Can We Explain Gender Differences in Officer Career Progression?

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Preface

In 2011, the congressionally mandated Military Leadership Diversity Commission (MLDC) concluded that two factors contributed to the underrepresentation among senior military leaders of racial and ethnic minority and female officers: lower rates of promotion than white male officers and, in the case of midlevel female officers, lower retention. Left unclear is the relative contribution of each. That is, to what extent is the lack of representation mostly because of lower retention, lower promotion rates, or both? The MLDC relied, in part, on the results of an earlier RAND study that tracked the retention and promotion of officers, using data on officer cohorts entering between 1967 and 1991 and tracking them through 1994.

Because the results of this earlier study are dated, the Office of the Secretary of Defense asked RAND to update the study, using more-recent data. The Office of the Secretary of Defense also requested that RAND provide information on what explains gender differences in the officer career pipeline. The updated analysis was conducted in the first phase of our research, summarized in Beth Asch, Trey Miller, and Alessandro Malchiodi, *A New Look at Gender and Minority Differences in Officer Career Progression in the Military* (2012). The second phase of the research is summarized in this report and addresses the question of what explains gender differences in the officer career pipeline. The analysis should be of interest to the policy community concerned about the career progression of minority and female officers and the military manpower research community.

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Summary

An ongoing concern of personnel managers in the Department of Defense (DoD) is the lack of diversity among senior military leaders, as well as the need to improve the representation of female officers in the senior ranks. In January 2013, the Secretary of Defense lifted the restriction on the service of women in combat units, and the services had until January 2016 to provide a review of their standards and assignment policies for implementing this policy. As a result of the review, all gender-based restrictions were lifted, starting in January 2016. Despite this recent focus on gender integration, surprisingly little quantitative information is available on how the career trajectories of female and male officers differ and the factors that explain those differences, though a notable exception is an older study by Hosek et al. (2001).

In this study, we conducted a two-phase analysis to address the gap in quantitative information on differences in the career progression of officers based on gender and minority status, as well as the factors that explain these differences. In the first phase, we updated the Hosek et al. (2001) study using more-recent data. This analysis is summarized in Asch, Miller, and Malchiodi (2012). The second phase of the study is summarized in this report. The objective of this second phase is to provide quantitative information on the factors that explain gender differences in officer career progression. The analysis in both reports examines career progression as a series of retention and promotion outcomes, each conditional on having attained the proceeding outcome. Specifically, we consider ten specific career milestones: retention at O1,

promotion to O2, retention at O2, promotion to O3, and so forth. The last milestone is promotion to O6.

Data and Methods

We used longitudinal data on officers provided by the Defense Manpower Data Center to track cohorts of officers entering between 1971 and 2005 over their careers, from 2000 through 2010. The data we used include information on occupation; service branch; grade; source of commission; deployments; and demography, including such variables as race, ethnicity, gender, education, marital status (e.g., dual-military status), the presence of dependents, and the ages of dependents.

We used a regression decomposition methodology, based on the well-known Blinder-Oaxaca method, to decompose gender differences in the likelihood of officers reaching each subsequent career milestone into the portion that is attributable to differences in observed characteristics and the portion that is attributable to the association between a given characteristic and the likelihood of achieving a given career milestone. We call the former part the *observed component* of the gender gap regarding the likelihood of reaching a given milestone and the latter part the *association component*. The associations we estimated capture structural factors—e.g., the factors that cause retention and promotion outcomes to differ for male and female officers with the same observed characteristics, as well as the role of self-selection and endogeneity of both observed and unobserved characteristics. Our method permits the detailed decomposition of the observed and association components into the contributions of specific observed characteristics. Thus, we are able to assess which specific characteristics, such as occupational group and age of dependents, are the most important contributors to each component of the gender gap in career progression between male and female officers.

It is important to recognize that the analysis provides descriptions of gender differences in career progression and the extent to which those differences are explained by differences in observed characteris-

tics and the associations between characteristics and career-progression outcomes. The analysis does not assess why observed characteristics differ or why differences in factors are positively or negatively related to career progression. Furthermore, because of estimation issues related to possible selectivity biases, we must be cautious in our interpretation of the analysis and focus on general magnitudes of results rather than specific estimates. Also, because of data constraints, the analysis focuses on officer retention and promotion behavior from 2000 to 2010, a period when many officers were deployed for the wars in Iraq and Afghanistan. This limits the comparability of our results to past studies and might also result in different relationships between family status and career progression than what would happen during peacetime. Nonetheless, our study provides one of the first quantitative assessments of the factors associated with gender differences in career progression across the officer force in the Department of Defense (DoD) that explicitly considers what can and cannot be explained by observed characteristics.

