NATIONAL DEFENSE RESEARCH INSTITUTE

Women's Representation in the U.S. Department of Defense Workforce

Addressing the Influence of Veterans' Employment

David Schulker, Miriam Matthews

Sponsored by the Office of Diversity Management and Equal Opportunity (ODMEO)

For more information on this publication, visit www.rand.org/t/RR2458

Published by the RAND Corporation, Santa Monica, Calif.

Preface

The U.S. Equal Employment Opportunity Commission requires all executive agencies and military departments to examine their workforces for barriers to equal opportunity using the relevant civilian labor force (CLF) as a benchmark. This policy directs agencies to strive for a similar proportion of employees who are women as that in the population of similarly situated workers in the CLF. Concurrently, agencies are also subject to several policies incentivizing the hiring of military veterans. For example, veterans who qualify receive preferential treatment in the federal hiring process, and a 2009 executive order indicated that further promoting employment opportunities for veterans in the executive branch should be considered official policy (Obama, 2009). Because most military veterans are men, agencies such as those in the U.S. Department of Defense (DoD) that have a large proportion of veteran workers should be less likely to mirror the relevant CLF, all else being equal. To investigate the potential trade-offs involved in these two policy areas, this report uses workforce modeling analytic tools to assess the relationship between veterans' employment and women's representation.

Specifically, this research addressed two questions that focus on DoD civilian employees, the population in which veterans are most concentrated in the federal government. First, how much of the representation gap between DoD and the CLF (that is, the difference between representation in the DoD workforce and that in the CLF) is potentially attributable to DoD's high tendency to employ veterans? Second, how would expectations for women's representation in the future change if policy changes were to reduce the level of hiring of veterans? To address the first question, we applied a decomposition technique comparing the DoD workforce with the CLF, using publicly available data. Then we designed a simple workforce model to examine future expectations for representation in a variety of scenarios. This report should be of interest to policymakers concerned about workforce diversity or veterans' issues, as well as defense manpower researchers.

This research was sponsored by the Office of Diversity Management and Equal Opportunity in the Office of the Secretary of Defense and conducted within the Forces and Resources Policy Center of the RAND National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community.

For more information on the RAND Forces and Resources Policy Center, see www.rand.org/nsrd/ndri/centers/frp or contact the director (contact information is provided on the webpage).

Contents

Figures and Tables

Figures

Tables

Summary

U.S. Equal Employment Opportunity Commission regulations direct federal agencies and departments to compare their workforce demographics with those of the civilian labor force (CLF). This process provides indicators of where there might be barriers to equal opportunity that are amenable to personnel policy changes. Persistent discrepancies between employees who work for the U.S. Department of Defense (DoD) and workers in the CLF prompted the Office of Diversity Management and Equal Opportunity to ask the RAND Corporation to perform a formal analysis of these workforce differences and potential barriers therein. Previous RAND work examined DoD's relatively low proportion of Hispanic employees in depth (Matthews et al., 2017). This report represents an exploratory effort examining the relatively low level of women's representation and testing the utility of alternative methods in better understanding workforce dynamics.

We Examined Two Main Research Questions on the Issue of Veterans' Employment

One of the key demographic differences between the DoD workforce and the CLF is that a significantly higher proportion of DoD employees are veterans. One might view DoD as a natural employer of veterans, given that they (by definition) have experience in the organization. However, many longstanding policies, such as preferences in the hiring process, explicitly favor employing veterans in the federal government. The fact that most veterans are men creates the possibility of a trade-off between goals for employing veterans and Equal Employment Opportunity Commission workforce demographic goals.

This analysis sought to quantify the dynamics of this potential trade-off by answering two main research questions. First, how much of the gap between women's representation in DoD and that in the CLF is attributable to the high proportion of veterans rather than to other workforce characteristics? Second, how would expectations for women's representation in the future change if policy changes or other broad trends were to reduce the level of hiring of veterans? Information about answers to these two questions will help policymakers to quantify the role that veterans' employment plays in women's underrepresentation, with the goal of informing the design of workforce policies in this area.

This Analysis Drew on Federal Administrative Records and Census Data

This research employed rich information on the federal workforce from individual-level, end-of-fiscal-year personnel data files on all federal employees, spanning from 2008 through 2013. These records include standard information on each employee, including the employee's agency, occupation, pay grade, service tenure, broad geographic location, retirement plan, and education level. All portions of the analysis restricted the population to full-time, permanent employees, which constituted 89 percent of the workforce in the most recent wave of the data.

In addition to the federal workforce data, portions of our analysis required information about the characteristics of workers in the national CLF. For information on the CLF, this research uses the 2013 American Community Survey (ACS), which is a 1-in-100 (that is, surveys 1 percent of the population), nationally representative population survey conducted by the U.S. Census Bureau (U.S. Census Bureau, 2018). To ensure that the CLF data were comparable to the federal workforce data, we excluded federal employees, active-duty military members, and part-time and seasonal workers from the ACS sample.

Having High Proportions of Veterans Contributes to Less Women's Representation

To assess the contribution that the high proportion of veterans makes to gaps between women's representation in different workforces among other major workforce characteristics, we applied the Blinder–Oaxaca decomposition method. This method uses descriptive regressions to measure the relationship between, in this case, workforce characteristics and women's representation in order to parse out each characteristic's contribution to explaining the representation difference. The results show that the proportion of employees who are veterans is the primary contributor to the explained portion of the gaps in women's representation between the DoD civilian workforce, the non-DoD civilian workforce, and the CLF. The contribution that the high proportion of employees who are veterans makes to the gap in women's representation between the DoD workforce and the CLF is 11.1 percentage points. In the non-DoD workforce, the contribution of veterans' employment to this workforce's gap in women's representation is also positive. However, it is smaller than seen in DoD because the proportion of non-DoD employees who are veterans is less than half of the proportion in the DoD workforce.

Given the finding that much of the DoD–CLF difference in representation is potentially attributable to the high proportion of DoD employees who are veterans, in the next portion of our analysis, we further explored the potential influence of hiring veterans.

Significant Changes in Hiring Would Be Required to Substantially Increase Long-Run Representation of Women in the Workforce

The previous results are limited in that they rely on a single snapshot in time, so they could not take into account the process by which policies might increase women's representation through changes in workforce management. Workforce management policies further require information on the magnitude of change in representation that could result from different hiring scenarios, as well as other potential barriers (e.g., differential retention).

With this in mind, we designed a workforce model based on the stock-and-flow inventory approach, which takes the initial workforce in 2013 and "ages" it forward using recent patterns in hiring, transfers, and retention. The workforce aging process takes into account each employee's retirement plan and nearness to retirement eligibility, as well as gender and veteran status. Although workforce planners can use such models to make decisions in the short term (for example, to project shortfalls in order to inform hiring decisions), we focused our analysis on the long-run level of representation of women in the DoD workforce after policy changes have stabilized. In this application, women's representation tended to stabilize after 30 to 50 years, so our long-run results focus on representation at the 50-year point.

The DoD personnel data do imply a relationship between hiring veterans and women's representation in the long run because new hires who were veterans were much more likely to be male than those who were nonveterans (80 percent versus 48 percent). However, we also found that female employees had lower continuation rates than male employees had, which could also tend to reduce women's representation under a given level of hiring in the long run. To disentangle these factors, we ran a series of scenarios in which we progressively reduced the number of veterans who were hired going forward and replaced them with nonveterans (while holding the gender mix in each group constant). Then, we replicated these same scenarios while setting gender-specific retention patterns to be equal within each veteran category, to measure the additional impact of relatively low rates of retaining women.[1]

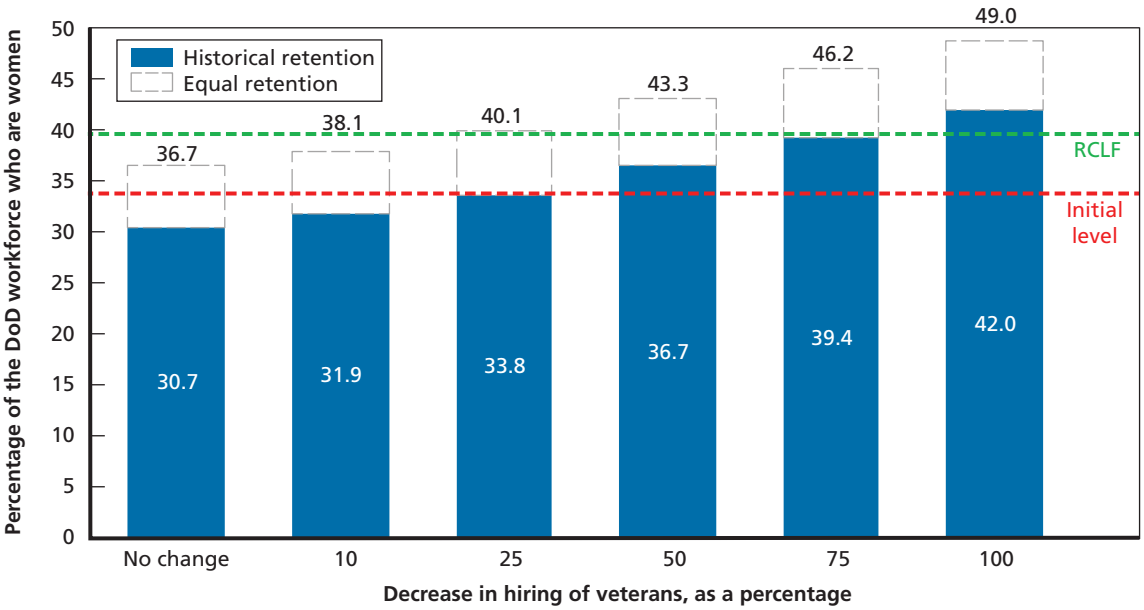
We summarize the results in Figure S.1, which compares the long-run level of women's representation in each scenario with the initial level in 2013, as well as the level of the relevant CLF (RCLF), according to our calculations from the ACS data.[2] The projections with no changes from the historical workforce patterns show a decline in long-run women's representation from the initial level in 2013. This decline results from the fact that hiring nonveteran women, according to the patterns from 2009 through 2013, is insufficient to replace losses implied by the retention patterns in the same period. Further, substantial changes in hiring veterans are necessary before the projections reach the two benchmarks—a 25-percent reduction in the number of veterans hired prevents the long-run decline in the baseline scenario, while a 75-percent reduction brings the projections in line with those for the RCLF. The sections outlined with gray dashed lines show the range of representation levels that are possible in each scenario through increasing women's retention. In general, equalizing retention raises the long-run level of women's representation by 6 to 7 percentage points across the different hiring scenarios.

We also examined scenarios that left the proportion of new hires who were veterans unchanged but raised women's representation among nonveteran new hires. These scenarios showed that a majority of nonveteran new hires needed to be women before projections maintained the initial level of women's representation over time. The scenarios also showed that some combination of women's representation among nonveteran new hires in the range of 55

[1] We do not view the hiring and retention patterns in the model themselves as policy levers but rather as the downstream effects of policy choices. A decrease in hiring veterans could result from a change in recruiting emphasis, for instance. The purpose of this analysis was to explore the magnitude of change that policies would need to generate in the areas of hiring and retention to reach a given level of steady-state female representation. However, such policies could have other effects that workforce planners would need to investigate, which we discuss under "Conclusion" at the end of this summary.

[2] The RCLF benchmark accounts for age, education level, occupation, citizenship, and geographic location.

Figure S.1
Long-Run Representation of Women in the DoD Workforce Under Scenarios Reducing the Level of Hiring of Veterans



SOURCES: U.S. Office of Personnel Management and ACS data.
NOTE: The RCLF is a benchmark estimate from a regression that takes into account age, education, citizenship, occupations, and geographic location (see Chapter Two). The initial representation level in 2013 is shown as an intermediate benchmark because the baseline projections show a long-run decline in representation. The sections outlined with gray dashed lines show the range of representation levels that are possible in each scenario through increasing women's retention.
RAND *RR2458-S.1*

to 65 percent *and* increased retention of women could bring projections in line with the RCLF in the long run.

Conclusion

Having a high proportion of employees being veterans is likely a barrier to raising women's representation in the federal workforce, all else being equal. However, attempting to reduce veterans' advantages in the hiring process[3] might not have the desired impact if policies do not address other important factors (such as gender differences in retention). The changes in the composition of the DoD workforce that would be required to reach the RCLF benchmark could also have secondary impacts that planners should investigate, such as whether veterans possess certain skills or experiences that are uncommon among nonveterans and difficult or costly to develop internally.

An alternative to focusing on a single factor (even one as apparently important as the high proportion of employees being veterans) might be to take an incremental approach across the areas of recruiting, onboarding, and retention. In this vein, the best path forward for

[3] Research identifying the portion of the high level of veterans' employment in DoD that is purely attributable to hiring preferences could clarify the impact of those hiring preferences.

DoD planners seeking to increase women's representation would be to identify feasible policy changes in each area that address representation gaps, and then assess the projected representation levels under each policy change using workforce projection techniques (such as the one we employed in this analysis). Policymakers would then be able to weigh the costs of these changes against the potential benefits in terms of gender diversity.

