yet when we further divide DoD civilians by the top three subagencies within each agency, the results vary: At times, predicted average income of DoD civilians is below, in line with, or above that in the private sector. This is true both across subagencies within each agency and within a career trajectory for certain subagencies. Lastly, among the minority of DoD civilians in the procurement workforce who are covered by demonstration project pay plans, predicted average income is above that of private-sector workers, while predicted average income among those covered by other pay plans is the same as that of private-sector workers.

Engineering and Science

When we examine average income by year for the engineering and science workforce, shown in Figure 3.21, we find that average income for DoD civilians was higher than adjusted average

income in the private sector in 2010 and 2011. However, from 2012 onward, the two were roughly equivalent. In 2018, DoD civilian average income for those in the engineering and science workforce was slightly less than the average adjusted income in the private sector (\$111,000 versus \$113,000).

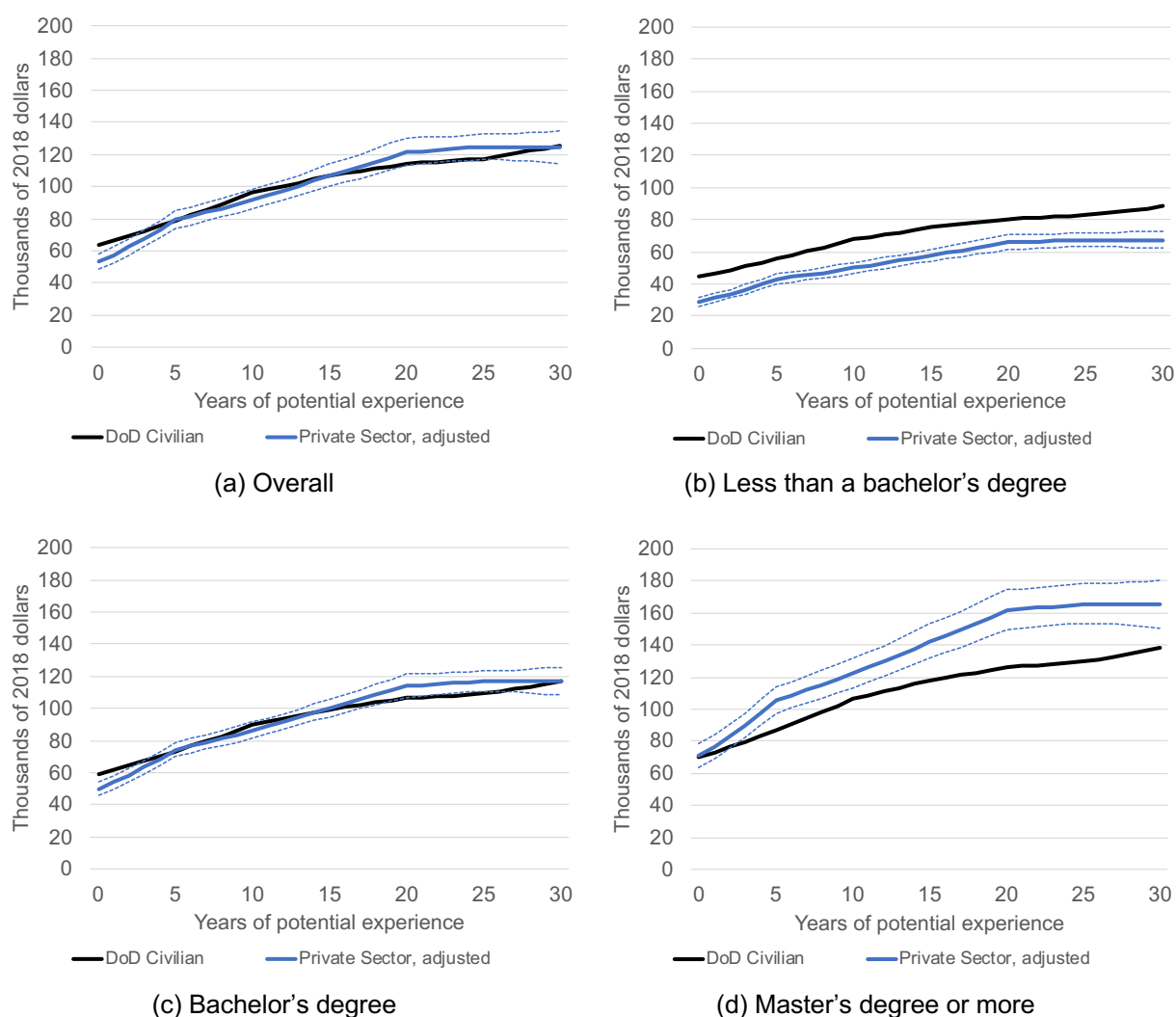
Figure 3.21. Average Income by Year and Sector Among the Defense Acquisition Engineering and Science Workforce



SOURCES: 2010–2018 DMDC Civilian Master and Pay File data, 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

Figure 3.22 shows predicted average income among the engineering and science workforce. Overall, DoD civilian predicted average income is greater than or equivalent to predicted average income in the private sector. As with the other workforces, DoD civilians with less than a bachelor’s degree have statistically significantly higher predicted average income than their private-sector counterparts. Among those with a bachelor’s degree, DoD civilian predicted average income is on par with or greater than that in the private sector for most years, except for 20–26 YOPE. With the exception of the first few YOPE, DoD civilian predicted average income among those with a master’s degree or more is statistically significantly less than predicted average income in the private sector, with the difference generally growing by YOPE.

Figure 3.22. Predicted Average Income by YOPE Among the Defense Acquisition Engineering and Science Workforce, 2018

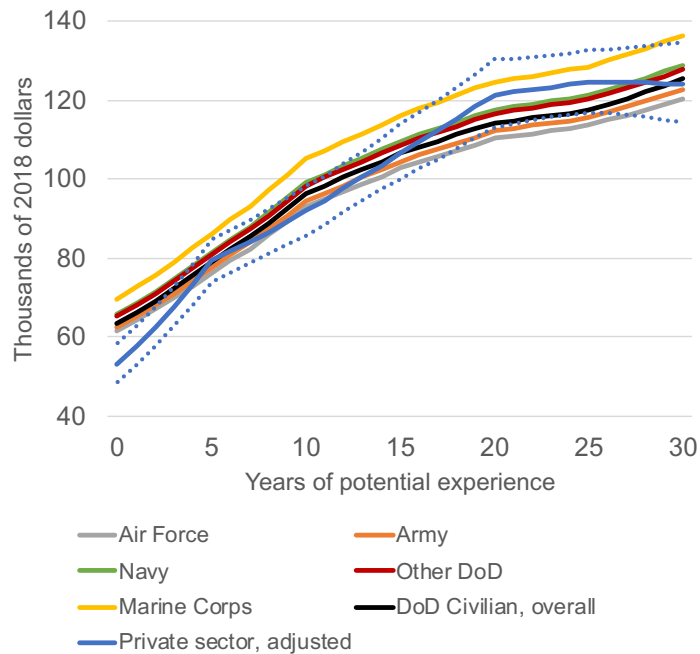


SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

As with the other defense acquisition workforces, there are subtle differences in predicted average income across agencies within the engineering and science workforce, as shown in Figure 3.23. For DoD civilians working for the Marine Corps, the Navy, or other DoD agencies, which make up about half of the engineering and science workforce, predicted average income is at least as high as it is in the private sector. For DoD civilians in the Air Force or Army, predicted average income is generally in line with that in the private sector. The exceptions are 18–27 YOPE for the Air Force and 20–25 YOPE for the Army, when predicted average income falls just below the 95-percent confidence interval for private-sector predicted average income.

Figure 3.23. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Engineering and Science Workforce, 2018



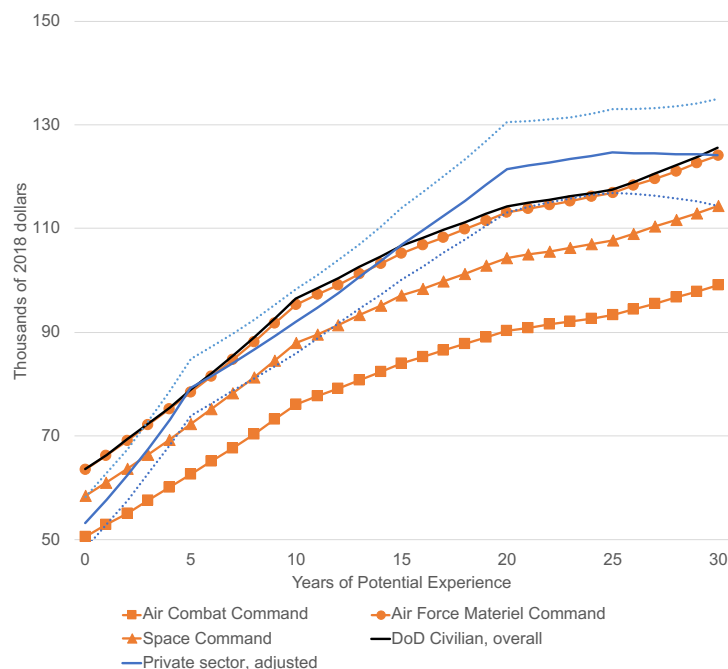
SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

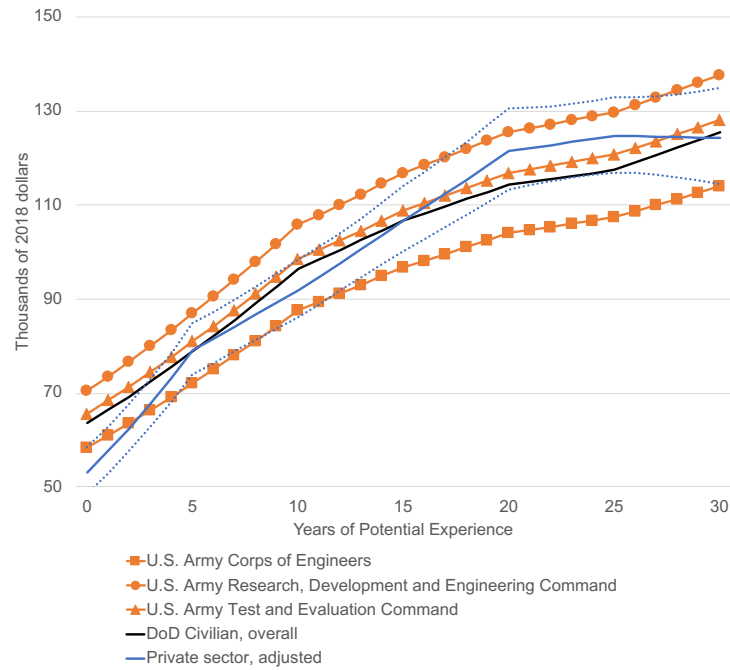
Although we found subtle differences in predicted average income by agency, when we further look into the top three subagencies, we find variation in DoD civilian predicted average income, as depicted in Figure 3.24. For example, for those working in the Air Force, predicted average income is competitive with the private sector in the Air Force Materiel Command, the largest subagency of the workforce, making up 69 percent of the workforce in 2018. In contrast, in the Air Combat Command, predicted average income is significantly lower than that in the private sector. Predicted average income for those working in the Space Command is in line with the private sector until 12 YOPE, when it falls below the 95-percent confidence interval of private-sector predicted average income. For the Army, predicted average income of civilians working for the U.S. Army Research, Development and Engineering Command—the top subagency of the Army workforce, at 36 percent in 2018—is statistically significantly greater than that in the private sector for most of the 30-year career. In contrast, predicted average income of civilians working for the second largest subagency, the U.S. Army Corps of Engineers, starts competitive and then falls statistically significantly below that in the private sector at 12 YOPE, with the gap closing only at 30 YOPE. Predicted average income of civilians working for the U.S. Army Test and Evaluation Command is in line with or greater than that in the private sector. For the Navy, predicted average income of civilians working in the Naval Sea

Systems Command or the Space and Naval Warfare Systems Command, which together make up 50 percent of the 2018 workforce, is statistically significantly greater than that in the private sector for the first half of the career, before falling in line with private-sector predicted average income. Predicted average income of civilians working for the Naval Air Systems Command, which employed 25 percent of the 2018 workforce, is generally in line with that in the private sector. Within other DoD agencies, predicted average income of civilians working for the Defense Information Systems Agency or the Missile Defense Agency, which together consisted of 37 percent of the 2018 workforce, is generally significantly higher than private-sector predicted average income. In contrast, predicted average income of civilians working for the Defense Contract Management Agency—the largest subagency, at 30 percent in 2018—is generally competitive with that in the private sector, except for 19–25 YOPE, when it is significantly below private-sector predicted average income.

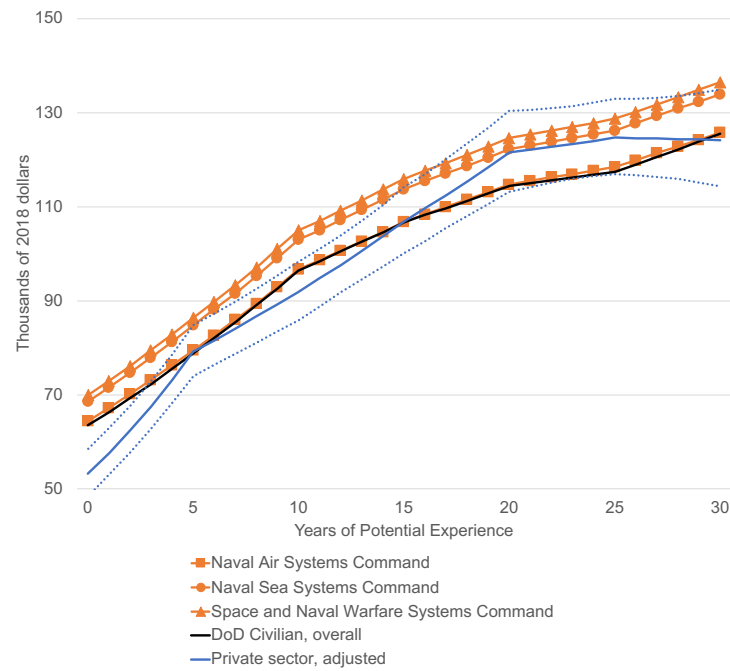
Figure 3.24. Predicted Average Income by YOPE and Top Three Subagencies Among the Defense Acquisition Engineering and Science Workforce, 2018



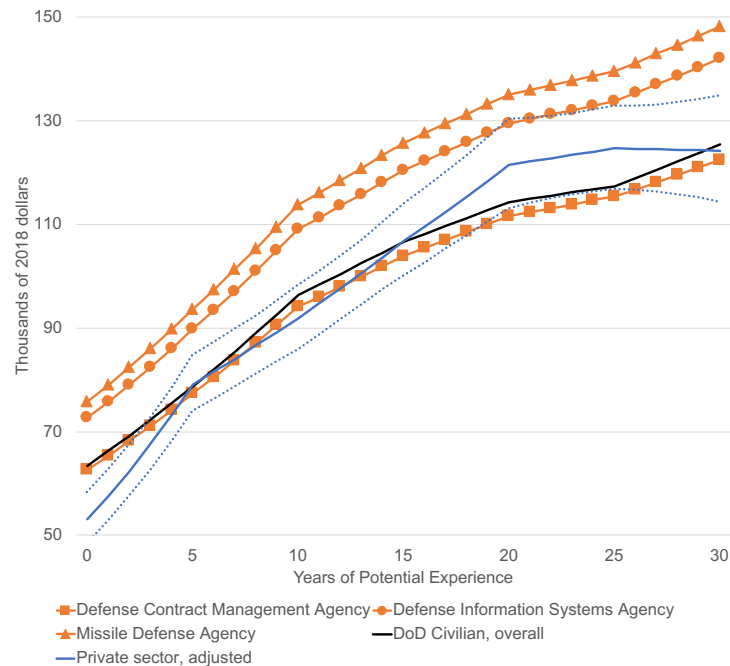
(a) Air Force



(b) Army



(c) Navy



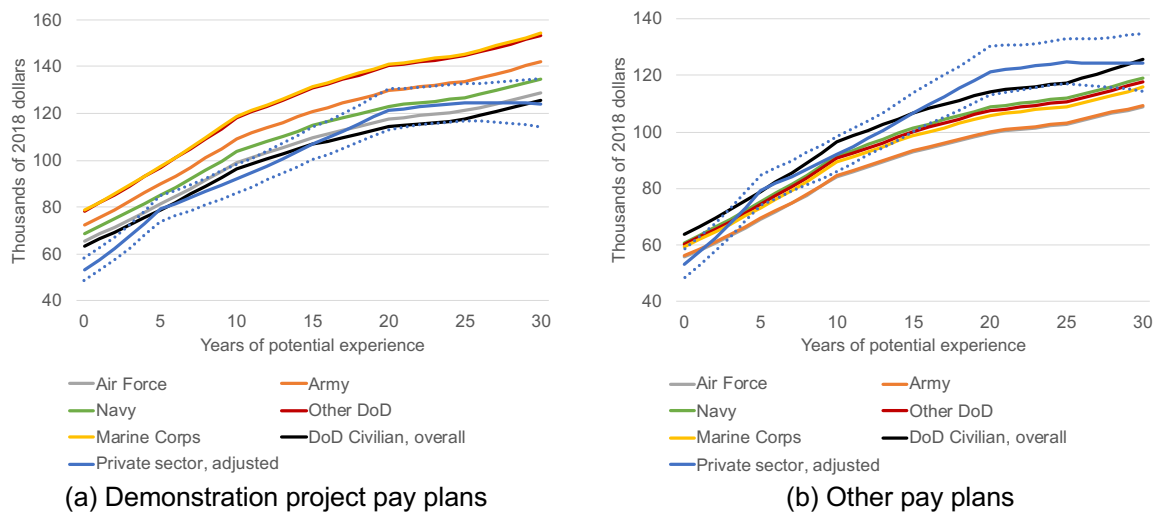
(d) Other DoD

SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Lastly, we compare predicted average income between DoD civilians and private-sector workers by further dividing DoD civilians into agency and pay plan, as shown in Figure 3.25. As discussed in Chapter 2, higher shares of the engineering and science workforce are covered by demonstration project pay plans compared with the three other defense acquisition workforces, with the percentage covered ranging from 28 percent for those in other DoD agencies to 63 percent for those in the Navy. DoD civilians in the Army, the Marine Corps, and other DoD agencies covered by demonstration project pay plans have predicted average incomes that are statistically significantly greater than that in the private sector, while those in the Air Force have predicted average incomes that are in line with that in the private sector. DoD civilians who work for the Navy and are covered by demonstration projects have predicted average incomes that are statistically significantly greater than that in the private sector for up to 15 YOPE; beyond that, their incomes are in line with that in the private sector. For those covered by other pay plans in the Army and Air Force, DoD civilian predicted average income is generally statistically significantly below that in the private sector. For those covered by other pay plans in the Marine Corps, the Navy, and other DoD agencies, predicted average income moves back and forth from being comparable with private-sector predicted average income to being just below it.

Figure 3.25. Predicted Average Income by YOPE, Agency, and Pay Plan Among the Defense Acquisition Engineering and Science Workforce, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

To summarize, raw income trends show that DoD civilian and private-sector average incomes in defense acquisition engineering and science occupations are similar, while the regression-adjusted predicted average income among DoD civilians is greater than or equal to private-sector predicted average income over the career trajectory. As with the other workforces of interest, we find that DoD civilian predicted average income for those with less than a bachelor's degree is higher than that in the private sector, while DoD civilian predicted average income for those with a master's degree or more is generally lower than that in the private sector. For most years over the 30-year career trajectory, DoD civilian predicted average income for those with a bachelor's degree is on par with or greater than that in the private sector. When we examine the results by agency, we find that predicted average income of DoD civilians working for the Marine Corps, the Navy, or other DoD agencies is in line with or greater than that in the private sector. Predicted average income of DoD civilians working in the Air Force or Army is generally on par with that in the private sector, except for certain YOPE, when it falls short. As with the other workforces, there is large variation in predicted average income across the top three subagencies within each agency: At times, DoD civilian predicted average income falls short, is on par with, or exceeds private-sector predicted average income, depending on the subagency. Finally, for the Army, the Marine Corps, and other DoD agencies, predicted average income among DoD civilians covered by demonstration projects exceeds that of private-sector workers. Among DoD civilians working for the Air Force and covered by demonstration projects, predicted average income is in line with that in the private sector. Among DoD civilians

who work for the Navy and are covered by demonstration project pay plans, predicted average income is on par with or exceeds that in the private sector, depending on the YOPE. For those working for the Army or the Air Force, predicted average income for those covered by other pay plans is generally below that in the private sector, and for those working for the Marine Corps, the Navy, or other DoD agencies, predicted average income moves between being on par with and being just below that in the private sector.

Results for Three Locality Pay Areas of Interest

Next, we narrow our focus to the three locality pay areas of interest: Denver-Aurora, Colorado; Los Angeles–Long Beach, California; and Washington, D.C. For each locality pay area, we present predicted average income by YOPE for each workforce of interest in three ways: overall, by educational attainment, and by agency. We note that the sample size is prohibitively small for the Denver-Aurora locality pay area; as a result, for that locality pay area, we present results for only two of the five workforces—defense acquisition business and financial management and engineering and science. Also, for the aerospace engineering workforce, the results by agency exclude the Marine Corps because there are no workers for that agency.

Denver-Aurora

In this subsection, we summarize the predicted average income results for the Denver-Aurora locality pay area for the defense acquisition business and financial management workforce and the defense acquisition engineering and science workforce.

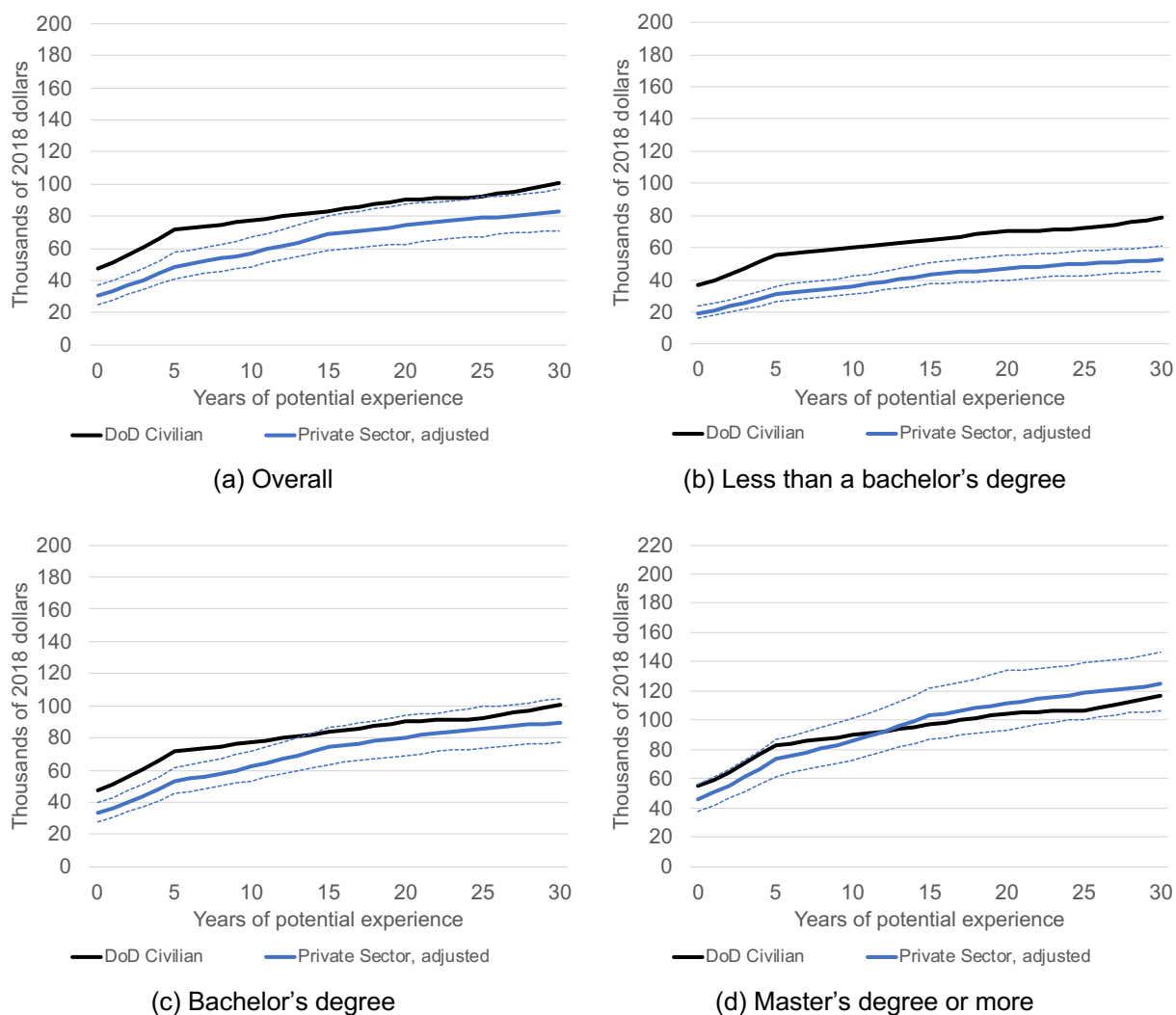
Defense Acquisition Business and Financial Management

Figure 3.26 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition business and financial management workforce in the Denver-Aurora locality pay area. Overall, predicted average income for the business and financial management workforce is statistically significantly higher for DoD civilians than for private-sector workers (panel a). The pattern is the same for workers with bachelor's degrees (panel c). For those with less than a bachelor's degree, predicted average income is statistically significantly higher for DoD civilians than for private-sector workers across the entire career trajectory (panel b). In contrast, there is no statistical difference between predicted average income for DoD civilians and private-sector workers among those with a master's degree or more (panel d).

Next, in Figure 3.27, we break out the predicted average income results for the defense acquisition business and financial workforce in the Denver-Aurora locality pay area by DoD agency. For DoD civilians who work for the Air Force, Army, or Navy, predicted average income is generally statistically indistinguishable from the private sector. However, for DoD civilians who work for other DoD agencies, predicted average income is statistically

significantly and considerably higher than that in the private sector. Finally, we note that there are no DoD civilians who work for the Marine Corps in the defense acquisition business and financial workforce in the Denver-Aurora locality pay area.

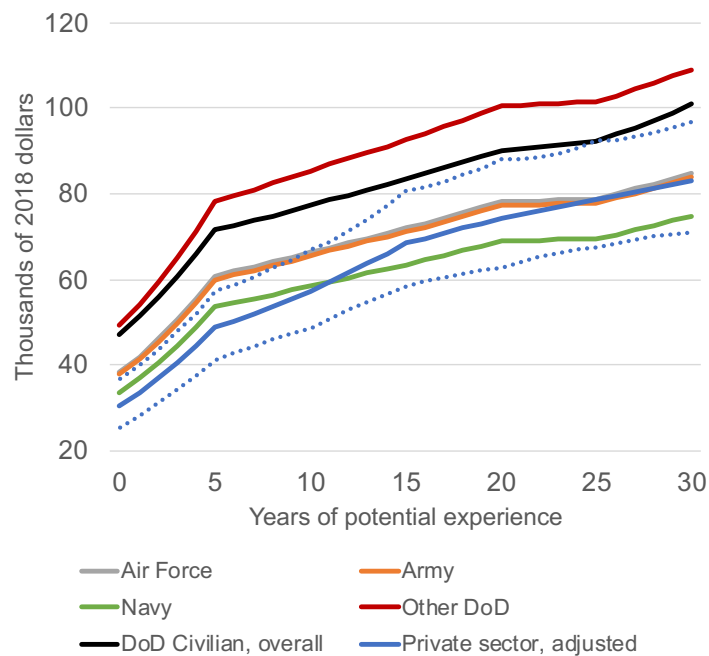
Figure 3.26. Predicted Average Income by YOPE Among the Defense Acquisition Business and Financial Management Workforce in the Denver-Aurora Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.27. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Business and Financial Management Workforce in the Denver-Aurora Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

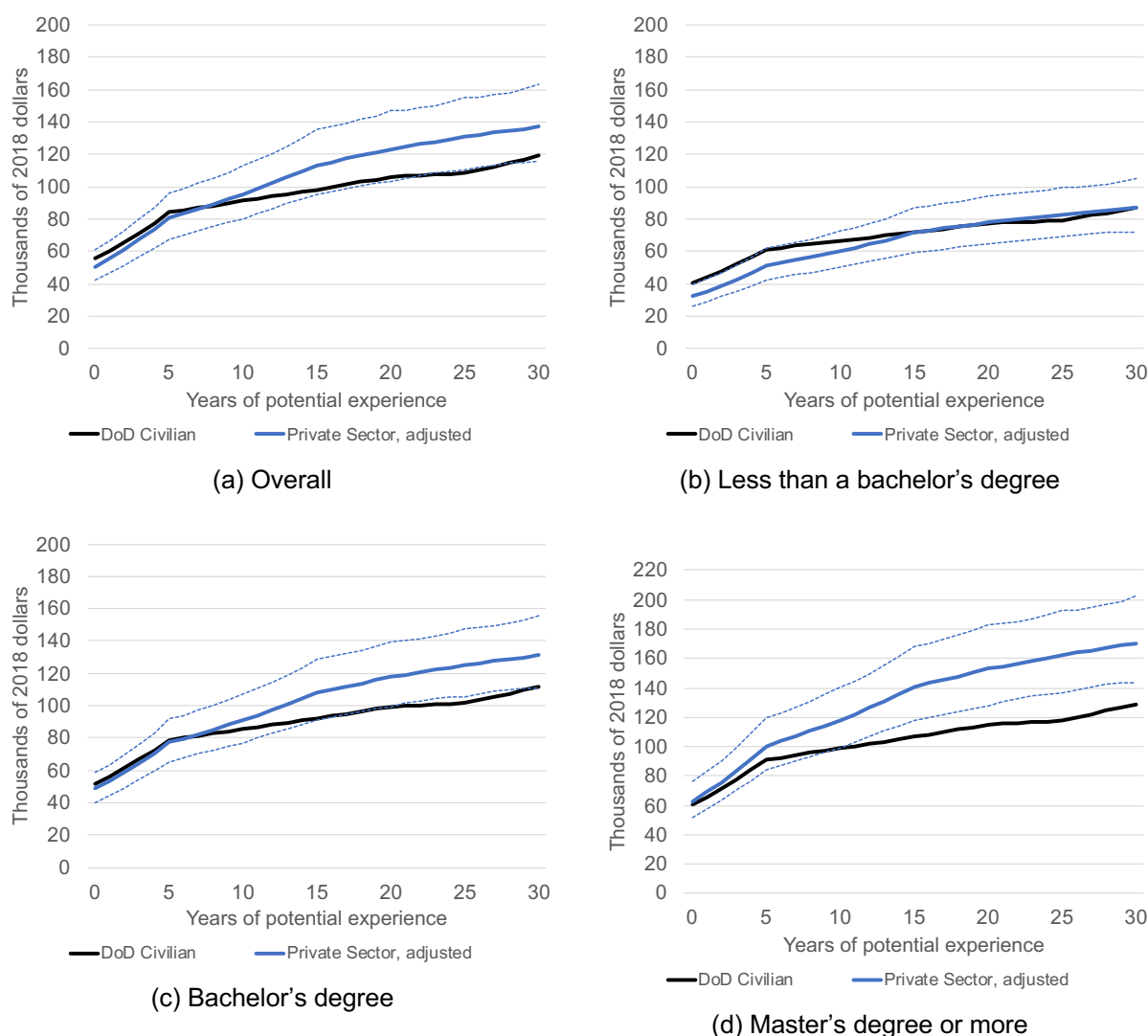
NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Defense Acquisition Engineering and Science

Figure 3.28 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition engineering and science workforce in the Denver-Aurora locality pay area. Overall (panel a), as well as among those with less than a bachelor’s degree (panel b) and those with a bachelor’s degree (panel c), predicted average income is generally statistically indistinguishable between DoD civilians and private-sector workers. The same is true for those with a master’s degree or more (panel d), until 10 YOPE, at which point DoD civilian predicted average income is statistically significantly lower than in the private sector, with the difference growing with YOPE.