Gender Differences in Career Progression and Observed Characteristics

Table S.1 shows tabulations of the gender differences in officer career progression. We find larger gender differences in the midcareer. Specifically, female officers are less likely to be promoted to O3, conditional on retention as an O2 (by 3.6 percentage points); less likely to be retained as an O3 until the O4 promotion window (by 11.8 percentage points); and less likely to be promoted to O4, conditional on retention as an O3 (by 6.0 percentage points). Beyond that point, we find relatively little difference until the O5 retention point, where female officers are less likely to stay as an O5 than male officers (by 10.9 percentage points).

Our tabulations also reveal differences in the observed characteristics of male and female officers, which, in some cases, vary across career milestones because of differences in both career progression for a given cohort and characteristics across cohorts:

Table S.1
Officers Retained or Promoted in Phase 2 Analysis: Male Versus Female Officers

Milestone	Overall (%)	Male Officers (%)	Female Officers (%)	Difference (Male Minus Female)
Retained as O1	99.9	99.9	99.8	0.1
Promotion to O2	98.1	98.2	97.2	1.0
Retained as O2	99.5	99.6	99.2	0.4
Promotion to O3	92.7	93.3	89.6	3.6
Retained as O3	82.0	83.2	71.6	11.8
Promotion to O4	83.6	84.2	78.1	6.0
Retained as O4	92.3	92.4	91.3	1.2
Promotion to O5	85.4	85.6	83.5	2.1
Retained as O5	86.2	86.2	76.3	10.9
Promotion to O6	59.2	59.3	58.0	1.3

NOTE: The last column was calculated before the percentages were rounded. The largest gender differences are highlighted.

- Female officers are less likely to be academy graduates, more likely to be in administrative occupations, and less likely to be in tactical occupations.
- Female officers are less likely to be married, more likely to be a dual-military spouse, and less likely to have dependents than male officers at each career milestone.
- Female officers have more education, are more likely to have entered a recent cohort, and are less likely to have prior enlisted service.

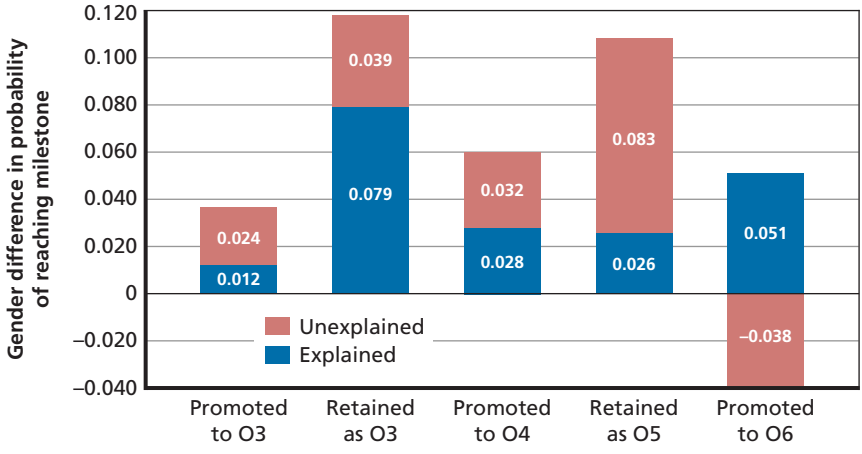
Decomposition of Gender Differences in Career Progression

We decomposed the gender differences in the likelihood of achieving a given milestone into observed and association components, focusing on those milestones with larger differences (bolded in Table S.1) and with relatively large observed and association components (as is the case of promotion to O6).

A key finding is that the portion of the difference attributable to variations in observed characteristics is not 100 percent; observed differences in individual and job characteristics explain some but not all of the differences in the likelihood of reaching the selected milestones (see Figure S.1).

- In the case of retention as an O3, at most the observed differences in characteristics explain about two-thirds (7.9 out of 11.8 percentage points) of the gender difference.
- In the case of retention as an O5, differences in observed characteristics only explain about one-quarter of the gender difference.