Abbreviations

ACS	American Community Survey
CCR	cumulative continuation rate
CLF	civilian labor force
DoD	U.S. Department of Defense
EEOC	U.S. Equal Employment Opportunity Commission
FEORP	Federal Equal Opportunity and Recruitment Program
FY	fiscal year
GS	General Schedule
MD	management directive
MSPB	U.S. Merit Systems Protection Board
OPM	U.S. Office of Personnel Management
PATCOB	professional, administrative, technical, clerical, other, or blue collar
RCLF	relevant civilian labor force

CHAPTER ONE

Introduction

The federal government plays a leading role in promoting workforce gender diversity (Choi, 2011), and, as one of its largest civilian employers, the U.S. Department of Defense (DoD) tends to play an influential role in determining government-wide levels of diversity (Copeland, 2008).[1] A recent assessment of women's employment in the federal government showed substantial progress in the past two decades in multiple areas, such as overall representation of women, women's representation in senior positions, and gender differences in earnings (U.S. Merit Systems Protection Board [MSPB], 2011). However, despite these overall gains, research suggests that women's representation across the federal workforce varies substantially, with less representation of women in DoD than in most non-DoD agencies and departments (Choi, 2010, 2011; Kellough, 1990). In this report, we examine women's representation in the DoD and non-DoD federal civilian workforces, and we consider the potential influence of promoting veterans' employment, which might influence levels of women's representation in the federal government (MSPB, 2011, 2014). Before describing our analyses and results, we begin with a brief review of women's representation and veterans' employment in the federal workforce.

Women's Representation

The primary "workhorse" regulation for monitoring demographic representation in federal agencies is U.S. Equal Employment Opportunity Commission (EEOC) Management Directive 715 (MD-715), *Federal Responsibilities Under Section 717 of Title VII and Section 501 of the Rehabilitation Act* (EEOC, 2003). MD-715 requires all executive agencies and military departments to annually assess their workforce demographics, identify barriers to equal opportunity, and address or eliminate barriers that appear to exclude certain groups from full representation in the workforce. As defined in MD-715, a barrier is "an agency policy, principle, practice or condition that limits or tends to limit employment opportunities for members of a particular gender, race or ethnic background or for an individual (or individuals) based on disability status" (EEOC, 2003). In conducting a workforce self-assessment, MD-715 directs agencies to compare their own workforces with groups of similarly situated civilian (i.e., nonfederal) workers—a population denoted as the relevant civilian labor force (RCLF). The implicit goal underlying this directive is that agencies will strive to represent the RCLF by addressing barriers that create representation gaps between agency workforces and groups of otherwise-similar nonfederal employees.

[1] Unless otherwise noted, *DoD* encompasses the department itself and the Departments of the Army, Navy, and Air Force.

The current level of women's representation in the federal government is the result of decades of growth. From 1976 to 2009, the proportion of female civilians in federal professional and administrative occupations grew from less than 25 percent to approximately 44 percent (MSPB, 2011). Still, although women's representation has increased, full gender equality within the federal government has not yet been realized, and future trends are uncertain (EEOC, 2014). For example, women's representation is not equally distributed across federal pay levels: Women are disproportionately concentrated in lower General Schedule (GS) pay grades relative to their proportions in higher GS grades and in the Senior Executive Service (Choi, 2011; EEOC, 2014). As these grade differences might imply, pay differences between male and female federal employees also hold even when researchers attempt to account for individual-specific factors (e.g., age, education, federal experience) (Bolitzer and Godtland, 2012; U.S. Office of Personnel Management [OPM], 2014). In addition, although 43 percent of new federal hires in 2000 were women, the proportion had dropped to 37 percent by 2012, and decreases in women's representation among new federal hires have the potential to have long-term impacts on that representation level (MSPB, 2014). In sum, recent findings show a reversal of a decades-long trend of women's employment gains in the federal civil service.

DoD agencies and departments, in particular, have shown persistent disparities in women's representation. According to recent Federal Equal Opportunity and Recruitment Program (FEORP) reports, women's representation in the federal government and in the RCLF was approximately equal (see Table 1.1) (OPM, 2012).[2] However, women's representation in federal executive departments varied from 27 percent to approximately 65 percent. The civilian workforce of each military service tended to have women represented less than most other agencies did, and these DoD departments consistently underrepresented the RCLF by 7 to 16 percentage points (see Table 1.1). Thus, these reports suggest that, by MD-715 standards, roughly 44 to 45 percent of civilian employees in the military departments should be women, but the actual representation levels in 2011 were below 30 percent for the Navy and Air Force and only 36.1 percent for the Army.

Levels of women's representation in DoD being lower than those in the RCLF could stem from many different factors, such as the supply of interested applicants, recruiting policies, and rates of retention. The key feature that we explore in this analysis is the level of veterans' employment, which our results show differs markedly between DoD and the CLF. Further, some research has shown that the use of special appointing authorities and hiring policies that give preference to military veterans negatively affects women's representation (Lewis, 2013; MSPB, 2011, 2014; Labbadia, 1980).

Veterans' Employment

The federal government uses multiple appointing authorities to hire people, and several of these authorities target veterans. The 30% or More Disabled Veteran appointing authority permits making a noncompetitive temporary appointment to any veteran with an official Department

[2] The FEORP is a federal program designed to address underrepresentation of minorities and women in the federal workforce. The RCLF is the directly comparable civilian labor force (CLF), and it serves as a benchmark to which federal agencies and departments compare their levels of representation. Fiscal year (FY) 2011 was the most recent FEORP report year that included a comparison with the RCLF.

Table 1.1
Percentage of the Permanent Workforce in Federal Executive Departments and the Relevant Civilian Labor Force Who Were Women, 2010 and 2011

	2010		2011	
Executive Department	**PW**	**RCLF**	**PW**	**RCLF**
Transportation	26.9	46.7	26.8	47.7
Navy	29.5	43.9	28.9	44.1
Air Force	29.6	44.8	29.0	44.8
Homeland Security	32.0	46.8	31.9	46.8
Army	36.8	44.1	36.1	44.3
Energy	38.3	52.0	38.3	52.1
Justice	39.3	51.4	39.1	52.0
Interior	40.1	45.8	40.0	46.2
Agriculture	43.9	50.2	44.0	50.3
Commerce	45.6	47.6	45.4	47.9
DoD	48.8	47.9	48.9	49.1
Labor	49.4	60.9	49.4	60.2
State	57.4	61.2	56.6	61.7
Veterans Affairs	59.6	51.8	59.5	51.8
Housing and Urban Development	60.8	63.7	60.5	62.9
Treasury	62.4	51.1	62.2	49.2
Education	62.9	63.9	62.6	63.6
Health and Human Services	64.7	52.3	64.7	52.0
Government-wide	43.9	44.2	43.6	43.8

SOURCE: OPM, 2012.

NOTE: PW = permanent workforce (permanent employees). Shaded rows indicate the departments included in this analysis: DoD (by which, in this table, we mean only agencies not aligned to the military services, so the departments of the Army, Navy, and Air Force are *not* included in it here, though they are generally elsewhere in this report) and the federal government as a whole. The RCLF benchmark adjusts the CLF to match the occupational mix in each agency, and OPM derives it from decennial census data.

of Veterans Affairs (service-connected) disability rating of at least 30 percent. The Veterans Employment Opportunities Act of 1998 (Pub. L. 105-339) created a special hiring authority that allows eligible veterans to apply through job announcements that would ordinarily be limited to current competitive-service employees, and the Veterans' Recruitment Appointment authority allows agencies to appoint eligible veterans to certain positions without competition (OPM, undated). In addition, a policy known as *veterans' preference* provides eligible veterans preference over other applicants for federal appointments in the competitive and excepted fed-

eral service. Each of these serves to recognize the sacrifices that military veterans make for their country and to prevent veterans from being penalized for their military service.

Some form of federal employment preference for veterans can be traced back to at least the Civil War era (Lewis, 2013), but eligibility has historically been limited to veterans who served in particular campaigns (OPM, undated; 5 U.S.C. 2108).[3] However, after September 11, 2001, preference rules considered any veteran eligible who served for 180 consecutive days from September 11, 2001, through the end of Operation Iraqi Freedom in 2010 or who earned an expeditionary medal or campaign badge (OPM, undated). These changes likely led to near-universal eligibility for those who met other criteria (e.g., released or discharged under honorable conditions), which could have increased the supply of preference-eligible veterans entering the federal job market during this period.

In addition to longstanding hiring preferences, there was new emphasis on veteran hiring beginning with Executive Order 13518 in 2009, "Employment of Veterans in the Federal Government" (Obama, 2009). This order made it official policy "to enhance recruitment of and promote employment opportunities for veterans within the executive branch" (Obama, 2009, p. 58533). This order created an interagency council on veterans' employment and charged it with participating in a Veterans Employment Initiative (Obama, 2009). It also commanded the director of OPM to develop a government-wide strategic plan for recruiting and employing veterans, along with a myriad of other prescriptions aiming to help veterans transition into federal employment (Obama, 2009).

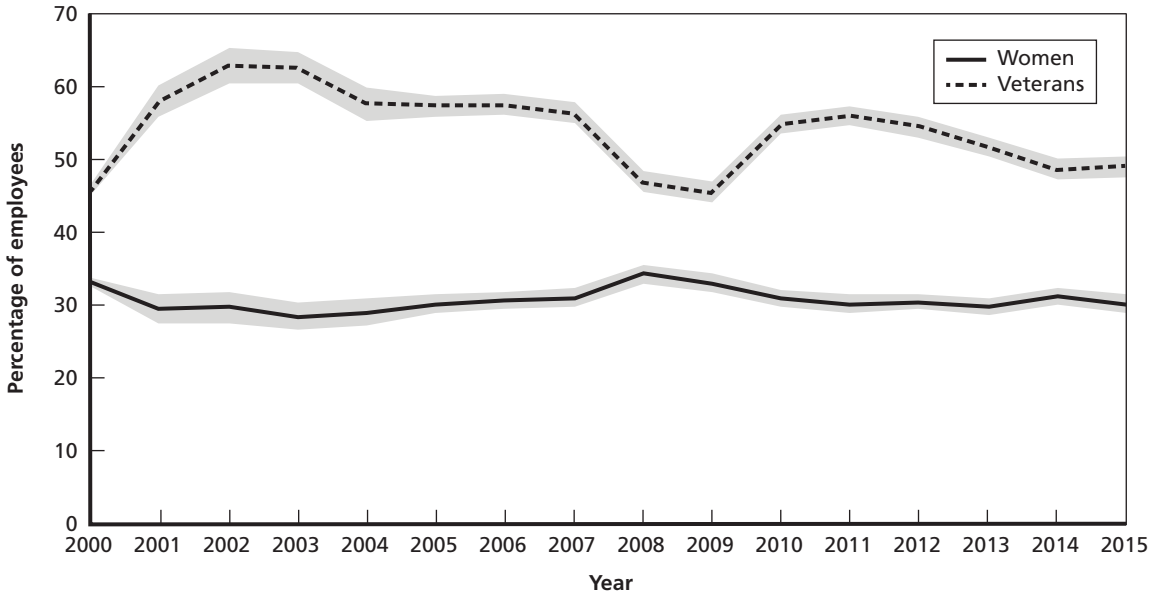
Leadership emphasis to agencies on hiring veterans, together with special avenues for hiring and preferential treatment for competitive positions, should theoretically increase the level of veterans' employment in federal service and boost veterans' advancement prospects. However, the exact impact that these measures have on levels of veterans' employment is not known. As discussed in Chapters Two and Three, veterans make up a substantial proportion of the non-DoD and DoD federal workforces (see also OPM, 2017). Some have argued that such patterns of veteran employment are the result of preferential treatment, so promoting the employment of the predominantly male veteran population hinders women's representation and advancement in the federal government (Lewis, 2013; MSPB, 2011, 2014). At the same time, a high level of federal employment of veterans could occur even in the absence of supporting policies if veterans were more likely than similar nonveterans to pursue federal employment or because veterans possess training, skills, and experience that are particularly valuable to government work, especially in DoD.[4]

Historically, veterans have made up a large portion of the national security workforce. As an illustration, Figure 1.1 uses U.S. census data going back to 2000 to show the percentage of full-time, full-year workers in the national security sector who were veterans. The data show that veterans have made up the majority of national security employees in most years. Further, the trends show two periods of marked growth in veterans' representation: first from 2000 through 2003 and then from 2009 to 2011. In addition to the potential increase in the supply

[3] For example, prior to September 11, 2001, veterans who were preference-eligible were those who had served (1) during wartime, (2) during a select period between 1952 and 1955, (3) for more than 180 consecutive days between 1955 and 1976, or (4) during the Gulf War between 1990 and 1992.

[4] For example, the 2009 executive order states, "Our veterans, who have benefited from training and development during their military service, possess a wide variety of skills and experiences, as well as the motivation for public service, that will help fulfill Federal agencies' staffing needs" (Obama, 2009, p. 58533).

Figure 1.1
Veterans' and Women's Representation in Full-Time, Full-Year National Security and International Affairs Workers, 2000–2015



SOURCE: Data for 2000 rely on the decennial census, while 2001 through 2015 data are drawn from the American Community Survey (ACS). Data files were provided by the Integrated Public Use Microdata Series (Ruggles, Flood, et al., 2018).
NOTE: Gray shading around each trendline shows the 95-percent confidence intervals. According to the data, all workers in this industry are federal employees, but population sizes suggest that these includes some other federal employees outside of DoD.
RAND *RR2458-1.1*

of eligible veterans because of Operations Enduring Freedom and Iraqi Freedom, the first boom in veterans' representation also coincides with significant policy changes in the FY 2000 National Defense Authorization Act (Pub. L. 106-65, 1999) affecting veterans' compensation as civilian employees. These changes eliminated a pay cap that constrained the total amount that veterans could earn from the combination of civilian basic pay and military retirement pay (OPM, 2000). The second boom coincides with the previously mentioned Veterans Employment Initiative. Women's representation, which is also shown in Figure 1.1, tended to move inversely with veterans' representation, but in much smaller increments. Overall, women's representation in this population has hovered around 31 percent for the past 25 years.