When we break out predicted average income results by DoD agency (Figure 3.29), we see that the results for DoD civilians who work for the other DoD agencies follow the overall trend—specifically, that predicted average income is statistically indistinguishable between DoD civilians and private-sector workers. This also is true for DoD civilians who work for the Air Force, Army, or Navy, until 11, 13, and 16 YOPE, respectively, at which point DoD civilian predicted average income is statistically significantly lower than that in the private sector. We note that there no DoD civilians in this workforce who work for the Marine Corps and are in the Denver-Aurora locality pay area.

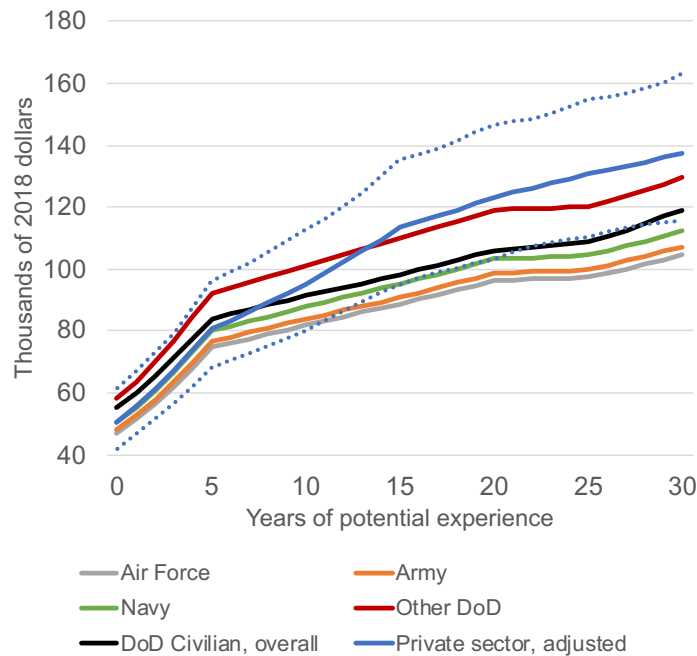
Figure 3.28. Predicted Average Income by YOPE Among the Defense Acquisition Engineering and Science Workforce in the Denver-Aurora Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.29. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Engineering and Science Workforce in the Denver-Aurora Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

To summarize, because of the small sample size, for the Denver-Aurora locality pay area, the analysis is limited to two of the defense acquisition workforces: business and financial management and engineering and science. For the business and financial management workforce, we find that DoD civilian predicted average income is in line with the private sector among those with a master's degree or more. For the workforce overall and among those with a bachelor's degree or less, DoD civilian predicted average income is statistically significantly greater than that in the private sector. Results by agency show that, for those working for the Air Force, Army, or Navy, predicted average income is statistically the same as the private sector, while for those working in other DoD agencies, predicted average income is statistically significantly greater than that in the private sector. These findings for the Denver-Aurora locality pay area are in contrast to the nationwide workforce, which shows that DoD civilian predicted average income to be statistically significantly greater than the private sector only among those with less than a bachelor's degree.

For the defense acquisition engineering and science workforce in the Denver-Aurora locality pay area, DoD civilian predicted average income is generally equivalent to that in the private sector for the workforce overall and among those with a bachelor's degree or less. For those with a master's degree or more, predicted average income is equivalent for the first part of the career,

after which private-sector predicted average income becomes statistically significantly higher than that for DoD civilians. The results also vary by agency. For those working for the Air Force, Army, or Navy, DoD civilian predicted average income is similar to the private sector in the first portion of the career and falls short after. For those working for other DoD agencies, DoD civilian and private-sector predicted average incomes are statistically equivalent over the entire career trajectory. Comparing the Denver-Aurora locality pay area results with the nationwide results reveals two differences. First, for the nationwide workforce, DoD civilians with less than a bachelor's degree have predicted average income greater than the private sector, unlike for the Denver-Aurora locality pay area, where income is comparable across the DoD civilian and private sectors. Second, results by agency show that DoD predicted average income is generally more comparable to the private sector for the nationwide workforce than for the workforce in the Denver-Aurora locality pay area.

Los Angeles–Long Beach

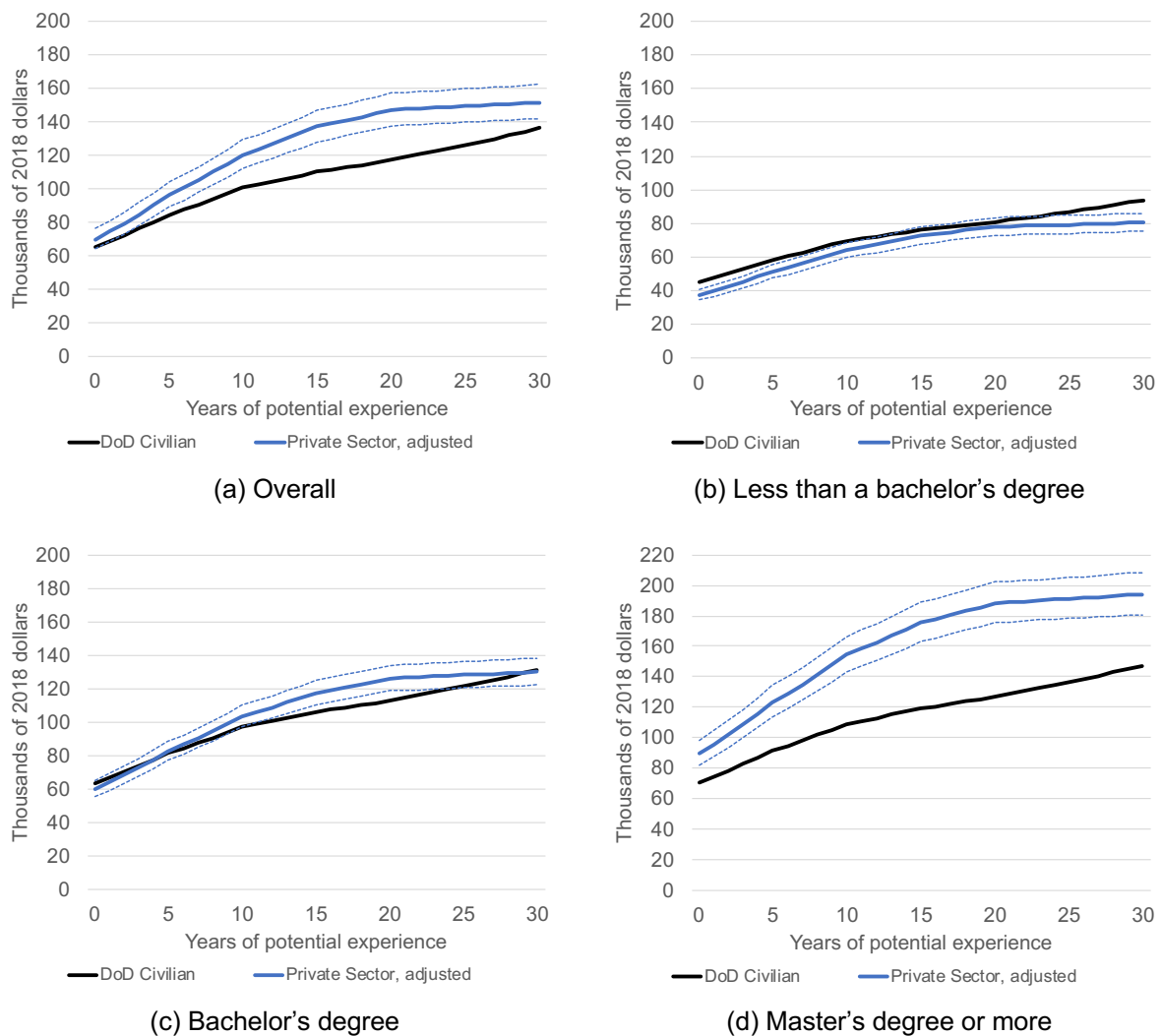
In this subsection, we summarize the predicted average income results for the Los Angeles–Long Beach locality pay area for each of the five workforces of interest.

Aerospace Engineering

Figure 3.30 shows predicted average income for DoD civilians and private-sector workers in the aerospace engineering workforce in the Los Angeles–Long Beach locality pay area. Overall, predicted average income for DoD civilians is statistically significantly lower than in the private sector (panel a). The same is true for those with a master's degree or more (panel d), and the difference in predicted average income between sectors generally grows by YOPE. However, for those with less than a bachelor's degree and those with a bachelor's degree, predicted average income is generally statistically indistinguishable from the private sector, or it is just outside the 95-percent confidence interval (panels b and c).

When we break out the predicted average income results by DoD agency (Figure 3.31), we see that the results are the same as for the overall; for DoD civilians who work for the Air Force, the Navy, or other DoD agencies, predicted average income is generally statistically significantly lower than in the private sector. We note that there are no aerospace engineers who work for the Marine Corps or the Army in the Los Angeles–Long Beach locality pay area.

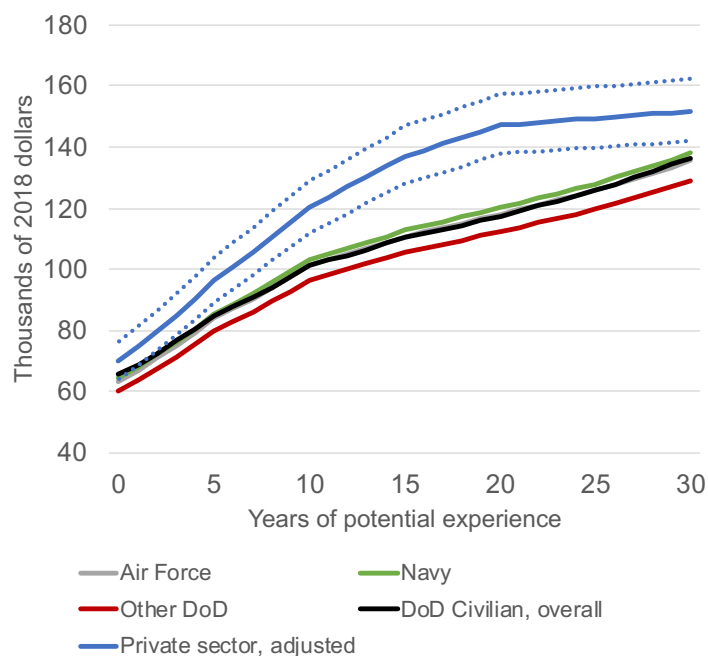
Figure 3.30. Predicted Average Income by YOPE Among the Aerospace Engineering Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.31. Predicted Average Income by YOPE and Agency Among the Aerospace Engineering Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

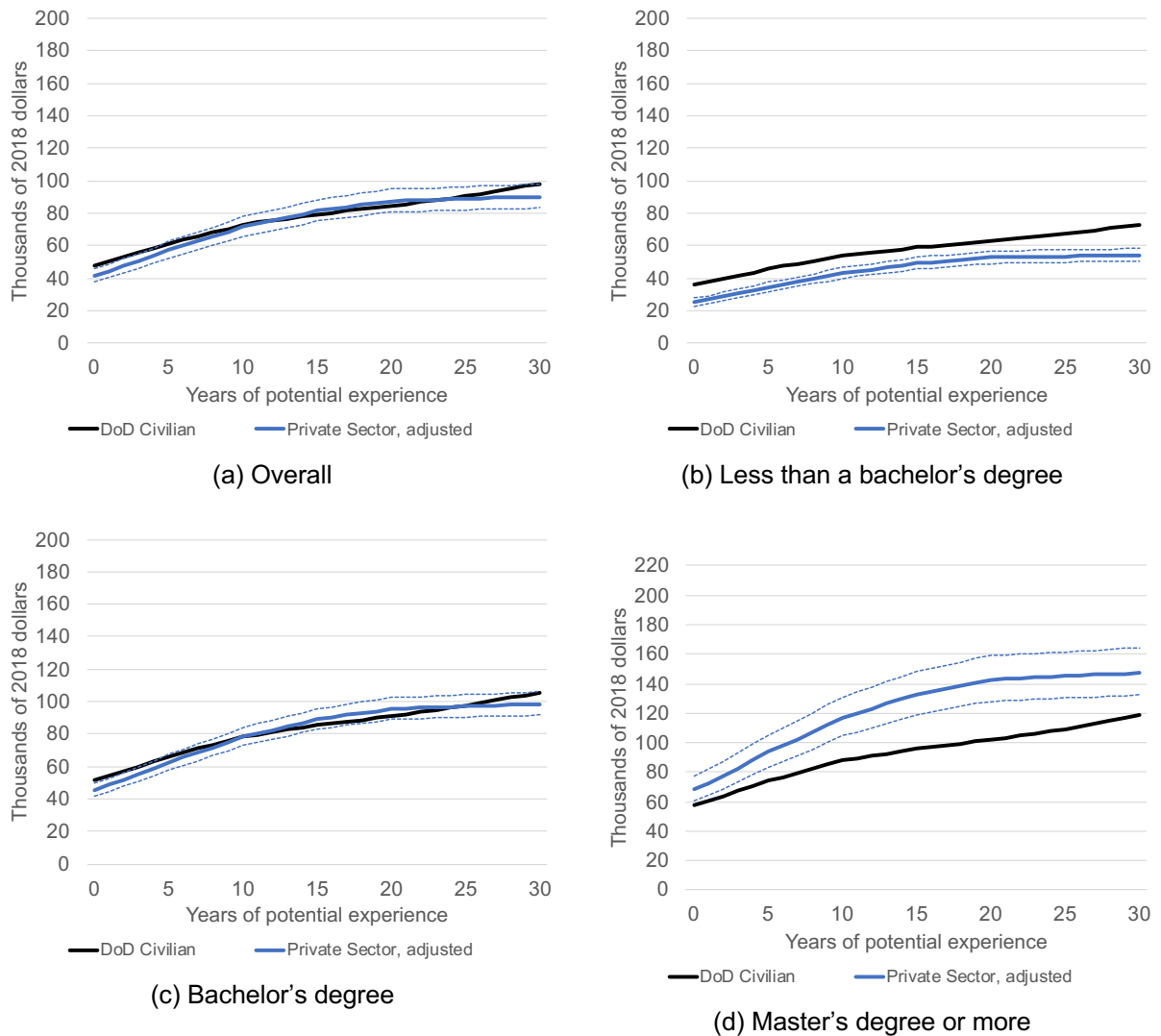
NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Defense Acquisition Business and Financial Management

Figure 3.32 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition business and financial management workforce in the Los Angeles–Long Beach locality pay area. Overall (panel a) and among those with a bachelor’s degree (panel c), predicted average income is generally statistically indistinguishable between DoD civilians and private-sector workers. In contrast, for those with less than a bachelor’s degree (panel b) and those with a master’s degree or more (panel d), DoD civilian predicted average income is statistically significantly higher and lower, respectively, than in the private sector.

Next, Figure 3.33 breaks out predicted average income results by DoD agency. For DoD civilians working for the Air Force or Navy, predicted average income is statistically indistinguishable between DoD civilians and private-sector workers—the same as the overall trend. For DoD civilians working for the Army or Marine Corps, predicted average income is statistically significantly lower than in the private sector. Lastly, for DoD civilians working for other DoD agencies, predicted average income is statistically significantly higher than in the private sector up through 11 YOPE and again from 24 YOPE and beyond, but it is statistically indistinguishable in the years in between.

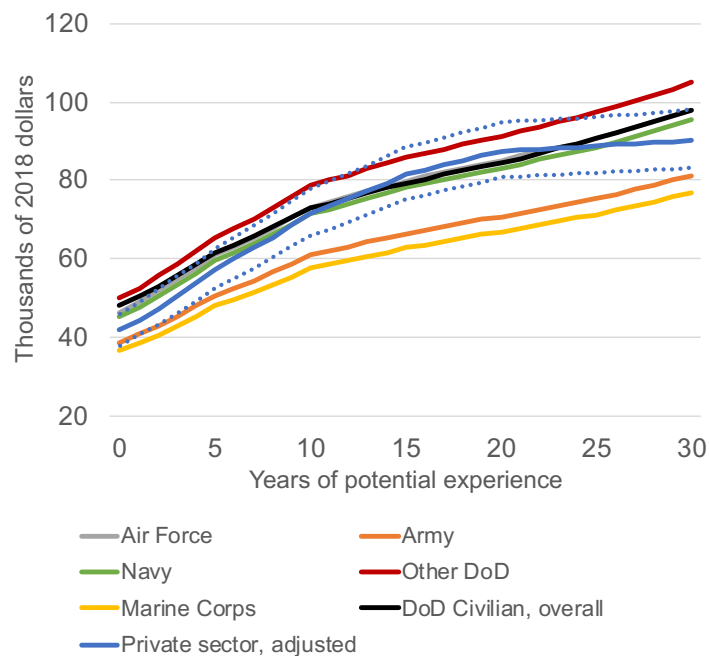
Figure 3.32. Predicted Average Income by YOPE Among the Defense Acquisition Business and Financial Management Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.33. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Business and Financial Management Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

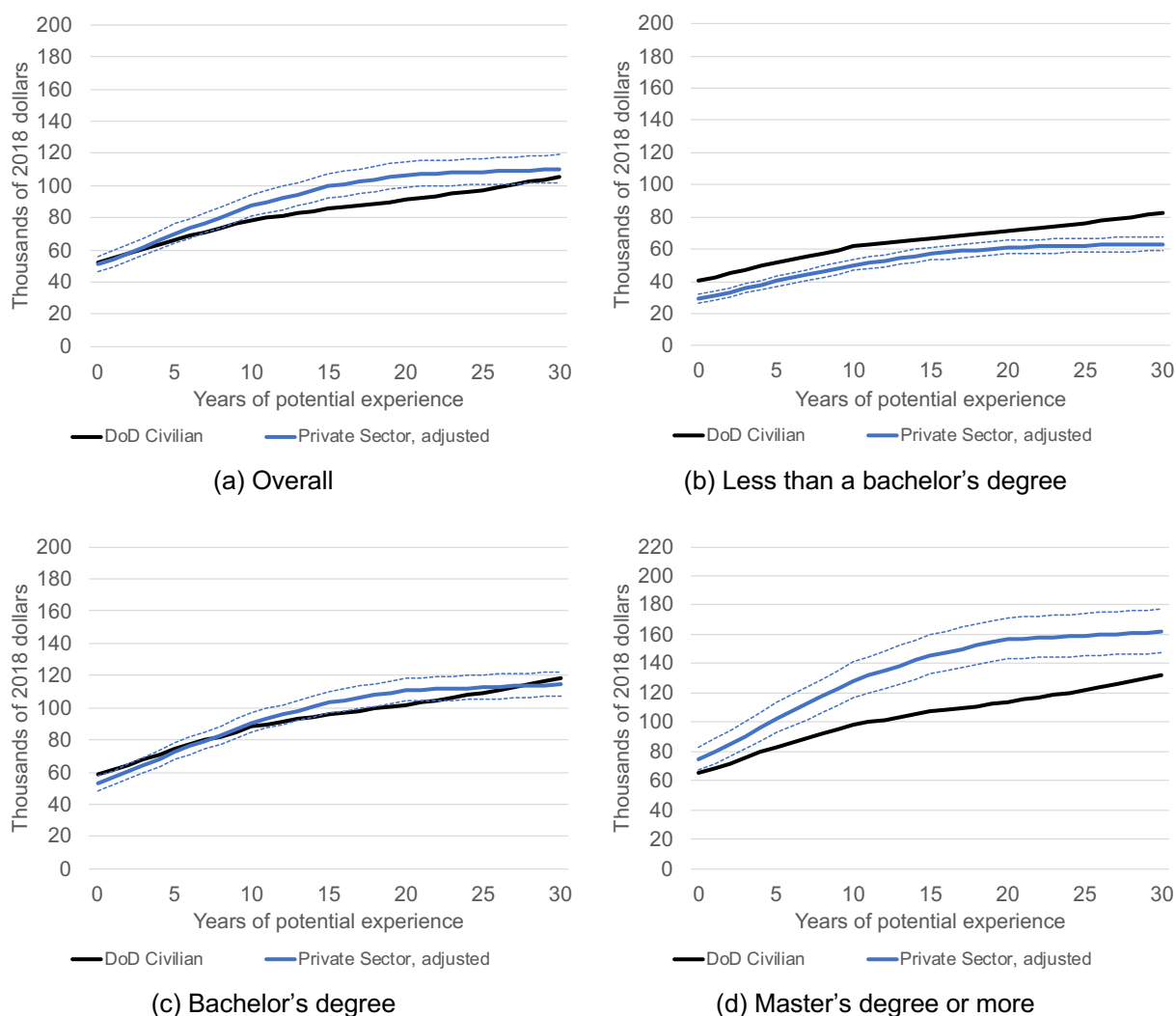
Defense Acquisition Program Management

Figure 3.34 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition program management workforce in the Los Angeles–Long Beach locality pay area. Overall (panel a), DoD civilian predicted average income is statistically indistinguishable from the private sector up through 7 YOPE and from 28 YOPE and beyond, but it is statistically significantly lower than the private sector in the years in between. For those with less than a bachelor’s degree (panel b), predicted average income is statistically significantly higher among DoD civilians than in the private sector. For those with a bachelor’s degree (panel c), predicted average income among DoD civilians and the private sector is generally statistically indistinguishable. Finally, for those with a master’s degree or more (panel d), DoD civilian predicted average income is statistically significantly lower than in the private sector.

Figure 3.35 breaks out predicted average income results by DoD agency. For DoD civilians working for the Army or the Marine Corps, predicted average income is statistically significantly lower than for the private sector. Predicted average income for DoD civilians who work for the Air Force or Navy is statistically indistinguishable from the private sector through 7 and

9 YOPE, respectively, and beyond 27 and 25 YOPE, respectively. For the years in between, DoD civilian predicted average income is statistically significantly lower than that in the private sector. For those who work for other DoD agencies, predicted average income is statistically indistinguishable from that in the private sector through 3 YOPE, at which point DoD civilian predicted average income falls statistically significantly below that in the private sector.

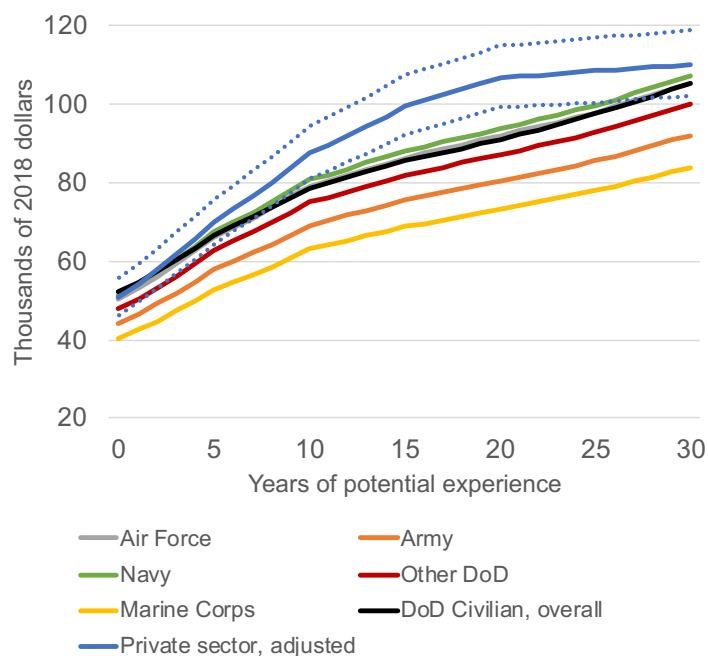
Figure 3.34. Predicted Average Income by YOPE Among the Defense Acquisition Program Management Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.35. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Program Management Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

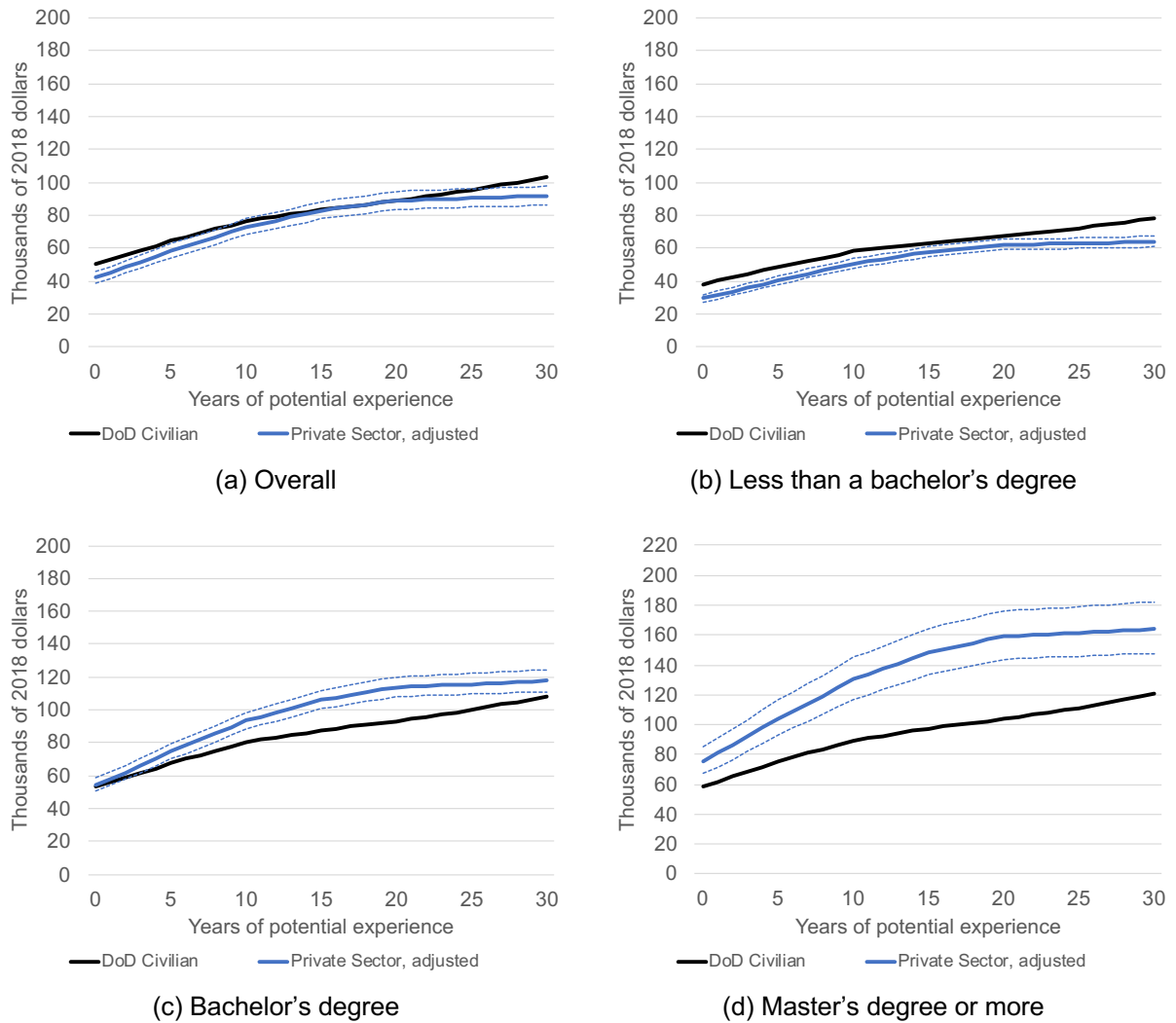
Defense Acquisition Procurement

Figure 3.36 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition procurement workforce in the Los Angeles–Long Beach locality pay area. Overall (panel a), DoD civilian predicted average income is statistically indistinguishable from the private sector except for early and late in the career trajectory. However, that overall trend masks interesting variation by educational attainment. For those with less than a bachelor’s degree (panel b), predicted average income is statistically significantly higher among DoD civilians than in the private sector. In contrast, for those with a bachelor’s degree (panel c) and for those with a master’s degree or more (panel d), predicted average income among DoD civilians is generally statistically significantly lower than in the private sector.

Figure 3.37 breaks out predicted average income results by DoD agency. For DoD civilians working for the Air Force or the Navy, predicted average income is generally statistically significantly higher than in the private sector, while the opposite is true for DoD civilians working for the Marine Corps. Predicted average income for DoD civilians working for the other DoD agencies is statistically indistinguishable from that in the private sector. The same is true for DoD civilians working for the Army through 6 YOPE and from 28 YOPE and beyond. For

the years in between, DoD civilian predicted average income is statistically significantly lower than in the private sector.