Figure S.1
Decomposition of Gender Differences in Probability of Achieving Selected Career Milestones: Explained and Unexplained Components



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- In the case of promotion to O6, observed differences in characteristics contributed to a lower likelihood of promotion for female relative to male officers, but unexplained factors contributed an almost equal amount to women's higher likelihood of promotion. That is, observed factors are disadvantageous to the O6 promotion for female officers relative to male officers, but differences in the associations between factors and O6 promotion for male and female officers are advantageous and almost completely offset the disadvantageous factors.

In short, differences in observed characteristics are important contributors to gender differences in career progression but are not the only contributors.

We further decomposed the observed and association components of the gender difference in officer career progression into specific characteristics. We did this for the milestones where these components are sizable: retention as an O3, promotion to an O4, retention as an O5, and promotion to an O6. Table S.2 summarizes the results. It shows the characteristics that are the main contributors to the observed component and the association component of the gender gap in the likelihood of reaching the milestone.

Table S.2
Summary of the Main Contributors to Gender Differences in Reaching Selected Milestones

Key Milestone	Difference in Gender Gap Attributable to Variations in Observed Characteristics	Difference in Gender Gap Attributable to Variations in the Association Between Characteristic and Outcome
Retained as O3	Family status, occupation, entry year	Family status, occupation, deployment experience, prior service, entry year
Promoted to O4	Family status, occupation, entry year	Family status, race/ethnicity
Retained as O5	Occupation	Prior service, entry year
Promoted to O6	Family status, deployment experience	Family status, deployment experience, race/ethnicity

Key Findings on the Characteristics That Contributed to the Observed Component of the Gender Gap

Among the characteristics that contributed to the portion of the gender gap attributable to differences in observed characteristics, family status—including marital status and presence of children—was consistently important at the selected milestones. The lower marriage rate and lower likelihood of having dependents among female officers (relative to male officers) contributed to the gender gap at these milestones, given that being married and having dependents were both positively associated with career progression among officers. As with their civilian counterparts, better-educated women in the military postponed marriage and childbirth. Yet, also like their civilian counterparts, married men had better career outcomes (A. Miller, 2011; Buckles, 2008; Lundberg and Rose, 2000; Waite, 1995).

Occupational group and, related to occupation, cumulative months of deployment were also generally disadvantageous to female officers, in terms of contributing to the gender gap in career progression attributable to differences in observed characteristics. While our descriptive analysis does not assess the effects on career progression of restrictions on the service of women, the analysis indicates that the lower representation of female officers in tactical occupations and higher representation in administrative occupations contributed to the observed component of the gender gap in the likelihood of career progression to key milestones. Entry year was also a main contributor. Female officers were more likely to enter in recent years, and more-recent entrants had a lower likelihood of being retained and promoted in the midcareer.

Key Findings on Characteristics That Contributed to the Association Component of the Gender Gap in Career Progression

As mentioned, differences in observed characteristics were not the only contributor to gender differences in career progression. Differences in the associations between these characteristics and the probability of reaching each milestone were also important. The differences in associations captured the differences in retention and promotion outcomes for male and female officers with the same observed characteristics.

Several factors contributed to the portion of the gender gap attributable to differences in the association between characteristics and the probability of reaching the selected milestones. Although no single factor is the primary contributor, family status is a statistically significant contributing factor to the association component in all milestones except retention as an O5, where few factors are statistically significant.

Specifically, we find that male and female officers with the same family status had different probabilities of being retained as an O3 (conditional on being promoted to O3), being promoted to O4 (conditional on being retained as an O3), and being promoted to O6 (conditional on being retained as an O5). For example, having a dependent between the ages of seven and 18 is positively associated with promotion to O6 for male officers but not for female officers. This result could be due to differences in the effects of children on promotion for male and female officers or to gender differences in the self-selection of officers who become eligible for O6 promotion, where the selection mechanism depends on the presence of children.

Key Findings on the Characteristics of the Overall Gender Gap in Career Progression

In addition to considering the contribution of specific characteristics to the observed and association components, we considered the overall contribution, or sum, of the two components for each characteristic to the three milestones with the largest gender gap: retention as an O3, promotion to O4, and retention as an O5. With respect to family status, we find that

- Family status had an overall positive and large contribution to the gender gap in terms of the probability of being retained as an O3. The lower marriage rate and rate of dependents among female officers, together with differences in the association between family status and O3 retention for male and female officers, contributed to the lower O3 retention among female officers.
- Family status contributed positively, overall, to the gender gap in the probability of promotion to O4 but had no statistically sig-

nificant overall contribution to gender differences in retention as an O5.