Regardless of the root cause of veterans' employment patterns in government, the demographic trends in the veteran population might put veterans' employment programs partly at odds with goals for employment and advancement of women in the federal service. In this report, we explore whether, or to what extent, changes in veterans' employment might contribute to the gap in women's representation in federal versus civilian employment.

DoD Barrier Analyses

We conducted this research as part of a larger effort within the DoD Office of Diversity Management and Equal Opportunity to examine barriers to employment across different demo-

graphic groups. Previous analyses conducted in support of this effort incorporated methods similar to those employed in this report—specifically, the Blinder–Oaxaca decomposition—to determine whether certain workforce characteristics might contribute to differences in the representation of Hispanics and people with targeted disabilities (Matthews et al., 2017).

Maintaining adequate representation of women (relative to that in the RCLF) is also part of the Office of Diversity Management and Equal Opportunity's mission to promote diversity and inclusion in the DoD civilian workforce. As an additional case study in barrier analysis, we applied the Blinder–Oaxaca decomposition technique to the question of women's representation. Blinder–Oaxaca decompositions calculate the amount of the representation gap between, in this case, the federal government and CLF that is attributable to broad workforce characteristics, including the proportion of employees who are veterans, under certain assumptions. When the large proportion of veterans emerged as a potential barrier, we took the next step and used an inventory model to assess the potential impacts of changes to the hiring of veterans. The inventory model permitted us to generate projected levels of DoD representation of women under varying levels of future hiring of veterans. Together, these analyses provide a comprehensive look at the complex relationship between diversity goals and initiatives promoting veterans' employment.

Organization of the Report

The remaining chapters in this report describe analyses conducted using data on the DoD civilian workforce, non-DoD civilian workforce, and CLF. Chapter Two describes our analytic approaches to examining the relationship between women's representation and veterans' representation in both the DoD and non-DoD federal workforces and to estimating the possible effects on women's representation in DoD in response to changes in hiring. Chapter Three provides the results of our analyses, and Chapter Four provides a discussion based on our analytic results.

CHAPTER TWO

Data and Analytic Approaches

We begin this chapter with a description of the workforce data we used to conduct our analyses. We include a description of the characteristics of the DoD and non-DoD federal civilian workforces and the CLF more broadly.[1] We then move to a description of the analytic approaches used to examine women's representation in these workforces and the potential effects of changes in hiring.

Data and Workforce Characteristics

This research leverages information on the federal workforce gleaned from individual-level, end-of-FY personnel data files on all federal employees from 2008 through 2013. These data contain administrative information on each employee, including the employee's agency, occupation, pay grade, service tenure, broad geographic location, retirement plan, and education level. All portions of the analysis restrict the population to full-time, permanent employees, who constituted 89 percent of the workforce in the most recent wave of the data.

Portions of our analysis compared women's employment in the federal workforce with that in the national CLF. For information on the CLF, this research used the 2013 ACS (Ruggles, Flood, et al., 2018). The ACS is a 1-in-100, nationally representative annual survey run by the U.S. Census Bureau that produces information on the demographic and economic characteristics of the U.S. population. To ensure that the CLF data are comparable to the federal workforce data, we excluded federal employees, active-duty military members, and part-time and seasonal workers from the ACS sample. After these omissions, the ACS sample size totaled 925,468, including 402,433 female CLF workers and 59,025 veterans.

The first three columns of Table 2.1 provide selected summary statistics on the federal workforce, including both the non-DoD and DoD workforces, and the CLF in 2013. The last two columns provide summary statistics for all men and women in the labor force, respectively, from the combined data.

Developing a Common Occupation Scheme to Compare Federal Workers with Those in the Civilian Labor Force

One important workforce attribute that is known to differ significantly along gender lines is occupation (Gabriel and Schmitz, 2007). Thus, comparing the federal workforce and the CLF

[1] We compare the federal workforce with the CLF rather than the RCLF so that we can identify the contribution of the different workforce characteristics (including occupations) to the overall gap in representation.

Table 2.1
Selected Summary Statistics, by Workforce and Gender in 2013, as Percentages

Variable	CLF (N = 925,468)	DoD Workforce (N = 610,905)	Non-DoD Federal Workforce (N = 1,140,822)	All Men	All Women
Gender					
Female	43.1	34.1	48.6		
Veteran status					
Veteran	5.8	45.9	21.8	10.0	1.4
Race and ethnicity					
White	66.3	69.7	62.5	67.0	65.2
Black	10.5	15.8	20.0	8.8	13.1
Hispanic	15.6	6.2	8.7	16.8	13.7
Asian or Pacific Islander	5.7	6.0	5.7	5.6	5.8
Other	2.0	2.2	3.1	1.9	2.2
Age, in years					
Under 30	17.6	7.2	6.8	17.1	17.8
30–39	23.5	17.8	21.5	23.9	22.8
40–49	25.0	26.0	27.9	25.1	24.8
Over 50	34.0	49.0	43.9	33.9	34.6
Education					
Less than high school	8.2	0.4	0.6	9.8	5.8
Completed high school or the equivalent	31.1	39.4	30.0	32.9	28.7
Some college or associate's degree	25.0	14.2	16.6	23.1	27.2
Bachelor's degree or higher	35.7	46.0	52.7	34.2	38.4
Citizenship					
U.S. citizen	91.3	100.0	99.9	89.7	93.7
Occupation					
Professional	19.3	25.1	27.0	16.6	23.2
Administrative	16.4	36.6	41.1	15.0	19.1
Technical	9.6	14.5	18.0	7.9	12.3
Clerical	18.3	3.9	5.3	11.7	26.4
Other white collar	5.3	3.4	4.4	6.8	3.2
Blue collar	31.1	16.5	4.2	42.0	15.8

SOURCES: ACS for the CLF; OPM personnel records for DoD and non-DoD workforces.

NOTE: Each value in the table represents the percentage of the population denoted in the column title who fall into the row's category. Percentages for a given variable might not sum to 100 because of rounding.

requires that workers be classified into occupations with enough resolution to capture potentially meaningful differences between the types of work in the two sectors. Simpler grouping schemes, such as the familiar professional, administrative, technical, clerical, other, or blue collar (PATCOB) categories used in Table 2.1, might erroneously consider workers who are doing qualitatively different work to be equivalent in their occupations. To better capture these potential differences, we applied the EEOC's occupational crosswalk to the federal employees, which matches each OPM code to an equivalent occupation in the census coding system (EEOC, 2013). For the federal workforce (DoD and non-DoD combined), the crosswalk successfully matched more than 99 percent of workers to census occupation codes. Then we grouped the individual census occupations into 23 general categories based on the nesting inherent in the census coding system. This improved granularity, but there might still be meaningful occupation differences between federal and CLF workers who would be grouped together under this scheme. Thus, an important caveat is that such differences could relate to gender in a way that causes these results to over- or underestimate the expected level of representation in DoD after adjusting for occupation. The following section provides more-detailed information on the statistical methods and this potential for error due to misspecification.

Methods

To examine the relationship between veterans' employment and women's representation in the federal workforce, we relied on the Blinder–Oaxaca decomposition method. To project the impact that changes to hiring veterans could have on women's representation, we used a stock-and-flow inventory model. We describe each of these in depth below.

Blinder–Oaxaca Decomposition

A starting point for assessing whether there are gender-related barriers to employment in the federal workforce is to compare the percentage of the federal workforce who are women with the corresponding percentage from a benchmark population, such as the CLF. This comparison shows that women's representation in DoD is lower than in the CLF, while representation in the non-DoD federal workforce is higher than in the CLF (see the first row of values in Table 2.1). The summary characteristics in Table 2.1 also suggest that the underrepresentation of women among DoD employees could relate to high levels of employment of veterans (veterans make up almost half of the DoD workforce), and male workers are much more likely to be veterans than female workers are. However, the data also suggest that the two workforces are not directly comparable because they differ in other respects that could affect the expected level of women's representation. For example, federal employees tend to have higher levels of education than the average CLF worker does: 46 percent of DoD employees and 52.7 percent of non-DoD federal employees had at least bachelor's degrees, both far more than the 35.7 percent of workers in the CLF who do. Because the average female worker is more educated than the average male worker, the higher levels of education prevalent in federal service would tend to favor the employment of female workers over males, all else being equal. Such differences in the characteristics of federal employees and workers in the CLF muddy interworkforce gender comparisons. To examine the relationship between women's representation and veterans' representation in the federal workforce, then, we needed to disentangle the impact of veterans' employment from that of other workforce characteristics.

To address the lack of comparability between workforces and to assess the characteristics' relative importance to women's representation, we used the Blinder–Oaxaca decomposition method (Blinder, 1973; Oaxaca, 1973). Alan S. Blinder and Ronald Oaxaca originally developed the technique to understand average differences in wages across demographic groups by using descriptive regressions to separate the portion that is attributable to characteristics, such as education and experience, from the residual portion for which group differences in characteristics cannot account. Since publication of the original papers, others have modified and generalized the technique in a variety of ways (e.g., Gardeazabal and Ugidos, 2004; Neumark, 1988; Oaxaca and Ransom, 1994; Yun, 2004, 2005). More-recent work has also employed this method to better understand gender differences in retention and promotion of military members (Asch, Miller, and Weinberger, 2016).

The most intuitive form of the Blinder–Oaxaca decomposition is the linear case, which we applied to the current problem with linear probability models. The technique involves first estimating workforce-specific regressions relating the characteristics to a binary indicator variable of whether each employee is (in this case) female. The percentage of each workforce (denoted by the subscript *w*) who are women can be represented as a vector of the average levels of the characteristics (represented by $\bar{X}$) multiplied by the estimated coefficients (represented by $\hat{\beta}_w$), or

$$\overline{female}_w = \bar{X}_w \hat{\beta}_w. \tag{2.1}$$

Then, the Blinder–Oaxaca decomposition represents the difference in women's representation between the federal workforce and the CLF in the following form:[2]

$$\overline{female}_{CLF} - \overline{female}_{FED} = \left(\bar{X}_{CLF} - \bar{X}_{FED}\right)\hat{\beta}_{CLF} + \bar{X}_{FED}\left(\hat{\beta}_{CLF} - \hat{\beta}_{FED}\right). \tag{2.2}$$

The first term on the right-hand side of Equation 2.2 is the change in representation that would result if both workforces had the same average level of all characteristics, to which we refer as the *explained component*. The second term on the right-hand side describes the portion of the gap that results from differences between the DoD workforce and the CLF in the way the characteristics relate to women's representation (which is captured in the coefficients from the regressions). We refer to the second term as the *unexplained component*, but, in a correctly specified regression that includes all relevant variables, it represents the effect of gender barriers or discrimination.

Equation 2.2 is the aggregate decomposition of all workforce characteristics, which is the sum of the individual effects. The method is especially intuitive for policymakers because it returns each characteristic's contribution to the representation differences. For example, the

[2] This particular form of the decomposition uses the CLF as the reference population for calculating the explained component. However, others (e.g., Neumark, 1988) have suggested using the coefficients from a regression that pools the two populations together as the reference group. In the current application, the relative sizes of the CLF and the DoD workforce means that pooled coefficients are very similar to the CLF coefficients, so the results are not sensitive to this choice.

chief result of interest to this study is the contribution that the proportion of veterans makes to the explained differences in women's representation, calculated in the following way:

$$Contribution of Veterans Employment = \left(\overline{Vet}_{CLF} - \overline{Vet}_{FED}\right)\hat{\beta}_{CLF}^{Vet}, \tag{2.3}$$

where $\overline{Vet}_{CLF}$ is the proportion of the CLF who are veterans, $\overline{Vet}_{FED}$ is the proportion of the federal workforce of interest who are veterans, and $\hat{\beta}_{CLF}^{Vet}$ is the regression coefficient from the CLF model predicting women's representation (which captures the association of being a veteran and being female, conditional on other factors). In this form, it is apparent that two factors contribute to the estimated association between veterans' employment and the women's representation gap: the workforce differences in the proportion of veterans and the association between being a veteran and being male.

Finally, the estimated coefficients that underlie the decompositions that we present measure only the association, not a true causal linkage, between the characteristics and the likelihood of being female. Members of different demographic groups choose whether to work in DoD or the CLF, as well as their occupations and education levels, based on unobservable factors that cannot be incorporated into these models. This reality could introduce error into the regressions, which would potentially skew the size of the two components in Equation 2.2, as well as the portion attributable to each individual characteristic.

Stock-and-Flow Inventory Model

Model Structure

Because prior discussion revolves around preferential treatment of veterans in the federal hiring process, policymakers also require information on how women's representation relates to the hiring of veterans. Some prior research assumed that high levels of hiring of veterans would automatically translate into decreases in women's representation (MSPB, 2011), but prior research exploring the question has relied on workforce comparisons that cannot explore the empirical relationship between hiring and representation (Lewis, 2013). In our analyses, we sought to examine this relationship. In addition to hiring patterns, the demographic makeup of a given workforce will evolve over time according to the rate at which members of each group separate or transfer out of the workforce, and these patterns differ by gender and veteran status. Further, counterfactual scenarios involving lower levels of hiring of veterans necessarily depend on the patterns of hiring nonveterans as well. This might differ by agency, depending on the agency's mission and other workforce characteristics.

To explore the potential impact of changes in the levels of hiring veterans, we created federal workforce projections under different scenarios using a stock-and-flow inventory model. Stock-and-flow inventory models represent a simple and intuitive way to apply recent workforce trends to current population levels to project future inventories. In building the inventory model, we drew heavily on models that RAND researchers developed to project the supply of workers in the Defense Acquisition Workforce (Gates, Keating, et al., 2008; Gates, Roth, et al., 2013). Subsequent work generalized the RAND stock-and-flow approach to apply to any federal workforce or subpopulation of interest (Nataraj et al., 2014).