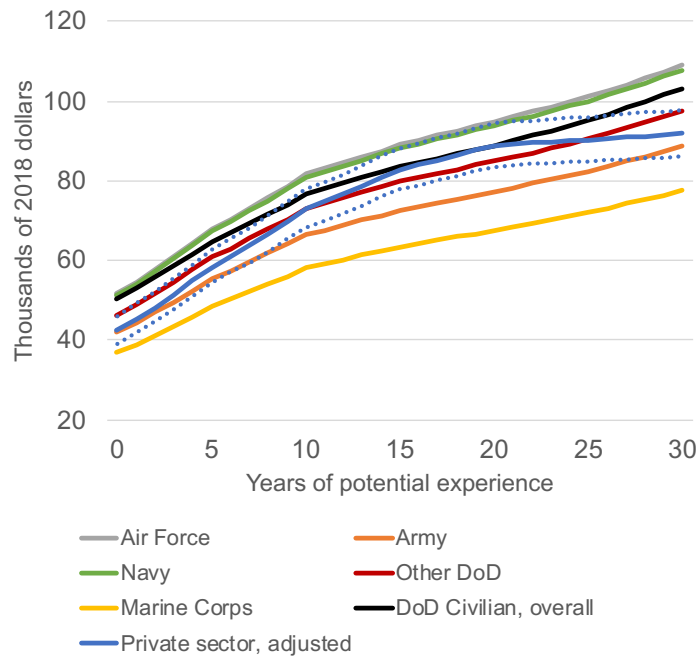
Figure 3.36. Predicted Average Income by YOPE Among the Defense Acquisition Procurement Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.37. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Procurement Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

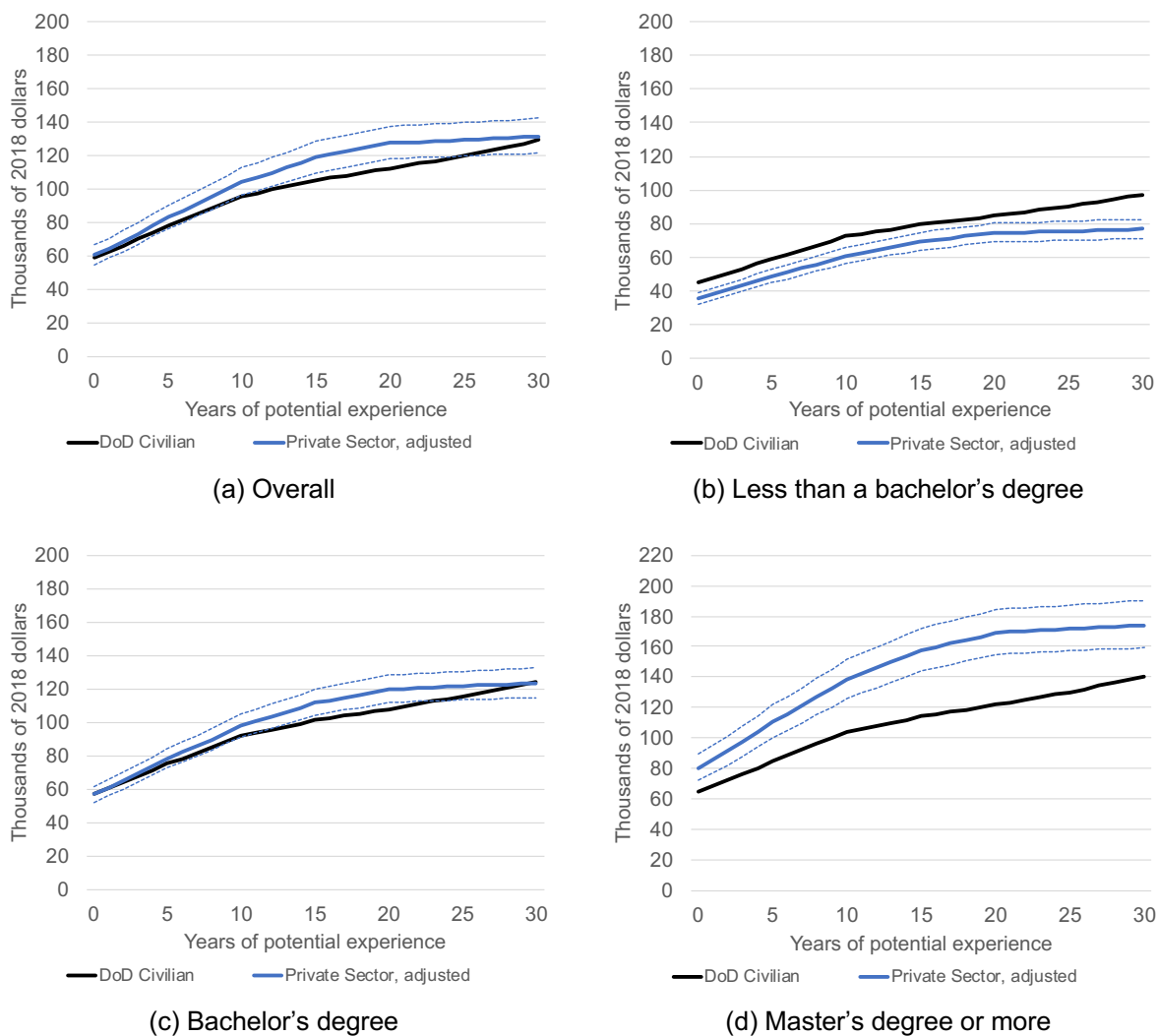
Defense Acquisition Engineering and Science

Figure 3.38 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition engineering and science workforce in the Los Angeles–Long Beach locality pay area. Overall (panel a), DoD predicted average income is statistically indistinguishable from the private sector through 9 YOPE and beyond 24 YOPE. For the years in between, DoD predicted average income falls below that in the private sector. Among those who have a bachelor’s degree (panel c), DoD civilian predicted average income is statistically indistinguishable from that in the private sector, except for the middle of the career trajectory, when it falls just below that in the private sector. In contrast, for those with less than a bachelor’s degree (panel b), predicted average income is statistically significantly higher among DoD civilians than it is in the private sector. The opposite is true for DoD civilians with a master’s degree or more (panel d), whose predicted average income is statistically significantly lower than that of their private-sector counterparts.

Figure 3.39 breaks out predicted average income results by DoD agency. The overall result—that predicted average income for DoD civilians is statistically indistinguishable from that in the private sector, except for the middle of the career trajectory, when it is significantly lower than in the private sector—holds for DoD civilians working for the Air Force, the Navy, or other DoD

agencies. However, predicted average income is statistically significantly lower than in the private sector for DoD civilians working for the Army or the Marine Corps.

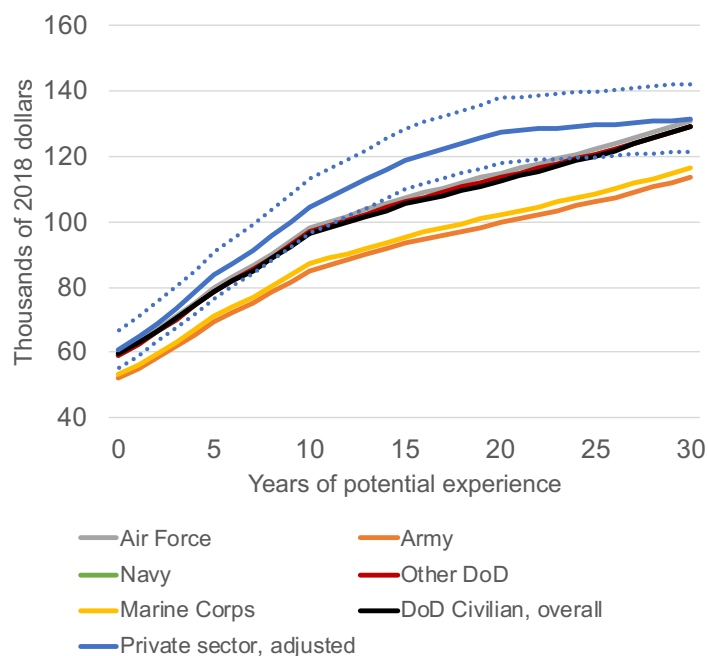
Figure 3.38. Predicted Average Income by YOPE Among the Defense Acquisition Engineering and Science Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.39. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Engineering and Science Workforce in the Los Angeles–Long Beach Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

To summarize, for the aerospace engineering workforce in the Los Angeles–Long Beach locality pay area, DoD civilian predicted average income is generally statistically significantly less than that in the private sector, except among DoD civilians with less than a bachelor’s degree, whose predicted average income is generally statistically significantly greater than that of their private-sector counterparts. In contrast, the results for the nationwide workforce show that, for the overall workforce and among those with a bachelor’s degree, the DoD civilian predicted average income bounces in and out of the 95-percent confidence interval for private-sector predicted average income.

For the defense acquisition business and financial management workforce in the Los Angeles–Long Beach locality pay area, the results are similar to those presented for the nationwide workforce, with predicted average income between the DoD civilian and private sectors being similar for the overall workforce and among those with a bachelor’s degree. As with the nationwide results, in the Los Angeles–Long Beach locality pay area, DoD civilian predicted average income among those with less than a bachelor’s degree is statistically significantly higher than that in the private sector, while the opposite is true for those with a master’s degree or more. Although DoD civilian predicted average income is significantly less than that in the private sector for those working in the Army or Marine Corps in the Los

Angeles–Long Beach locality pay area, results by agency for the nationwide workforce show that DoD civilian and private-sector predicted average incomes are similar.

For the defense acquisition program management workforce, the Los Angeles–Long Beach locality pay area results are broadly similar to the nationwide results. DoD civilian predicted average income generally falls short of that in the private sector overall, by agency, and across educational attainment groups. However, for those with less than a bachelor’s degree, DoD civilian predicted average income is greater than that in the private sector, both nationwide and in the Los Angeles–Long Beach locality pay area.

For the defense acquisition procurement workforce, the results for the Los Angeles–Long Beach locality pay area are similar to the nationwide results, with DoD civilian predicted average income generally falling short of that in the private sector among those with a bachelor’s degree or higher and exceeding that in the private sector among those with less than a bachelor’s degree. For the nationwide workforce and in the Los Angeles–Long Beach locality pay area, DoD civilian predicted average income moves in and out of the 95-percent confidence interval for private-sector predicted average income. The results by agency show that, although there is little variation in DoD civilian predicted average income for the nationwide workforce, the results vary for the defense acquisition procurement workforce in the Los Angeles–Long Beach locality pay area. In particular, in the Los Angeles–Long Beach locality pay area, for DoD civilians working for the Air Force or Navy, predicted average income is generally statistically significantly greater than that in the private sector, while the opposite is generally true for those working for the Army.

For the defense acquisition engineering and science workforce, there are some differences between the nationwide results and the Los Angeles–Long Beach results. For DoD civilians in the Los Angeles–Long Beach locality pay area, predicted average income falls short of that in the private sector in the middle part of the career, both for the overall workforce and among those with a bachelor’s degree. In contrast, nationwide, DoD civilian predicted average income is generally on par with that in the private sector for the overall workforce and among those with a bachelor’s degree. Both in the Los Angeles–Long Beach locality pay area and nationwide, DoD civilian predicted average income is significantly greater than that in the private sector among those with less than a bachelor’s degree and is significantly lower than that in the private sector among those with a master’s degree or more. Looking at results by agency, we find that national DoD civilian predicted average income is generally on par with or significantly greater than that in the private sector, regardless of agency. In contrast, for DoD civilians in the Los Angeles–Long Beach locality pay area who work for the Army or Marine Corps, predicted average income is statistically significantly lower than that in the private sector.

Washington, D.C.

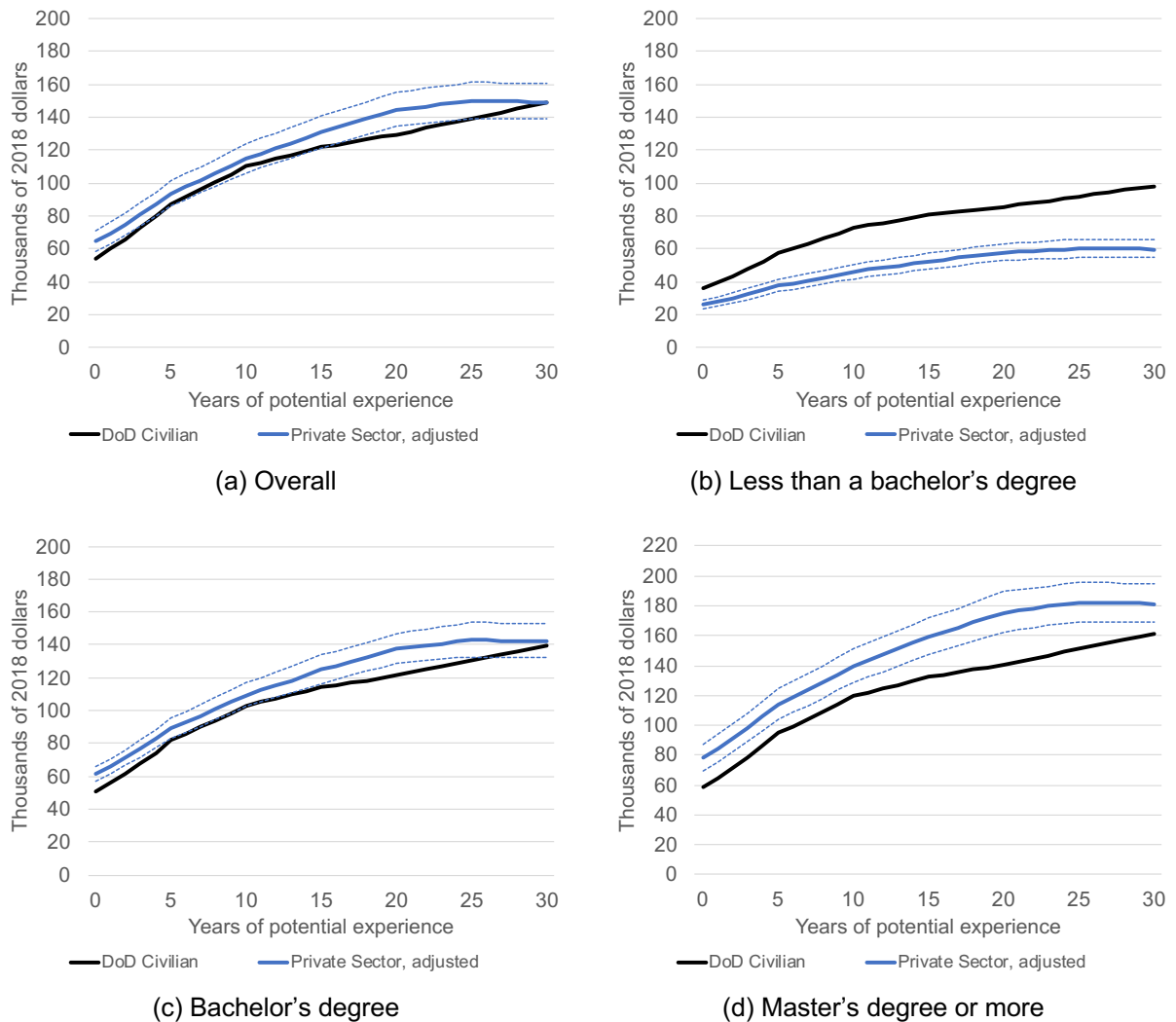
In this subsection, we summarize the predicted average income results for the Washington, D.C., locality pay area for each of the five workforces of interest.

Aerospace Engineering

Figure 3.40 shows predicted average income for DoD civilians and private-sector workers in the aerospace engineering workforce in the Washington, D.C., locality pay area. Overall (panel a) and for those with a bachelor's degree (panel c), predicted average income for DoD civilians is generally statistically indistinguishable from that in the private sector, except for the first few YOPE and in certain YOPE in the middle portion of the career trajectory, where DoD income falls short. Across all education levels, DoD civilian predicted average income is below the private sector through 4 YOPE and between 16 and 24 YOPE. For those with a bachelor's degree, DoD civilian predicted average income is below the that of private sector through 8 YOPE and between 12 and 26 YOPE. However, for those with less than a bachelor's degree (panel b) or a master's degree or more (panel d), predicted average income is statistically significantly higher or lower, respectively, than in the private sector.

Figure 3.41 shows that, across agencies, DoD civilian predicted average income is statistically the same as that in the private sector for certain YOPE and falls short in the beginning and middle portions of the career trajectory. For those working for the Air Force, DoD predicted average income is below that in the private sector through 3 YOPE and between 19 and 21 YOPE. For those working for the Army, DoD predicted average income falls short of the private sector through 4 YOPE and between 15 and 25 YOPE. For those working for the Navy, predicted average income is below that in the private sector through 4 YOPE and from 17 to 24 YOPE. Through 6 YOPE and from 13 through 26 YOPE, DoD predicted average income for those working for other DoD agencies is below that in the private sector. We further note that there are no aerospace engineers who work for the Marine Corps.

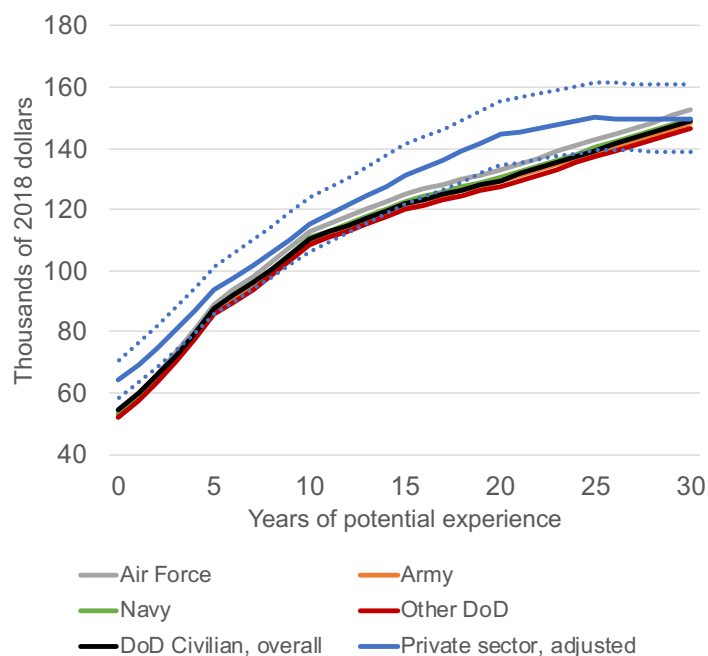
Figure 3.40. Predicted Average Income by YOPE Among the Aerospace Engineering Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.41. Predicted Average Income by YOPE and Agency Among the Aerospace Engineering Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

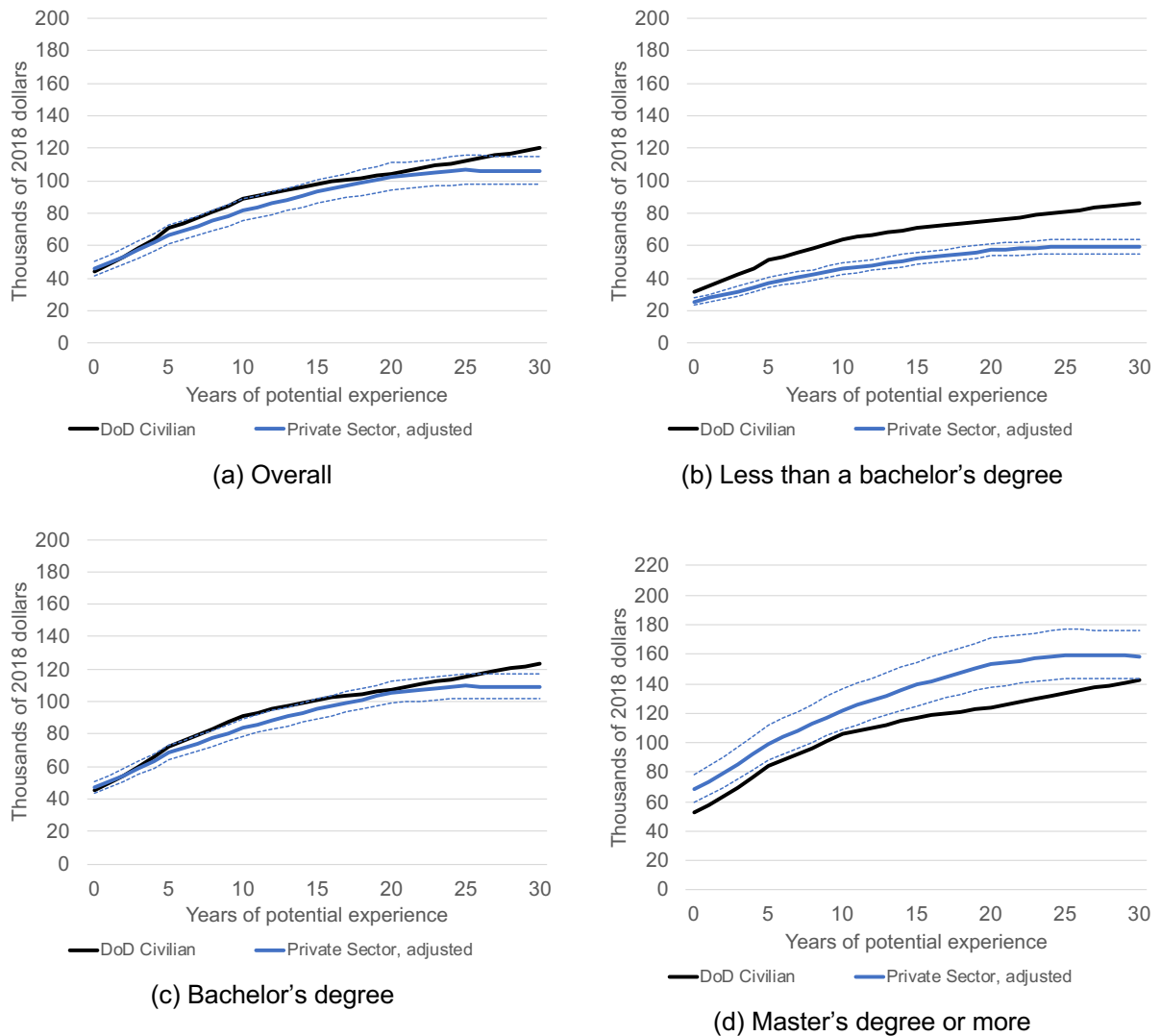
NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Defense Acquisition Business and Financial Management

Figure 3.42 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition business and financial management workforce in the Washington, D.C., locality pay area. Overall (panel a), predicted average income for DoD civilians is generally statistically indistinguishable from that in the private sector. For those with a bachelor's degree (panel c), there are certain YOPE (7–13 and 27–30 YOPE) in which DoD civilian predicted average income is higher than that in the private sector. In the other years, DoD civilian predicted income is statistically the same as that in the private sector. For those with less than a bachelor's degree (panel b) or a master's degree or more (panel d), predicted average income is statistically significantly higher or lower, respectively, than in the private sector.

Figure 3.43 shows that DoD civilian predicted average income is generally statistically indistinguishable from that in the private sector among those working for the Air Force, Army, Marine Corps, or Navy. For those working for other DoD agencies, predicted average incomes for DoD civilians and private-sector workers are statistically the same, except for 5 through 16 YOPE and 24 through 30 YOPE, when DoD civilian predicted average income exceeds that in the private sector.

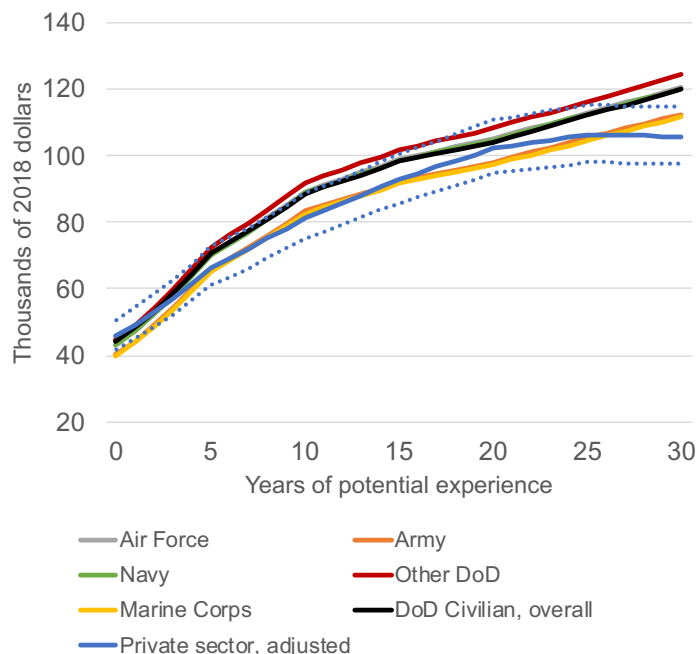
Figure 3.42. Predicted Average Income by YOPE Among the Defense Acquisition Business and Financial Management Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.43. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Business and Financial Management Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

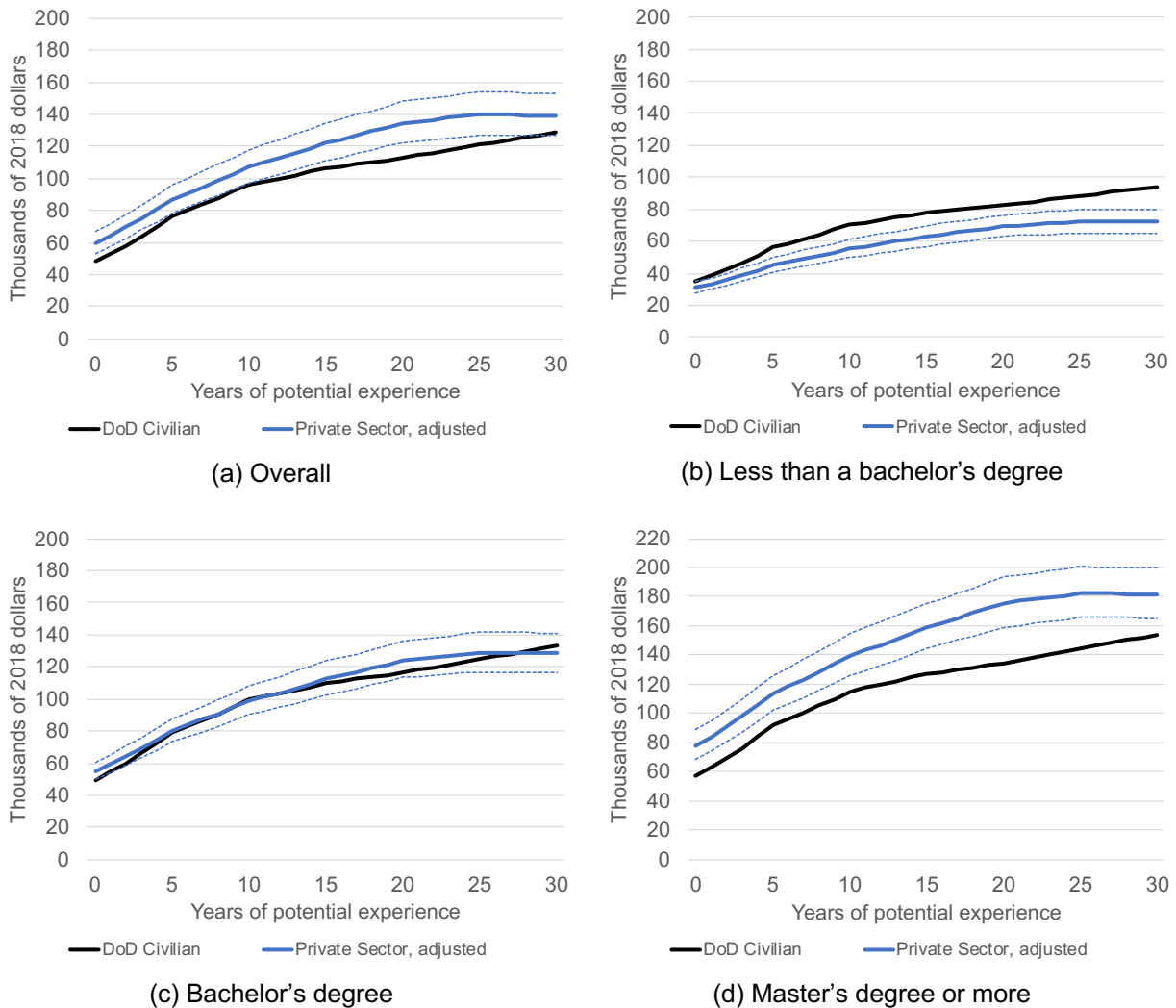
NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Defense Acquisition Program Management

Figure 3.44 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition program management workforce in the Washington, D.C., locality pay area. Overall (panel a), DoD civilian predicted average income is either statistically indistinguishable from or just below that in the private sector. For those with less than a bachelor's degree (panel b), predicted average income is statistically significantly higher among DoD civilians than in the private sector. For those with a bachelor's degree (panel c), predicted average incomes among DoD civilians and the private sector are generally statistically indistinguishable. Finally, for those with a master's degree or more (panel d), DoD civilian predicted average income is statistically significantly lower than in the private sector.

Figure 3.45 breaks out predicted average income results by DoD agency. There is slight variation by DoD agency. For DoD civilians working for the Air Force or the Navy, predicted average income is either statistically indistinguishable from or just below that in the private sector—as is the case for the overall results. However, for DoD civilians working for the Army, the Marine Corps, or other DoD agencies, predicted average income is statistically significantly lower than the private sector.

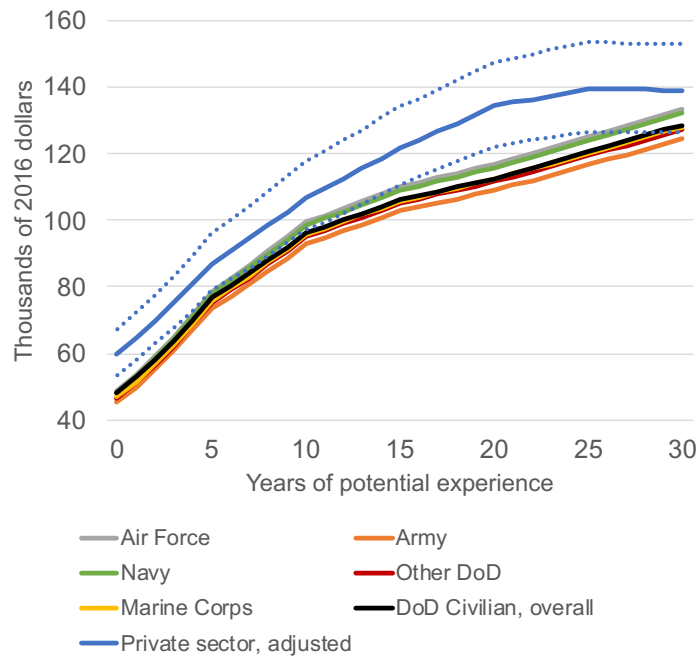
Figure 3.44. Predicted Average Income by YOPE Among the Defense Acquisition Program Management Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.45. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Program Management Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

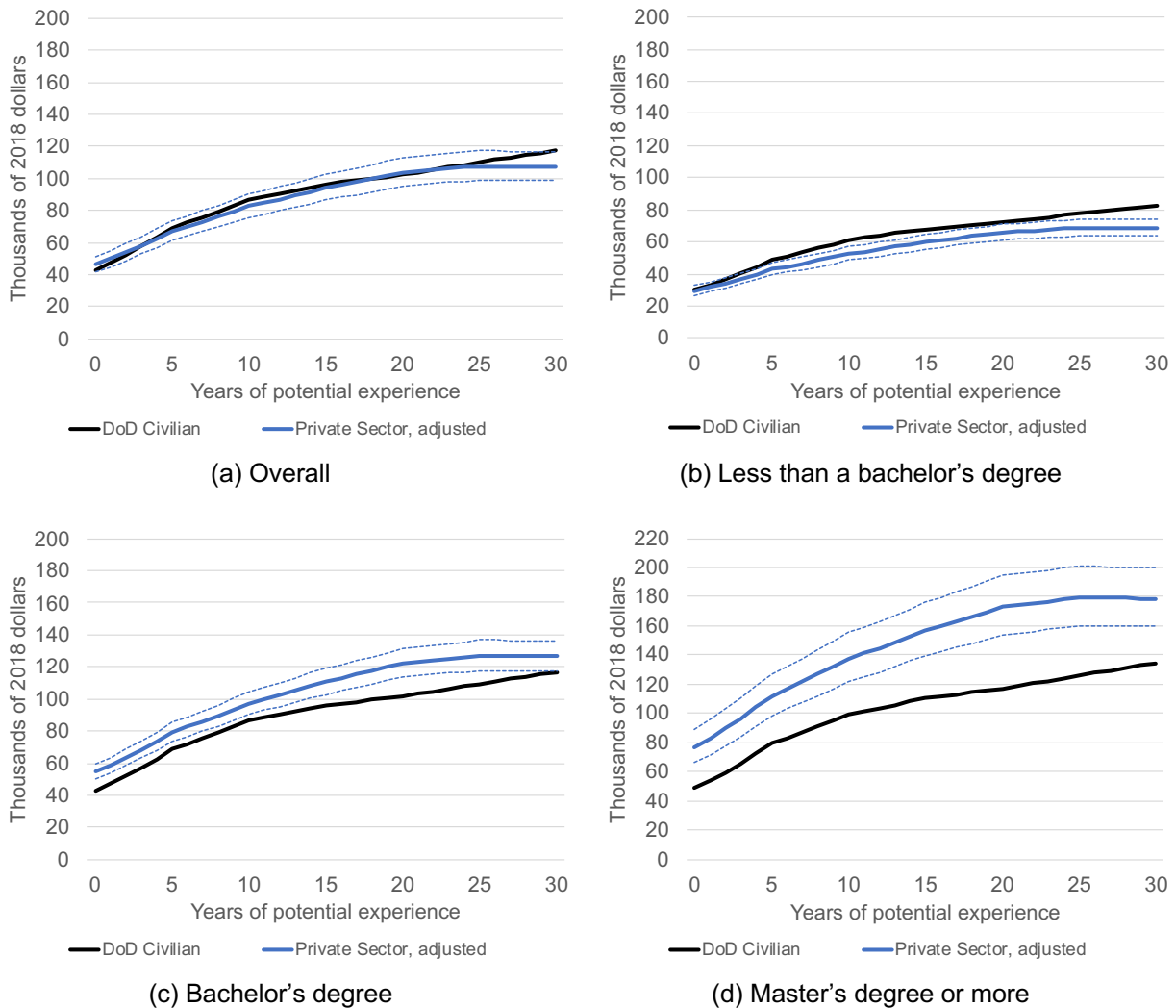
NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Defense Acquisition Procurement

Figure 3.46 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition procurement workforce in the Washington, D.C., locality pay area. Overall (panel a), DoD civilian predicted average income is statistically indistinguishable from that in the private sector. For those with less than a bachelor’s degree (panel b), predicted average income is generally statistically significantly higher—but just barely—among DoD civilians than in the private sector. In contrast, for those with a bachelor’s degree (panel c) and especially for those with a master’s degree or more (panel d), predicted average income among DoD civilians is generally statistically significantly lower than in the private sector.