In short, family status tended to be disadvantageous to female officers in terms of contributing positively the gender gap in O3 retention and O4 promotion.

In contrast, occupational group differences were advantageous, overall, to female officers for being retained as an O3; although female officers were less likely to be in tactical occupations, which were more likely to be retained, the association between O3 retention and being in a tactical occupation was stronger for female officers. Thus, the negative contribution of the association component outweighed the positive contribution of the observed component, so the overall effect was advantageous for female officers. The opposite is the case for O5 retention; occupational group differences were a positive contributor overall to the gender gap in O5 retention.

Entry year was also a notable contributor to the gender gap in reaching key milestones. Female officers were more represented in recent entry cohorts, while female officers who entered in these recent cohorts had lower retention than male officers. Both the association component and observed component of the entry cohort variables are disadvantageous to female officers.

We find that being a dual-military spouse had little or no role in contributing to the explained and unexplained gender differences in officer career progression. This finding is surprising given the attention that issues and challenges facing dual-military couples have received from the research and policy communities (L. Miller et al., 2011; Smith, 2010; Moini, Zellman, and Gates, 2006; Steinberg, Harris, and Scarville, 1993; Teplitzky, 1988).

Our study does not necessarily imply that dual-military couples do not face challenges with such issues as colocation and finding adequate and dependable childcare, as past research has demonstrated. However, the study does suggest that such factors might not translate to material differences in the career progression of dual-military spouses. It could be that civilian spouses of officers tend to have high-stress, professional careers that could also contribute to lower retention

rates for their officer spouses. Alternatively, it could be that dual-military spouses exhibit higher attachment to their military careers, which might counterbalance the negative influence of those challenges.

Policy Implications

The results of our study have several policy implications, though it should be remembered that our analysis is descriptive and does not directly evaluate existing policies to reduce the gender gap in officer career progression. Given our findings about the role of characteristics in contributing to the gender gap, and specifically of family status and occupational group, policies that reduce differences in these characteristics (such as the lifting of restrictions on the service of women) are likely to contribute to the narrowing of the gender gap.

However, the analysis also indicates that these policies are unlikely to fully eliminate the gender gap, given the role of differences in the association between factors and career milestones. The associations we estimated captured structural factors and the role of self-selection and endogeneity of both observed and unobserved characteristics. With respect to unobserved characteristics, gender differences in taste for the military and performance could be important. Policies that improve attitudes toward service (such as those that address sexual harassment and assault), for example, could have a role insofar as they address the unexplained portion of the gender gap. We find that multiple factors contributed to the association portion of the gender gap, though family factors are among these factors. Thus, our analysis suggests that policies aimed at targeting work-family balance are likely to reduce the gender gap, given our findings on the important role of these factors in contributing to the gender gap. Finally, we find that dual-military officers exhibited similar patterns of career progression as other officers. It could be that the programs and policies that the services have developed to address issues among dual-military spouses, such as prioritizing the colocation of spouse duty, have helped.

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CHAPTER ONE

Introduction

This report is the second of two that provide information on the career progression of officers in the military and differences by race and ethnicity and gender. Both reports were motivated by an ongoing concern within the Department of Defense (DoD) about the diversity of the military's leadership, especially in the more-senior officer corps. While diversity has increased historically (Lim et al., 2014), minority and female officers are less likely to be in the senior-officer ranks (O4 through general and flag officer ranks) than in the junior-officer ranks. Table 1.1 shows that in fiscal year (FY) 2013, the most recent year for which DoD has published data, female officers composed 19.4 percent of junior officers in the grades of O1 to O3, but 13.8 percent in grades O4 to O6 and 7.7 percent of general and flag officers. While the percentages differ, the pattern is similar for racial minorities and Hispanics. Thus, officer diversity remains an ongoing concern.

Another motivation for the analysis was the lifting of the restriction on the service of women in combat units. The services had until January 2016 to provide a review of their standards and assignment policies for implementing this change. As a result of the review, all gender-based restrictions were lifted, beginning in January 2016. Despite this recent focus on gender integration, surprisingly little quantitative information is available on how the career trajectories of female and male officers differ and the factors that explain those differences, though a notable exception is an older study by Hosek et al. (2001).