The goal of this analysis was to understand the interplay between gender and veteran status as the workforce changes over time, so we modeled each demographic group separately. Further, because DoD has lower women's representation than the CLF does, and because vet-

erans' skills and experiences might relate more to employment in DoD than in non-DoD agencies, we focused the inventory modeling on the DoD population. The final inventory model is an aggregate of four subpopulation models—one for each combination of gender (male and female) and veteran status (veteran and nonveteran).

The inventory model begins with the number of personnel in the workforce of interest at the end of, in this case, FY 2013. The workforce in our case can gain personnel by external hiring or by absorbing workers from other agencies who were already federal employees. At the same time, annual losses stem from personnel who separate from federal employment entirely or who transfer to another agency. To project the workforce into the future, the model calculates annual gains and losses based on the historical patterns in previous years. Accurately estimating both gains and losses requires two additional layers of detail. The model must track each workforce's inventory separately for different retirement plans (which have very different incentives to remain until retirement eligibility), as well as for different tenures relative to retirement (Gates, Keating, et al., 2008). This ensures that the model will capture the tendency for new hires to enter the workforce at a greater distance from retirement, while retention patterns can vary for employees at different points in their careers. An employee's distance from retirement depends on his or her age, years of service, and retirement plan. Because the years-until-retirement metric incorporates information from all three of these factors, it is more strongly correlated with retention than with either age or years of service alone (Gates, Keating, et al., 2008). Thus, years until retirement is the current standard in similar inventory models for tracking employees as they age (Gates, Roth, et al., 2013; Nataraj et al., 2014).

For a given population within a workforce and retirement plan (subscripts omitted for brevity), the inventory (I) in a given year of service relative to the year of retirement (y) and time (t) is

$$I_{yt} = I_{y-1,t-1}\left(c.rate_{y-1}\right) + sw.rate\left(\Sigma_y I_{y,t-1}\right)\left(sw.dist_y\right) + newhires_t\left(nh.dist_y\right), \qquad (2.4)$$

where *c.rate* is the continuation rate for the year of service (which captures both separations and transfers), *sw.rate* is the historical rate at which new employees switch into the agency of interest, $sw.dist_y$ is the historical proportion of switchers who are in year of service y, $newhires_t$ is the number of new hires for the given time period, and $nh.dist_y$ is the historical proportion of new hires in year of service y. The fact that we modeled each subpopulation separately allows all parameters in Equation 2.4 to differ by subpopulation. For example, if veterans tend to enter federal service closer to retirement, the values in *nh.dist* capture that fact, while the continuation rates (*c.rate*) capture gender differences in retention.

This approach requires one additional assumption about future hiring patterns. It is possible to assume that the historical hiring patterns in each subpopulation will continue unabated. However, the time period covered in the data actually involved significant growth in the permanent, full-time federal workforce (U.S. Government Accountability Office, 2014), so making this assumption would lead to projections that continue this significant growth into the future. Instead, we set the number of new hires at exactly the level needed to replace losses and keep the total size of the DoD workforce constant. Then, the baseline scenario allocates new hires across demographic groups in each organization according to the historical proportions in our data. In reality, the DoD workforce could grow or shrink rather than remain constant, and either of these scenarios would have implications for our results. Generally speaking,

workforce growth would increase the importance of new-hire demographics because it would bring more new hires into the population. If the workforce were to shrink, the new-hire demographics would have less of an impact, while the population makeup would tend to be driven by the initial demographics and group-specific retention patterns.

Time Horizon

Because the inventory model projects the demographic makeup of the workforce into the future, an additional consideration is the time horizon of interest. As a pure forecasting tool, the model will likely become less accurate for longer time horizons because the underlying parameters, such as hiring and retention rates, are likely to change. Thus, researchers recommend that practitioners using such models for workforce management decisions update them frequently and vary the input parameters to provide a range of potential estimates (Nataraj et al., 2014). Instead of generating the best possible forecast in the coming years, the goal of this application is to assess the impact that broad trends in hiring and retention have on long-run representation of women. In such cases, a *steady-state* analysis is more useful because such policy changes play out over a longer period of time (Robbert et al., 2015). In a steady-state analysis, the key result is the workforce makeup in the long run, once developments resulting from the policy changes have stabilized. In working with this particular model, we found that women's representation tended to stabilize after 30 to 50 years, so we present representation levels at the 50-year point as the primary outcome of interest.

Policy Scenarios and Benchmarks

From Equation 2.4, it is clear that two major forces govern the future demographic makeup of the DoD civilian workforce: the demographics of new hires and the retention patterns of different demographic groups. To illustrate the impact of potential policies in each area, we crafted scenarios that used the inventory model to project future levels of women's representation while we varied the new-hire demographics and retention parameters. First, we examined how projected women's representation would change when we decrease the hiring of veterans, which is meant to explore the impact of notional policies that would increase the likelihood of filling new openings with nonveterans. Given the unlikelihood and undesirability of policy changing to require that DoD reduce hiring of veterans, we examined a second potential way in which women's representation could increase: if higher shares of *nonveteran* new hires were women.[3] Such increases could occur, for example, through changes to recruiting and outreach that target women.

We ran each hiring scenario under two different sets of retention assumptions. The first retention outlook assumed that each demographic group would follow the average continuation rates observed in the OPM personnel records. The second retention outlook removed any gender differences in retention by setting women's continuation rates to equal the corresponding male rates for each category of veterans. Equalizing retention between the genders provides a way to measure the impact that relatively low retention of women has on representation in the workforce. Alternatively, one could view the results under equalized retention as a scenario modeling a notional policy that increased women's retention relative to men's. The combination of hiring and retention scenarios yielded four variants of the baseline model, which we

[3] We chose to focus this scenario on nonveteran female hiring and leave veteran female hiring unchanged because the number of female veterans available to be hired is likely constrained by other factors, such as prior military accessions.

summarize in Table 2.2. In each scenario, the changes are permanent. That is, the changes are in place for all years within the model's time horizon.

Ideally, a policy analysis of this sort would use the inventory model to examine the impact of specific policies that affect hiring or retention so that planners can weigh the potential benefits of each policy against other factors. Prior research in this area has yet to codify concrete alternatives to evaluate, so we instead focused on identifying the levels of change that would be required for the workforce to reach the following representation benchmarks.

- **initial level:** Because the baseline projections suggest that women's representation will decrease in the coming years, the first benchmark is women's level of representation in the initial workforce inventory. Projections that meet this benchmark essentially keep the representation level from falling in the long run from its initial point.
- **the RCLF:** Published statistics, such as those Table 1.1 in Chapter One, often break out the services separately and adjust only for occupations. Thus, we created our own RCLF benchmark using a regression that takes into account age, education level, occupation, citizenship, and geographic location (i.e., key workforce characteristics *other than veteran status*). Notably, we included a full set of indicators for the census occupation codes (instead of the more-general groups discussed previously) to ensure that this benchmark reflects DoD's occupation mix as closely as possible. This benchmark represents the level of women's representation expected in the CLF if the CLF had the same observable characteristics as DoD had.

The goal of this analysis was to map out the potential space for increases in women's representation under a wide range of hiring and retention changes. *Because the goal was to explore the possible range of representation levels, we allowed the parameter changes to be on the extreme end of what is feasible.* For example, erasing all gender differences in retention is not possible in the short term, so the reader should interpret the resulting increases in women's representation as a sort of upper bound on what is achievable in the long run. In the absence of clear policy alternatives, information on the magnitude of a change in hiring or retention that is needed to reach different levels of representation of women is still valuable to decisionmakers seeking to prioritize their resources. However, particular policies that seek to change hiring or retention patterns could have other effects not captured in this exercise, and these potential costs and benefits should also be weighed in evaluating such policies.

Table 2.2
Policy Scenarios Arising from Changing Baseline Inventory Model Parameters

Hiring Change	Retention Pattern	Policy Space Investigated
Reduced hiring of veterans	Historical	The impact of reductions in the hiring of veterans and increases in hiring of nonveterans with no changes to retention
	No gender differences	The combined impact of reductions in the hiring of veterans and increases in women's retention
Increased hiring of nonveteran women	Historical	The impact of increasing representation of women among nonveteran new hires with no changes to hiring or retention of veterans
	No gender differences	The combined impact of increasing the percentage of new hires who are nonveteran women and increasing retention of women

Together, these methods will yield clear information to policymakers on the question of veterans' employment and women's representation in the federal workforce. The Blinder–Oaxaca decompositions serve to estimate the contribution of the high levels of employment of veterans among other workforce characteristics on the gap in the gender mix between the DoD and CLF workforces, while the inventory model provides unique information on how responsive gender representation will be to the hiring of veterans.

CHAPTER THREE

Findings on Women's Representation

In this chapter, we first address the potential contribution that high levels of employment of veterans make to the gap between the level of women's representation among federal employees and the corresponding level in the CLF. To do so, we used Blinder–Oaxaca decompositions to compare the DoD and non-DoD components of the federal workforce with those of the CLF. We then move to consider trends in employment and the potential implication that policy modifications could have on women's representation in DoD.

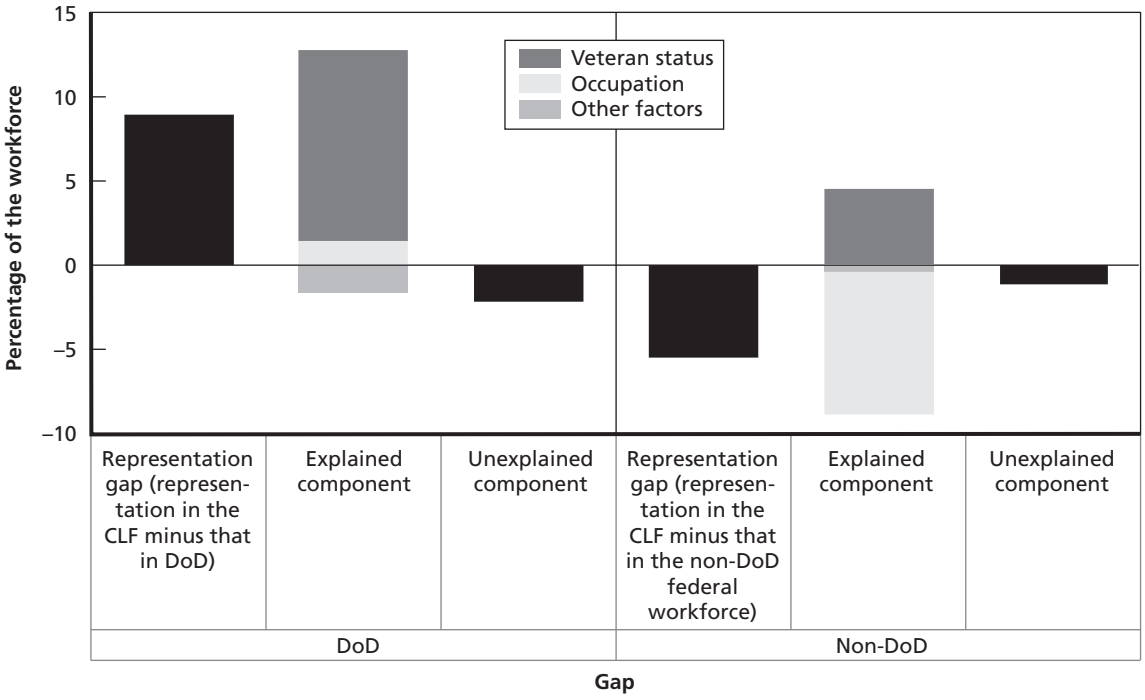
Veterans' Employment and Women's Representation Among Federal Employees

Figure 3.1 shows the largest estimates of the contributions that workforce variables make to the gap in women's representation, and Table 3.1 shows the estimated coefficients and standard errors for all workforce variables included in the models.[1] The figure shows two sets of three bars: The set on the left represents information on the DoD civilian federal workforce and the set on the right represents information on the non-DoD civilian federal workforce. Reading each set from left to right, we see a black bar that depicts the gaps in women's representation in the DoD and non-DoD federal workforces. These are the differences in the percentages of the CLF and each workforce who are women. For example, there is a 9-percent representation gap between the CLF and the DoD workforce, such that women are less represented in DoD than in the overall CLF. In contrast, there is a –5.5-percent gap between the CLF and non-DoD federal workforce, such that women are more represented in the non-DoD workforce than in the CLF. Next, Figure 3.1 shows the estimated contribution of workforce characteristics on each representation gap (the sum of which forms the explained component). As laid out math-

[1] The reported results specify all variables as categorical and use ordinary-least-squares regression. The explained component is decomposed separately for each workforce characteristic, although each estimate in Table 3.1 is the sum of the estimates for the individual indicator variables (e.g., dummy variables for each age group or education level). Occupation controls include an indicator for census occupation category (see Chapter Two), and location represents the net effect of indicators for each state and an indicator for whether the person resides in an urban area. We examined a variety of model specifications that employed logistic regression rather than ordinary least squares, included age and education in years with polynomial terms, and controlled for simplified PATCOB occupation categories instead of OPM job groups. Results were generally similar across the various specifications regarding the contribution of veteran status, but the contribution of the occupation differences varied depending on the way they were categorized.

The variables included in the model were limited to broader factors available in both data sources. Notably, some prior studies on gender differences using this method (e.g., Asch, Miller, and Weinberger, 2016) account for family-related variables, which could influence differences in men's versus women's propensity to work for DoD. Unfortunately, information on marital status and children is available only in the ACS, not in the OPM personnel data.