Figure 3.47 breaks out predicted average income results by DoD agency. For DoD civilians working for the Army, the Navy, the Marine Corps, or other DoD agencies, predicted average income follows the overall trend—meaning that DoD predicted income is generally statistically indistinguishable from that in the private sector. The Air Force is the outlier, with predicted average income that is generally statistically significantly higher than in the private sector.

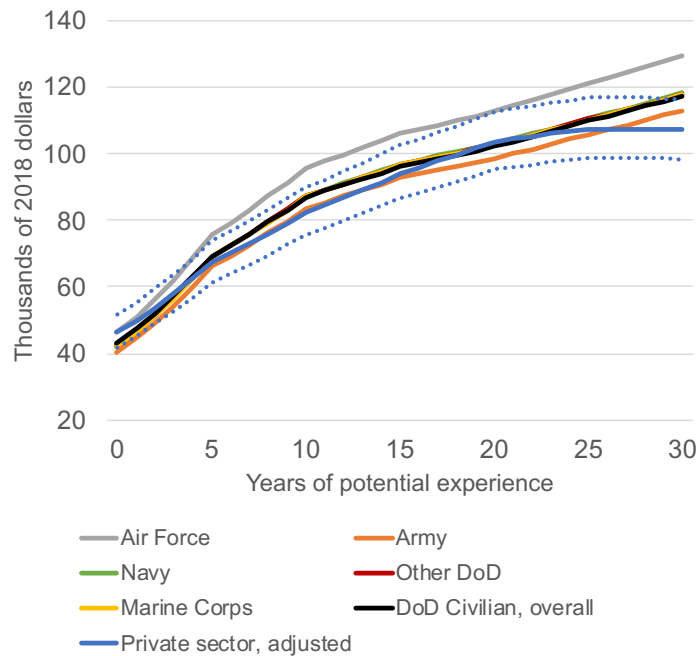
Figure 3.46. Predicted Average Income by YOPE Among the Defense Acquisition Procurement Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.47. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Procurement Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

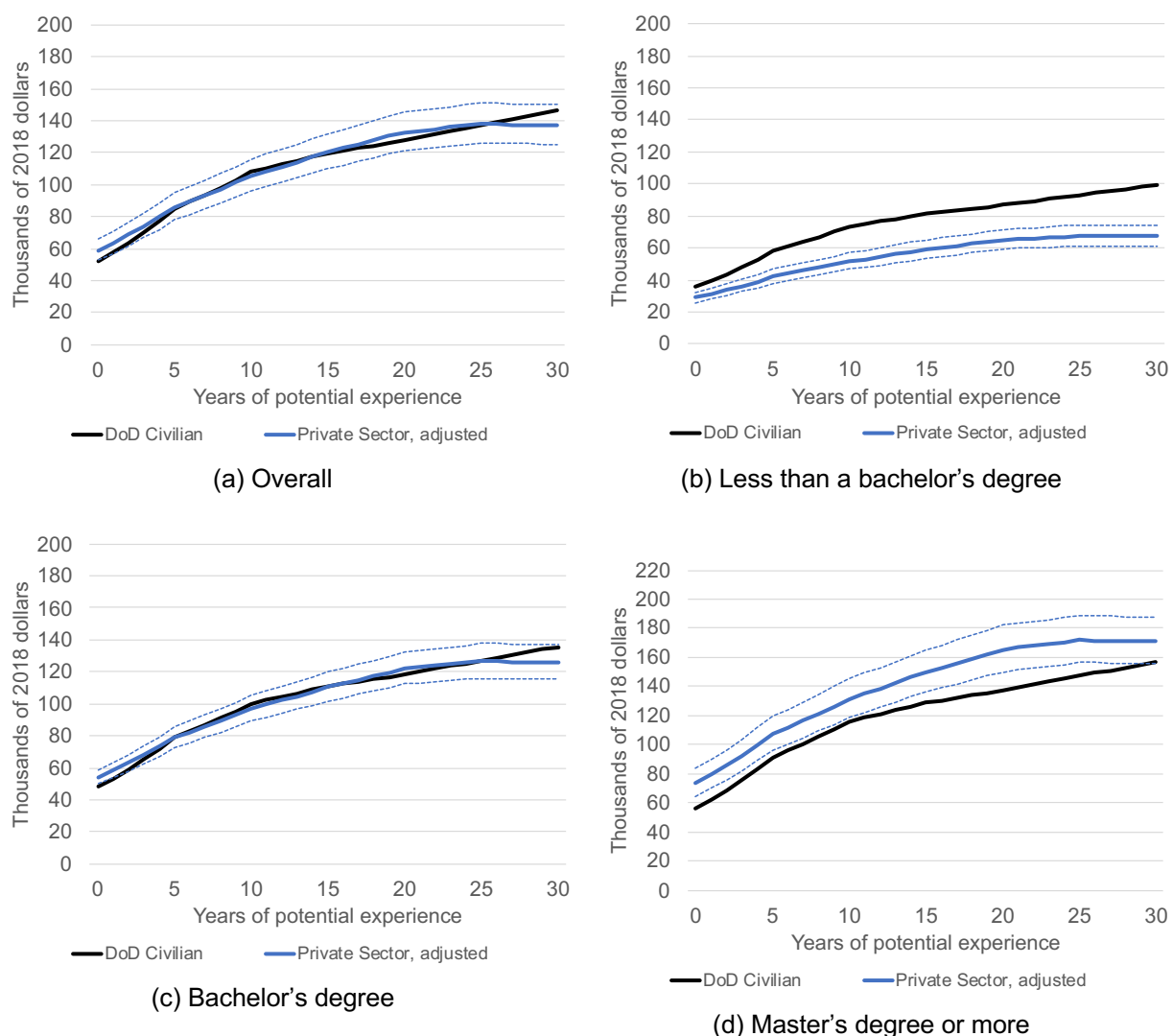
NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Defense Acquisition Engineering and Science

Figure 3.48 shows predicted average income for DoD civilians and private-sector workers in the defense acquisition engineering and science workforce in the Washington, D.C., locality pay area. Overall (panel a) and among those who have a bachelor's degree (panel c), DoD civilian predicted average income is statistically indistinguishable from that in the private sector. In contrast, for those with less than a bachelor's degree (panel b), predicted average income is statistically significantly higher among DoD civilians than in the private sector. The opposite is true for those with a master's degree or more (panel d), where predicted average income among DoD civilians is statistically significantly lower than in the private sector.

Figure 3.49 breaks out predicted average income results by DoD agency. There is little variation in the predicted average income results by DoD agency. With the exception of the first few YOPE, predicted average income is statistically indistinguishable from that in the private sector.

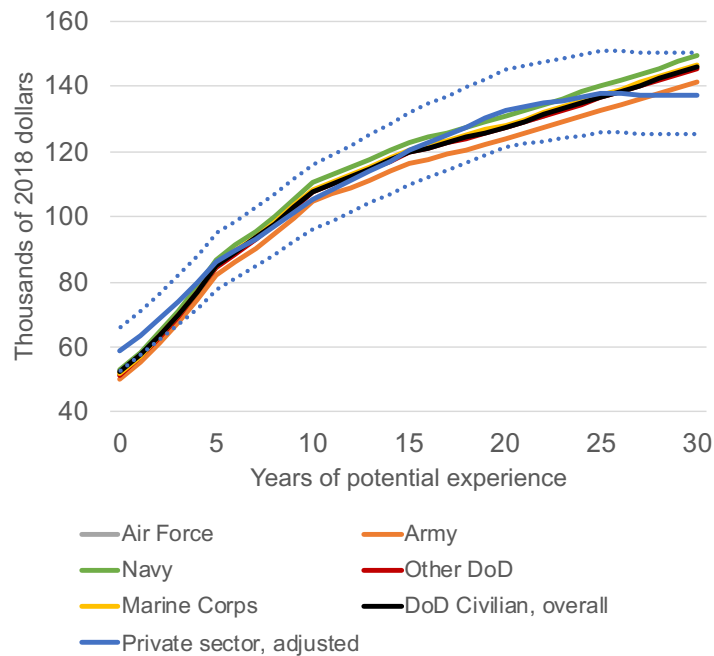
Figure 3.48. Predicted Average Income by YOPE Among the Defense Acquisition Engineering and Science Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020).. Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure 3.49. Predicted Average Income by YOPE and Agency Among the Defense Acquisition Engineering and Science Workforce in the Washington, D.C., Locality Pay Area, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

To summarize, for the aerospace engineering workforce in the Washington, D.C., locality pay area, DoD civilian predicted average income is below that in the private sector in certain YOPE and on par with that in the private sector in others for the workforce overall and among those with a bachelor's degree. For those with less than a bachelor's degree, DoD civilian predicted average income is statistically significantly greater than that in the private sector, while the opposite is true for those with a master's degree or more. These results are in line with those for the workforce nationwide. Although the nationwide results show variation in results by agency, there is little variation across agencies for those in the Washington, D.C., locality pay area.

For the defense acquisition business and financial management workforce in the Washington, D.C., locality pay area, predicted average income of DoD civilians is generally the same as that for the private sector for the workforce overall and among those with a bachelor's degree. For those with less than a bachelor's degree, DoD civilian predicted average income is statistically significantly greater than that in the private sector, and the reverse is true for those with a master's degree or more. Furthermore, DoD civilian predicted average income is generally in line with that in the private sector across agencies. These findings are similar to those for the workforce nationwide.

For the defense acquisition program management workforce in the Washington, D.C., locality pay area, DoD civilian predicted average income falls short of that in the private sector for the workforce overall and for those with a master's degree or more. For those with less than a bachelor's degree, DoD civilian predicted average income is statistically significantly greater than that in the private sector, while predicted average income is similar across sectors among those with a bachelor's degree. In contrast, for the workforce nationwide, DoD civilian predicted average income is generally lower than that in the private sector for the workforce overall and among those with a bachelor's degree or more. Results by agency are similar for those in the Washington, D.C., locality pay area and nationwide, with DoD civilian predicted average income generally falling below that in the private sector across agencies.

For the defense acquisition procurement workforce in the Washington, D.C., locality pay area, DoD predicted average income is indistinguishable from that in the private sector for the workforce overall and among those with a bachelor's degree. In contrast, the nationwide results show that DoD civilian predicted average income falls short of that in the private sector. Among those with less than a bachelor's degree, DoD predicted average income is statistically significantly greater than that in the private sector, while the opposite is true for those with a master's degree or more, both in the Washington, D.C., locality pay area and nationwide. For most agencies, DoD civilian and private-sector incomes are generally indistinguishable for the workforce nationwide and in the Washington, D.C., locality pay area. The one exception is for DoD civilians working for the Air Force in the Washington, D.C., locality pay area; these workers have predicted average income that is generally statistically significantly greater than that in the private sector.

Finally, for the defense acquisition engineering and science workforce in the Washington, D.C., locality pay area, DoD civilian predicted average incomes for the workforce overall and among those with a bachelor's degree are statistically indistinguishable from that in the private sector. As with the other workforces, DoD civilian predicted average income for those with less than a bachelor's degree is statistically significantly greater than that in the private sector, and the reverse is true for those with a master's degree or more. Across agencies in the Washington, D.C., locality pay area, predicted average income is statistically the same between the DoD civilian and private sectors. These results are consistent with those found for the workforce nationwide. The one exception is that, for the workforce nationwide, DoD civilian predicted average income for those working for the Marine Corps is statistically significantly greater than that in the private sector for the first half of the career trajectory.

Summary

We conclude this chapter with a discussion of the extent to which the relationship between DoD civilian and private-sector regression-adjusted predicted incomes displays common or different patterns across the workforces of interest. First, we summarize the overall results for

each workforce. Next, we provide high-level summaries by subgroup (i.e., educational attainment, agency, top three subagencies, pay plan, locality pay areas of interest). More-detailed summaries can be found at the end of each of the previous workforce-specific sections.

Overall

Of the five workforces of interest, we find that regression-adjusted predicted income over the entire career trajectory for DoD civilians is comparable to that in the private sector for two workforces: defense acquisition business and financial management and defense acquisition procurement. The defense acquisition engineering and science workforce is the only workforce for which predicted average income of DoD civilians is found to be on par with or greater than that in the private sector. DoD civilian average income for the aerospace engineering workforce, which is a subset of the defense acquisition engineering and science workforce, is estimated to be on par with or below that in the private sector in different parts of the career trajectory. Finally, DoD civilians in the defense acquisition program management workforce are predicted to earn less on average than private-sector workers.

By Educational Attainment

Although the overall results differ across the workforces, there is broad consistency when we examine predicted average income by educational attainment. Regression-adjusted predicted income among DoD civilians with less than a bachelor's degree generally exceeds that of their private-sector counterparts. The opposite is true for those with a master's degree or more; for this group, predicted average income among DoD civilians typically falls short of that in the private sector. Notably, for those with a master's degree or more, the difference between DoD civilian and private-sector predicted average income increases with YOPE, suggesting that DoD might have difficulty recruiting and retaining not only highly educated civilians who are just entering the labor market but also those at all other levels of experience. Results for workers with a bachelor's degree are mixed across the workforces, with DoD civilian predicted average income generally being in line with or falling short of private-sector predicted average income at various points in the career trajectory. The one exception is the defense acquisition procurement workforce, for which predicted average income of DoD civilians with a bachelor's degree remains below that of their private-sector counterparts.

By Agency

For the aerospace engineering, defense acquisition business and financial management, and defense acquisition engineering and science workforces, the results from comparing predicted average income across sectors and agencies reveal interesting variations. DoD civilians within each of those workforces fare better than DoD civilians within the other workforces, but not for all agencies. For the other two workforces, defense acquisition program management and defense acquisition procurement, the results do not vary by agency. Furthermore, we do not find

that civilians working for a particular agency have consistently higher or lower predicted average income than their private-sector counterparts across the five workforces of interest. For instance, while DoD civilian aerospace engineers working for the Army are predicted to have average income greater than that in the private sector, DoD civilians working for the Army in the business and financial management and procurement workforces have predicted average income that is on par with or below that in the private sector.

By Top Three Subagency

When we compare DoD civilian predicted average income among those working in the top three subagencies with private-sector predicted average income, we find that there is some variation by subagency. This suggests that overall comparisons of DoD civilian–sector and private-sector predicted average income by workforce and by agency mask results for finer subgroups of DoD civilians.

By Pay Plan

DoD civilians who are covered by demonstration projects are predicted to have higher average income than those covered by other pay plans. As a consequence, predicted average income of DoD civilians covered by demonstration project pay plans tends to be in line with or greater than private-sector predicted average income, while predicted average income of DoD civilians covered by other pay plans tends to be in line with or below that in the private sector.

By Locality Pay Area of Interest

For the nationwide workforces, the results are generally consistent by educational attainment, with DoD civilian predicted average income estimated to be statistically significantly greater than that in the private sector among those with less than a bachelor's degree. The reverse is true for those with a master's degree or more. These results also hold for the workforces in the Los Angeles–Long-Beach and Washington, D.C., locality pay areas, but not for the Denver-Aurora locality pay area. Specifically, in the Denver-Aurora locality pay area, we find that DoD civilian and private-sector predicted average incomes are statistically indistinguishable for those in the defense acquisition business and financial management workforce with a master's degree or more, as well as for those in the defense acquisition engineering and science workforce with less than a bachelor's degree. Therefore, although DoD has an advantage among those with less than a bachelor's degree and a disadvantage among those with a master's degree or more nationwide, there is evidence that these findings do not necessarily hold true at the local level.

We also find that the results by agency for the three locality pay areas of interest sometimes differ from the results by agency for the workforces nationwide. For instance, DoD civilian predicted income for those working at certain agencies exceeds private-sector predicted income at the nationwide level, but not among the three locality pay areas we examined; the reverse is true for other agencies. More-detailed summaries of these differences can be found in earlier

sections of this chapter. Although explicitly studying the impact of locality pay on the income differences between the DoD civilian and private sectors was beyond the scope of this study, the results for the three locality pay areas imply that geographic location could affect differences in pay between agencies (and, by extension, across subagencies) and the private sector.

Finally, we close with a word of caution against using these results by locality pay area to inform potential changes in locality pay, for two reasons. First, recall from Chapter 2 that we found that no more than 1 percent of each of the workforces of interest was in the Denver-Aurora locality pay area in 2018. Consequently, the differences between the Denver-Aurora and nationwide results might not be sufficiently meaningful to merit a broader discussion of changes to locality pay. Second, compensation adjustments should be motivated by more than just differences in compensation. Indeed, empirical evidence is needed on the extent to which there are recruiting and retention problems. Still, this discussion should be informed by further investigation, of the kind performed in this report, of how monetary compensation differs between the DoD civilian and private sectors across key localities.

4. Nonmonetary Compensation

In this chapter, we explore nonmonetary compensation and how it differs across the DoD civilian and private-sector workforces. Nonmonetary compensation can take many forms. One form of nonmonetary compensation is working conditions, which could include the consistency of an employee's work schedule—i.e., the variability of the hours and days worked each week, the degree to which variability is predictable, and the degree of agency that the employee has in setting the work schedule. Another form of nonmonetary compensation is paid time off, such as vacation, sick leave, and caregiver leave. Other forms of nonmonetary compensation relate to work-life balance—i.e., the extent to which employees can adapt their work location and hours to balance personal commitments and the conveniences that employers provide to help employees achieve a better work-life balance. And of course, some of the more well-known forms of nonmonetary compensation are health insurance, matched retirement plans, and educational stipends or loan assistance. In this chapter, we explore these and other forms of nonmonetary compensation—commonly referred to as *benefits*—and their prevalence in the workforce.¹⁷

Because there are limited data available on nonmonetary compensation for both the public and private sectors, the comparisons that we make in this chapter are not at the same level of granularity as the comparisons we make in Chapters 2 and 3. Whereas in Chapters 2 and 3 we compare specific workforces of interest across the DoD civilian and private sectors, in this chapter, the comparisons are aggregated. In some cases, we compare aggregated *workforces*, such as STEM—which includes aerospace engineering and some of the occupations that are part of the defense acquisition workforces of interest—versus non-STEM.¹⁸ In other cases, we compare aggregated *sectors*, such as the public or federal sector versus the private sector, where the DoD civilian sector is a subset of the federal sector, which in turn is a subset of the public sector. In each instance, we make plain what aggregations are used. Furthermore, unlike the analysis of monetary compensation in Chapter 3, our analysis of nonmonetary compensation does not account for differences in demographic composition of workforces across sectors. Instead, we provide direct comparisons of the raw data. Despite these limitations, the comparisons that we make in this chapter provide useful information on the potential differences in nonmonetary compensation across our workforces of interest in the DoD civilian and private sectors.

¹⁷ We acknowledge that there might be differences in other forms of nonmonetary compensation—for example, job satisfaction and job security—across the DoD civilian and private sectors. However, we do not observe these other forms of nonmonetary compensation in the data. Therefore, they are outside the scope of this study.

¹⁸ In grouping occupations into STEM and non-STEM, we use the definition developed in Edwards et al., forthcoming. Appendix D contains a list of occupations that are included in STEM.

We begin this chapter with a description of methods—the two approaches we took to examine differences in nonmonetary compensation and the data sources we used—followed by a summary of the findings.

Methods

To compare nonmonetary compensation across the DoD civilian and private sectors, we use a two-pronged approach.

First, we analyze survey data from the RAND American Life Panel (ALP), a nationally representative, longitudinal survey with more than 6,000 participants (RAND Corporation, undated b). The ALP is publicly available and includes information on demographics, as well as a host of different modules on specific topics. We use data from the American Working Conditions Survey (AWCS) module, which collects information on a wide variety of working conditions that relate to nonmonetary compensation (RAND Corporation, undated a). These include hours, schedule, paid sick and vacation time, and work-life balance. We pool data from the two waves of the AWCS, administered July–October 2015 and July–September 2018. It is important to note that, although AWCS data provide rich detail about working conditions, the sample size is too small to allow for results at the workforce level. Therefore, we aggregate the results into two occupation groups: STEM and non-STEM. Also, the AWCS does not allow us to identify DoD within the public sector; so, instead, our results are reported for the public sector as a whole and compared with those of the private sector. Moreover, the small AWCS sample size prohibits us from accounting for demographic differences in a regression-controlled framework, such as the analysis presented in Chapter 3.

Second, we conduct case studies of large private-sector employers in highly skilled industries to compare nonmonetary compensation offered by those companies with that in the federal sector. We selected 12 private-sector employers for the case studies, using the following criteria. Employers must

- be geographically dispersed to avoid location-based biases
- cover a diverse set of industries—including the computer hardware, computer software, and service industries—to capture variation by type of product produced
- make information on nonmonetary compensation publicly available
- be large enough to be considered by prospective employees as reasonably comparable to the federal government; we consider companies with *market capitalization*—i.e., stock market value—that exceeds \$10 billion to be large.

The 12 private-sector companies that meet these criteria are Adobe, Airbnb, Amazon, Apple, Cisco, Facebook, Google, Intel, LinkedIn, Microsoft, Netflix, and Qualcomm. The primary source of information about nonmonetary compensation at these companies is the benefits page of each company's public website. We supplement that with information found in public

media.¹⁹ Information about nonmonetary compensation in the federal government comes primarily from the OPM.²⁰

In the case studies, we compare the 12 companies and the federal government along the following types of nonmonetary compensation: paid time off, health, education, family, financial, food, transit, and other benefits.²¹ We note that the case studies do not focus on specific workforces, nor do they differentiate between different types of federal employer (i.e., DoD versus other federal employers). Yet the latter should be of little concern because all federal employees generally are eligible for the same kinds of nonmonetary compensation.

In the remainder of this chapter, we present the findings from the AWCS data analysis and the employer case studies.

AWCS Data on Working Conditions

Table 4.1 shows the sample size for the AWCS by wave, public versus private sector, and STEM versus non-STEM occupation.²² The workforce is split almost evenly across the public and private sectors—47 percent and 53 percent, respectively, in wave one and 42 percent and 58 percent, respectively, in wave two. When we pool the waves together, the public- and private-sector shares of the sample are 45 percent and 55 percent, respectively. STEM occupations are a small share of the sample—no more than 6 percent—in either of the waves or sectors. Because

¹⁹ We consulted the following sources for the private-sector employers: Adobe, undated; Amazon, undated; Apple, undated; Careers at Airbnb, undated; Cisco, undated; “Coolest Employee Perks at Silicon Valley Tech Companies,” 2018; D’Onfro, 2015; Facebook Careers, undated; Google Careers, undated; Intel, undated; LinkedIn Careers, undated; Microsoft, undated; Molla, 2018; Netflix, undated; Qualcomm, undated; and Seipel, 2017.

²⁰ We consulted the following sources for the federal government: Executive Order 13150, 2000; OPM, undated a; OPM, undated b; OPM, undated c; OPM, undated f; OPM, undated g; OPM, undated i; OPM, undated j; OPM, undated l; OPM, undated m; OPM, undated n; OPM, 1998; and OPM, 2020.

²¹ In instances in which we do not observe a specific form of nonmonetary compensation, it is not necessarily the case that such compensation is not offered; rather, it could be that the information was not publicly available to confirm coverage.

²² For wave one of the AWCS, the total sample size is 3,131; however, only 1,636 respondents had SOC codes, which we use to group respondents into STEM and non-STEM groups. (Of respondents without SOC codes, the majority [68 percent] were unemployed.) Of the 1,636 respondents with SOC codes, we drop three respondents who have a missing value for sector and another seven respondents whose SOC codes reveal that they are uniformed service members. Of the remaining 1,626 respondents, we exclude respondents in the nonprofit sector (190, or approximately 12 percent of 1,626) because the group is too small to allow us to compare working conditions across STEM and non-STEM occupations. That leaves a total sample of 1,436 respondents in STEM and non-STEM occupations in the private and public sectors. For wave two of the AWCS, the total sample size is 2,504; however, only 1,290 respondents had SOC codes. (Of respondents without SOC codes, the majority [74 percent] were unemployed.) Of the 1,290 respondents with SOC codes, we drop 13 respondents who have a missing value for sector and one respondent whose SOC code reveals that that person is a uniformed service member. Of the remaining 1,276 respondents, we exclude respondents who were in the nonprofit sector (162, or approximately 13 percent of 1,276). That leaves a total sample of 1,114 respondents in STEM and non-STEM occupations in the private and public sectors.

of the small sample sizes in both waves, when we analyze the data, we combine the waves, for a total sample size of 2,550.

Table 4.1. AWCS Sample Size by Sector, Occupation Group, and Wave

Wave	Public Sector			Private Sector			Total
	STEM	Non-STEM	All Occupations	STEM	Non-STEM	All Occupations	
Wave one	39 (3%)	637 (44%)	676 (47%)	89 (6%)	671 (47%)	760 (53%)	1,436 (100%)
Wave two	21 (2%)	444 (40%)	465 (42%)	70 (6%)	579 (52%)	649 (58%)	1,114 (100%)
Total	60 (2%)	1,081 (42%)	1,141 (45%)	159 (6%)	1,250 (49%)	1,409 (55%)	2,550 (100%)

NOTE: Author's calculations using AWCS wave one and two. Sample excludes respondents who do not report a SOC code or who are in the nonprofit sector.

Next, we compare working conditions across the public and private sectors and across STEM and non-STEM occupations using the AWCS survey responses. We grouped the results into three categories:

- work schedule (Figure 4.1), which reflects work schedule consistency (e.g., number of hours of work every day, days every week, or hours every week, as well as fixed starting and finishing times), how working arrangements are set, and work schedule predictability and stability²³
- paid time off (Figure 4.2), which reflects paid sick and vacation time off
- work-life balance (Figure 4.3), which reflects the extent to which location and hours can be adapted to balance personal commitments.

We discuss each in turn.

Work Schedule

Figure 4.1 shows working conditions related to work schedule by sector and STEM versus non-STEM.²⁴ First, we examine differences in the share of respondents who report that they

²³ We exclude one survey question that asks whether changes to a person's work schedule occur often, because the response rate was low (41 percent), and because there are other survey questions that we include that provide similar information. The excluded question and response options are as follows: Q40. "Do changes to your work schedule occur often?" "No," "Yes, the same day," "Yes, the day before," "Yes, several days in advance," "Yes, several weeks in advance."

²⁴ The survey questions and response options behind the data in Figure 4.1 are as follows:

- Q37a. "Do you work the same number of hours every day?" "Yes," "No"
- Q37b. "Do you work the same number of days every week?" "Yes," "No"

work the same number of hours every day (panel a). Across all occupations, we see that a larger share of respondents who work in the public sector report working the same number of hours every day, compared with respondents who work in the private sector (60 percent versus 48 percent). However, that difference is driven by the non-STEM occupations; among STEM occupations, the shares are roughly equal across the sectors. Also, when we compare total STEM occupations with total non-STEM occupations, we see that approximately the same share of respondents work the same number of hours every day (54 percent of total STEM and 53 percent of total non-STEM).

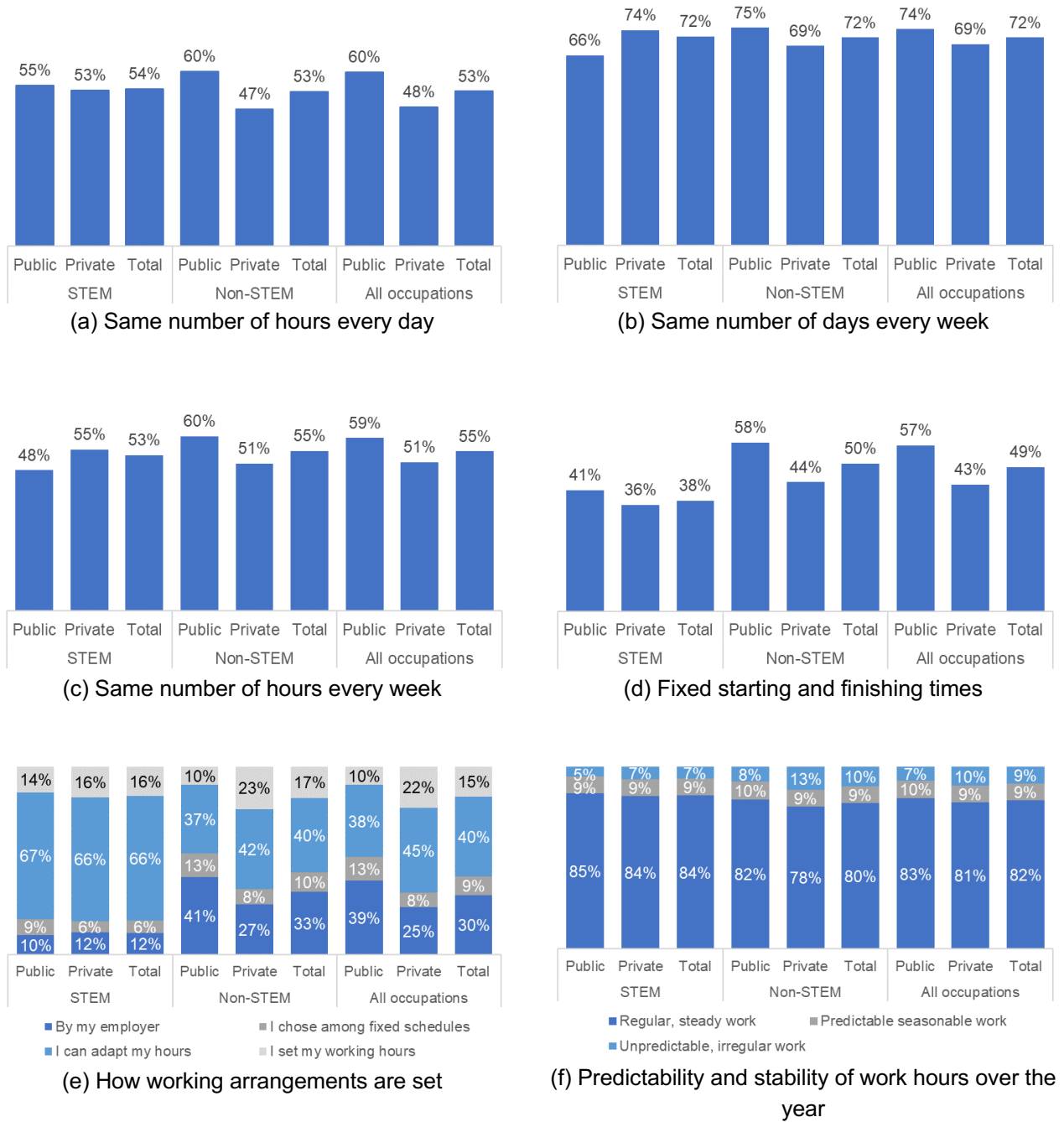
However, when we look at the share of respondents who report working the same number of days every week (panel b), we see a different pattern. Across all occupations, a larger share of respondents who work in the public sector report working the same number of days a week, compared with respondents who work in the private sector (74 percent for the public sector and 69 percent for the private sector). The same is true when looking at only non-STEM occupations (75 percent for the public sector and 69 percent for the private sector). However, the opposite is true for STEM occupations—there, a smaller share of public-sector workers report working the same number of days every week (66 percent), compared with private-sector workers (74 percent). Finally, the share of total STEM and total non-STEM respondents working the same number of days every week is the same (72 percent).