Understanding the underrepresentation of minority and female officers in the senior ranks requires an understanding of differences in

Table 1.1
Active Component Officer Corps: Gender, Race, and Ethnicity Status, FY 2013

Status	Accessions (%)	O1 to O3 (%)	O4 to O6 (%)	General and Flag Officers (%)	All Officers (%)
Female	22.8	19.4	13.8	7.7	17.1
White	75.9	77.2	80.5	90.4	78.6
Black	7.5	8.3	9.0	6.6	8.6
Asian	5.4	5.1	3.8	1.8	4.6
Other, two or more, unknown	11.3	9.4	6.7	1.2	8.3
Hispanic	6.2	6.0	5.3	1.4	5.7

SOURCE: DoD., 2015, Tables B-23, B-25, B-38, and B-39.

their career progression and the factors that affect those differences. *Career progression* refers to the process by which individuals become an officer, pursue their military careers, and advance through the ranks. Differences in career progression might be due to a number of factors, including entry source and qualifications, occupation and job assignment, retention behavior, promotion selection criteria, and performance.

Study Objective and First-Phase Report

In our first report (Asch, Miller, and Malchiodi, 2012), we focused on two aspects of the career progression process for officers: promotion and retention. That report analyzed gender and minority differences in the attainment of successive promotion and retention milestones of entry cohorts of officers. It also analyzed differences in career progression among female officers in partially closed versus open occupations. The report provided a descriptive analysis of the extent to which lower promotion, lower retention, or both factors contributed to the lower

representation of minorities and female officers among senior military leaders. The report used data on entering officer cohorts, tracking their progression to each retention and promotion career milestone, O1 through O6, until 2010. That analysis also estimated differences between the career progression of female officers in occupations partially closed to women and female career progression in open occupations. The results were inputs to the Secretary of Defense's 2012 report to Congress on restrictions on the service of women (Office of the Under Secretary of Defense, Personnel and Readiness, 2012).

A key finding of the first report was that career progression does indeed differ for minority and female officers relative to white men. Minority male officers are more likely to be retained at each milestone but also less likely to be promoted, conditional on retention. In the early career, the lower promotion rate was offset by higher retention, so the likelihood that a minority male officer reached O4 was higher than for white male officers. However, in the field grades of O4 to O6, the lower promotion offset the higher retention. In particular, black male officers had a 19.5-percent likelihood of reaching O6, conditional on having reached O4, compared with 23.6 percent of white male officers. As a result of lower promotion rates, minority male officers were less likely to be among the pool of personnel from which senior general and flag officers are chosen, especially to the O4 and O5 milestones, despite higher retention.

For female officers, the report found some differences by race and ethnicity. However, the report generally found that female officers made slower progress in the early career to O4 than white male officers did, largely owing to lower promotion rates to O3 and O4, as well as lower retention following the O3 promotion. Female officers also made slower progress to O6, conditional on having reached O4, largely owing to lower retention after reaching O5. Thus, female officers were less likely to be part of the pool from which general and flag officers are selected, generally because of significantly lower retention at the O3 and O5 levels, as well as lower promotion to the O4 level. Finally, the report found that, on net, relative to men, women in partially closed occupations were as likely as women in open occupations to reach O6, conditional on having reached O4.

The earlier report was a descriptive analysis intended to provide updated and quantitative information on how career progression differs and at which points in careers those differences arise. The report did not attempt to examine the factors that are associated with those differences. The second half of our study focuses on this question.

This report provides quantitative analysis on some of the factors associated with differences in career progression, focusing specifically on female officers relative to male officers. The study provides information on the relative contribution of different factors toward explaining differences in career progression, particularly information on the relative importance of differences in the incidence of different factors versus differences in how a given factor is associated with career progression. For example, officers who are retained are more likely to be married, but female officers have a lower incidence of marriage over their careers. However, being married is positively associated with career progression at some stages for male officers but not for female officers.

Our analysis is designed to provide information on such questions as: To what extent is lower retention among female officers at each career milestone because of their lower incidence of marriage relative to male officers, to other observed differences between male and female officers, or to differences in retention even when men and women have the same observed characteristics? Similarly, the analysis is designed to address to the extent to which observed differences in promotion to each grade are attributable to observed differences in the characteristics of male and female officers versus differences in promotion, even when the observed characteristics are the same. We consider individual characteristics—focusing on family status and marital status, as well as presence and age of dependents—and job characteristics, including occupational area.