Figure 3.1
Decomposition Results of DoD and Non-DoD Federal Workforces and the Civilian Labor Force



SOURCES: ACS and OPM data.
NOTE: The units in this figure are percentage points of women's representation. Positive values favor the CLF (i.e., tend to increase the gap between the two), while negative values favor the federal workforce of interest (i.e., tend to increase federal representation relative to the CLF). The black bars represent overall representation differences, while the shaded bars of the explained component represent the impacts that the individual characteristics have on the representation gap.
RAND *RR2458-3.1*

ematically in Equation 2.2 in Chapter Two, these contributions are the portion of the initial representation gap that is attributable to each characteristic. Alternatively, one might think of these bars as representing the expected representation gap that the observed characteristics would tend to produce, all else being equal. The explained components in both workforce comparisons include positive and negative contributions. A positive value suggests that the factor contributes to the gap between the federal workforce and the CLF, while a negative value suggests that the characteristic favors *higher* representation in the federal workforce than in the CLF. The third bar for each workforce shows the portion of the representation gap remaining after adjusting for differences in workforce characteristics (the unexplained component). The negative unexplained components for both workforces indicate that, after we adjust for workforce characteristics, federal representation is slightly higher than that in the CLF.

Table 3.1 shows the same results as Figure 3.1 but with additional detail on the characteristics that combine to form the "other factors" bar in the figure, along with standard errors. All of the estimates are highly significant, even if they are small, stemming from the largeness of the sample in the OPM and ACS data sets.

These results address the first research question regarding the amount of the DoD–CLF gender representation gap that is potentially attributable to the higher proportion of veterans in DoD. The proportion of each workforce who are veterans is the largest contributor to relatively

Table 3.1
Decomposition Results of DoD and Non-DoD Federal Workforces and the Civilian Labor Force

Variable	DoD	Non-DoD Federal
Representation difference	0.090	–0.055
	(0.0009)	(0.0008)
Explained component	0.111	–0.043
	(0.0014)	(0.0019)
Race and ethnicity	–0.002	–0.006
	(0.0002)	(0.0002)
Age	–0.005	–0.004
	(0.0002)	(0.0002)
Education level	–0.001	0.015
	(0.0003)	(0.0003)
Citizenship	–0.004	–0.004
	(0.0002)	(0.0002)
Veteran status	0.114	0.045
	(0.0008)	(0.0003)
Occupation	0.014	–0.084
	(0.001)	(0.0011)
Location	–0.004	–0.006
	(0.0006)	(0.0015)
Unexplained component	–0.021	–0.012
	(0.0014)	(0.0019)

SOURCES: ACS and OPM data.

NOTE: A number in parentheses is the standard error for the result in the cell above it. Results represent coefficients from a Blinder–Oaxaca decomposition of linear regressions predicting the probability of being female conditional on all characteristics. Models include survey weights and cluster-robust standard errors to account for the sampling design of the ACS. All coefficients are statistically significant at $p < 0.001$. All results were computed using the oaxaca command in Stata (Jann, 2008), which computes standard errors from the model variance–covariance matrices using the delta method.

low women's representation in each federal workforce. In the DoD workforce, the contribution of veterans is more than enough to explain the entire gap in women's representation between DoD and the CLF.

From applying the CLF patterns to the DoD workforce, the decomposition results suggest that the relatively high proportion of employees who are veterans translates into an 11.1–percentage point gap in gender representation, conditional on other characteristics (represented

by the height of the gray bar in Figure 3.1 and the veteran-status coefficient in Table 3.1). In the non-DoD workforce, the contribution of the proportion of veterans goes in the same direction. However, it is smaller because veterans make up a smaller proportion of non-DoD employees (see Table 2.1 and Equation 2.3 in Chapter Two).

In addition to veteran status, the occupation mix in the federal sectors relates to the representation gap but in different ways. For DoD, the net contribution of its occupation differences is an increase of 1.4 percentage points in the representation gap,[2] while the corresponding contribution of the non-DoD occupation mix is a *decrease* of 8.4 percentage points. This means that DoD occupations have a slightly male bent in the CLF, while non-DoD occupations tend to skew female. Other factors generally make small contributions and tend to be negative, which indicates that they do not contribute to the gap in the current specification. An examination of the contributions of the individual occupation groups in the DoD comparison revealed that the largest contributor was for architecture and engineering occupations—a group that makes up a relatively high proportion of DoD employees and also happens to have relatively low representation of women in the CLF.

Together, these results reveal that the high level of employment of veterans is the primary contributor to the gaps in the expected proportion of women in both the DoD and non-DoD workforces, even when included alongside a set of other workforce characteristics. Because most workforce policies under discussion revolve around hiring veterans, the next section explores the responsiveness that women's future representation has to changes in the proportions of veterans entering the workforce.

Projections of Women's Representation Under Varying Levels of Hiring of Veterans

Summary of Data Trends Governing Model Inputs

Before examining workforce projections, it is helpful to understand the group-specific dynamics that occurred between 2008 and 2013 in the OPM data, which form the basis of the parameters in Equation 2.4 in Chapter Two that govern the evolution of the workforce over time. Table 3.2 summarizes the overall change in the number of DoD federal employees in each demographic group (the first data column), as well as the allocation of new hires across demographic groups (the second data column), and the FY 2013 population in percentage and numerical terms (which is the starting inventory of the model).

With the exception of female nonveterans, the inventory for all demographic groups increased between 2008 and 2013, but the veteran populations grew much faster than the nonveteran populations during this expansionary period. A full explanation for this growth is beyond the scope of this report, but such an explanation could include known factors elevating both the government demand for workers who are veterans and the supply of veterans seeking employment. For example, Chapter One noted that this growth coincides with a policy emphasis on hiring veterans (e.g., see Obama, 2009). On the supply side, this period of growth

[2] The reported results specify occupation as one of 23 possible categories based on the census coding scheme. We explored specifications that included indicators for each census occupation code, as well as those that specified occupation as the simple PATCOB categories. In general, each additional increase in granularity increased occupation's contribution to the representation gap. Still, veteran status was the dominant contributor in all specifications.

Table 3.2
DoD Descriptive Statistics, by Demographic Subpopulation

Demographic Group	DoD Growth Rate, 2008–2013, as a Percentage	DoD New Hires, 2009–2013, as a Percentage	DoD Population, 2013	
			Number, in Thousands	Percentage
Male nonveterans	7.9	23.6	174.5	27.6
Male veterans	19.2	43.2	243.3	38.5
Female nonveterans	–1.9	22.2	162.6	25.8
Female veterans	41.6	11.1	51.1	8.1

SOURCE: OPM data.

could also relate to a temporary increase in veterans looking for employment, driven by economic conditions (Table 3.3). As a result, male and female veterans tended to be represented more among new hires than in the existing workforce, while numbers of male and female nonveteran new hires tended to be lower than their workforce proportions.

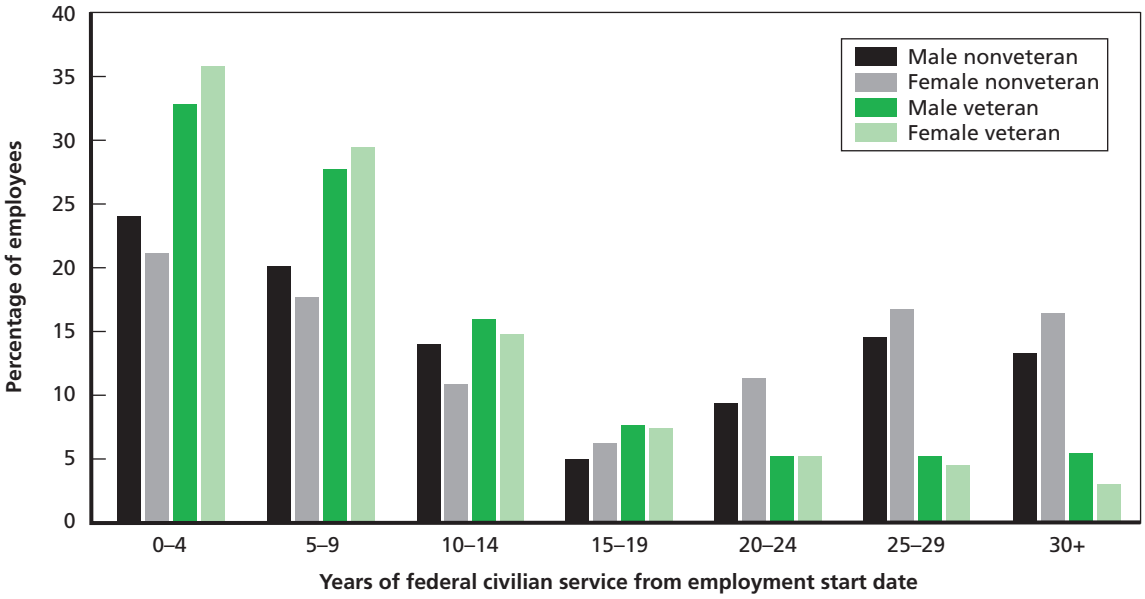
Figures 3.2 and 3.3 further describe the initial inventory (the number of employees currently in a workforce) in the last two columns of Table 3.2 by providing the experience and age distributions of the different demographic groups. Figure 3.2 shows that veterans in the initial inventory are more likely than their nonveteran counterparts to be in their first ten years of service (e.g., 61 percent of male veterans fall into these bins, but only 44 percent of male nonveterans do). Within the categories of veterans, the distribution of experience is similar between the two genders. Female veterans tend to have slightly fewer years of service than male veterans, whereas female nonveterans tend to have higher levels of experience than male nonveterans. The age distributions are similar across groups but singular at a few key points (Figure 3.3). Nonveterans are more likely than those in other groups to be in their 20s. Female veterans have a slightly higher tendency than those in other groups to be in their late 30s and early 40s, and male veterans and female nonveterans are disproportionately likely to be 55 or older.

Table 3.3
Average Official Unemployment Rate and Number of Unemployed Veterans, 2008–2013

Year	Average Official Unemployment Rate	Estimated Number of Unemployed Veterans
2008	5.8	597,576
2009	9.3	977,654
2010	9.6	1,072,619
2011	8.9	963,337
2012	8.1	829,941
2013	7.4	664,160

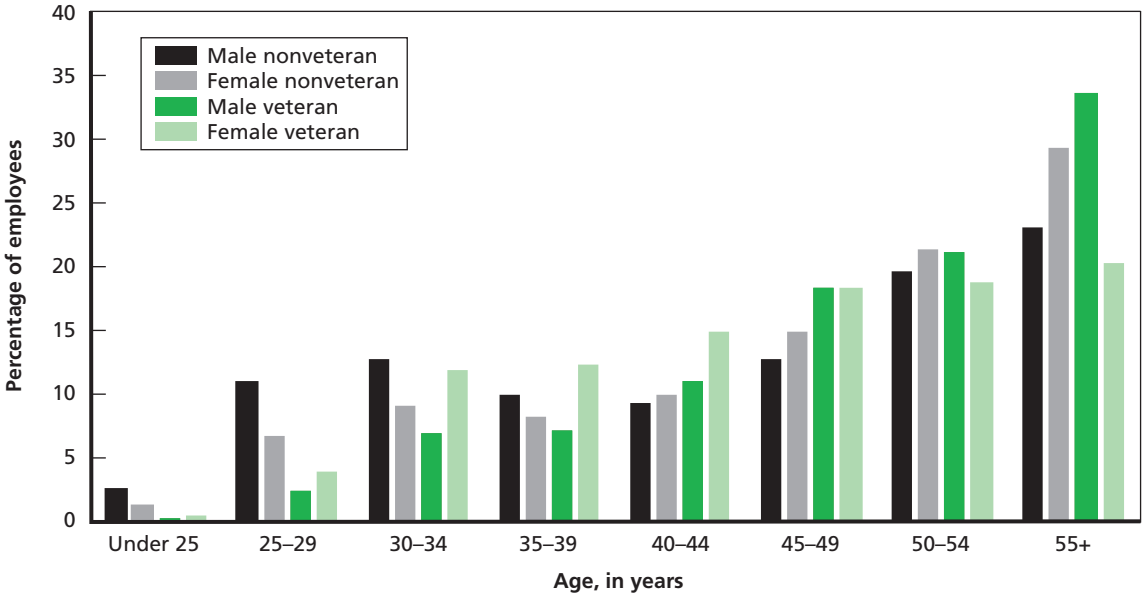
SOURCES: Official unemployment figures are from Bureau of Labor Statistics, undated, while the estimated number of unemployed veterans are based on ACS data (Ruggles, Flood, et al., 2018).