We can see a similar story for the share of respondents who work the same number of hours every week (panel c). Across all occupations, a larger share of respondents who work in the public sector report working the same number of hours each week, compared with respondents who work in the private sector (59 percent for the public sector and 51 percent for the private sector). The same is true for non-STEM occupations (60 percent for the public sector and 51 percent for the private sector). Again, however, the opposite is true for STEM occupations: A smaller share of public-sector workers report working the same number of hours every week (48 percent), compared with private-sector workers (55 percent). Finally, when we compare total STEM and total non-STEM workers, the share working the same number of hours every week is about the same (53 percent for STEM and 55 percent for non-STEM).

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- Q37c. “Do you work the same number of hours every week?” “Yes,” “No”
 - Q37d. “Do you work fixed starting and finishing times?” “Yes,” “No”
 - Q39. “How are your working time arrangements set?” “They are set by the company/organization with no possibility for changes,” “I can choose between several fixed working schedules determined by my company/organization,” “I can adapt my working hours within certain limits,” “My working hours are entirely determined by me”
 - SW1. “In general, how would you describe your hours on your main job?” “Regular, steady work throughout the year,” “Predictable seasonal work during the year,” “Unpredictable or irregular work (e.g., unpredictable periods without work, layoffs, and/or sporadic hours).”

We also note that respondents who work a compressed work schedule—an established form of nonmonetary compensation among federal employees that is discussed more fully in the employer case studies—would respond negatively to questions Q37a–d, even though a compressed work schedule might be considered a valuable benefit some employees.

Figure 4.1. Working Conditions by Sector and STEM and Non-STEM: Work Schedule



SOURCE: AWCS data.

NOTE: Sample excludes respondents who do not report a SOC code or who are in the nonprofit sector.

Next, we look at differences in the share of respondents who report that they have fixed starting and finishing times (panel d). Across all occupations, a larger share of respondents who work in the public sector report having fixed starting and finishing times, compared with

respondents who work in the private sector (57 percent versus 43 percent). The same is true when we compare sectors within STEM and non-STEM occupations; however, the magnitude of the difference is smaller for STEM occupations (41 percent for the public sector and 36 percent for the private sector) than for non-STEM occupations (58 percent for the public sector and 44 percent for the private sector). Moreover, the total STEM workforce has a lower share with fixed starting and finishing times (38 percent) than the total non-STEM workforce (50 percent).

When examining how working arrangements are set (panel e), we see that, across all occupations, public-sector workers have less influence over their working arrangements. Respondents who work in the public sector are more likely to report that their working arrangements are set by their employer (39 percent) than are respondents who work in the private sector (25 percent). Moreover, public-sector workers are less likely to be able to adapt or set their working arrangements (38 percent and 10 percent, respectively) than are private-sector workers (45 percent and 22 percent, respectively). This pattern is mirrored in non-STEM occupations, but the picture is quite different for STEM occupations, for which, by sector, there is only a trivial difference in workers' abilities to influence their working arrangements. Lastly, when comparing the total STEM and non-STEM workforces, we see that workers in the total non-STEM workforce have less influence over their working arrangements. Those who work in non-STEM occupations are more likely to have their working arrangements set by their employers (33 percent) than are those who work in STEM occupations (12 percent). And workers in the non-STEM workforce are considerably less likely to be able to adapt their hours (40 percent) than are those in the STEM workforce (66 percent).

The final panel in Figure 4.1 reveals the extent to which workers' hours are predictable and consistent throughout the year. There is minimal variation by occupation group or sector. Indeed, more than three-fourths of the sample (78 percent to 85 percent) has regular, steady work hours; approximately one-tenth has predictable seasonal work; and the remainder has unpredictable, irregular work. Non-STEM occupations tend to have slightly less predictable and stable hours compared with STEM occupations; in particular, 13 percent of private-sector non-STEM workers have unpredictable, irregular hours, compared with 7 percent of private-sector STEM workers.

Paid Time Off

Figure 4.2 shows working conditions related to time off by sector and STEM versus non-STEM.²⁵ First, we compare average days of paid sick time off provided each year (panel a).

²⁵ The survey questions and response options behind the data in Figure 4.2 are as follows:

- N5a. "How many days of paid sick time are you given each year?" 0 . . . 366
- N5b. "How many days of paid vacation time are you given each year?" 0 . . . 366
- N6. "During the past 12 months, did you take a vacation?" "Yes," "No"

Looking across all occupations, we see that average paid sick time given each year is slightly greater in the public sector (11.8 days) than in the private sector (10.6 days).²⁶ This difference is driven by the non-STEM occupations, for which average paid sick time given each year is 12.0 days in the public sector and 10.9 days in the private sector. In contrast, among STEM occupations, the average paid sick time given each year is 9.0 days in the public sector, just a half-day less than what is given in the private sector. Finally, when comparing total STEM and total non-STEM occupations, we see that average paid sick leave given each year is moderately higher in non-STEM occupations (11.5 days) than in STEM occupations (9.3 days).

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- N6_days. “How many vacation days did you take off from work during the past 12 months?” 0 . . . 366.

²⁶ Although response rates (relative to the 2,550 pooled wave-one and wave-two samples) are high (86–99 percent), the response rates for paid sick time and paid vacation time are lower for all other AWCS survey questions discussed in this chapter—49 percent and 70 percent, respectively.

Figure 4.2. Working Conditions by Sector and STEM and Non-STEM: Paid Time Off



SOURCE: AWCS data.

NOTE: Sample excludes respondents who do not report a SOC code or who are in the nonprofit sector.

Second, we examine average paid vacation time given each year (panel b). There is very little variation across sectors, but there is considerable variation across occupation groups. When we compare paid vacation time within STEM, non-STEM, and all occupations, the averages vary across the public and private sectors by 0.3 days at most. However, the big difference is STEM versus non-STEM: Average paid vacation time given each year is 14.0 days for STEM occupations, compared with 18.0 days for non-STEM occupations.

Third, we compare the share of respondents who took vacation time in the last 12 months (panel c) across occupation group and sector. Across all occupations, the share of respondents who took a vacation in the last 12 months is lower in the public sector (68 percent) than in the private sector (72 percent). That same pattern is mirrored in non-STEM occupations: 65 percent of public-sector respondents and 73 percent of private-sector respondents took a vacation in the last 12 months. The opposite is true for STEM occupations; 78 percent of public-sector respondents and 70 percent of private-sector respondents took a vacation in the last 12 months.

Lastly, we see that, across sectors, those in STEM occupations are slightly more likely to have taken a vacation in the last 12 months (72 percent) than those in non-STEM occupations (69 percent).

Lastly, we compare days of vacation taken in the last 12 months (panel d). Across all occupations, the average number of vacation days taken in the last 12 months is just one day lower in the public sector (12.4 days) than in the private sector (13.6 days). That same pattern is mirrored in both non-STEM occupations—the average was 12.6 days for the public sector and 13.7 days in the private sector, or a one-day difference on average—and in STEM occupations—the average was 9.5 days in the public sector and 12.8 days in the private sector, or a three-day difference on average. Lastly, we see that, across sectors, those in STEM occupations take slightly fewer days of vacation on average (11.9 days) than those in non-STEM occupations (13.2 days).

Work-Life Balance

Figure 4.3 shows working conditions related to work-life balance by sector and STEM versus non-STEM occupation.²⁷ First, we examine the share of respondents who can choose where to work during regular business hours (panel a). Across all occupations, the share is the same (24 percent). Within STEM occupations, the share of respondents who can choose where to work during regular business hours is considerably higher in the public sector (31 percent) than in the private sector (21 percent). Within non-STEM occupations, the opposite is true: The share of respondents who can choose where to work during regular business hours is lower in the public sector (21 percent) than in the private sector (26 percent). Lastly, comparing total STEM and total non-STEM, we see that the shares are roughly the same (24 percent and 23 percent, respectively).

Next, we explore the extent to which working hours fit with respondents' personal commitments (panel b). Across all occupations, we see that the fit is slightly better for public-sector respondents, with 44 percent reporting that their hours fit "very well," compared with 39 percent in the private sector. Accordingly, a smaller share of public-sector respondents reported that their hours fit "well" (42 percent) compared with the private sector (47 percent). The same is true within STEM and non-STEM occupations, but with varying magnitudes. Whereas the spread across all occupations is 5 percentage points across public and private sectors in terms of respondents' hours fitting "very well" or "well," that spread is roughly

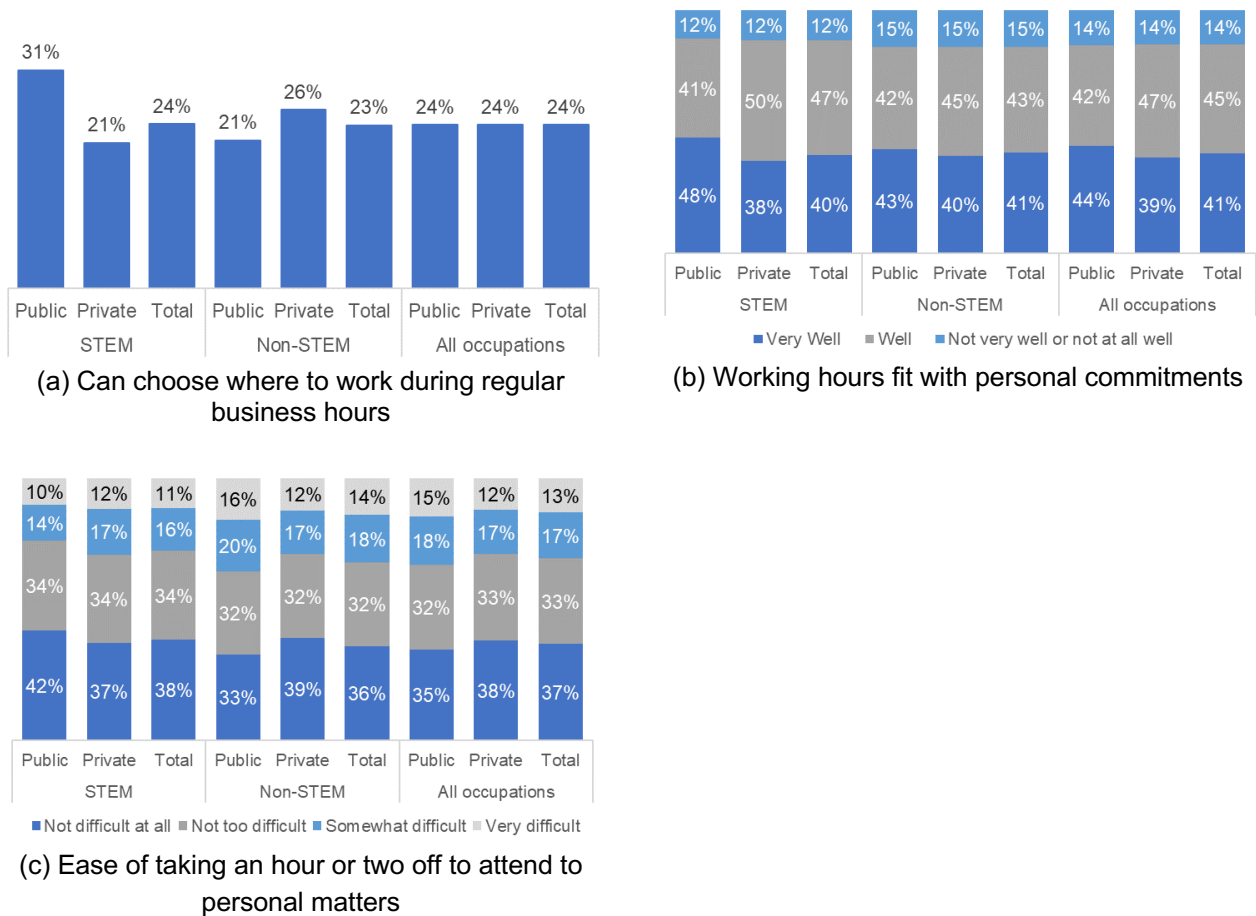
²⁷ The survey questions and response options behind the data in Figure 4.3 are as follows:

- N8. "Can you choose where you work during regular business hours?" "Yes," "No"
- Q41. "In general, do your working hours fit in with your family or social commitments outside work?" "Very well," "Well," "Not very well," "Not at all well"
- Q43. "Would you say that, for you, arranging to take an hour or two off during working hours to take care of personal or family matters is . . . ?" "Not difficult at all," "Not too difficult," "Somewhat difficult," "Very difficult."

10 percentage points for STEM occupations—e.g., 48 percent versus 38 percent for “very well”—and just 3 percentage points for non-STEM occupations—e.g., 43 percent versus 40 percent for “very well.” Finally, comparing total STEM and total non-STEM occupations, we see that workers in STEM occupations are slightly less likely to report that their hours fit “very well” (40 percent versus 41 percent), slightly more likely to report that their hours fit “well” (47 percent versus 43 percent), and slightly less likely to report that their hours fit “not very well or not well at all” (12 percent versus 15 percent).

The third panel of Figure 4.3 compares the ease of taking an hour or two off to attend to personal matters (panel c). Across all occupations, it is slightly more difficult to do so in the public sector than in the private sector—e.g., 15 percent versus 12 percent, respectively, find it “very difficult.” This pattern holds for non-STEM occupations; 16 percent of the public-sector respondents find it to be “very difficult,” compared with 12 percent of the private-sector respondents, and, 33 percent of the public-sector respondents find it “not difficult at all,” compared with 39 percent of private-sector respondents. The opposite is true for STEM occupations; 42 percent of public-sector respondents find it “not difficult at all,” compared with 37 percent in the private sector, while 14 percent and 10 percent of public-sector respondents find it “somewhat difficult” and “very difficult,” respectively, compared with 17 percent and 12 percent of private-sector respondents. Finally, comparing total STEM with total non-STEM, we see that those working in STEM occupations are slightly more likely to find it “not difficult at all” or “not too difficult” (38 percent and 34 percent, respectively), compared with those working in non-STEM occupations (36 percent and 32 percent, respectively). Accordingly, those working in STEM occupations are slightly less likely to find it “somewhat difficult” or “very difficult” (16 percent and 11 percent, respectively) than those working in non-STEM occupations (18 percent and 14 percent, respectively).

Figure 4.3. Working Conditions by Sector and STEM/non-STEM: Work-Life Balance



SOURCE: AWCS data.

NOTE: Sample excludes respondents who do not report a SOC code or who are in the nonprofit sector.

Employer Case Studies

Using publicly available information on nonmonetary compensation, we compare the 12 selected private employers and the federal government along the following dimensions: paid time off, health, education, family, financial, food, transit, and other benefits. In this section, we summarize the findings. Detailed information by employer can be found in Appendix E.

Paid Time Off

In the case studies, we observe different forms of paid time off, including vacation, holidays, sick pay, and parental leave.

Most of the private employers offer paid vacation, with only two providing information on the number of vacation days offered (21 days).²⁸ The federal government offers paid vacation on an accrual basis; for full-time employees, vacation accrues at a rate of four to eight hours each pay period (depending on years of service), which corresponds to 13 to 26 days a year. Half of the private employers offer paid holidays, ranging from ten days (which is what the federal government provides) to 17 days. Similarly, most of the private employers also offer paid sick leave; however, only three provide information on the duration of paid sick leave. All three of these companies offer ten days. The federal government offers up to 13 days of paid sick leave per year.

Finally, regarding parental leave, we observe that all but two of the private employers provide paid parental leave and one private employer provides both paid parental and caregiver leave. Among the private employers that provide information on the duration of the paid parental leave, the duration ranges from 17 to 26 weeks, with one employer providing 52 weeks. Currently, the federal government does not provide paid parental leave. However, the FY 2020 NDAA will change this; in October 2020, federal employees will be eligible for 12 weeks of paid parental leave.

Health

In the case studies, we observe the following health-related forms of nonmonetary compensation:

- health insurance, dental insurance, or both
- access to employer-provided clinics, either on-site or off-site
- fitness centers, either on-site or subsidies for off-site
- general wellness (e.g., massage, acupuncture), either on-site or subsidies for off-site.

Health insurance is offered by all 12 private employers and the federal government. The federal government also provides dental insurance, while we observe this benefit for only six of the private employers. Nearly half (five of the 12) of the private employers provide on-site clinics, and a sixth private employer provides access to an off-site clinic. By contrast, the federal government does not offer either benefit. Additionally, half of the private employers provide fitness centers; three private employers offer this benefit on-site, and another three employers provide subsidies for this benefit off-site only. For the federal government, fitness centers are a benefit that varies by agency. Finally, half of the private employers offer some type of wellness benefit—again, three private employers offer this benefit on-site, and another three employers provide subsidies for this benefit off-site only—while the federal government does not.

²⁸ Recall that there will be cases in which, although we do not observe a specific form of nonmonetary compensation, it is not necessarily the case that nonmonetary compensation is not offered. Instead, it could be that the information was not publicly available to confirm coverage. We expect that is the case for paid vacation and paid sick leave.

Education

The education-related forms of nonmonetary compensation observed in the case studies include loan assistance and educational stipends or reimbursement. The federal government offers both of these benefits. Across the private employers, loan assistance was offered by only two employers, while education stipends or reimbursements were more common. Three-fourths of the private employers offered stipends or reimbursements. The benefits pages for two of the employers provided details on the amounts for which employees are eligible.

Family

We observe several family-related forms of nonmonetary compensation in the case studies, including

- subsidies for fertility treatment
- subsidies or a flexible spending account for childcare or eldercare
- adoption assistance
- Employee Assistance Programs (EAPs) or similar employee support programs.

Just two of the private employers provide subsidies for fertility treatment, and the federal government does not. When it comes to childcare or eldercare, half of the private employers provide subsidies and a third of the private employers provide a flexible spending account. The federal government offers both; however, childcare subsidies are reserved for lower-income employees. Just over half (seven of 12) of the private employers provide adoption assistance—with one employer's benefits page providing details on the amount for which employees are eligible—while the federal government does not. Two-thirds of the private employers offer EAPs or similar employee support programs, as does the federal government.

Financial

The financial forms of nonmonetary compensation that we observe in the case studies include the following:

- stock incentives
- retirement benefits (and, in some cases, employer matching)
- financial advising
- life insurance
- identity protection
- survivor support services.

We observe that three-fourths of the private employers offer stock incentives, a form of nonmonetary compensation that is unique to the private sector. Similarly, we observe that three-fourths of the private employers provide retirement benefits in the form of defined-contribution plans, with most providing employer matching, as does the federal government. The federal government also provides eligible employees with a pension, which we did not observe among

the private employers and which is not typically offered in the private sector.²⁹ Half of the private employers offer financial advising and life insurance. The federal government offers the latter, but not the former. Finally, we observe that one private employer offers identity protection and four private employers provide survivor support services. The federal government does not provide identity protection, but it does offer survivor benefits to survivors of federal employees.

Food

The food-related forms of nonmonetary compensation benefits that we observe in the case studies include catered meals, snacks, and take-home meals. Half of the private employers report providing catered meals, and nearly half (five of 12) report providing employees with snacks. In addition, one private company provides employees with take-home meals and another provides employees with cooking classes and grocery delivery. In contrast, the federal government does not provide food-related nonmonetary compensation.

Transit

In our case studies, we observe a small number of transit-related forms of nonmonetary compensation, including shuttle service, transit subsidies, and other services, such as car washes and oil changes. These are not commonly offered benefits. We observe just three private employers offering shuttle service, two offering transit subsidies, and two offering car washes and oil changes. By comparison, we observe that the federal government offers transit subsidies but not the other transit-related benefits.

Other Benefits

Finally, we observed some other forms of nonmonetary compensation that do not fit into the previous categories. They include product discounts, charitable matching and volunteer reimbursement, specialized services, and flexible work arrangements. Just over half of the private employers (seven of 12) offer product discounts. Nearly all of the private employers (ten of 12) offer charitable matching (four of 12), volunteer reimbursement (two of 12), or both (four of 12). Moreover, three of the private employers offer other special services, such as laundry, dry cleaning, and concierge. The federal government, by contrast, does not offer any of these benefits.

Finally, we observe that most of the private employers and the federal government offer some form of flexible work arrangements. The descriptions of what is offered among the private employers are not specific; however, they mention flexible work schedules and locations as a personal or family benefit. There is more specificity available for the federal government. The

²⁹ March 2019 data from the BLS National Compensation Survey suggest that only 17 percent of private-industry workers had access to an employer-sponsored defined-benefit plan, whereas 64 percent had access to a defined-contribution plan (BLS, 2019).

availability of alternative work schedules varies by agency, but it comes in two forms: a flexible work schedule—which allows employees a prescribed amount of flexibility in their arrival and departure times—and a compressed work schedule—which allows employees to work the same number of weekly hours over fewer days than usual (e.g., working 80 hours every two weeks, with every other Friday off). Similarly, there are provisions for teleworking in the federal government per the Telework Enhancement Act of 2010 (Pub. L. 111-292). Eligibility and participation vary by agency. A 2018 report shows that 42 percent of federal employees were eligible for telework and half of eligible employees participated in telework (OPM, 2020).

Summary

In this chapter, we explore the prevalence of different types of nonmonetary compensation in the workforces of interest. In this section, we summarize the findings from the AWCS tabulations and the employer case studies. Overall, the findings are mixed: In some cases, the federal government provides more-generous nonmonetary compensation; in other cases, the reverse is true.

AWCS Data on Working Conditions

Through the AWCS data analysis, we compared STEM and non-STEM occupations and the public and private sectors across three categories: work schedule, paid time off, and work-life balance. In this subsection, we focus on what is most comparable to the employer case studies—specifically, comparisons between the public and private sectors for all occupations.

Regarding work schedule, we find that, among all occupations, public-sector jobs are more consistent than private-sector jobs in terms of having the same number of hours worked each day, having the same number of hours and days worked each week, and having fixed starting and finishing times. We also find that public-sector employees have marginally more predictable and stable hours over the course of the year. However, we also find that public-sector employees are less likely than private-sector employees to be able to influence their working arrangements.

Comparing paid time off across all occupations, we see that public-sector employees are given more sick days on average than in the private sector, but there is little difference in vacation days. However, when it comes to vacation time, public-sector employees are less likely to have taken a vacation in the past year and take fewer days of vacation on average than private-sector employees.

Finally, with respect to work-life balance across all occupations, we see no public-private difference in employees' ability to choose where they work during regular business hours. Yet compared with private-sector employees, public-sector employees are more likely to report that their hours fit their personal commitments—but also that it is moderately more difficult to take an hour or two off from work to attend to personal matters.

Employer Case Studies

In our employer case studies, we compared the federal government and select private employers along eight categories of benefits: paid time off, health, education, family, financial, food, transit, and other.³⁰ In this subsection, we summarize the most salient results.

The federal government is generally on par with the private-sector employers when it comes to paid vacation, holidays, and sick leave (and is catching up when it comes to parental leave). The same is true when it comes to providing health and dental insurance, although the federal government does lag behind private employers in terms of other health benefits (e.g., on-site clinics, wellness benefits, and on-site fitness centers).

The federal government offers more-generous education-related benefits, in the forms of loan assistance and educational stipends or reimbursement. Among private-sector employers, the former is rare, while the latter is more common.

In terms of financial benefits, although both the federal government and the private-sector employers provide retirement programs, the federal government offers both defined-contribution and defined-benefit plans, while private employers offer only defined-contribution plans. Moreover, the federal government offers life insurance, while not all private-sector employers do. However, private-sector employers offer stock incentives, which are unique to the private sector.

With respect to family-related benefits, the private employers provide more-generous childcare or eldercare subsidies—which the federal government provides, but only for lower-income employees. Among the private-sector employers, we found subsidies for fertility treatment and adoption assistance, while the federal government provides neither. Still, both the private employers and the federal government provide dependent care flexible spending accounts and EAPs or similar employee support programs.

Most of the private employers and the federal government offer flexible work arrangements. Although there is not much publicly available detail regarding what forms these arrangements take among the private employers, flexible work schedule and location are touted as a personal or family benefit. In the federal government, we know that flexible work arrangements can take two forms: a flexible work schedule or a compressed work schedule. Moreover, there are provisions for teleworking in the federal government, but eligibility and participation vary by agency.

³⁰ Again, we note that, in instances in which we do not observe a specific form of nonmonetary compensation, it is not necessarily the case that such compensation is not offered. Rather, it could be that the information was not publicly available to confirm coverage.

5. Authorities for High-Value Skill Sets

In this chapter, we transition from comparisons of monetary and nonmonetary compensation across the DoD civilian and private sectors to an examination of what authorities DoD has, as a federal employer, to recruit and retain DoD civilians with high-value skill sets. This chapter is not a summary of all forms of compensation that DoD civilians do and could receive. Instead, we concentrate on those authorities that are particularly relevant for the aerospace engineering and defense acquisition workforces that are the focus of this study.

Unfortunately, for many of the authorities discussed in this chapter, we are unable to directly observe the extent to which they are being used by DoD in the management of the workforces of interest. In some cases, such as the Acquisition Demonstration (AcqDemo) project (which we will discuss in more detail later), the use of the authority is obvious. In another case, we explored whether we could observe the use of special and incentive (S&I) pays for the workforces of interest. However, we observe limited information on the use of specific hiring authorities in the DMDC data. In this chapter, we share a glimpse of that information, noting that a detailed analysis of the use of hiring authorities is outside the scope of this study. Moreover, although some information on S&I pays is available in the DMDC data, there is no information about what form the S&I pay takes. As we will discuss, S&I pays can come in different forms—recruiting, relocation, and retention incentives, as well as performance-based awards. Because of data limitations, parsing which forms of S&I pay are received by the workforces of interest is outside the scope of this study.

Even with this shortcoming, the following discussion of authorities relevant to the workforces of interest provides a helpful lens through which to interpret the findings from our comparisons of monetary and nonmonetary compensation. Where gaps exist and the DoD civilian sector appears to be lagging behind the private sector, what authorities can be used to close those gaps? This chapter embarks on that discussion.

In the remainder of this chapter, we highlight three categories of authorities that are relevant to the aerospace engineering and defense acquisition workforces: hiring, compensation, and demonstration projects (which address hiring and compensation, among other aspects of workforce management). For each category, we note which authorities are relevant to any of the workforces of interest to this study and which authorities pertain to a specific workforce of interest.

Among the resources we rely on for this chapter, three are most commonly used. The first resource is a 2013 OPM report, *Human Resources Flexibilities and Authorities in the Federal Government*, which contains a comprehensive summary of the main federal government authorities designed to address recruiting, retaining, and motivating the workforce (OPM, 2013). Second, we use a forthcoming RAND report that reviews federal demonstration projects and

alternative personnel systems (Groeber, Mayberry, et al., forthcoming). We note that this report focuses on recent and ongoing federal practices (i.e., those that were active as of May 2019 or started in 2008), which are particularly relevant for our purposes. Third, we refer to a 2019 U.S. Government Accountability Office (GAO) report on DoD’s use of human capital flexibilities for the defense acquisition workforce (GAO, 2019). In this chapter, we highlight the most salient authorities for the purposes of this study; we refer the interested reader to these three resources for more-detailed discussions.³¹

Hiring

In general, federal employers have at their disposal several authorities to hire specific groups of workers—e.g., veterans, military spouses, and people with disabilities—or to fill short-term staffing needs. Federal employers also may hire through excepted service appointments, to which some aspects of the typical competitive hiring process do not apply. For example, OPM may grant a federal agency excepted appointing authority—whereby recruitment and examination are not required—after it has been demonstrated that past attempts to fill the position have not been successful or that effective recruitment or examination might not be possible.³²

Federal employers also may be granted Direct Hiring Authority (DHA), which streamlines hiring by, among other things, eliminating competitive rating and ranking. Use of DHA requires an OPM determination that there is a critical shortage of candidates or a critical hiring need.³³ DHAs can be government-wide or agency specific. A government-wide DHA that is relevant to some of the occupations in the defense acquisition workforce allows employers to expedite hiring for positions at the GS-11 through GS-15 grade levels.³⁴ Turning to DoD-specific DHAs, there are several that are relevant to our workforces of interest. They include a DHA established by the FY 2017 NDAA, giving the Secretary of Defense the authority to make temporary or term appointments (up to five years) or noncompetitive temporary or term appointments (up to 18 months) to meet critical DoD hiring needs (Pub. L. 114-328, 2016, Section 1105). Moreover, the FY 2019 NDAA authorized the Secretary of Defense to use DHA to make competitive

³¹ Also, we refer readers who are interested specifically in the U.S. Space Force to the recent RAND study that assesses which career fields necessary for the Space Force mission could be fully sustained within the Space Force and which will need to be supplemented by the Air Force (Spirtas et al., 2020). The report refers to the success that intelligence and special operations have had in creating specialized personnel processes that allow for more autonomy. Additionally, the authors note that the Space Command has successfully used its own selection standards for STEM candidates. Finally, the report highlights new authorities in the 2019 NDAA (Pub. L. 115-232, 2018) that could aid in attracting talent to the Space Force, including the authority to award “constructive credit” to older, experienced personnel with technical skills, allowing them to enter the service at higher ranks.

³² For more information, see OPM, undated e.

³³ For more information, see OPM, undated d.