The role of occupational area is particularly salient. In January 2013, the combat exclusion policy was lifted on the service of women in combat positions in the U.S. military. Part of the argument made by the 2011 report of the Military Leadership Diversity Commission, as well as the 2012 Office of the Under Secretary of Defense, Personnel and Readiness, report of restrictions on the service of women in the

armed services, both in support of eliminating the combat exclusion, was that such the exclusion policy was an institutional barrier to career advancement. Female officers are less likely to be in occupational areas that are more likely to lead to future promotion. That is, senior leaders are disproportionately in occupations from which women faced restrictions in serving. While our analysis does not specifically focus on the effects of opening occupations on the career progression of female officers, it does provide information on the relative role of occupational group versus other factors in explaining differences in the career progression of female and male officers.

Family factors are also highly relevant. The Navy and Air Force are testing programs that permit service members to take a sabbatical or "career intermission" (Navy Personnel Command, n.d.; Losey, 2015). Part of the objective of these programs is to allow members to take time off to start or expand their families and more broadly help service members balance service and family life. Insofar as such family factors contribute to lower retention, one of the intentions of a sabbatical program is to improve retention and satisfaction with service. Our analysis of career progression examines the extent to which such factors explain differences in career progression for female versus male officers and the relative importance of these factors versus other factors, such as occupational area.

Past Literature

Our analysis contributes to a sparse but growing body of research exploring factors that might contribute to differences in the career progression of male and female officers. Broadly speaking, this literature suggests that family- and job-related characteristics play a role in officer career progression. Here we focus on family-related characteristics, since these factors are additions to our phase 1 analysis (the phase 1 analysis included job-related characteristics).

Qualitative studies have found that female service members indicate that time separated from family and work or life conflicts are their top reasons for leaving the military (Jones, 1997; Steinberg, Harris, and

Scarville, 1993). An unpublished quantitative analysis from RAND found lower continuation rates for female officers with a child younger than one at home. Another quantitative analysis indicated that being married and having dependents is positively related to officer retention for men but has no statistically significant relationship with retention for female officers (Kraus et al., 2013). Female officers cited difficulty in finding adequate childcare, particularly during times of deployment (Long, 2010; Smith, 2010; Steinberg, Harris, and Scarville, 1993; Teplitzky, 1988). Interviews and focus groups of female and male officers, summarized in Hosek et al. (2001), revealed that perceived limited occupational roles, concerns about harassment, and competing family obligations were the main reasons cited for why female officers separate from the military at a substantially greater rate than men. Lim et al. (2014) considered gender and minority differences in Air Force officer eligibility, accessions, retention, and promotion. With respect to gender differences and Air Force officer retention, the study found that the observed lower retention rates of female officers are partially but not fully explained by differences in observed factors, including marital status and presence of children, especially later in the officer career. However, the study found few differences in the promotion rates of male and female Air Force officers after controlling for observed characteristics, including these family-related factors and occupation.

Female officers are more likely to be married to another service member than are male officers, and available research suggests that being a joint spouse can affect career progression. Research suggests that dual-career officers can have difficulty maintaining a joint domicile, and such difficulties are an important contributor to the decision to leave (Smith, 2010; Steinberg, Harris, and Scarville, 1993; Teplitzky, 1988). Long (2010) found that deployments have a negative relationship with retention intentions, and the negative effect is larger for dual-career members than for other groups. Moini, Zellman, and Gates (2006) found that dual-military parents were substantially more likely than single parents to state in a survey that they would consider leaving because of childcare concerns. Laura Miller et al. (2011) found a similar result in the context of a survey they conducted of Air Force families. That study found that obtaining childcare during work or school

hours was cited as a problem more frequently for dual-military spouses than for civilian spouses.

That said, a major limitation of the existing literature is that, aside from being rather sparse, no previous study of gender differences in career progression decomposed the differences into the portion explainable by differences in individual and job characteristics and structural factors, such as the promotion process of the underlying retention decisions that relate to how those differences affect career progression. While observed factors might affect gender differences in career progression, such as having children, the role of these factors might be quite small relative to structural or unobserved factors.

Another drawback of the existing literature is that past studies usually focused on a specific service, or occupation, as opposed to the officer corps as a whole. In addition, some of the studies are dated (from before 2000). While the qualitative studies provide rich detail on relevant factors, they focus on retention intentions, not actual retention behavior. Furthermore, interview and focus group analysis cannot be generalized to the officer corps. Many of the quantitative studies are more recent but are often largely descriptive, focusing on a specific service or occupational area.