Figure 3.2
Initial Inventory, by Experience Level



SOURCE: OPM data.
RAND *RR2458-3.2*

Figure 3.3
Initial Inventory, by Age Group

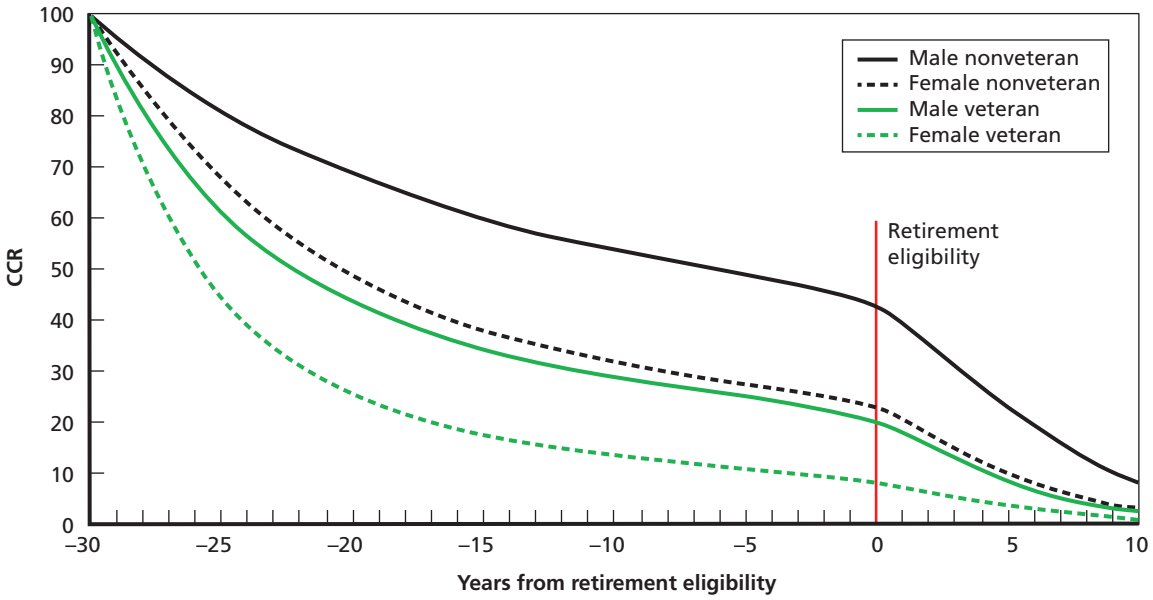


SOURCE: OPM data.
RAND *RR2458-3.3*

In addition to the previously discussed demographic differences in hiring patterns (i.e., inflow), there were large differences in continuation rates across groups in the OPM data (i.e.,

outflow). To illustrate these differences, Figure 3.4 shows the cumulative continuation rates (CCRs), based on the continuation rates that went into the model, for each group for employees in the range from 30 years prior to retirement eligibility to ten years after becoming retirement eligible. For a given year (relative to retirement eligibility), the CCR is the percentage of employees remaining through that year among a hypothetical cohort who began at the 30-year point (calculated as the product of the continuation rates for all previous years). For example, the top curve, representing CCRs for male nonveterans, shows that the continuation rates imply that 43 percent of personnel who began their careers with 30 years until retirement eligibility would remain in the DoD workforce until the point of retirement eligibility. In contrast, only 8 percent of female DoD veterans would remain at this same point (which stems from the much greater losses early on, as indicated by the slope of the curve). The CCRs are a useful illustration of what the patterns in the data imply for retention over the career life cycle, but the reader should also keep in mind that they are assembled piecemeal from combining the continuation rates of many cohorts of employees present in the personnel data from 2008 to 2012.[3]

Figure 3.4
Department of Defense Cumulative Continuation Rates for Federal Employees Retirement System Employees by Demographic Group



SOURCE: OPM data.
NOTE: These rates apply only to employees in the Federal Employees Retirement System, into which all new employees since 1987 have entered. For employees who were hired before 1987 and who remained in the legacy Civil Service Retirement System, we calculated a separate set of continuation rates. These continuation rates drive the long-run results as Civil Service Retirement System employees age out of the workforce and are not replaced.
RAND *RR2458-3.4*

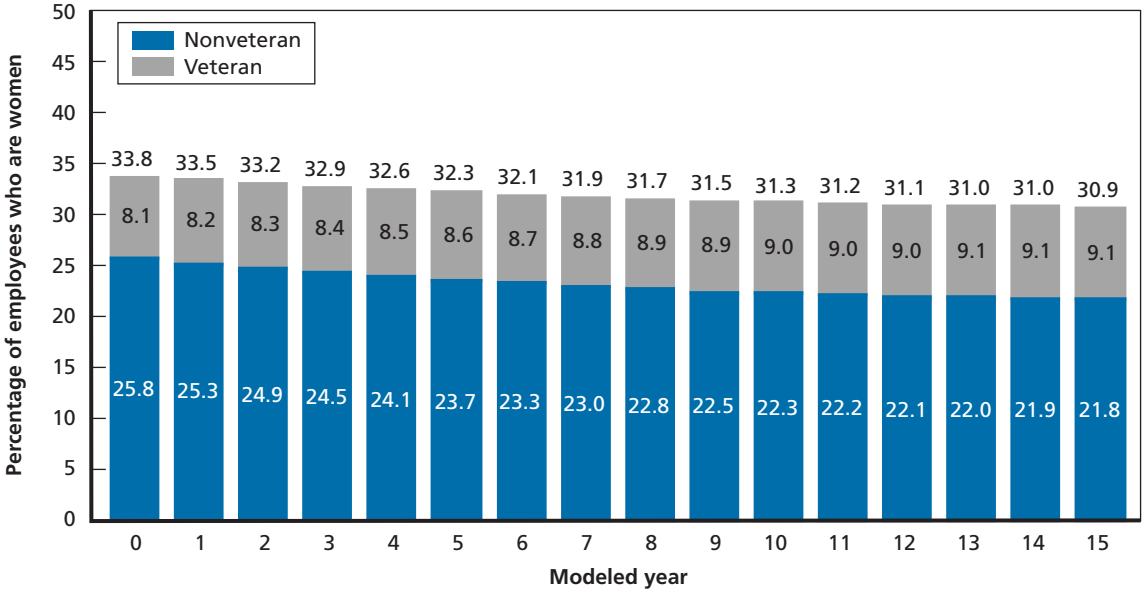
[3] Thus, the model implicitly assumes that employees who are further from retirement will follow the same patterns as previous cohorts as the workforce ages. It is possible that previous cohorts differ from new employees in the future, so they might have different continuation rates as they age. For this reason, others have recommended viewing inventory models as tools that project past trends into the future, rather than as predictions of the future.

Overall, when employees are grouped solely based on years relative to retirement eligibility, nonveteran retention tends to be higher than veteran retention,[4] and retention of men tends to be higher than retention of women, while retention patterns of female nonveterans are very similar to those of male veterans. Thus, although Table 3.2 indicated that veterans' representation would tend to be represented more among new hires than in the DoD workforce as a whole, lower rates of retention of veterans will tend to reduce veterans' representation in the workforce relative to that among new hires.

Recent Trends Project Declining Women's Representation in Coming Years

Figure 3.5 presents the first set of inventory model results, which show the projected level of women's representation in DoD, by veteran status, in the first 15 years of inventory flow. This baseline result reflects the level of women's representation that would be expected if workforce separation patterns in Figure 3.4 were to continue, with losses being replaced according to the average new-hire demographics in Table 3.2.[5] These results show that, *if recent trends continue*,

Figure 3.5
Projected Female Representation in DoD over Time, by Veteran Status



SOURCE: OPM data.
NOTE: These projected representation levels assume that average continuation rates from the OPM data (by years relative to retirement eligibility and retirement plan) will continue. The overall size of the DoD civilian workforce is held constant, with new hires allocated to demographic groups according to their historical proportions as shown in Table 3.2.
RAND *RR2458-3.5*

[4] One of the possible reasons for this result is that veterans in a given position relative to retirement eligibility tend to be older than nonveterans, all else being equal. In the data, if one compares retention of veterans and nonveterans conditional on age, rather than years until retirement eligibility, retention of veterans tends to be higher.

[5] Future retention patterns and new-hire demographics could differ from those we calculated from the recent personnel records, which would alter the expected level of women's representation. A key limitation to this model is that it does not capture potential trends in the parameters. For example, women's representation among active-duty accessions has increased over time (see, e.g., Lim et al., 2014), so the supply of *female veterans* could be even higher in the future. However,

women's representation will decline to roughly 31 percent after 15 years, despite the trend of increasing representation of female veterans. The reason for this decline is that the number of female new hires (driven by the new-hire proportions in Table 3.2) is lower than the level required to replace the losses among existing female employees. As long as this is the case, the population will tend to fall until it reaches the level at which the number of annual losses is in balance with the number of new hires. The decline in representation is greater in the first five years of inventory flow than in later years, which results from the fact that a relatively high proportion of the initial inventory of female nonveteran employees are close to retirement (Figure 3.3).

Large Reductions in the Hiring of Veterans Would Be Needed to Significantly Alter Women's Representation in DoD

Although the tension between opportunities for veterans and efforts to promote gender diversity has been raised before (MSPB, 2011), there are currently no concrete policy alternatives—with accompanying estimates of the expected reductions in the hiring of veterans—to evaluate. A natural starting place would be to assess the impact of limiting veteran-hiring preferences, but the true effect that these policies have on the likelihood of federal employment is somewhat mysterious.[6] Instead of evaluating specific policies, then, we characterize the relationship between hiring veterans and women's workforce representation as generally as possible so policymakers can see the magnitude of representation change that would occur under a variety of hiring scenarios and compare long-run representation levels to relevant benchmarks.

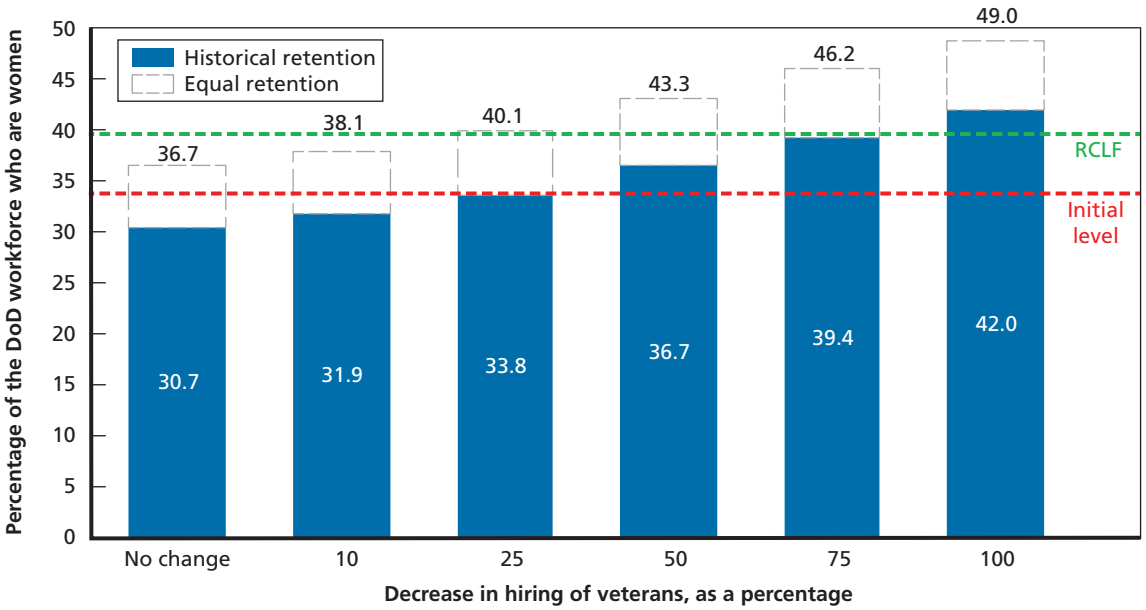
We first calculated women's representation in the long run (i.e., steady state) for a range of reductions in the hiring of veterans under the historical retention patterns, as well as the equalized retention patterns (Figure 3.6). We express the hiring reductions in terms of a percentage—that is, a 10-percent reduction in the hiring of veterans means that the number of new hires who are veterans is reduced by 10 percent and replaced by new hires who are nonveterans (with the gender splits held constant within each veteran-status category). The reductions in the hiring of veterans are intended to capture the range of potential effects from policies that shift aggregate hiring away from veterans to favor nonveterans, such as changes to the level of preference awarded to veteran over nonveteran applicants or more-aggressive recruiting of nonveterans to fill DoD positions. The difference between the representation level with equalized retention and the level under historical retention patterns illustrates the impact of relatively low levels of retention of women, or, alternatively, the potential change if new policies were implemented that disproportionately boosted women's retention relative to men's. Figure 3.6 also compares the long-run representation levels with the two benchmarks discussed in Chapter Two.

---

the proportion of new hires in the personnel records who are female veterans remains fairly consistent in the limited window of time we have. Additionally, changes in the supply of veterans seeking employment, such as those in Table 3.3, will likely occur and will affect new-hire demographics.

[6] MSPB, 1995, examines a sample of job postings and reports the frequency with which job postings receive at least one applicant, as well as selection rates depending on whether the top applicant was a veteran. The primary purpose of this study was to examine whether veterans would be worse off under a category rating system than the legacy rule-of-three system (that system requires a manager to select from among the top three candidates sent by the examining office). As of this writing, no study has provided a credible counterfactual estimate for how veterans' likelihood of employment would change if preference policies were altered.

Figure 3.6
Long-Run Representation of Women in DoD Under Scenarios Reducing the Level of Hiring of Veterans



SOURCES: ACS and OPM data.
NOTE: The RCLF is a benchmark estimate from a regression that takes into account age, education, citizenship, occupation, and geographic location (see Chapter Two). The initial representation level in 2013 is shown as an intermediate benchmark; the baseline projections show a long-run decline in representation.
RAND *RR2458-3.6*

The first bar, labeled "No change," shows that the long-run level of women's representation settles at 30.7 percent if recent hiring and retention trends are projected forward in perpetuity, which represents a decline of slightly more than 3 percentage points from the initial level. Further, with no change to retention, relatively substantial alterations to hiring of veterans would be necessary to bring long-run representation closer to the benchmarks. Reaching the initial level (i.e., preventing the decline that is projected under the no-change scenario) would require a 25-percent decrease in hiring of veterans, while a 75-percent decrease in that hiring is necessary to bring the projected level of representation near the level in the RCLF. The dashed gray sections show that gender differences in retention decrease long-run representation of women by 6 to 7 percentage points. Further, because the gender gap in retention rates is larger among nonveterans than among veterans, the size of the retention impact increases with lower levels of hiring of veterans (Figure 3.4).