³⁴ Those occupations are contracting in the defense acquisition procurement workforce and general engineering, civil engineering, general physical sciences, physics, chemistry, mathematics, and mathematical sciences in the defense acquisition engineering and science workforce.

service appointments for positions in the acquisition workforce that manage service contracts for operation and maintenance of programs, as well as for science, technology, or engineering positions (Pub. L. 115-232, 2018, Section 1101).

In addition, there are multiple DoD DHAs specific to defense acquisition. The most relevant for this study's purposes are from three NDAA's. The FY 2016 NDAA authorized the Secretary of Defense to use DHA for select technical acquisition positions (Pub. L. 114-92, 2015, Sections 1112–1113), focusing specifically on hiring qualified veterans into scientific, technology, engineering, and mathematics and hiring qualified candidates who have degrees in science or engineering. The FY 2017 NDAA authorized the secretary of a military department to use DHA for financial management experts, specifically appointing those who have degrees in finance, accounting, management, business administration, or actuarial science to positions in financial management, accounting, auditing, and actuary (Pub. L. 114-328, 2016, Section 1110). Finally, the FY 2018 NDAA authorized the Secretary of Defense to use DHA for personnel with experience in management or business, who are working in large or complex organizations, and with such skills as data analytics or business process design (Pub. L. 115-91, 2017, Section 1101)—positions that might be found in the defense acquisition business and financial management workforce.

As we have noted, we observe limited information in the DMDC data on the use of hiring authorities. For instance, we observe the share of the 2018 workforce that was hired by DHA. DMDC data show that the share is the highest for aerospace engineers (30 percent). Among the defense acquisition workforces, the share hired by DHA is largest for procurement (24 percent), followed by science engineering (23 percent). Business and financial management and program management have the smallest shares hired by DHA (12 percent and 11 percent, respectively). We provide these estimates as a rough approximation of the use of DHA among the workforces of interest, noting that estimates could be a lower bound given the complexity involved in analyzing hiring authority data. A thorough investigation of the use of DHA or other hiring authorities is outside the scope of this study.

Compensation

The compensation authorities that we highlight in this section are relevant to our workforces of interest, but they are not specific to them. For instance, OPM may establish special pay rates, in excess of GS pay rates, for occupations for which recruitment or retention would suffer without the higher pay rates. These special pay rates exist for many of the occupations included in our workforces of interest.³⁵ Similarly, under another compensation authority, agencies may set basic pay for a new employee above the minimum rate for that employee's GS grade if the

³⁵ For more information, see OPM, undated k. These special pay rates should be reflected in the analysis of monetary compensation presented in Chapter Three because the variable we use from the DMDC Civilian Pay File is gross pay, which includes special pays.

employee has superior qualifications for a position or if the agency has a special need for the employee's services.³⁶ Moreover, OPM may use the critical position pay authority to increase basic pay, up to the rate for a Level I position on the Executive Schedule, for positions that require high expertise in a scientific, technical, professional, or administrative field and that are critical to an agency's mission. Indeed, in 2014, OPM issued a special memorandum that promoted the use of the critical pay authority to recruit and retain STEM professionals (Archuleta, 2014).

In addition, agencies can use monetary incentives to assist with recruiting and retention. The 2013 OPM report describes three forms these incentives can take (OPM, 2013):

- **Recruitment:** If it is determined that a position is likely to be difficult to fill without an incentive, an agency may pay a recruitment incentive. This incentive requires a signed agreement that the employee will complete a specific period of service (up to four years). The amount of the incentive is capped; it cannot exceed 25 percent of the product of annual basic pay (at the time the period of service begins) and the duration of the required period of service. The incentive can be paid as a lump sum at the beginning or end of the required period of service or in installments throughout the required period of service.
- **Relocation:** If a current employee must relocate to accept a position *and* if it is determined that it would be difficult to fill the position without an incentive, then an agency may pay a relocation incentive. The relocation incentive requires the same signed period-of-service agreement and has the same cap on the total amount as the recruitment incentive does. It, too, can be paid as a lump sum or in installments.
- **Retention:** If it is determined that, without an incentive, a current employee is likely to leave the federal service *and* that employee has unusual or high qualifications or is essential to the agency, an agency may pay a retention incentive. The same can be applied to a group or a category of such employees. The retention incentive requires a signed agreement that the employee will complete a specific period of service, and the amount of the retention incentive is capped at 25 percent of basic pay for an individual employee or at 10 percent of basic pay for a group or category of employees. Like the other incentives, the retention incentive can be paid as a lump sum or in installments.

In addition to these incentives, agencies may provide performance-based awards that recognize employee performance over the course of a review period. Agencies can customize their performance-based awards programs to their needs, as long as they are in accordance with the central premise that the awards reflect meaningful differences in employees' performance.

As we mentioned earlier, we were unable to empirically observe whether these different S&I pays—recruiting, relocation, and retention incentives and performance-based awards—are received by workers in our workforces of interest. The DMDC Civilian Pay File does contain some information on S&I pay, but there is insufficient information to know what form it takes. As can be inferred from the descriptions of recruiting, relocation, and retention incentives and performance-based awards, there is considerable overlap in how these S&I pays are constructed

³⁶ For more information, see OPM, undated h.

and how they are paid out. For example, if we observe an individual receiving S&I pay in the first few years of employment, we cannot determine whether the pay is a recruiting incentive or a performance-based award. And, if we observe an individual receiving S&I pay later in that person's career, we cannot determine whether the pay is a relocation incentive, a retention incentive, or a performance-based award. Because of this limitation, assessing the extent to which these S&I pays are used for our workforces of interest is outside the scope of this study.

Demonstration Projects

Next, we discuss demonstration projects, which address hiring and compensation among other aspects of workforce management. Recall that our empirical analysis of monetary compensation in Chapter 3 showed that DoD civilians who are covered by demonstration projects in our workforces of interest are predicted to have higher average incomes than DoD civilians covered by other pay plans. As the 2013 OPM report describes, agencies can expand beyond traditional personnel systems (e.g., the GS) to address fundamental human resources issues (OPM, 2013). With authority from OPM, agencies can propose, develop, test, and evaluate a demonstration project as an alternative to the traditional personnel system. The interested reader can find a detailed discussion of demonstration projects in a forthcoming RAND review of federal demonstration projects and alternative personnel systems (Groeber, Mayberry, et al., forthcoming). For the purposes of this study, we focus on one demonstration program that is relevant to our workforces of interest: the AcqDemo program.

AcqDemo started in 1999 as a new way to approach acquisition workforce management to ensure that DoD will meet its acquisition mission.³⁷ AcqDemo features enhanced managerial control over the personnel process and increased flexibility over recruiting, hiring, and compensation (e.g., directly linking compensation with performance to attract and retain the most qualified employees). AcqDemo has expanded since its inception (GAO, 2019). In 2017, there was a series of enhancements, including

- a simplified hiring process, which expedites hiring and appointments
- the authority to appoint student interns; the students are enrolled in undergraduate or graduate programs that prepare them for a critical acquisition field
- the authority to hire people into the business and technical management professional career path on the basis of scholastic achievement, taking into consideration education level and cumulative grade point average in specific courses of study
- DHA for the business and technical management professional career path
- DHA for veterans for the business and technical management professional career path and the technical management support career path

³⁷ For more on the history of AcqDemo, see Department of Defense Civilian Acquisition Workforce Personnel Demonstration Project, undated.

- a voluntary emeritus program, whereby voluntary assignments can be offered to select former AcqDemo personnel, as well as non-AcqDemo former DoD civilians or former military service members who worked in certain positions.

Summary

In this chapter, we described three types of authorities available to DoD to recruit and retain civilians with high-value skill sets: hiring authorities, compensation authorities, and demonstration projects. Using hiring authorities, DoD can streamline the hiring process for certain groups of individuals. Compensation authorities allow DoD to offer special pay rates above standard rates and offer monetary incentives to assist with recruiting and retaining civilian workers. Finally, demonstration projects give DoD the ability to use alternative personnel systems to address, among other issues, hiring, recruiting, and retention.

As noted, using DMDC data, we gained limited visibility into the use of hiring authorities, and we were unable to determine the type of special pay received. However, the analysis presented in Chapter 3 compares gross pay between the DoD civilian and private sectors, where DoD civilian gross pay reflects all monetary compensation, including special pays. Further research is needed to determine the extent to which DoD is using the full set of compensation authorities available and whether existing compensation authorities could be used to make pay more competitive with that in the private sector. This is particularly important for the two workforces for which overall predicted average income is estimated to be below that in the private sector—the aerospace engineering workforce and the defense acquisition program management workforce—and for the subgroups within each of the workforces for which DoD civilian income is predicted to fall short of that in the private sector.

Our analysis in Chapter 3 shows that when DoD civilians in the workforces of interest are covered by demonstration projects, they generally have predicted average income in line with or even greater than that in the private sector. Yet we find in Chapter 2 that the shares covered by demonstration projects vary both across workforces and across agencies within each workforce. Additional research is needed to determine whether certain agencies and workforces could increase the share of workers covered by demonstration projects, particularly to target subgroups for which predicted average income of DoD civilians falls short of that of private-sector workers.

The authorities described in this chapter affect the hiring process and monetary compensation but do not directly affect nonmonetary compensation of DoD civilians in high-value skill sets.³⁸ As shown by the AWCS tabulation in Chapter 4, there are differences between what the public and private sectors offer as nonmonetary compensation. For instance, public-sector employees have more consistent and predictable work schedules but have less influence over their working arrangements. And, despite receiving about the same number of vacation days as their private-

³⁸ Demonstration projects can address aspects of nonmonetary compensation (e.g., hours of work), but our review of authorities did not produce examples of this.

sector counterparts, public-sector employees are less likely to take vacations. When they do, they use fewer vacation days. Moreover, our private-sector employer case studies suggest that there are differences in nonmonetary compensation between the federal government and the private sector. The federal government offers both defined-benefit and defined-contribution retirement savings plans, while the private-sector employers offer only defined-contribution plans. However, the private-sector employers offer stock incentives—a benefit unique to the private sector. In general, more research is needed to investigate the extent to which nonmonetary compensation factors into recruiting and retention of DoD civilians in high-value skill sets and whether any changes to federal authorities regarding nonmonetary compensation should be considered.

6. Conclusion

In this study, we compared workforce characteristics and monetary and nonmonetary compensation between DoD civilian and private-sector workers in the aerospace engineering workforce and four defense acquisition workforces: business and financial management, program management, procurement, and engineering and science. Furthermore, we described authorities available to DoD to recruit and retain DoD civilians with high-value skill sets. We close with a summary of our findings and recommendations.

Findings

We find some differences in demographic characteristics across the DoD civilian and private sectors in our workforces of interest. For instance, DoD civilians generally have higher educational attainment and more YOPE than private-sector workers. When we compare monetary compensation (i.e., income trajectories over the course of a 30-year career, controlling for demographic characteristics), we find that DoD is competitive with or exceeds the private sector in three defense acquisition workforces—business and financial management, procurement, and engineering and science. However, for the remaining two workforces—aerospace engineering and defense acquisition program management—DoD falls short of the private sector.

Looking within the workforces of interest, we find that, for most workforces, these results vary by different subgroups, particularly by educational attainment, agency, top three subagencies, and three locality pay areas of interest. For the workforces nationwide, we find broad consistency in results for the lowest and highest education groups. Regression-adjusted predicted income among DoD civilians with less than a bachelor's degree generally exceeds that of their private-sector counterparts. The opposite is true for DoD civilians with a master's degree or more, for whom predicted average income among typically falls short of private-sector workers, with the difference between DoD civilian and private-sector predicted average income increasing with YOPE. This result suggests that DoD might have difficulty recruiting and retaining not only highly educated civilians who are just entering the labor market but also those at all other levels of experience.

We also find that DoD civilians covered by demonstration project pay plans generally have income that is competitive with or higher than that in the private sector, but that the share of DoD civilians covered by demonstration projects varies across the workforces. When we narrow the analysis to three locality pay areas of interest, we find that there is broad consistency between the nationwide results and those for the Los Angeles–Long-Beach and Washington, D.C., locality pay areas but that there are differences between the nationwide results and those for the

Denver-Aurora locality pay area. As we discussed earlier, the differences found in the Denver-Aurora locality pay area are not sufficient to warrant a reexamination of locality pay. Instead, additional investigation by locality pay area, as well as empirical evidence on the extent to which there are recruiting and retention problems, should inform this discussion.

Our analysis of nonmonetary compensation suggests that the federal government provides more-generous benefits in some cases and less generous benefits in others. For example, in the AWCS data, we see that public-sector workers have less influence over their working arrangements and are less likely to take vacations than private-sector workers. Furthermore, the employer case studies imply that private-sector employers might provide more-generous childcare and eldercare subsidies and certain health-related benefits and that they might offer benefits, such as stock incentives, that are not available in the public sector. The employer case studies suggest that the federal government is more generous than private employers in terms of education-related benefits and availability of life insurance. Also, unlike private employers, the federal government provides a defined-benefit retirement plan to employees, and this benefit has been documented as the main driver for why total compensation provided by the federal government exceeds that in the private sector (Falk, 2012). These differences underscore the importance of considering total compensation—not just monetary compensation—when comparing across the DoD civilian and private sectors.

Finally, we describe authorities available to DoD, as a federal employer, to recruit and retain talent. These include hiring authorities, such as DHA, which allow DoD to expedite and simplify the hiring process for select workforces or candidates; compensation authorities, which allow DoD to provide targeted, additional monetary compensation in the form of S&I pays; and demonstration projects, which allow DoD to create alternative personnel systems to address hiring, recruiting, and retention.

Unfortunately, the data consulted in this study provide limited visibility into the use of hiring authorities or compensation authorities.³⁹ However, as we mentioned earlier, the data reveal information about DoD civilians in our workforces of interest who are covered by demonstration projects. Among DoD civilians covered by demonstration projects, income is in line with or even higher than that in the private sector, while income among individuals covered by other pay plans, including the standard GS system, is lower than in the private sector. This result is consistent with prior work that finds that, compared with individuals covered by the GS system, DoD civilians covered by special pay band systems can receive higher pay (Groeber, Mayberry, et al., forthcoming). Furthermore, as we see in the data, the share of DoD civilians covered by demonstration projects varies widely across our workforces of interest and across agencies within each workforce. More research is needed to understand the extent to which hiring and compensation authorities are used for our workforces of interest, whether the use of

³⁹ We note that salaries in the federal government have a statutory cap, which can contribute to pay being less competitive with that in the private sector (National Academy of Engineering and National Research Council, 2012).

demonstration projects could be expanded, and whether new authorities might be needed to improve recruiting and retention.

Returning to the bigger picture, we remind readers that this study is motivated by the concern that DoD might have difficulty recruiting and retaining civilians with high-value skill sets. To this end, we have compared monetary and nonmonetary compensation among the DoD civilian and private sectors. But although this is important information to bring to bear, what is missing from this discussion is empirical evidence on the extent to which there are recruiting and retention problems in our workforces of interest. New research that examines data on job openings and turnover would shed light on whether positions in high-value skill sets are more likely to remain unfilled, take longer to fill, or have lower retention rates than other positions. Moreover, there are likely other drivers—beyond compensation—that influence individuals’ decisions to work in the public or private sector; these motivators might include differences in recruiting and hiring processes. In addition, it is likely that there are harder-to-quantify aspects of federal employment at play, both positive—e.g., a desire to serve their country—and negative—e.g., a lengthy hiring process, government shutdowns, pay freezes, or frequent leadership turnover following a change in the federal administration. Future research could involve reviewing the recruiting and hiring processes and conducting exit interviews—directly asking DoD employees why they decided to leave—to give DoD a better understanding of how individuals make their employment decisions and what impact those decisions have on DoD’s ability to recruit and retain talent.

Finally, we note that the demand for high-value skill sets fluctuates over time. The differences in compensation between the DoD civilian and private sectors documented in this report rely on recent historical data. In the future, these differences could persist, widen, or shrink. As a result, when considering changes in compensation to better position DoD to recruit talent, policymakers should consider how demand for high-value skill sets—and also what constitutes *high-value*—might change over time, within both DoD and the private sector.

Recommendations

With this broader context in mind, we conclude our study with two recommendations. First, we suggest that DoD investigate the merits of expanding the use of demonstration projects. Specifically, our results show that DoD civilians covered by demonstration projects generally are predicted to have income that is competitive with or greater than that in the private sector—unlike DoD civilians covered by other pay plans, who are predicted to have income below that in the private sector. Second, we recommend that research be done to (1) quantify the usage of existing hiring and compensation authorities to recruit and retain DoD civilians with high-value skill sets, (2) further investigate differences in monetary compensation at the local level, and (3) empirically demonstrate the extent to which recruiting and retaining DoD civilians with high-value skill sets is a problem. Before recommendations can be made on whether new authorities

are needed, we must first understand the extent to which existing authorities are being used and the size and scope of the problem—both nationwide and at a local level—that they are designed to resolve.

Appendix A. Regression Coefficients

In Tables A.1–A.10, we report the coefficient estimates from the regressions used in Chapter 3 to predict average income for the DoD civilian and private sectors. For each workforce and sector, we show four sets of coefficient estimates for which additional control variables are included with each subsequent table column. In particular, the specification in the first column of each table contains year dummy variables, in addition to the demographic controls and workforce-of-interest dummy variable. The specification in the second column adds controls for interactions between the workforce-of-interest dummy variable and YOPE intervals. The specification in the third column further adds interactions between the workforce-of-interest dummy variable and year dummy variables. The specification in the fourth column contains coefficient estimates from the fully interacted model that is used in Chapter 3 to predict average income for the DoD civilian and private sectors.

**Table A.1. Income Regression Results for DoD Civilian Aerospace Engineers,
Fiscal Years 2010–2018**

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.326*** (0.0250)	0.326*** (0.0250)	0.326*** (0.0250)	0.326*** (0.0249)
Master's degree or more	0.498*** (0.0316)	0.498*** (0.0316)	0.498*** (0.0316)	0.498*** (0.0316)
Race/ethnicity				
White	−0.00523 (0.0108)	−0.00526 (0.0108)	−0.00526 (0.0108)	−0.00539 (0.0108)
Black	−0.118*** (0.0130)	−0.118*** (0.0130)	−0.118*** (0.0130)	−0.119*** (0.0129)
Hispanic	−0.0757*** (0.00977)	−0.0757*** (0.00977)	−0.0757*** (0.00976)	−0.0757*** (0.00976)
Other	−0.0563*** (0.0113)	−0.0563*** (0.0113)	−0.0563*** (0.0113)	−0.0562*** (0.0113)
Missing	−0.0423*** (0.0116)	−0.0423*** (0.0116)	−0.0423*** (0.0116)	−0.0425*** (0.0115)
Male	0.133*** (0.0258)	0.133*** (0.0258)	0.133*** (0.0258)	0.133*** (0.0257)
Prior military service	−0.0639*** (0.0176)	−0.0639*** (0.0176)	−0.0639*** (0.0176)	−0.0636*** (0.0176)
YOPE				
0–4	0.0644*** (0.00629)	0.0483*** (0.000652)	0.0486*** (0.000641)	0.0351*** (0.000322)
5–9	−0.0354*** (0.00525)	−0.0101*** (0.000504)	−0.0105*** (0.000505)	0.00995*** (0.000291)
10–14	−0.0126*** (0.00263)	−0.0190*** (0.000285)	−0.0188*** (0.000291)	−0.0243*** (0.000353)
15–19	−0.00725*** (0.000858)	−0.00444*** (0.000205)	−0.00452*** (0.000209)	−0.0115*** (0.000255)
20–24	0.00178 (0.00141)	−0.00434*** (0.000169)	−0.00416*** (0.000188)	0.00784*** (0.000811)
25–29	0.00363*** (0.000851)	0.000599 (0.000603)	0.000495 (0.000671)	−0.0133*** (0.000201)
30–34	−0.00693*** (0.000938)	−0.0124*** (0.000167)	−0.0127*** (0.000153)	−0.0117*** (0.000475)

Demographic Characteristic	Regression Specification			
	1	2	3	4
35–39	–0.00912*** (0.000827)	–0.00860*** (0.000424)	–0.00835*** (0.000487)	0.00382*** (0.000884)
40+	–0.000201 (0.000884)	0.00424*** (0.000427)	0.00437*** (0.000370)	0.00227** (0.000962)
Not aerospace engineering	–0.166*** (0.0205)	–0.200*** (0.0491)	–0.206*** (0.0498)	–0.305*** (0.0623)
Year dummy variables	Yes	Yes	Yes	Yes
Not aerospace engineering interacted with YOPE intervals	No	Yes	Yes	Yes
Not aerospace engineering interacted with year dummies	No	No	Yes	Yes
Not aerospace engineering interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	10.60*** (0.0500)	10.63*** (0.0390)	10.64*** (0.0384)	10.68*** (0.0390)
Observations	6,478,742	6,478,742	6,478,742	6,478,742
R-squared	0.346	0.346	0.346	0.347

SOURCE: Data from the 2010–2018 DMDC Civilian Master File.

NOTE: Robust standard errors in parentheses, *** = $p < 0.01$. The YOPE interval coefficients represent the change in the slope from the preceding interval. The coefficient estimates by educational attainment are relative to the omitted group, those with less than a bachelor's degree. The coefficient estimates by race/ethnicity are relative to the omitted group, Asians.

**Table A.2. Income Regression Results for Private-Sector Aerospace Engineers,
Fiscal Years 2010–2018**

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.558*** (0.0219)	0.558*** (0.0219)	0.558*** (0.0219)	0.557*** (0.0219)
Master's degree or more	0.927*** (0.0500)	0.927*** (0.0500)	0.927*** (0.0500)	0.927*** (0.0500)
Race/ethnicity				
White	0.0819*** (0.0212)	0.0819*** (0.0212)	0.0819*** (0.0212)	0.0819*** (0.0212)
Black	−0.132*** (0.0208)	−0.132*** (0.0208)	−0.132*** (0.0208)	−0.132*** (0.0209)
Hispanic	−0.175*** (0.0247)	−0.175*** (0.0247)	−0.175*** (0.0247)	−0.175*** (0.0247)
Other	−0.0163 (0.0177)	−0.0163 (0.0177)	−0.0163 (0.0177)	−0.0163 (0.0177)
Missing	—	—	—	—
Male	0.233*** (0.0183)	0.233*** (0.0183)	0.233*** (0.0183)	0.233*** (0.0183)
Prior military service	−0.0212** (0.00925)	−0.0211** (0.00925)	−0.0211** (0.00925)	−0.0221** (0.00921)
YOPE				
0–4	0.0641*** (0.00247)	0.0916*** (0.000726)	0.0916*** (0.000610)	0.144*** (0.00227)
5–9	−0.0228*** (0.00232)	−0.0649*** (0.000581)	−0.0648*** (0.000317)	−0.115*** (0.00345)
10–14	−0.0169*** (0.00104)	−0.00339*** (0.000674)	−0.00344*** (0.000676)	−0.0223*** (0.00126)
15–19	−0.00800*** (0.00108)	−0.0101*** (0.000468)	−0.0102*** (0.000440)	0.0107*** (0.000975)
20–24	−0.0102*** (0.000696)	0.000820** (0.000350)	0.00151*** (0.000393)	−0.00176 (0.00131)

Demographic Characteristic	Regression Specification			
	1	2	3	4
25–29	–0.00184*** (0.000664)	0.00274*** (0.000378)	0.00164*** (0.000339)	–0.00413*** (0.000669)
30–34	–0.00559*** (0.000667)	–0.0102*** (0.000669)	–0.00974*** (0.000625)	–0.0153*** (0.00177)
35–39	–0.00224*** (0.000728)	–0.00631*** (0.000706)	–0.00628*** (0.000695)	0.00498*** (0.00107)
40+	–0.00536*** (0.00130)	–0.00824*** (0.000590)	–0.00820*** (0.000589)	–0.00433*** (0.000907)
Not aerospace engineering	–0.266*** (0.0309)	–0.151*** (0.0215)	–0.143*** (0.0215)	0.0567** (0.0240)
Year dummies	Yes	Yes	Yes	Yes
Not aerospace engineering interacted with YOPE intervals	No	Yes	Yes	Yes
Not aerospace engineering interacted with year dummies	No	No	Yes	Yes
Not aerospace engineering interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	10.03*** (0.0530)	9.919*** (0.0424)	9.911*** (0.0419)	9.716*** (0.0417)
Observations	6,800,308	6,800,308	6,800,308	6,800,308
R-squared	0.334	0.334	0.334	0.334

SOURCE: Data from the 2010–2018 ACS (Ruggles et al., 2020).

NOTE: Robust standard errors in parentheses, *** = $p < 0.01$, ** = $p < 0.05$. The YOPE interval coefficients represent the change in the slope from the preceding interval. — = there are no observations in the missing race/ethnicity category.

Table A.3. Income Regression Results for DoD Civilian Defense Acquisition Business and Financial Management, Fiscal Years 2010–2018

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.326*** (0.0250)	0.326*** (0.0250)	0.326*** (0.0250)	0.326*** (0.0250)
Master's degree or more	0.499*** (0.0314)	0.499*** (0.0315)	0.499*** (0.0315)	0.500*** (0.0315)
Race/ethnicity				
White	−0.00478 (0.0109)	−0.00456 (0.0109)	−0.00456 (0.0109)	−0.00470 (0.0109)
Black	−0.119*** (0.0130)	−0.118*** (0.0129)	−0.118*** (0.0129)	−0.119*** (0.0129)
Hispanic	−0.0759*** (0.00983)	−0.0754*** (0.00979)	−0.0753*** (0.00977)	−0.0753*** (0.00976)
Other	−0.0560*** (0.0113)	−0.0557*** (0.0113)	−0.0557*** (0.0113)	−0.0556*** (0.0113)
Missing	−0.0424*** (0.0115)	−0.0421*** (0.0115)	−0.0421*** (0.0115)	−0.0422*** (0.0115)
Male	0.137*** (0.0263)	0.137*** (0.0263)	0.137*** (0.0263)	0.137*** (0.0263)
Prior military service	−0.0645*** (0.0176)	−0.0643*** (0.0175)	−0.0643*** (0.0175)	−0.0640*** (0.0176)
YOPE				
0–4	0.0636*** (0.00629)	0.0811*** (0.00354)	0.0818*** (0.00342)	0.0730*** (0.00396)
5–9	−0.0349*** (0.00520)	−0.0563*** (0.00214)	−0.0557*** (0.00232)	−0.0492*** (0.00469)
10–14	−0.0123*** (0.00263)	−0.0131*** (0.00316)	−0.0141*** (0.00331)	−0.0133 (0.00972)
15–19	−0.00728*** (0.000854)	−0.000748 (0.00196)	−0.00126 (0.00195)	0.00864 (0.0103)
20–24	0.00178 (0.00141)	0.00557 (0.00342)	0.00555 (0.00345)	0.00184 (0.00501)
25–29	0.00362*** (0.000851)	0.00237 (0.00198)	0.00292 (0.00192)	−0.00726*** (0.00151)
30–34	−0.00695*** (0.000939)	−0.00944*** (0.00142)	−0.00934*** (0.00146)	−0.00587* (0.00328)

Demographic Characteristic	Regression Specification			
	1	2	3	4
35–39	–0.00911*** (0.000829)	–0.00954*** (0.00175)	–0.00984*** (0.00176)	–0.0102*** (0.00321)
40+	–0.000119 (0.000883)	0.00148 (0.00250)	0.00161 (0.00252)	0.00619*** (0.00195)
Not defense acquisition business and financial management	–0.0430 (0.0471)	0.0543 (0.0535)	0.0419 (0.0536)	–0.0491 (0.0757)
Year dummies	Yes	Yes	Yes	Yes
Not defense acquisition business and financial management interacted with YOPE intervals	No	Yes	Yes	Yes
Not defense acquisition business and financial management interacted with year dummies	No	No	Yes	Yes
Not defense acquisition business and financial management interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	10.48*** (0.0598)	10.39*** (0.0369)	10.40*** (0.0359)	10.43*** (0.0455)
Observations	6,478,742	6,478,742	6,478,742	6,478,742
R-squared	0.346	0.346	0.346	0.347

SOURCE: Data from the 2010–2018 DMDC Civilian Master File.

NOTE: Robust standard errors in parentheses, *** = $p < 0.01$. The YOPE interval coefficients represent the change in the slope from the preceding interval.

Table A.4. Income Regression Results for Private-Sector Defense Acquisition Business and Financial Management, Fiscal Years 2010–2018

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.556*** (0.0221)	0.555*** (0.0221)	0.555*** (0.0221)	0.555*** (0.0221)
Master's degree or more	0.926*** (0.0506)	0.926*** (0.0507)	0.926*** (0.0507)	0.926*** (0.0506)
Race/ethnicity				
White	0.0821*** (0.0213)	0.0823*** (0.0213)	0.0823*** (0.0213)	0.0823*** (0.0213)
Black	−0.131*** (0.0210)	−0.131*** (0.0210)	−0.131*** (0.0210)	−0.131*** (0.0210)
Hispanic	−0.175*** (0.0248)	−0.174*** (0.0248)	−0.174*** (0.0248)	−0.175*** (0.0248)
Other	−0.0157 (0.0178)	−0.0155 (0.0178)	−0.0155 (0.0178)	−0.0155 (0.0179)
Missing	—	—	—	—
Male	0.236*** (0.0183)	0.236*** (0.0183)	0.236*** (0.0183)	0.236*** (0.0183)
Prior military service	−0.0219** (0.00932)	−0.0217** (0.00933)	−0.0217** (0.00933)	−0.0227** (0.00929)
YOPE				
0–4	0.0641*** (0.00248)	0.0847*** (0.00407)	0.0846*** (0.00404)	0.0803*** (0.00261)
5–9	−0.0229*** (0.00235)	−0.0578*** (0.00463)	−0.0577*** (0.00461)	−0.0516*** (0.00486)
10–14	−0.0169*** (0.00104)	0.00232 (0.00383)	0.00231 (0.00380)	−0.00763 (0.00557)
15–19	−0.00801*** (0.00108)	−0.0172*** (0.00347)	−0.0172*** (0.00347)	−0.0158** (0.00697)
20–24	−0.0101*** (0.000697)	−0.0114*** (0.00190)	−0.0114*** (0.00192)	0.00825*** (0.00281)
25–29	−0.00183*** (0.000665)	0.00223 (0.00289)	0.00225 (0.00291)	−0.0231** (0.00924)
30–34	−0.00562*** (0.000668)	−0.00549*** (0.00170)	−0.00544*** (0.00161)	0.00744*** (0.00152)

Demographic Characteristic	Regression Specification			
	1	2	3	4
35–39	–0.00228*** (0.000727)	–0.00164** (0.000818)	–0.00165** (0.000811)	0.00268 (0.00548)
40+	–0.00536*** (0.00130)	–0.00237*** (0.000845)	–0.00240*** (0.000820)	–0.0104 (0.00776)
Not defense acquisition business and financial management	–0.0731* (0.0418)	–0.0476 (0.0309)	–0.0526** (0.0265)	–0.104*** (0.0367)
Year dummies	Yes	Yes	Yes	Yes
Not defense acquisition business and financial management interacted with YOPE intervals	No	Yes	Yes	Yes
Not defense acquisition business and financial management interacted with year dummies	No	No	Yes	Yes
Not defense acquisition business and financial management interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	9.838*** (0.0539)	9.814*** (0.0457)	9.818*** (0.0423)	9.873*** (0.0470)
Observations	6,800,308	6,800,308	6,800,308	6,800,308
R-squared	0.334	0.334	0.334	0.334

SOURCE: Data from the 2010–2018 ACS (Ruggles et al., 2020).