Our research differs from earlier analyses in a number of other ways. First, it considers the officer community as a whole and does not focus on officers in a specific service branch or community. This means that we are not able to provide narrowly focused results for a specific area of the military, but it also means that we provide a broad overview from a DoD perspective. Second, the analysis examines career progression as a series of retention and promotion outcomes, each conditional of the proceeding outcome. We consider ten specific career milestones: retention at O1, promotion to O2, retention at O2, promotion to O3, and so forth. The last milestone is promotion to O6. The advantage of this approach is that by considering the progression of retention and promotion outcomes separately, we can assess the extent to which a given factor is important, because of its relationship to retention (conditional on promotion), versus its relationship to promotion, given retention and the specific promotion or retention milestones that are important. Studies that only consider retention at a given career deci-

sion point, without conditioning the sequence of retention and promotion outcomes that led to the member being at that decision point, are unable to make such an assessment.

Finally, our analysis explicitly considers to what degree observed differences in the job and individual characteristics of female and male officers explain observed differences in their career progression and the degree to which career progression differences are because of structural or unobserved factors. To the extent that differences in observables explain gender differences in career progression, our study further decomposes observed differences into the contribution of individual characteristics. The decomposition is important because policy to reduce gender differences and improve the diversity of the senior officer force tend to focus more on reducing differences in observed characteristics and less on reducing differences in how those characteristics are related to career progression. Insofar as the latter is important, policies focused on addressing differences in observed characteristics will not be fully effective in reducing gender differences.

Approach

The approach we used built on the data and analysis in the first report. We use Defense Manpower Data Center (DMDC) Proxy-PERSTEMPO data on entering cohorts of officers, tracking their careers through 2010, supplemented with data from the DMDC Defense Enrollment Eligibility Reporting System Point-in-Time Extract (DEERS PITE) file on family-related factors. For each of the ten outcomes, we estimated a linear probability regression model that produced estimates of the association between individual and job-specific factors and the outcome of interest. We used these models to estimate how much of the observed difference in the outcome between male and female officers is attributable to the set of observed factors we considered and how much is due to unobserved factors or to the effects of both observed and unobserved factors on the outcome. That is, we quantified how much of the differences we observed are explainable by the fact that male and female officers have a differing set of individual and job char-

acteristics and how much is unexplainable because the male and female officers with the same characteristic have differing outcomes. We then further decomposed how much of the differences in observables and differences in associations is attributable to each specific factor, such as marital status.

It is important to recognize that the analysis provides descriptions of how career progression differs by gender and the extent to which those differences are attributable to factors we can observe in our data. The analysis does not explain why the differences in factors occur, nor does it ascertain whether differences in factors cause differences in career progression. We did not control for every relevant factor that could affect differences in career progression. Because the analyses are purely descriptive, readers should take care not to attribute a causal explanation for the results. Nonetheless, the report provides one of the first broad overviews, from a DoD perspective, of the factors associated with differences in officer career progression and considering each milestone in that progression, which is conditional on reaching the previous milestone.

Organization of the Report

Chapter Two provides an overview of the data and methods. We present our descriptive statistics and an overview of the regression results in Chapter Three. Chapter Four presents the decomposition of the gender differences in officer career milestones into explainable and unexplainable components. In Chapter Five, we discuss policy implications and conclusions. The report also has two appendices. Appendix A provides details about the decomposition methodology we use, and Appendix B shows more-detailed results of our analysis.

CHAPTER TWO

Overview of Data and Methods

Because the data and analysis used in this report build on the data and analytic approach used in the first phase of our study, we begin with a brief overview of the data used in the phase 1 analysis and then discuss how we supplemented the data, as well as other data changes for phase 2. The chapter then describes the method we used to decompose gender differences in the probability of reaching each officer career milestone in the explainable and unexplainable parts and further decompose the explainable part into the parts attributable to observed characteristics. This method is known as the Blinder-Oaxaca decomposition, and we describe the method in this chapter and its application to gender differences in officer career pipelines.

Overview of Data

Description of Data Used in the Phase 1 Analysis

Our analysis extends a rich longitudinal data set that we created for the phase 1 part of our study. The data set tracks cohorts of officers from January 1988 (or time of entry) until December 2010 (or time of separation). We described in detail how we built this file in Asch, Miller, and Malchiado (2012), but we provide an overview of the process here.