As expected, these results show a relationship between DoD hiring patterns and long-run representation of women but that decreases to hiring of veterans on the order of 25 to 75 percent would be necessary to bring the DoD level of representation in line with its RCLF benchmark. Further, this finding accords well with the decomposition results, which showed that the contribution of the DoD–CLF difference in veterans' representation (where the CLF proportion of veterans was roughly 87 percent lower) was 11.1 percentage points. In the inventory model, reductions of a similar magnitude in hiring (i.e., 75 to 100 percent) produce a representation swing of between 8.7 and 11.3 percentage points. However, the retention scenarios

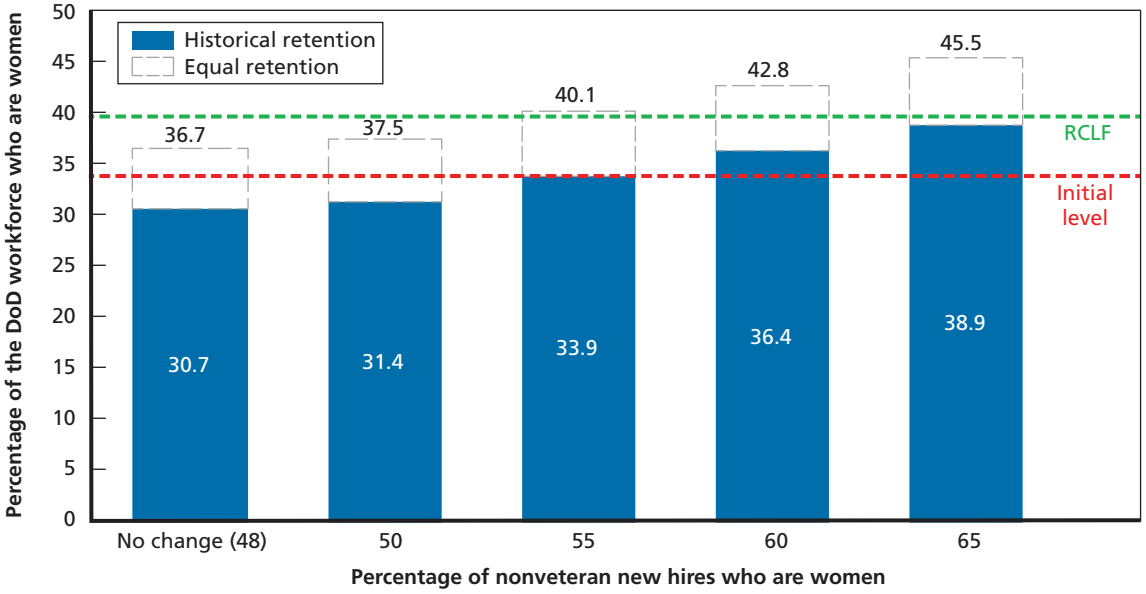
illustrate that gender differences in other workforce factors can also have significant impacts on women's representation in the long run.

With No Changes to Levels of Hiring of Veterans, Women Would Need to Make Up a Majority of Nonveteran New Hires to Reverse Projected Declines

It could be that policy alternatives that affect hiring of veterans are impractical or undesirable for various reasons. In this case, another approach would be to attempt to alter the gender mix of new hires directly. Targeted outreach efforts, for example, could boost the number of female applicants for DoD positions and increase women's representation among new hires. We used the inventory model to explore the projected effect of such potential efforts by varying the level of women's representation among *nonveteran* new hires only (because the number of female new hires who are veterans is likely constrained by recent historical patterns in DoD military accessions). Figure 3.7 depicts the results in the same form as Figure 3.6, with long-run representation levels for varying levels of increased hiring of female nonveterans. The first bar, labeled "No change (48%)," is the same as the first bar in Figure 3.6, except that, in Figure 3.7, women made up 48 percent of nonveteran female new hires in the historical data. Subsequent bars show the effect of raising the level of women's representation among nonveteran new hires, while holding the veteran/nonveteran mix constant.

The results of these scenarios show that women would need to make up a majority of nonveteran new hires before the long-run level of representation reached the first benchmark. That is, if no changes in hiring of veterans occur, DoD would consistently need 55 percent of its nonveteran new hires to be women in order to prevent the long-run level of women's representation from falling below the starting level in the initial inventory. Further, the results show

Figure 3.7
Long-Run Women's Representation in DoD Under Scenarios That Increase Female Nonveteran Hiring



SOURCE: OPM data.
NOTE: *RCLF* is a benchmark estimate of the RCLF from a regression that takes into account age, education, citizenship, occupation, and geographic location (see Chapter Two).

RAND *RR2458-3.7*

that different combinations of representation among new hires and retention increases bring projections in line with the RCLF benchmark. For instance, if a consistent 55 percent of nonveteran new hires were women *and* retention were equalized across genders, the long-run representation level would reach the benchmark. Alternatively, if 65 percent of nonveteran new hires were women, a much smaller change in retention would be required to reach the RCLF level.

In total, this analysis shows, with a diverse array of methods, that the proportion of government employees who are veterans likely works against women's representation in the federal service. However, the inventory modeling indicates that gains in women's representation are unlikely to result without careful attention to multiple demographic factors and trends. Further, without other changes, significant reductions in levels of hiring of veterans would be needed to move DoD closer to its RCLF benchmark. Chapter Four concludes with a discussion of policy alternatives in light of these findings.

CHAPTER FOUR

Discussion and Conclusion

Service members' demographic characteristics, including lower representation of women than of men, link to subsequent veterans' demographic characteristics. All else being equal, a workforce such as that in DoD—with a significant plurality of veterans—will tend to have a lower level of women's representation. This exploratory analysis tested which of DoD's broad workforce characteristics contribute to its relatively low level of representation of women.

Among the Characteristics Examined, the High Proportion of Veterans Is the Primary Contributor to the DoD–CLF Gender Representation Gap

Using the CLF as a benchmark, we estimate that the high proportion of veterans in the DoD and non-DoD civilian workforces is the most important contributor to the explained gaps in the representation of women among federal and CLF employees. In DoD, in which about 46 percent of the full-time permanent employees are veterans, our decompositions suggest that the level of employment of veterans contributes to lower representation of women, by double digits. Depending on the way occupations are categorized, the differences in the mix of occupations between DoD and the CLF also contribute to the representation gap. DoD has a higher proportion than the CLF does of certain occupations in which women are less likely to work. Other factors, such as age, education levels, and geographic location, do not appear to contribute to the lower levels of women's representation in DoD.

Significant Changes in the Hiring of Veterans Would Be Required to Substantially Increase Long-Run Representation of Women

Although female veterans are a fast-growing demographic in the DoD civilian workforce, workforce projections show that this growth is not enough to offset projected declines in the nonveteran female population. In other words, simply employing more veterans who are female will not strongly affect the overall level of women's representation in DoD. Thus, if recent patterns continue, the gap between women's representation in the CLF and DoD civilian workforces could grow.

Discussions of veterans' employment in the federal workforce often revolve around the issue of federal hiring preferences for this group (see, e.g., Lewis, 2013). However, no research has demonstrated what the level of veteran employment would be in the absence of the many programs that aid veterans in the hiring process. Importantly, both the decomposition analysis

and the inventory modeling confirm the existence of a demographic trade-off, in which high levels of employment of veterans are at odds with EEOC goals for women's representation. However, because the levels of DoD employment of veterans are so much higher than those in the CLF, our inventory model results demonstrate that substantial policy changes in levels of hiring of veterans would be needed to keep the level of women's representation in DoD from declining in the near future, let alone to change the composition in a way that allows DoD to gain ground relative to representation benchmarks. Future new-hire demographics and retention patterns could provide a tailwind by turning out to be different from the parameters assumed in the model, but they could just as easily accelerate the projected decline.

Beyond simple demographics, planners should consider whether there might be costs associated with hiring changes of this magnitude. Policies aimed at promoting the employment of veterans serve to recognize the contributions and sacrifices made by service members in support of the United States (MSPB, 2011). In addition, the military knowledge, skills, and experiences of veterans can provide a valuable source of continuity to DoD agencies and bolster DoD's human capital stock. The potential costs of reducing the share of veterans in the workforce to the levels required to reach the RCLF benchmark for women's representation could outweigh the benefits. Thus, the results suggest that policymakers desiring to move closer to EEOC benchmarks should carefully examine the costs of changing different hiring policies and weigh them against their estimated impact on gender diversity.

Long-Run Increases in Gender Diversity Require Careful Workforce Planning in Multiple Areas

Given the strong link between the high level of veterans' employment and lower level of gender diversity, it is tempting to focus on policies that promote hiring of veterans as the chief barrier to higher levels of women's representation. The inventory model illustrated, however, that increases in women's representation require careful attention and workforce planning in multiple stages throughout the career life cycle. In particular, the results show that increases in women's representation on the order that would bring DoD to the level of EEOC benchmarks are unlikely to occur without changes in the gender mix among nonveteran new hires or increases in women's retention relative to men's. In light of these results, this section draws on prior research to describe examples of how barriers to gender diversity could operate through the onboarding process, followed by a discussion of potential barriers to retaining women (see also EEOC, 2014, and Naff and Kellough, 2001). These discussions survey topics that are often mentioned in the literature, but all policy changes aiming to alter either recruitment or retention need to be studied for their likely impacts before implementation.

Policies for Recruitment and Onboarding

Our decomposition analysis suggests that many broad workforce characteristics, such as education levels required and job locations, do not appear to be contributors to the gap in women's representation in the federal workforces and the CLF. If these factors are not limiting the pool of potential workers, the success of attempts to increase women's representation among new hires could depend on the number of women who choose to seek out DoD employment and whether there are potential barriers in the hiring process.

To increase the supply of female applicants, DoD could outline what its current recruitment efforts are and evaluate which of these are most effective in reaching women and encouraging them to apply for DoD positions. For instance, targeted outreach efforts could focus on women pursuing technical degrees, given that the decomposition identified the high proportion of technical DoD jobs as a contributor to the explained component. In doing so, research will likely be required to determine the most-effective outreach approaches. Such approaches need to pay particular attention to recruiting women for higher-level positions in the department (such as the Senior Executive Service) because this will promote more-equal women's representation across GS levels and mitigate the aggregate gender pay differences.

If efforts can increase the numbers of female applicants but analyses find that they are hired at lower rates than male applicants (a hypothetical finding that is beyond the scope of this research), DoD should identify the root cause through barrier analysis (Matthews et al., 2017). Such efforts should examine whether female applicants lack key characteristics related to competitiveness, which can potentially inform adjustments to recruiting and outreach, helping DoD to attract female applicants who are the right fit for its workforce needs.

Measures Designed to Address Retention of Women in the Workforce

The aggregate retention patterns in DoD that we used to inform our workforce inventory model show that recent female employees have lower retention rates than those of male employees. Addressing gender differences in retention will likely require detailed analysis at lower echelons to address the root causes behind the rates observed in the data.

As discussed in Chapter One, previous research has shown that, within the overall federal civilian workforce, the salaries of women are lower than those of men in most professional and administrative occupations, and these pay differences are not fully explained by position-based or individual factors (Bolitzer and Godtland, 2012; U.S. Government Accountability Office, 1999; MSPB, 2011). Assessment of potential pay discrepancies in DoD and their impact on retention of women fell outside the scope of the present analyses. However, DoD could explore the extent to which implementing policies to address this pay gap would increase the level of retention of women in the department. Relatedly, difficulty attaining higher-level federal positions might also negatively affect retention of women, and previous research suggests that insufficient mentoring and limited networking opportunities contribute to this difficulty in the federal workforce (EEOC, 2014). Mentors help to communicate organizational expectations and educate workers about the qualifications necessary to obtain certain positions (Kellough and Naff, 2004). Mentoring is also strongly associated with career commitment (Colarelli and Bishop, 1990). DoD currently maintains a mentoring resource portal, and the services and different agencies within DoD provide mentoring programs (Defense Civilian Personnel Advisory Service, undated). However, awareness of, willingness to use, actual use of, and the career effects and perceptions following women's use of these resources in DoD are unclear. In addition, the extent to which senior-level DoD officials understand how to mentor and participate in mentoring of female employees is also not known.

Improved Demographic Workforce Models Could Aid Decisionmaking

DoD planners rely on workforce models to aid decisionmaking in many areas, but these models are not widely applied to demographics. The inventory model that we developed as part of this

research demonstrates the usefulness in barrier analysis of modeling potential policies and testing them to determine their effectiveness. A forward-looking decisionmaking process would use projection tools, such as inventory models, to understand the expected result of the status quo, as well as the potential effects of concrete steps aiming to move the organization closer to diversity benchmarks. If additional resources are necessary to execute a new program, such as a change in recruiting, workforce model results can help to justify such programs by demonstrating their likely impact. The baseline model results show that increases in diversity do not happen automatically and that, without careful planning, workforce demographics can drift further from desired levels over time.

Still, the workforce model in this analysis could be improved in a few ways. Future efforts could add granularity so individual agencies could examine their unique trends and barriers. Further, additional elements of workforce structure, such as grade levels, could go beyond workforce representation as a whole and yield insights about the impact that policies about senior-level representation could have on senior-level representation. The few insights gleaned from this exploratory analysis demonstrate the value of these approaches.

Conclusion

High levels of employment of veterans are likely a barrier to raising women's representation in the federal workforce, all else being equal. However, attempting to reduce veterans' advantages in the hiring process might not have the desired impact if policies do not address other important factors (such as gender differences in retention).[1] The changes in the composition of the DoD workforce that would be required to reach the RCLF benchmark could also have secondary impacts that planners should investigate if, for instance, veterans possess certain skills or experiences that are uncommon among nonveterans and difficult or costly to develop internally.