NOTE: Robust standard errors in parentheses, *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. The YOPE interval coefficients represent the change in the slope from the preceding interval. — = there are no observations in the missing race/ethnicity category.

Table A.5. Income Regression Results for DoD Civilian Defense Acquisition Program Management, Fiscal Years 2010–2018

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.321*** (0.0258)	0.321*** (0.0257)	0.321*** (0.0257)	0.321*** (0.0256)
Master's degree or more	0.490*** (0.0322)	0.491*** (0.0321)	0.492*** (0.0321)	0.492*** (0.0321)
Race/ethnicity				
White	–0.0103 (0.0106)	–0.0105 (0.0106)	–0.0105 (0.0105)	–0.0106 (0.0105)
Black	–0.124*** (0.0127)	–0.123*** (0.0127)	–0.123*** (0.0127)	–0.123*** (0.0127)
Hispanic	–0.0795*** (0.00969)	–0.0793*** (0.00966)	–0.0793*** (0.00966)	–0.0793*** (0.00965)
Other	–0.0616*** (0.0112)	–0.0618*** (0.0112)	–0.0618*** (0.0112)	–0.0617*** (0.0112)
Missing	–0.0485*** (0.0117)	–0.0484*** (0.0117)	–0.0483*** (0.0117)	–0.0485*** (0.0116)
Male	0.139*** (0.0248)	0.138*** (0.0247)	0.138*** (0.0247)	0.138*** (0.0247)
Prior military service	–0.0756*** (0.0176)	–0.0763*** (0.0176)	–0.0762*** (0.0176)	–0.0760*** (0.0177)
YOPE				
0–4	0.0629*** (0.00630)	0.0948*** (0.00195)	0.0957*** (0.00220)	0.0951*** (0.00334)
5–9	–0.0347*** (0.00522)	–0.0603*** (0.00309)	–0.0602*** (0.00348)	–0.0505*** (0.00433)
10–14	–0.0122*** (0.00264)	–0.0140*** (0.00143)	–0.0145*** (0.00155)	–0.0300*** (0.00119)
15–19	–0.00708*** (0.000873)	–0.00945*** (0.00134)	–0.0106*** (0.00135)	–0.00216 (0.00161)
20–24	0.00137 (0.00143)	0.00174 (0.00129)	0.00174 (0.00122)	0.00638*** (0.00169)
25–29	0.00370*** (0.000866)	0.00596*** (0.00130)	0.00697*** (0.00122)	–0.00138 (0.00134)
30–34	–0.00664*** (0.000968)	–0.00501*** (0.000860)	–0.00491*** (0.000851)	–0.00527*** (0.00174)

Demographic Characteristic	Regression Specification			
	1	2	3	4
35–39	–0.00856*** (0.000790)	–0.00630*** (0.000528)	–0.00666*** (0.000562)	–0.00899*** (0.00117)
40+	–0.000301 (0.000896)	–0.00219** (0.000992)	–0.00227** (0.00105)	0.00360*** (0.00131)
Not defense acquisition program management	–0.162*** (0.0304)	0.109** (0.0541)	0.0894* (0.0537)	0.0700 (0.0699)
Year dummies	Yes	Yes	Yes	Yes
Not defense acquisition program management interacted with YOPE intervals	No	Yes	Yes	Yes
Not defense acquisition program management interacted with year dummies	No	No	Yes	Yes
Not defense acquisition program management interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	10.60*** (0.0496)	10.34*** (0.0400)	10.36*** (0.0377)	10.32*** (0.0407)
Observations	6,478,742	6,478,742	6,478,742	6,478,742
R-squared	0.356	0.358	0.358	0.358

SOURCE: Data from the 2010–2018 DMDC Civilian Master File.

NOTE: Robust standard errors in parentheses, *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. The YOPE interval coefficients represent the change in the slope from the preceding interval.

Table A.6. Income Regression Results for Private-Sector Defense Acquisition Program Management, Fiscal Years 2010–2018

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.556*** (0.0220)	0.556*** (0.0220)	0.556*** (0.0220)	0.555*** (0.0220)
Master's degree or more	0.924*** (0.0507)	0.924*** (0.0507)	0.924*** (0.0507)	0.924*** (0.0507)
Race/ethnicity				
White	0.0822*** (0.0213)	0.0822*** (0.0213)	0.0822*** (0.0213)	0.0821*** (0.0213)
Black	−0.131*** (0.0209)	−0.131*** (0.0209)	−0.131*** (0.0209)	−0.131*** (0.0210)
Hispanic	−0.174*** (0.0248)	−0.174*** (0.0248)	−0.174*** (0.0248)	−0.175*** (0.0248)
Other	−0.0160 (0.0178)	−0.0160 (0.0178)	−0.0160 (0.0178)	−0.0160 (0.0179)
Missing	—	—	—	—
Male	0.234*** (0.0184)	0.234*** (0.0184)	0.234*** (0.0184)	0.234*** (0.0184)
Prior military service	−0.0208** (0.00924)	−0.0208** (0.00924)	−0.0208** (0.00924)	−0.0218** (0.00920)
YOPE				
0–4	0.0639*** (0.00248)	0.0769*** (0.00495)	0.0772*** (0.00509)	0.0631*** (0.0137)
5–9	−0.0226*** (0.00233)	−0.0377*** (0.00685)	−0.0381*** (0.00708)	−0.00115 (0.0147)
10–14	−0.0169*** (0.00104)	−0.0102* (0.00519)	−0.00995* (0.00533)	−0.0486*** (0.00346)
15–19	−0.00800*** (0.00108)	−0.00972 (0.00834)	−0.0100 (0.00843)	0.00149 (0.00946)
20–24	−0.0101*** (0.000698)	−0.0139** (0.00603)	−0.0136** (0.00606)	−0.00884 (0.0117)
25–29	−0.00183*** (0.000665)	−0.00174 (0.00322)	−0.00206 (0.00313)	0.000100 (0.00759)
30–34	−0.00563*** (0.000668)	−0.00640*** (0.00169)	−0.00614*** (0.00147)	−0.0112 (0.00941)

Demographic Characteristic	Regression Specification			
	1	2	3	4
35–39	–0.00226*** (0.000728)	–0.00715** (0.00290)	–0.00721** (0.00286)	–0.0101 (0.0184)
40+	–0.00535*** (0.00130)	–0.00138 (0.00310)	–0.00141 (0.00306)	0.0133 (0.0144)
Not defense acquisition program management	–0.194*** (0.0429)	–0.125*** (0.0342)	–0.115*** (0.0269)	–0.149*** (0.0312)
Year dummies	Yes	Yes	Yes	Yes
Not defense acquisition program management interacted with YOPE intervals	No	Yes	Yes	Yes
Not defense acquisition program management interacted with year dummies	No	No	Yes	Yes
Not defense acquisition program management interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	9.961*** (0.0583)	9.892*** (0.0473)	9.882*** (0.0419)	9.921*** (0.0433)
Observations	6,800,308	6,800,308	6,800,308	6,800,308
R-squared	0.335	0.335	0.335	0.335

SOURCE: Data from the 2010–2018 ACS (Ruggles et al., 2020).

NOTE: Robust standard errors in parentheses, *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. The YOPE interval coefficients represent the change in the slope from the preceding interval. — = there are no observations in the missing race/ethnicity category.

Table A.7. Income Regression Results for DoD Civilian Defense Acquisition Procurement, Fiscal Years 2010–2018

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.327*** (0.0250)	0.327*** (0.0251)	0.327*** (0.0251)	0.327*** (0.0250)
Master's degree or more	0.499*** (0.0314)	0.500*** (0.0315)	0.500*** (0.0315)	0.500*** (0.0315)
Race/ethnicity				
White	−0.00537 (0.0108)	−0.00530 (0.0108)	−0.00530 (0.0108)	−0.00545 (0.0108)
Black	−0.119*** (0.0130)	−0.119*** (0.0129)	−0.119*** (0.0129)	−0.119*** (0.0129)
Hispanic	−0.0761*** (0.00976)	−0.0759*** (0.00975)	−0.0759*** (0.00975)	−0.0759*** (0.00974)
Other	−0.0568*** (0.0112)	−0.0568*** (0.0112)	−0.0568*** (0.0112)	−0.0567*** (0.0112)
Missing	−0.0431*** (0.0116)	−0.0429*** (0.0116)	−0.0429*** (0.0116)	−0.0431*** (0.0115)
Male	0.135*** (0.0260)	0.135*** (0.0259)	0.135*** (0.0259)	0.134*** (0.0259)
Prior military service	−0.0648*** (0.0176)	−0.0644*** (0.0175)	−0.0644*** (0.0175)	−0.0641*** (0.0175)
YOPE				
0–4	0.0637*** (0.00630)	0.0736*** (0.00370)	0.0741*** (0.00329)	0.0631*** (0.00580)
5–9	−0.0350*** (0.00522)	−0.0403*** (0.00429)	−0.0402*** (0.00395)	−0.0248** (0.00973)
10–14	−0.0124*** (0.00263)	−0.0186*** (0.00291)	−0.0189*** (0.00283)	−0.0309*** (0.00166)
15–19	−0.00722*** (0.000858)	−0.00779*** (0.00259)	−0.00844*** (0.00259)	0.00994* (0.00513)
20–24	0.00179 (0.00141)	0.00560** (0.00247)	0.00553** (0.00260)	0.00430** (0.00205)
25–29	0.00361*** (0.000842)	0.00686*** (0.00209)	0.00746*** (0.00192)	−0.00331 (0.00441)
30–34	−0.00694*** (0.000937)	−0.00701*** (0.00222)	−0.00697*** (0.00229)	−0.00763* (0.00430)

Demographic Characteristic	Regression Specification			
	1	2	3	4
35–39	–0.00911*** (0.000829)	–0.00867*** (0.000867)	–0.00890*** (0.000851)	–0.00599*** (0.00222)
40+	–0.000153 (0.000880)	–0.00149 (0.00259)	–0.00142 (0.00261)	–0.00196 (0.00270)
Not defense acquisition procurement	–0.0180 (0.0242)	0.0767 (0.0501)	0.0644 (0.0513)	0.0120 (0.0706)
Year dummies	Yes	Yes	Yes	Yes
Not defense acquisition procurement interacted with YOPE intervals	No	Yes	Yes	Yes
Not defense acquisition procurement interacted with year dummies	No	No	Yes	Yes
Not defense acquisition procurement interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	10.60*** (0.0496)	10.34*** (0.0400)	10.36*** (0.0377)	10.32*** (0.0407)
Observations	6,478,742	6,478,742	6,478,742	6,478,742
R-squared	0.356	0.358	0.358	0.358

SOURCE: Data from the 2010–2018 DMDC Civilian Master File.

NOTE: Robust standard errors in parentheses. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. The YOPE interval coefficients represent the change in the slope from the preceding interval.

**Table A.8. Income Regression Results for Private-Sector Defense Acquisition Procurement,
Fiscal Years 2010–2018**

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.557*** (0.0220)	0.558*** (0.0220)	0.558*** (0.0220)	0.557*** (0.0220)
Master's degree or more	0.928*** (0.0499)	0.928*** (0.0499)	0.928*** (0.0499)	0.928*** (0.0499)
Race/ethnicity				
White	0.0813*** (0.0212)	0.0813*** (0.0212)	0.0813*** (0.0212)	0.0813*** (0.0212)
Black	−0.132*** (0.0208)	−0.132*** (0.0208)	−0.132*** (0.0208)	−0.132*** (0.0208)
Hispanic	−0.175*** (0.0246)	−0.175*** (0.0246)	−0.175*** (0.0246)	−0.176*** (0.0246)
Other	−0.0167 (0.0177)	−0.0168 (0.0177)	−0.0168 (0.0177)	−0.0168 (0.0177)
Missing	—	—	—	—
Male	0.234*** (0.0183)	0.234*** (0.0183)	0.234*** (0.0183)	0.234*** (0.0183)
Prior military service	−0.0214** (0.00926)	−0.0214** (0.00925)	−0.0214** (0.00925)	−0.0224** (0.00922)
YOPE				
0–4	0.0640*** (0.00248)	0.0766*** (0.00976)	0.0764*** (0.00972)	0.0561** (0.0232)
5–9	−0.0227*** (0.00232)	−0.0314*** (0.0117)	−0.0312*** (0.0117)	−0.00394 (0.0199)
10–14	−0.0169*** (0.00104)	−0.0216*** (0.00422)	−0.0216*** (0.00429)	−0.0329*** (0.00665)
15–19	−0.00797*** (0.00108)	−0.00223 (0.00496)	−0.00240 (0.00502)	−0.00706 (0.0126)
20–24	−0.0102*** (0.000696)	−0.0154*** (0.00562)	−0.0152*** (0.00561)	−0.00492 (0.0146)
25–29	−0.00183*** (0.000665)	0.00122 (0.00373)	0.00120 (0.00363)	−0.00106 (0.00860)
30–34	−0.00563*** (0.000667)	−0.00854** (0.00368)	−0.00844** (0.00360)	−0.00282 (0.00842)

Demographic Characteristic	Regression Specification			
	1	2	3	4
35–39	–0.00226*** (0.000729)	0.000542 (0.00494)	0.000613 (0.00478)	–0.00803 (0.0149)
40+	–0.00538*** (0.00130)	–0.00531** (0.00241)	–0.00545** (0.00231)	0.000642 (0.0123)
Not defense acquisition procurement	–0.128*** (0.0253)	–0.0256 (0.0370)	–0.0397 (0.0368)	–0.146 (0.110)
Year dummies	Yes	Yes	Yes	Yes
Not defense acquisition procurement interacted with YOPE intervals	No	Yes	Yes	Yes
Not defense acquisition procurement interacted with year dummies	No	No	Yes	Yes
Not defense acquisition procurement interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	9.896*** (0.0444)	9.794*** (0.0484)	9.808*** (0.0479)	9.918*** (0.114)
Observations	6,800,308	6,800,308	6,800,308	6,800,308
R-squared	0.334	0.334	0.334	0.334

SOURCE: Data from the 2010–2018 ACS (Ruggles et al., 2020).

NOTE: Robust standard errors in parentheses. *** = $p < 0.01$, ** = $p < 0.05$. The YOPE interval coefficients represent the change in the slope from the preceding interval. — = there are no observations in the missing race/ethnicity category.

Table A.9. Income Regression Results for DoD Civilian Defense Acquisition Engineering and Science, Fiscal Years 2010–2018

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.273*** (0.0160)	0.274*** (0.0160)	0.274*** (0.0160)	0.274*** (0.0160)
Master's degree or more	0.446*** (0.0273)	0.447*** (0.0272)	0.447*** (0.0272)	0.447*** (0.0273)
Race/ethnicity				
White	0.0114 (0.00985)	0.0114 (0.00984)	0.0114 (0.00984)	0.0113 (0.00983)
Black	−0.0921*** (0.0117)	−0.0921*** (0.0117)	−0.0921*** (0.0117)	−0.0923*** (0.0117)
Hispanic	−0.0572*** (0.00964)	−0.0572*** (0.00963)	−0.0572*** (0.00963)	−0.0572*** (0.00964)
Other	−0.0361*** (0.0107)	−0.0360*** (0.0107)	−0.0359*** (0.0107)	−0.0359*** (0.0107)
Missing	−0.0193* (0.0100)	−0.0191* (0.0100)	−0.0191* (0.0100)	−0.0193* (0.0100)
Male	0.113*** (0.0250)	0.113*** (0.0250)	0.113*** (0.0250)	0.113*** (0.0250)
Prior military service	−0.0388** (0.0154)	−0.0386** (0.0153)	−0.0387** (0.0153)	−0.0383** (0.0153)
YOPE				
0–4	0.0698*** (0.00570)	0.0525*** (0.00307)	0.0525*** (0.00309)	0.0446*** (0.00398)
5–9	−0.0377*** (0.00521)	−0.0157*** (0.00268)	−0.0155*** (0.00270)	−0.00308 (0.00333)
10–14	−0.0146*** (0.00247)	−0.0184*** (0.000741)	−0.0184*** (0.000745)	−0.0288*** (0.00128)
15–19	−0.00779*** (0.000858)	−0.00611*** (0.00127)	−0.00653*** (0.00131)	0.00559** (0.00236)
20–24	0.000730 (0.00130)	0.00204** (0.000989)	0.00211** (0.00103)	−0.00153 (0.00258)
25–29	0.00342*** (0.000727)	−0.00523*** (0.00155)	−0.00466*** (0.00152)	−0.0133*** (0.00131)
30–34	−0.00583*** (0.000793)	−0.0101*** (0.000406)	−0.0102*** (0.000375)	−0.00705*** (0.00154)

Demographic Characteristic	Regression Specification			
	1	2	3	4
35–39	–0.00916*** (0.000804)	–0.00467*** (0.000713)	–0.00501*** (0.000734)	0.00200 (0.00142)
40+	–0.000985 (0.000832)	0.00423*** (0.000633)	0.00436*** (0.000639)	0.00127 (0.00173)
Not defense acquisition engineering and science	–0.219*** (0.0220)	–0.317*** (0.0588)	–0.333*** (0.0592)	–0.414*** (0.0682)
Year dummies	Yes	Yes	Yes	Yes
Not defense acquisition engineering and science interacted with YOPE intervals	No	Yes	Yes	Yes
Not defense acquisition engineering and science interacted with year dummies	No	No	Yes	Yes
Not defense acquisition engineering and science interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	10.60*** (0.0496)	10.34*** (0.0400)	10.36*** (0.0377)	10.32*** (0.0407)
Observations	6,478,742	6,478,742	6,478,742	6,478,742
R-squared	0.356	0.358	0.358	0.358

SOURCE: Data from the 2010–2018 DMDC Civilian Master File.

NOTE: Robust standard errors in parentheses. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. The YOPE interval coefficients represent the change in the slope from the preceding interval.

Table A.10. Income Regression Results for Private-Sector Defense Acquisition Engineering and Science, Fiscal Years 2010–2018

Demographic Characteristic	Regression Specification			
	1	2	3	4
Educational attainment				
Bachelor's degree	0.550*** (0.0229)	0.550*** (0.0229)	0.550*** (0.0229)	0.550*** (0.0229)
Master's degree or more	0.916*** (0.0522)	0.916*** (0.0522)	0.916*** (0.0522)	0.916*** (0.0522)
Race/ethnicity				
White	0.0854*** (0.0215)	0.0850*** (0.0215)	0.0850*** (0.0215)	0.0850*** (0.0215)
Black	−0.127*** (0.0214)	−0.127*** (0.0213)	−0.127*** (0.0213)	−0.127*** (0.0214)
Hispanic	−0.170*** (0.0250)	−0.171*** (0.0250)	−0.171*** (0.0250)	−0.171*** (0.0250)
Other	−0.0126 (0.0181)	−0.0130 (0.0181)	−0.0130 (0.0181)	−0.0129 (0.0181)
Missing	—	—	—	—
Male	0.229*** (0.0186)	0.229*** (0.0186)	0.229*** (0.0186)	0.229*** (0.0186)
Prior military service	−0.0207** (0.00924)	−0.0205** (0.00922)	−0.0205** (0.00922)	−0.0215** (0.00918)
YOPE				
0–4	0.0642*** (0.00249)	0.0852*** (0.00204)	0.0853*** (0.00201)	0.0893*** (0.00719)
5–9	−0.0227*** (0.00234)	−0.0536*** (0.00407)	−0.0538*** (0.00403)	−0.0528*** (0.0105)
10–14	−0.0171*** (0.00104)	−0.00156 (0.00438)	−0.00143 (0.00437)	−0.0183** (0.00829)
15–19	−0.00797*** (0.00108)	−0.0136*** (0.00358)	−0.0137*** (0.00357)	−0.00228 (0.00753)
20–24	−0.0103*** (0.000693)	−0.00546* (0.00285)	−0.00527* (0.00280)	−0.00222 (0.0101)
25–29	−0.00182*** (0.000667)	−0.00457* (0.00253)	−0.00479* (0.00244)	−0.00246 (0.00928)
30–34	−0.00558*** (0.000671)	−0.00134 (0.00247)	−0.00134 (0.00245)	−0.0148* (0.00818)

Demographic Characteristic	Regression Specification			
	1	2	3	4
35–39	–0.00222*** (0.000727)	–0.00925*** (0.00284)	–0.00910*** (0.00287)	0.00361 (0.00673)
40+	–0.00531*** (0.00130)	–0.00639** (0.00292)	–0.00650** (0.00290)	–0.0149*** (0.00505)
Not defense acquisition engineering and science	–0.196*** (0.0354)	–0.0948*** (0.0353)	–0.0758** (0.0357)	–0.0686 (0.0527)
Year dummies	Yes	Yes	Yes	Yes
Not defense acquisition engineering and science interacted with YOPE intervals	No	Yes	Yes	Yes
Not defense acquisition engineering and science interacted with year dummies	No	No	Yes	Yes
Not defense acquisition engineering and science interacted with YOPE intervals and year dummies	No	No	No	Yes
Constant	9.960*** (0.0552)	9.862*** (0.0508)	9.844*** (0.0507)	9.842*** (0.0633)
Observations	6,800,308	6,800,308	6,800,308	6,800,308
R-squared	0.335	0.335	0.335	0.336

SOURCE: Data from the 2010–2018 ACS (Ruggles et al., 2020).

NOTE: Robust standard errors in parentheses. *** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$. The YOPE interval coefficients represent the change in the slope from the preceding interval. — = there are no observations in the missing race/ethnicity category.

Appendix B. Detailed Income Adjustment Factors

To address potential underreporting of income in the ACS survey data, we created income adjustment factors for each workforce, as described in Chapter 3. For our analysis, we used one adjustment factor per workforce that was based on the ratio of median income in the OES to median income in the ACS. At the request of the sponsor, we provided more-detailed adjustment factors at the occupation-code level and that were calculated using the mean, median, 25th percentile of income, and 75th percentile of income in the OES and ACS data. Table B.1 contains these adjustment factors. In addition, the table contains a crosswalk of the occupation codes to detail how we identified occupations across the three data sets. Specifically, the OPM code is used in the DMDC data, the 2010 SOC code is used in the OES data, and the 2017–2019 occupation code is used in the ACS data.

Table B.1. Detailed Income Adjustment Factors

Acquisition Category	OPM Title	OPM Code (DMDC)	2010 SOC Code (OES)	2017–2019 OCC (ACS)	Adjustment Factors (ratio of OES to ACS)			
					Mean	Median	25th Percentile	75th Percentile
Business and financial management	Financial administration	501	13-2099	960	0.66	1.07	1.25	0.75
	Financial clerk and technician	503	43-3031	5120	1.13	1.18	1.54	1.06
	Accounting	510	13-2011	800	1.05	1.18	1.39	1.04
	Auditing	511	13-2011	800	1.05	1.18	1.39	1.04
	Budget analysis	560	13-2031	820	1.01	1.22	1.16	0.99
	Budget clerical and assistance	561	43-3031	5120	1.13	1.18	1.54	1.06
	Financial analysis	1160	13-2051	845	0.84	1.08	1.14	0.98
Program management	Program management	340	13-1199	750	1.11	1.33	1.57	1.12
	Management and program analysis	343	13-1111	710	1.00	1.07	1.26	0.99
	Logistics	346	13-1081	700	1.40	1.59	1.85	1.45
	Supply program management	2003	13-1081	700	1.40	1.59	1.85	1.45
Procurement	General business and industry	1101	13-1199	750	1.11	1.33	1.57	1.12
	Contracting	1102	13-1023	530	1.10	1.21	1.26	1.10
	Industrial property management	1103	11-9141	410	1.13	1.29	1.46	1.15
	Property disposal	1104	13-1199	750	1.11	1.33	1.57	1.12
	Purchasing	1105	13-1023	530	1.10	1.21	1.26	1.10

Acquisition Category	OPM Title	OPM Code (DMDC)	2010 SOC Code (OES)	2017-2019 OCC (ACS)	Adjustment Factors (ratio of OES to ACS)			
					Mean	Median	25th Percentile	75th Percentile
	Industrial specialist	1150	13-1199	750	1.11	1.33	1.57	1.12
	Support services administration	342	11-3011	101	1.46	1.50	1.57	1.45
	Quality assurance	1910	13-1199	750	1.11	1.33	1.57	1.12
Engineering and science	General engineering	801	17-21YY	1530	0.97	1.02	1.05	1.01
	Safety engineering	803	17-2110	1430	1.11	1.09	1.20	1.09
	Fire protection engineering	804	17-2110	1430	1.11	1.09	1.20	1.09
	Materials engineering	806	17-2131	1450	1.16	1.14	1.22	1.16
	Civil engineering	810	17-2051	1360	1.06	1.10	1.19	1.04
	Environmental engineering	819	17-2081	1420	1.22	1.24	1.65	1.21
	Mechanical engineering	830	17-2141	1460	1.09	1.08	1.12	1.07
	Electrical engineering	850	17-2070	1410	1.03	1.07	1.14	1.06
	Computer engineering	854	17-2061	1400	1.08	1.18	1.23	1.13
	Electronics engineering	855	17-2070	1410	1.03	1.07	1.14	1.06
	Biomedical engineering	858	17-20XX	1340	1.10	1.17	1.36	1.09
	Aerospace engineering	861	17-2011	1320	1.10	1.14	1.25	1.07
	Naval architecture	871	17-2121	1440	1.19	1.15	1.20	1.18

Acquisition Category	OPM Title	OPM Code (DMDC)	2010 SOC Code (OES)	2017–2019 OCC (ACS)	Adjustment Factors (ratio of OES to ACS)			
					Mean	Median	25th Percentile	75th Percentile
	Agricultural engineering	890	17-20XX	1340	0.91	0.99	1.19	0.89
	Chemical engineering	893	17-2041	1350	1.13	1.14	1.19	1.08
	Industrial engineering	896	17-2110	1430	1.11	1.09	1.20	1.09
	General physical sciences	1301	19-2099	1760	1.47	1.70	2.00	1.36
	Physics	1310	19-2010	1700	1.34	1.58	1.65	1.28
	Hydrology	1315	19-2040	1750	0.77	0.99	1.02	0.80
	Chemistry	1320	19-2030	1720	0.99	1.12	1.15	1.01
	Metallurgy	1321	19-2030	1720	0.99	1.12	1.15	1.01
	Geology	1350	19-2040	1745	1.30	1.21	1.27	1.25
	Cartography	1370	17-1020	1310	1.19	1.24	1.51	1.13
	Operations research	1515	15-2031	1220	1.09	1.11	1.19	1.09
	Mathematics	1520	15-20XX	1240	1.29	1.42	1.75	1.28
	Mathematical sciences	1529	15-20XX	1240	1.02	1.05	1.09	1.03
	Computer science	1550	15-1111	1005	1.26	1.40	2.60	1.14

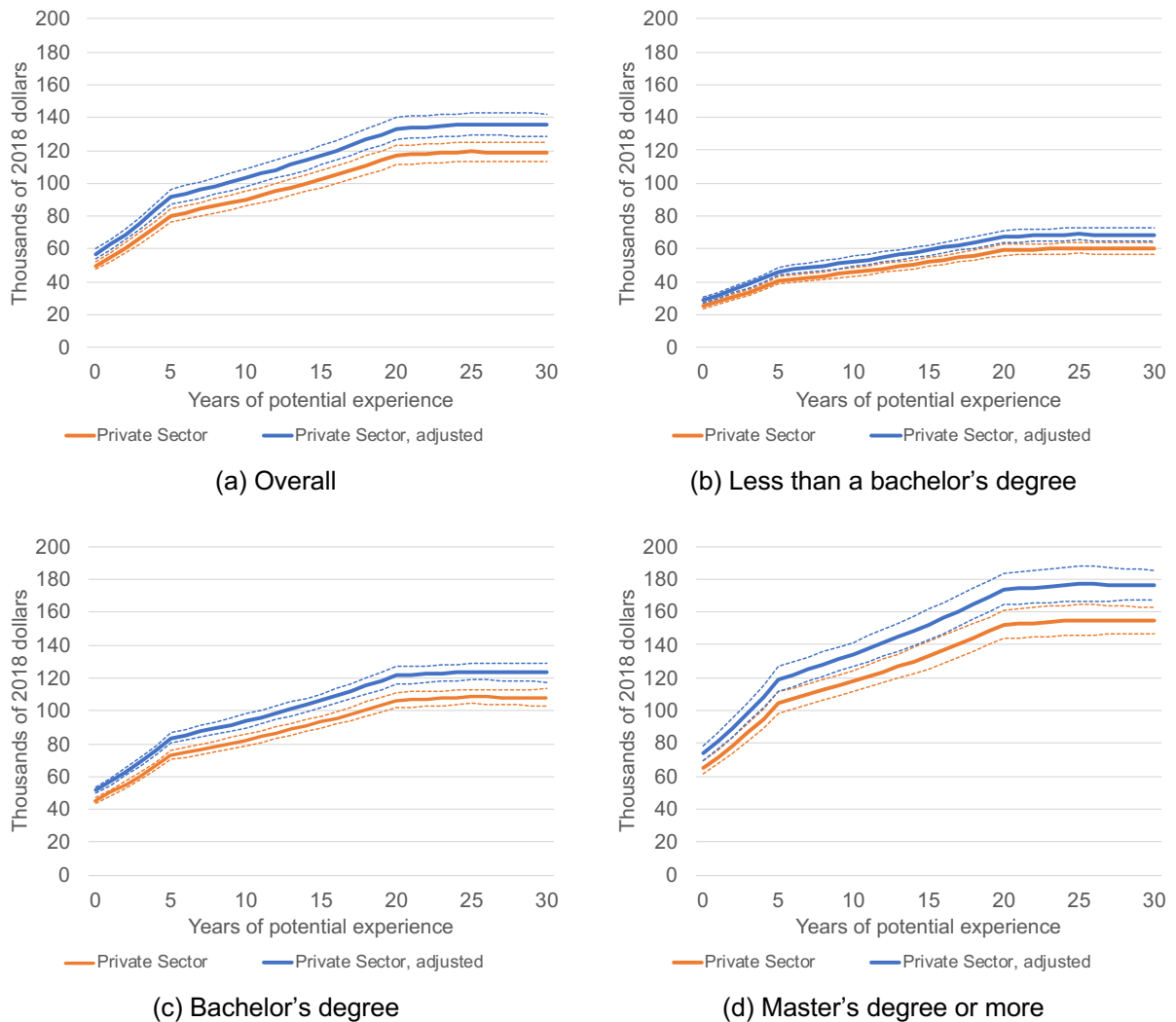
SOURCES: 2018 ACS (Ruggles et al., 2020) and OES.

NOTE: OCC = occupation code. To be comparable with the OES, the ACS sample is restricted to full- and part-time workers with nonzero incomes in the private and nonprofit sectors. OPM-SOC-OCC crosswalks were developed using the EEOC Federal Sector Occupation Cross-Classification Table (EEOC, 2020) and IPUMS USA OCC SOC occupation codes (IPUMS USA, undated).