An alternative to focusing on a single factor (even one as apparently important as the high level of employment of veterans) might be to take an incremental approach across the areas of recruiting, onboarding, and retention. In this vein, the best path forward for DoD planners seeking to increase women's representation would be to identify feasible policy changes in each area that address representation gaps, and then assess the projected representation levels under each policy change using workforce projection techniques (such as the one we employed in this analysis). Policymakers could then weigh the costs of these changes against the potential benefits in terms of gender diversity.

[1] Research identifying the portion of the high level of DoD employment of veterans that is purely attributable to hiring preferences could clarify this issue.

References

Asch, Beth J., Trey Miller, and Gabriel Weinberger, *Can We Explain Gender Differences in Officer Career Progression?* Santa Monica, Calif.: RAND Corporation, RR-1288-OSD, 2016. As of February 6, 2018: https://www.rand.org/pubs/research_reports/RR1288.html

Blinder, Alan S., "Wage Discrimination: Reduced Form and Structural Estimates," *Journal of Human Resources*, Vol. 8, No. 4, Autumn 1973, pp. 436–455.

Bolitzer, Benjamin, and Erin M. Godtland, "Understanding the Gender–Pay Gap in the Federal Workforce over the Past 20 Years," *American Review of Public Administration*, Vol. 42, No. 6, 2012, pp. 730–746.

Bureau of Labor Statistics, "Databases, Tables and Calculators by Subject," undated. As of March 5, 2018: https://data.bls.gov/timeseries/LNS14000000

Choi, Sungjoo, "Diversity in the U.S. Federal Government: Antecedents and Correlates of Diversity in Federal Agencies," *Review of Public Personnel Administration*, Vol. 30, No. 3, 2010, pp. 301–321.

———, "Diversity and Representation in the U.S. Federal Government: Analysis of the Trends of Federal Employment," *Public Personnel Management*, Vol. 40, No. 1, Spring 2011, pp. 25–46.

Colarelli, Stephen M., and Ronald C. Bishop, "Career Commitment: Functions, Correlates, and Management," *Group and Organization Management*, Vol. 15, No. 2, June 1990, pp. 158–176.

Copeland, Curtis W., *The Federal Workforce: Characteristics and Trends*, Washington, D.C.: Congressional Research Service, RL34685, September 30, 2008. As of July 5, 2018: https://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1560&context=key_workplace

Defense Civilian Personnel Advisory Service, "Mentoring Program Links," undated. As of January 26, 2018: https://www.cpms.osd.mil/Subpage/NewBeginnings/MentoringLinks

EEOC—*See* U.S. Equal Employment Opportunity Commission.

Gabriel, Paul E., and Susanne Schmitz, "Gender Differences in Occupational Distributions Among Workers," *Monthly Labor Review*, June 2007, pp. 19–24. As of July 5, 2018: https://www.bls.gov/opub/mlr/2007/06/art2full.pdf

Gardeazabal, Javier, and Arantza Ugidos, "More on Identification in Detailed Wage Decompositions," *Review of Economics and Statistics*, Vol. 86, No. 4, November 2004, pp. 1034–1036.

Gates, Susan M., Edward G. Keating, Adria D. Jewell, Lindsay Daugherty, Bryan Tysinger, Albert A. Robbert, and Ralph Masi, *The Defense Acquisition Workforce: An Analysis of Personnel Trends Relevant to Policy, 1993–2006*, Santa Monica, Calif.: RAND Corporation, TR-572-OSD, 2008. As of July 5, 2018: https://www.rand.org/pubs/technical_reports/TR572.html

Gates, Susan M., Beth Roth, Sinduja Srinivasan, and Lindsay Daugherty, *Analyses of the Department of Defense Acquisition Workforce: Update to Methods and Results Through FY 2011*, Santa Monica, Calif.: RAND Corporation, RR-110-OSD, 2013. As of July 5, 2018: https://www.rand.org/pubs/research_reports/RR110.html

Jann, Ben, "The Blinder–Oaxaca Decomposition for Linear Regression Models," *Stata Journal*, Vol. 8, No. 4, 2008, pp. 453–479.

Kellough, J. Edward, "Integration in the Public Workplace: Determinants of Minority and Female Employment in Federal Agencies," *Public Administration Review*, Vol. 50, No. 5, September–October 1990, pp. 557–566.

Kellough, J. Edward, and Katherine C. Naff, "Responding to a Wake-Up Call: An Examination of Federal Agency Diversity Programs," *Administration and Society*, Vol. 36, No. 1, March 2004, pp. 62–90.

Labbadia, Pat, III, "Veterans' Preference Statutes: Do They Really Discriminate Against Women?" *Duquesne Law Review*, Vol. 18, No. 3, Spring 1980, pp. 653–682.

Lewis, Gregory B., "The Impact of Veterans' Preference on the Composition and Quality of the Federal Civil Service," *Journal of Public Administration Research and Theory*, Vol. 23, No. 2, April 1, 2013, pp. 247–265.

Lim, Nelson, Louis T. Mariano, Amy G. Cox, David Schulker, and Lawrence M. Hanser, *Improving Demographic Diversity in the U.S. Air Force Officer Corps*, Santa Monica, Calif.: RAND Corporation, RR-495-AF, 2014. As of March 5, 2018:
https://www.rand.org/pubs/research_reports/RR495.html

Matthews, Miriam, Bruce R. Orvis, David Schulker, Kimberly Curry Hall, Abigail Haddad, Stefan Zavislan, and Nelson Lim, *Hispanic Representation in the Department of Defense Civilian Workforce: Trend and Barrier Analysis*, Santa Monica, Calif.: RAND Corporation, RR-1699-OSD, 2017. As of July 5, 2018:
https://www.rand.org/pubs/research_reports/RR1699.html

MSPB—*See* U.S. Merit Systems Protection Board.

Naff, Katherine C., and J. Edward Kellough, *A Changing Workforce: Understanding Diversity Programs in the Federal Government*, Washington, D.C.: PricewaterhouseCoopers Endowment for the Business of Government, December 2001. As of August 8, 2018:
http://www.businessofgovernment.org/report/
changing-workforce-understanding-diversity-programs-federal-government

Nataraj, Shanthi, Christopher Guo, Philip Hall-Partyka, Susan M. Gates, and Douglas Yeung, *Options for Department of Defense Total Workforce Supply and Demand Analysis: Potential Approaches and Available Data Sources*, Santa Monica, Calif.: RAND Corporation, RR-543-OSD, 2014. As of July 5, 2018:
https://www.rand.org/pubs/research_reports/RR543.html

Neumark, David, "Employers' Discriminatory Behavior and the Estimation of Wage Discrimination," *Journal of Human Resources*, Vol. 23, No. 3, Summer 1988, pp. 279–295.

Oaxaca, Ronald, "Male–Female Wage Differentials in Urban Labor Markets," *International Economic Review*, Vol. 14, No. 3, October 1973, pp. 693–709.

Oaxaca, Ronald L., and Michael R. Ransom, "On Discrimination and the Decomposition of Wage Differentials," *Journal of Econometrics*, Vol. 61, No. 1, March 1994, pp. 5–21.

Obama, Barack, "Employment of Veterans in the Federal Government," Washington, D.C.: White House, Executive Order 13518, November 9, 2009. As of July 5, 2018:
https://www.federalregister.gov/documents/2009/11/13/E9-27441/
employment-of-veterans-in-the-federal-government

OPM—*See* U.S. Office of Personnel Management.

Pendry, Louise F., Denise M. Driscoll, and Susannah C. T. Field, "Diversity Training: Putting Theory into Practice," *Journal of Occupational and Organizational Psychology*, Vol. 80, No. 1, March 2007, pp. 27–50.

Public Law 78-359, Veterans' Preference Act of 1944, June 27, 1944.

Public Law 105-339, Veterans Employment Opportunities Act of 1998, October 31, 1998. As of July 11, 2018:
https://www.gpo.gov/fdsys/pkg/PLAW-105publ339/content-detail.html

Public Law 106-65, National Defense Authorization Act for Fiscal Year 2000, October 5, 1999. As of July 12, 2018:
https://www.gpo.gov/fdsys/pkg/PLAW-106publ65/content-detail.html

Robbert, Albert A., Anthony D. Rosello, C. R. Anderegg, John A. Ausink, James H. Bigelow, Bill Taylor, and James Pita, *Reducing Air Force Fighter Pilot Shortages*, Santa Monica, Calif.: RAND Corporation, RR-1113-AF, 2015. As of August 8, 2017:
https://www.rand.org/pubs/research_reports/RR1113.html

Ruggles, Steven, J. T. Alexander, Katie Genadek, Ronald Goeken, M. B. Schroeder, and Matthew Sobek, *Integrated Public Use Microdata Series*, version 5.0, Minneapolis: University of Minnesota, 2010. As of July 4, 2018:
https://usa.ipums.org/usa

Ruggles, Steven, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas, and Matthew Sobek, *IPUMS USA*, version 8.0, Minneapolis: Integrated Public Use Microdata Series, 2018. As of August 8, 2018:
https://doi.org/10.18128/D010.V8.0

Schulker, David, "The Recent Occupation and Industry Employment Patterns of American Veterans," *Armed Forces and Society*, Vol. 43, No. 4, October 2017, pp. 695–710.

U.S. Census Bureau, "American Community Survey: Data Releases, 2013," last revised June 17, 2018. As of July 5, 2018:
https://www.census.gov/programs-surveys/acs/news/data-releases.2013.html

U.S. Code, Title 5, Government Organization and Employees; Part III, Employees; Subpart A, General Provisions; Chapter 21, Definitions; Section 2108, Veteran, Disabled Veteran, Preference Eligible. As of July 5, 2018:
https://www.gpo.gov/fdsys/granule/USCODE-2011-title5/
USCODE-2011-title5-partIII-subpartA-chap21-sec2108

U.S. Equal Employment Opportunity Commission, *Federal Responsibilities Under Section 717 of Title VII and Section 501 of the Rehabilitation Act*, Equal Employment Opportunity Management Directive 715, effective October 1, 2003; referenced March 20, 2008, last modified August 26, 2003. As of July 10, 2018:
https://www.eeoc.gov/federal/directives/md715.cfm

———, "EEOC Federal Sector Occupation Cross-Classification Table," January 2013. As of April 17, 2018:
https://www.eeoc.gov/federal/directives/00-09opmcode.cfm

———, *Women's Work Group Summary*, Washington, D.C., 2014. As of January 28, 2018:
https://www.eeoc.gov/federal/reports/upload/women_workgroup_report.pdf

U.S. Government Accountability Office, *Women's Pay: Gender Pay Gap in the Federal Workforce Narrows as Differences in Occupation, Education, and Experience Diminish*, Washington, D.C., GAO-09-279, March 17, 2009. As of July 5, 2018:
https://www.gao.gov/products/GAO-09-279

———, *Federal Workforce: Recent Trends in Federal Civilian Employment and Compensation*, Washington, D.C., GAO-14-215, January 29, 2014. As of July 5, 2018:
https://www.gao.gov/products/GAO-14-215

U.S. Merit Systems Protection Board, *The Rule of Three in Federal Hiring: Boon or Bane?* Washington, D.C., December 1995. As of February 9, 2018:
https://www.mspb.gov/MSPBSEARCH/
viewdocs.aspx?docnumber=253660&version=253947&application=ACROBAT

———, *Women in the Federal Government: Ambitions and Achievements*, Washington, D.C., May 2011. As of July 5, 2018:
https://www.mspb.gov/mspbsearch/
viewdocs.aspx?docnumber=606214&version=608056&application=ACROBAT

———, "How You Hire and Who You Hire: The Implications of the Appointing Authority," *Issues of Merit*, Fall 2014, p. 4. As of January 28, 2018:
https://www.mspb.gov/netsearch/
viewdocs.aspx?docnumber=1085840&version=1090192&application=ACROBAT

U.S. Office of Personnel Management, *Veterans Services: Vet Guide*, Washington, D.C., undated. As of January 26, 2018:
https://www.opm.gov/policy-data-oversight/veterans-services/vet-guide-for-hr-professionals/

———, "Repeal of Dual Compensation Reductions for Military Retirees," *Federal Register*, Vol. 65, No. 71, April 12, 2000, pp. 19643–19644. As of April 13, 2018:
https://www.gpo.gov/fdsys/pkg/FR-2000-04-12/pdf/00-8838.pdf

———, "A Message from the Director of the U.S. Office of Personnel Management," memorandum from John Berry transmitting and including the Federal Equal Opportunity Recruitment Program report for fiscal year 2011, Washington, D.C., c. 2012. As of January 25, 2018:
https://archive.opm.gov/About_OPM/reports/feorp/2011/feorp2011.pdf

———, *Governmentwide Strategy on Advancing Pay Equality in the Federal Government*, Washington, D.C., April 2014. As of July 5, 2018:
https://www.opm.gov/policy-data-oversight/pay-leave/reference-materials/reports/Governmentwide-Strategy-on-Advancing-Pay-Equality-in-the-Federal-Government.pdf

———, *Employment of Veterans in the Federal Executive Branch: Fiscal Year 2016*, Washington, D.C., June 2017. As of July 5, 2018:
https://www.fedshirevets.gov/veterans-council/veteran-employment-data/employment-of-veterans-in-the-federal-executive-branch-fy2016.pdf

Yun, Myeong-Su, "Decomposing Differences in the First Moment," *Economics Letters*, Vol. 82, No. 2, February 2004, pp. 275–280.

———, "A Simple Solution to the Identification Problem in Detailed Wage Decompositions," *Economic Inquiry*, Vol. 43, No. 4, October 2005, pp. 766–772.