Appendix C. Unadjusted and Adjusted Predicted Average Private-Sector Income

In this appendix, we present figures with private-sector predicted average income, both unadjusted and adjusted for underreporting of income in the ACS survey data, as well as the 95-percent confidence intervals for unadjusted and adjusted predicted average income. Figures C.1–C.5 show private-sector predicted average income for each workforce overall and by educational attainment. As shown, for certain workforces and educational groups, unadjusted and adjusted private-sector predicted average income are statistically different from each other. In other instances, they are statistically the same.

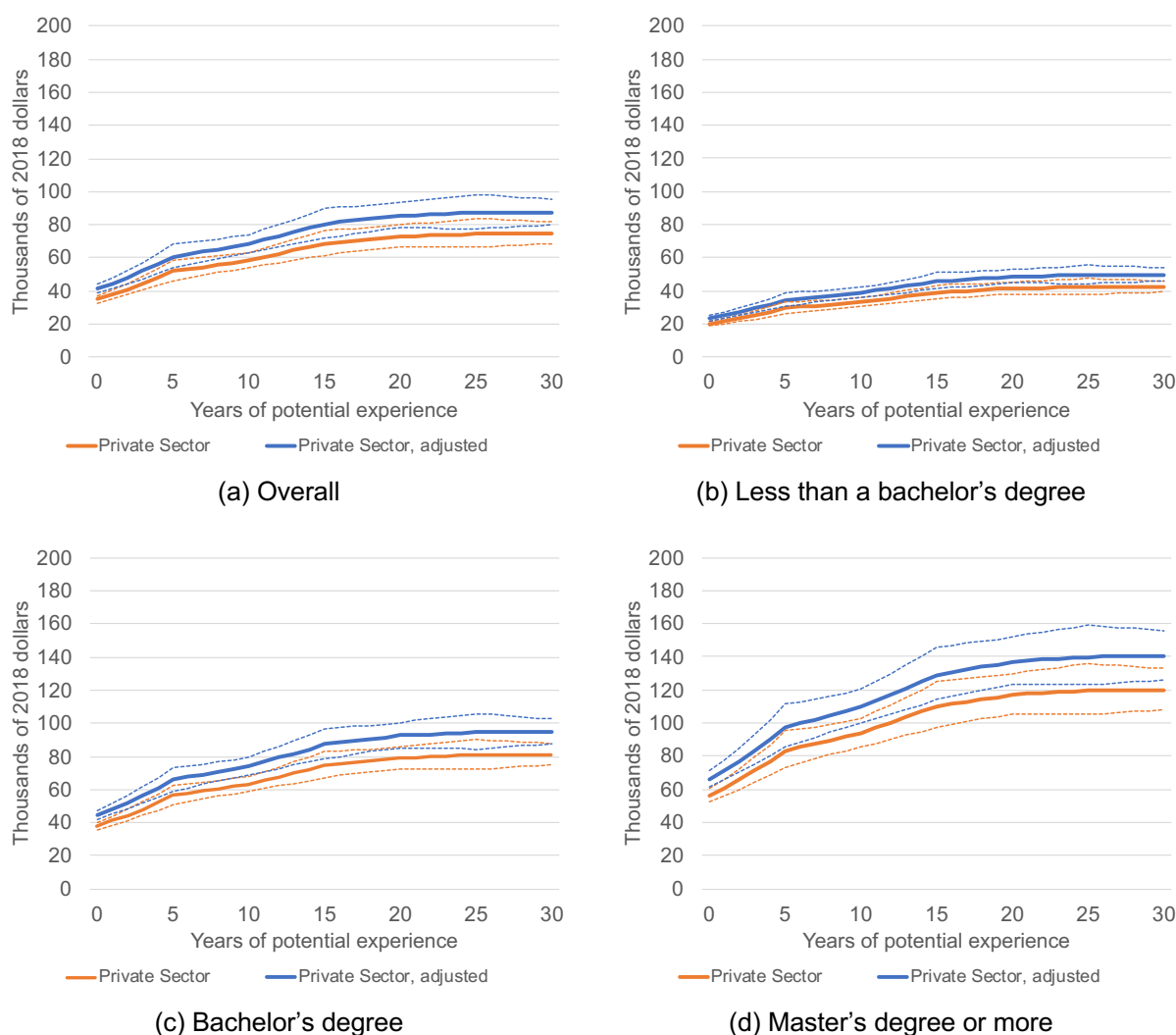
Figure C.1. Predicted Average Income by YOPE Among Aerospace Engineering Workforce in the Private Sector



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

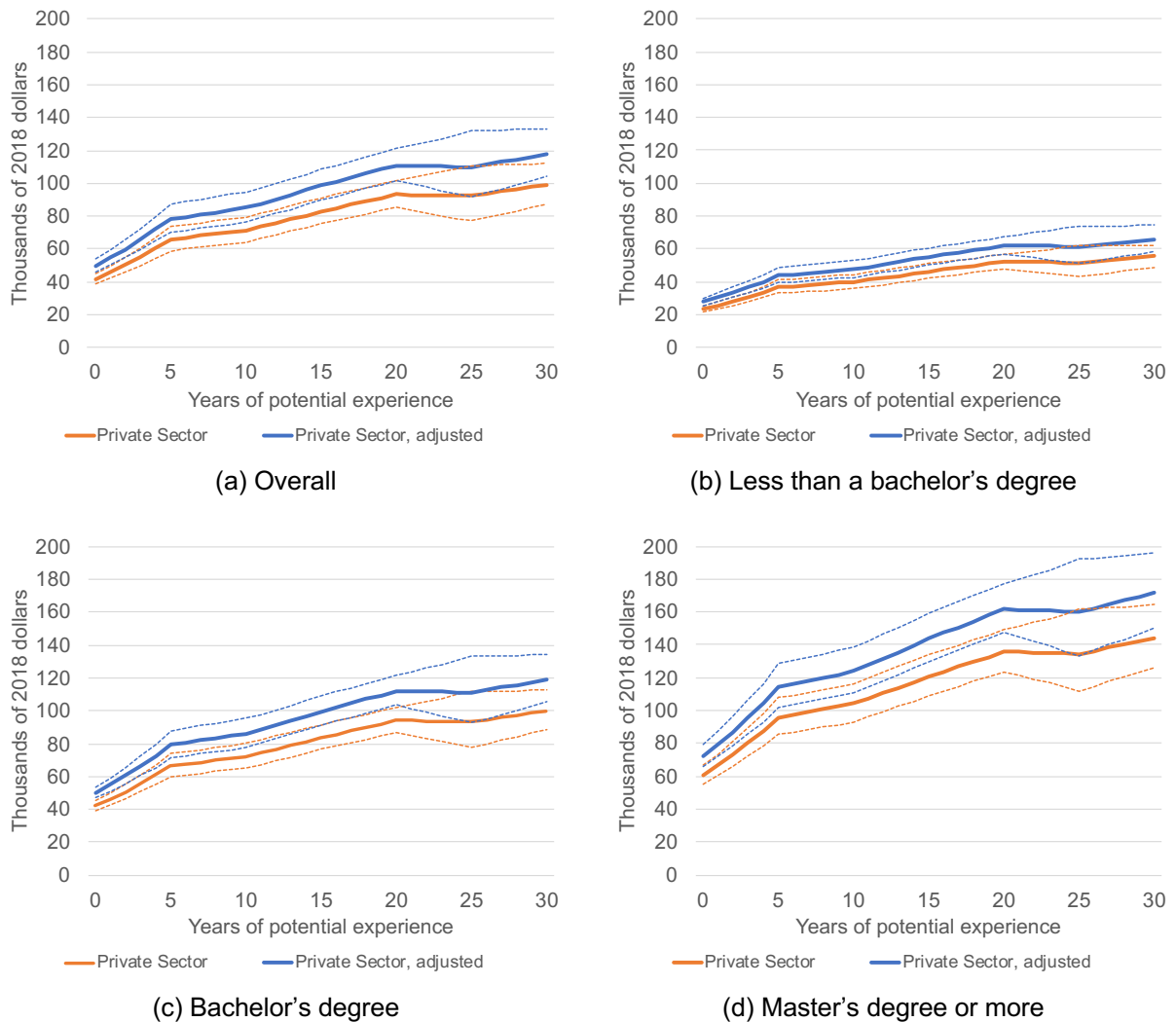
Figure C.2. Predicted Average Income by YOPE Among the Defense Acquisition Business and Financial Management Workforce in the Private Sector, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

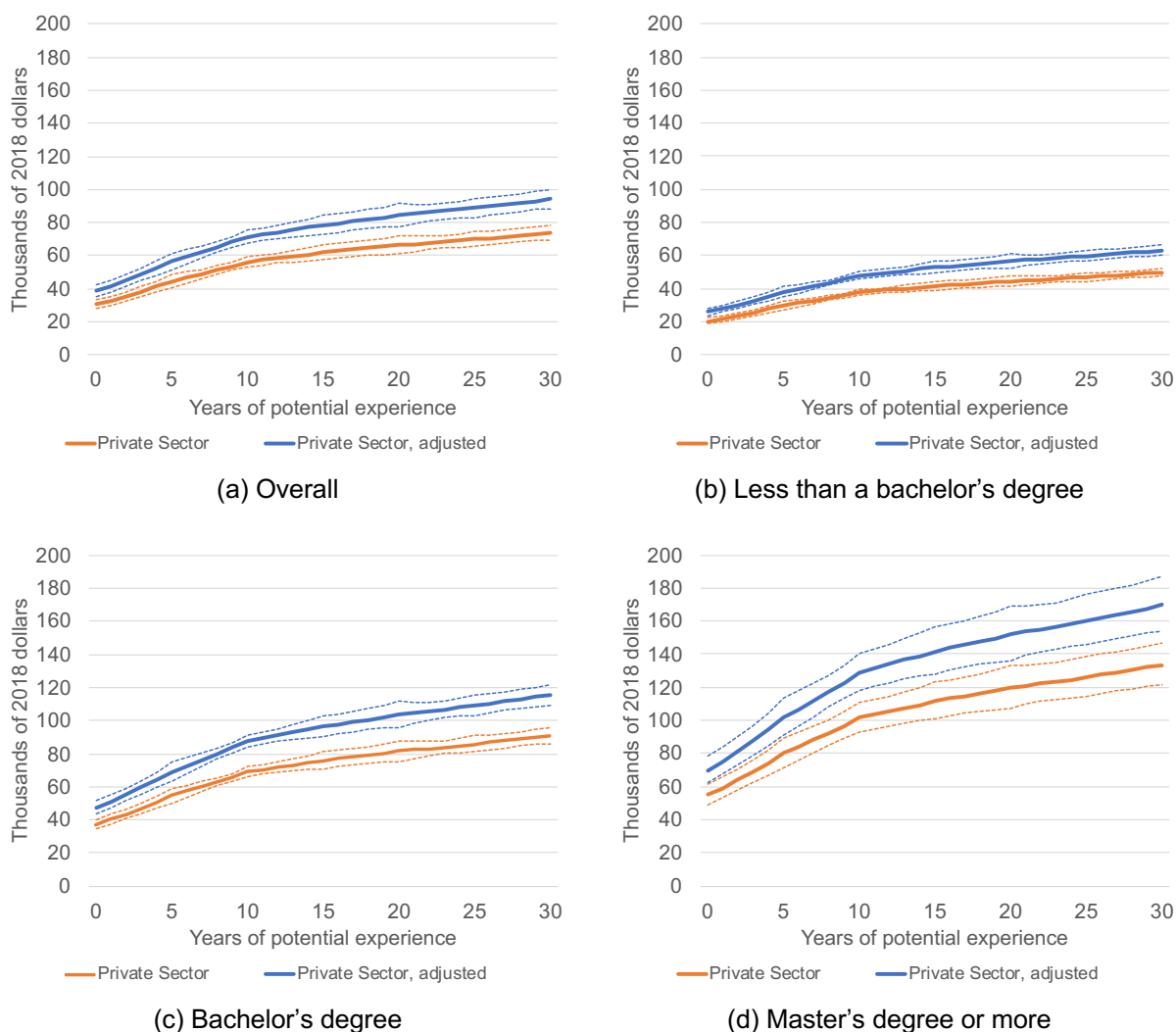
Figure C.3. Predicted Average Income by YOPE Among the Defense Acquisition Program Management Workforce in the Private Sector, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

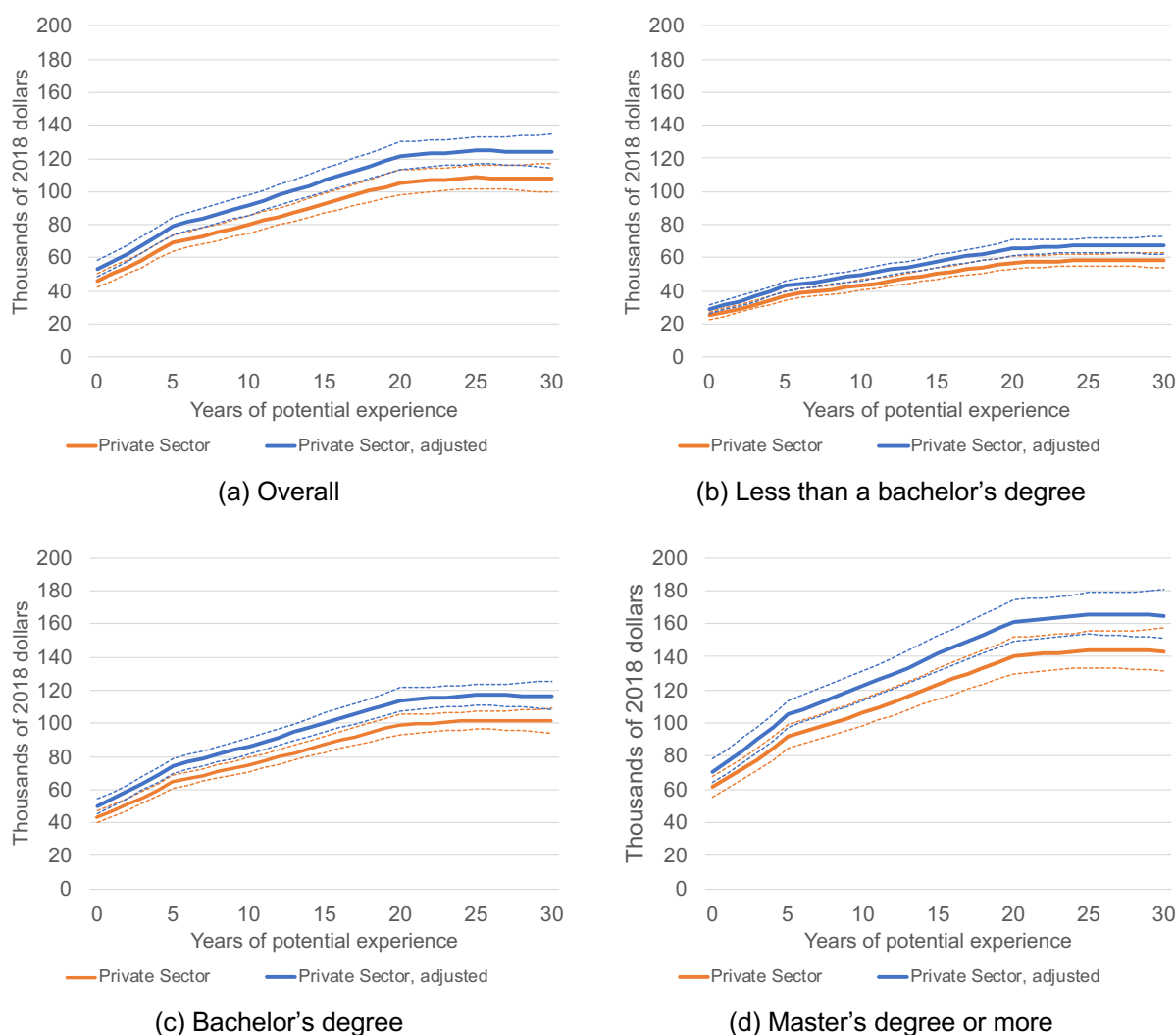
Figure C.4. Predicted Average Income by YOPE Among the Defense Acquisition Procurement Workforce in the Private Sector, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Figure C.5. Predicted Average Income by YOPE Among the Defense Acquisition Engineering and Science Workforce in the Private Sector, 2018



SOURCES: Income is predicted from two regression models, one run using 2010–2018 DMDC Civilian Master and Pay File data and another using 2010–2018 ACS data (Ruggles et al., 2020). Private-sector income is adjusted for potential underreporting using the 2018 OES and the 2018 ACS.

NOTE: The dotted blue lines are the 95-percent confidence intervals for the adjusted predicted average income.

Appendix D. STEM Occupations

As described in Chapter 4, when analyzing the AWCS data, we group occupations into STEM and non-STEM, using a definition developed in Edwards et al., forthcoming. In this appendix, we list the occupations that are categorized as STEM. Table D.1 includes the U.S. Census’s occupation code—the occupation code used in the AWCS—and the corresponding occupation name.

Table D.1. STEM Occupations

Occupation Code	Occupation Name
110	Computer and information systems managers
300	Architectural and engineering managers
360	Natural sciences managers
1005	Computer and information research scientists
1006	Computer systems analysts
1007	Information security analysts
1010	Computer programmers
1020	Software developers, applications and systems software
1030	Web developers
1060	Database administrators
1105	Network and computer systems administrators
1106	Computer network architects
1107	Computer occupations, all other
1200	Actuaries
1220	Operations research analysts
1240	Miscellaneous mathematical science occupations, including mathematicians and statisticians
1300	Architects, except naval
1310	Surveyors, cartographers, and photogrammetrists
1320	Aerospace engineers
1340	Biomedical and agricultural engineers
1350	Chemical engineers
1360	Civil engineers
1400	Computer hardware engineers
1410	Electrical and electronics engineers
1420	Environmental engineers
1430	Industrial engineers, including health and safety

Occupation Code	Occupation Name
1440	Marine engineers and naval architects
1450	Materials engineers
1460	Mechanical engineers
1520	Petroleum, mining and geological engineers, including mining safety engineers
1530	Miscellaneous engineers, including nuclear engineers
1540	Drafters
1550	Engineering technicians, except drafters
1560	Surveying and mapping technicians
1600	Agricultural and food scientists
1610	Biological scientists
1640	Conservation scientists and foresters
1650	Medical scientists and life scientists, all other
1700	Astronomers and physicists
1710	Atmospheric and space scientists
1720	Chemists and materials scientists
1740	Environmental scientists and geoscientists
1760	Physical scientists, all other
1800	Economists
1820	Psychologists
1860	Miscellaneous social scientists, including survey researchers and sociologists
1910	Biological technicians
1920	Chemical technicians
1930	Geological and petroleum technicians, nuclear technicians
3750	Fire inspectors

Appendix E. Detailed Information from Employer Case Studies

This appendix summarizes the publicly available information found in our case studies of nonmonetary compensation in the federal government and 12 large private-sector employers: Adobe, Airbnb, Amazon, Apple, Cisco, Facebook, Google, Intel, LinkedIn, Microsoft, Netflix, and Qualcomm. Information on nonmonetary compensation in the federal government comes primarily from the OPM. For the private employers, the primary source of information are the benefits pages on the companies' public websites. We supplement that with information found in public media. The dimensions of nonmonetary compensation that we explore are paid time off (Table E.1), health (Table E.2), education (Table E.3), family (Table E.4), financial (Table E.5), food (Table E.6), transit (Table E.7), and other benefits (Table E.8). We note that, in instances where a specific form of nonmonetary compensation is not included in the table, it is not necessarily the case that it is not offered, but instead it could be that the information was not publicly available to confirm coverage.

Table E.1. Nonmonetary Compensation, Federal Government and Private Employers: Paid Time Off

Employer	Vacation	Holidays	Sick Leave	Parental Leave
Federal government	Yes, 13–26 days	Yes, 10 days	Yes, up to 13 days	Yes, 12 weeks (as of October 2020)
Adobe	Yes	Yes, 13 days	Yes, 10 days	Yes, 26 weeks
Airbnb				Yes, 22 weeks
Amazon	Yes			Yes, 20 weeks
Apple				Yes, 18 weeks
Cisco	Yes	Yes	Yes	Yes
Facebook	Yes		Yes	Yes, 17.4 weeks
Google	Yes		Yes	Yes, 18 weeks
Intel		Yes	Yes	
LinkedIn	Yes	Yes, 17 days	Yes	Yes
Microsoft	Yes, 21 days	Yes, 10 days	Yes, 10 days	Yes, 20 weeks
Netflix	Yes			Yes, 52 weeks
Qualcomm	Yes, 21 days	Yes, 11 days	Yes, 10 days	

SOURCES: For the private-sector employers, we consulted Adobe, undated; Amazon, undated; Apple, undated; Careers at Airbnb, undated; Cisco, undated; “Coolest Employee Perks at Silicon Valley Tech Companies,” 2018; D’Onfro, 2015; Facebook Careers, undated; Google Careers, undated; Intel, undated; LinkedIn Careers, undated; Microsoft, undated; Molli, 2018; Netflix, undated; Qualcomm, undated; and Seipel, 2017. For the federal government, we consulted Executive Order 13150, 2000; OPM, undated a; OPM, undated b; OPM, undated c; OPM, undated f; OPM, undated g; OPM, undated i; OPM, undated j; OPM, undated l; OPM, undated m; OPM, undated n; OPM, 1998; and OPM, 2020.

Table E.2. Nonmonetary Compensation, Federal Government and Private Employers: Health

Employer	Health Insurance	Dental Insurance	On-Site or Off-Site Clinic	Fitness Center	Other General Wellness
Federal government	Yes	Yes		Varies by agency	
Adobe	Yes	Yes			Subsidized
Airbnb	Yes				
Amazon	Yes	Yes			
Apple	Yes		On-site	On-site	
Cisco	Yes		On-site		
Facebook	Yes	Yes	On-site	Subsidized	Subsidized
Google	Yes		On-site	On-site	On-site
Intel	Yes			Subsidized	On-site
LinkedIn	Yes		Off-site	On-site	On-site
Microsoft	Yes	Yes	On-site	Subsidized	Subsidized

Employer	Health Insurance	Dental Insurance	On-Site or Off-Site Clinic	Fitness Center	Other General Wellness
Netflix	Yes	Yes			
Qualcomm	Yes	Yes			

SOURCES: For the private-sector employers, we consulted Adobe, undated; Amazon, undated; Apple, undated; Careers at Airbnb, undated; Cisco, undated; “Coolest Employee Perks at Silicon Valley Tech Companies,” 2018; D’Onfro, 2015; Facebook Careers, undated; Google Careers, undated; Intel, undated; LinkedIn Careers, undated; Microsoft, undated; Molli, 2018; Netflix, undated; Qualcomm, undated; and Seipel, 2017. For the federal government, we consulted Executive Order 13150, 2000; OPM, undated a; OPM, undated b; OPM, undated c; OPM, undated f; OPM, undated g; OPM, undated i; OPM, undated j; OPM, undated l; OPM, undated m; OPM, undated n; OPM, 1998; and OPM, 2020.

Table E.3. Nonmonetary Compensation, Federal Government and Private Employers: Education

Employer	Loan Assistance	Education Stipend or Reimbursement
Federal government	Yes	Yes
Adobe	Yes	Yes
Airbnb		Yes
Amazon		
Apple		Yes
Cisco		Yes
Facebook		
Google		Yes
Intel		Yes
LinkedIn		Yes
Microsoft	Yes	Yes
Netflix		
Qualcomm		Yes

SOURCES: For the private-sector employers, we consulted Adobe, undated; Amazon, undated; Apple, undated; Careers at Airbnb, undated; Cisco, undated; “Coolest Employee Perks at Silicon Valley Tech Companies,” 2018; D’Onfro, 2015; Facebook Careers, undated; Google Careers, undated; Intel, undated; LinkedIn Careers, undated; Microsoft, undated; Molli, 2018; Netflix, undated; Qualcomm, undated; and Seipel, 2017. For the federal government, we consulted Executive Order 13150, 2000; OPM, undated a; OPM, undated b; OPM, undated c; OPM, undated f; OPM, undated g; OPM, undated i; OPM, undated j; OPM, undated l; OPM, undated m; OPM, undated n; OPM, 1998; and OPM, 2020.

Table E.4. Nonmonetary Compensation, Federal Government and Private Employers: Family

Employer	Fertility Treatment Subsidy	Childcare or Eldercare: Subsidy (S) or Flex Account (F)	Adoption Assistance	EAP, Other Support Services, or Both
Federal government		F		Yes
Adobe		S, F	Yes	Yes
Airbnb				
Amazon			Yes	Yes
Apple	Yes			
Cisco			Yes	
Facebook	Yes	F	Yes	Yes
Google		S		
Intel		S	Yes	Yes
LinkedIn		S	Yes	Yes
Microsoft		S		Yes
Netflix		S, F		Yes
Qualcomm		F	Yes	Yes

SOURCES: For the private-sector employers, we consulted Adobe, undated; Amazon, undated; Apple, undated; Careers at Airbnb, undated; Cisco, undated; “Coolest Employee Perks at Silicon Valley Tech Companies,” 2018; D’Onfro, 2015; Facebook Careers, undated; Google Careers, undated; Intel, undated; LinkedIn Careers, undated; Microsoft, undated; Molli, 2018; Netflix, undated; Qualcomm, undated; and Seipel, 2017. For the federal government, we consulted Executive Order 13150, 2000; OPM, undated a; OPM, undated b; OPM, undated c; OPM, undated f; OPM, undated g; OPM, undated i; OPM, undated j; OPM, undated l; OPM, undated m; OPM, undated n; OPM, 1998; and OPM, 2020.

Table E.5. Nonmonetary Compensation, Federal Government and Private Employers: Financial

Employer	Stock Incentives	Defined-Contribution Retirement Plan	Defined-Benefit Retirement Plan	Financial Advising	Life Insurance	Other
Federal government		Yes, matching	Yes		Yes	Survivor benefits
Adobe	Yes	Yes		Yes	Yes	Identity protection
Airbnb						
Amazon	Yes	Yes, matching		Yes	Yes	
Apple	Yes	Yes				
Cisco	Yes				Yes	
Facebook	Yes	Yes		Yes	Yes	Survivor support
Google		Yes, matching		Yes		Survivor support
Intel	Yes	Yes				
LinkedIn					Yes	Survivor support

Employer	Stock Incentives	Defined-Contribution Retirement Plan	Defined-Benefit Retirement Plan	Financial Advising	Life Insurance	Other
Microsoft	Yes	Yes, matching		Yes		
Netflix	Yes	Yes, matching		Yes	Yes	Survivor support
Qualcomm	Yes	Yes, matching				

SOURCES: For the private-sector employers, we consulted Adobe, undated; Amazon, undated; Apple, undated; Careers at Airbnb, undated; Cisco, undated; “Coolest Employee Perks at Silicon Valley Tech Companies,” 2018; D’Onfro, 2015; Facebook Careers, undated; Google Careers, undated; Intel, undated; LinkedIn Careers, undated; Microsoft, undated; Molli, 2018; Netflix, undated; Qualcomm, undated; and Seipel, 2017. For the federal government, we consulted Executive Order 13150, 2000; OPM, undated a; OPM, undated b; OPM, undated c; OPM, undated f; OPM, undated g; OPM, undated i; OPM, undated j; OPM, undated l; OPM, undated m; OPM; undated n; OPM, 1998; and OPM, 2020.

Table E.6. Nonmonetary Compensation, Federal Government and Private Employers: Food

Employer	Catered Meals	Snacks	Take-Home Meals	Other
Federal government				
Adobe				
Airbnb	Yes	Yes		
Amazon				
Apple				
Cisco				
Facebook	Yes		Yes	
Google	Yes	Yes		Cooking classes, grocery delivery
Intel	Yes	Yes		
LinkedIn	Yes	Yes		
Microsoft	Yes	Yes		
Netflix				
Qualcomm				

SOURCES: For the private-sector employers, we consulted Adobe, undated; Amazon, undated; Apple, undated; Careers at Airbnb, undated; Cisco, undated; “Coolest Employee Perks at Silicon Valley Tech Companies,” 2018; D’Onfro, 2015; Facebook Careers, undated; Google Careers, undated; Intel, undated; LinkedIn Careers, undated; Microsoft, undated; Molli, 2018; Netflix, undated; Qualcomm, undated; and Seipel, 2017. For the federal government, we consulted Executive Order 13150, 2000; OPM, undated a; OPM, undated b; OPM, undated c; OPM, undated f; OPM, undated g; OPM, undated i; OPM, undated j; OPM, undated l; OPM, undated m; OPM; undated n; OPM, 1998; and OPM, 2020.

Table E.7. Nonmonetary Compensation, Federal Government and Private Employers: Transit

Employer	Shuttles	Subsidies	Other
Federal government		Yes	
Adobe		Yes	
Airbnb			
Amazon			
Apple			
Cisco			
Facebook	Yes		
Google	Yes		Car wash, oil change
Intel			
LinkedIn			Car wash, oil change
Microsoft			
Netflix	Yes	Yes	
Qualcomm			

SOURCES: For the private-sector employers, we consulted Adobe, undated; Amazon, undated; Apple, undated; Careers at Airbnb, undated; Cisco, undated; “Coolest Employee Perks at Silicon Valley Tech Companies,” 2018; D’Onfro, 2015; Facebook Careers, undated; Google Careers, undated; Intel, undated; LinkedIn Careers, undated; Microsoft, undated; Molli, 2018; Netflix, undated; Qualcomm, undated; and Seipel, 2017. For the federal government, we consulted Executive Order 13150, 2000; OPM, undated a; OPM, undated b; OPM, undated c; OPM, undated f; OPM, undated g; OPM, undated i; OPM, undated j; OPM, undated l; OPM, undated m; OPM; undated n; OPM, 1998; and OPM, 2020.

Table E.8. Nonmonetary Compensation, Federal Government and Private Employers: Other

Employer	Product Discounts	Charitable Matching	Volunteer Reimbursement	Other
Federal government				
Adobe	Yes	Yes	Yes	
Airbnb			Yes	
Amazon	Yes			
Apple	Yes	Yes		
Cisco	Yes		Yes	
Facebook				
Google		Yes	Yes	Laundry, dry cleaning, concierge
Intel		Yes	Yes	Laundry, dry cleaning
LinkedIn	Yes	Yes		Laundry, dry

Employer	Product Discounts	Charitable Matching	Volunteer Reimbursement	Other
				cleaning
Microsoft	Yes	Yes	Yes	
Netflix		Yes		
Qualcomm	Yes	Yes		

SOURCES: For the private-sector employers, we consulted Adobe, undated; Amazon, undated; Apple, undated; Careers at Airbnb, undated; Cisco, undated; “Coolest Employee Perks at Silicon Valley Tech Companies,” 2018; D’Onfro, 2015; Facebook Careers, undated; Google Careers, undated; Intel, undated; LinkedIn Careers, undated; Microsoft, undated; Molli, 2018; Netflix, undated; Qualcomm, undated; and Seipel, 2017. For the federal government, we consulted Executive Order 13150, 2000; OPM, undated a; OPM, undated b; OPM, undated c; OPM, undated f; OPM, undated g; OPM, undated i; OPM, undated j; OPM, undated l; OPM, undated m; OPM, undated n; OPM, 1998; and OPM, 2020.

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