The phase 1 data file was built from the Proxy-PERSTEMPO, a file that was maintained by DMDC until 2010 and contains longitudinal administrative records on active-duty personnel, from January 1988 through September 2010. For officers, the data include service, occupation (using the DoD occupational coding), grade, months of

service before attaining current grade, source of commission, date of entry and date of commissioning, demographics (including race, ethnicity, gender, marital status, and education), prior enlisted service, and indicators of deployment based on receipt of two deployment-related pays (family separation pay and hostile fire pay).

Using these data, we were able to ascertain for each officer in the data their entry path in terms of commissioning source and prior service, their promotion path, and whether and when they left active duty. We used this information to construct the career progression of each officer in terms of retention and promotion, as described below.

We excluded officers who did not enter the officer ranks at the grade of O1, and we also excluded officers in professional occupations, based on their occupation coding, such as medical, legal, and religious career fields.[1] These officers were put into a separate competitive category for promotion, so their career paths were not consistent with the other officers we studied.

We measured career progression as a series of retention and promotion milestones, each conditional on its predecessor. Retention is conditional on achieving the previous grade (except O1, where it is conditional on officer commissioning), and retention is measured up to the point of eligibility for the next promotion (e.g., the promotion window). For example, retention as an O3 is measured for those who achieved O2 and remained on active duty until the beginning of the promotion window to O3.

Determining these career milestones in DMDC data, including the Proxy-PERSTEMPO data, is challenging because the data do not indicate who was considered eligible for promotion. We identified a three-year promotion eligibility window for each grade, cohort, and service based on observed promotions in the data. In general, for each grade, cohort, and service, we identified the six-month period when at least 95 percent of all promotions occurred. This six-month period was then designated as the center of the promotion window for that grade,

[1] For pre-1988 cohorts, we did not observe entry as O1, so we matched officers to a cohort based on the first observed promotion. These cohorts might include officers who entered after O1.

cohort, and service, and we added 15 months prior to this period and 15 months after this period, for a total of 36 months. Given these promotion eligibility windows, a promotion occurs if an eligible officer achieves promotion to the next grade during that window. If the officer was promoted after the window, he or she is considered not promoted.

After defining the promotion window, we defined the retention milestones. Retention is defined as staying until at least the first month of the promotion window. For example, retention as an O3 is defined as including all officers in an entry cohort and service who achieved O3 and who stayed in service at least until the first month of the promotion eligibility window for O4 for that cohort or service. A limitation of this approach is that some officers will choose to voluntarily separate during promotion windows, even when they would have a relatively high chance of promotion. Our approach wrongly classified these officers as not being promoted, when they should have been classified as failing to retain. Nevertheless, we believe that our approach, which has been used in past studies, accurately captures the majority of promotion and retention outcomes (Hosek et al., 2001; Asch, Miller, and Malchiodi, 2012).

Addition of DEERS Data

To extend the analyses reported in Asch, Miller, and Malchiodi (2012) for phase 2 of our study, we merged detailed individual-level records from DEERS records that are maintained by DMDC. DEERS contains information on all service-connected individuals eligible for military benefits, such as the TRICARE health benefit. Because service members use DEERS to register their dependents as beneficiaries of military benefits, DEERS allowed us to collect longitudinal and detailed information on family characteristics, including marriage and number and ages of dependents, for a large subset of the officers in the phase 1 file. More specifically, our source file for DEERS data has monthly point-in-time extracts for all service-connected individuals from January 2000 to December 2014, allowing us to match family-related variables to all observations in our phase 1 file, from January 2000 to September 2010.

Because family-related variables change over time, as officers get married or divorced and gain or lose young dependents, we matched the records in the phase 1 file to the proper observations in the DEERS. That is, we ensured that time-varying characteristics were properly matched in terms of timing with the appropriate career milestone. To do this, we captured DEERS data for each officer in the phase 1 analysis during the month in which he or she achieved each career milestone that occurred between January 2000 and September 2010. For example, for an officer who entered as an O1 in 2001 and was promoted to O3, we captured family-related variables from DEERS during the months in which the officer entered, reached the promotion window to O2, was promoted to O2, reached the promotion window to O3, and was promoted to O3. Thus, we measured time-varying characteristics at the time the milestone was reached.

One challenge with time-varying characteristics is that we had to measure family characteristics for those who leave. For example, some officers might leave before reaching the O4 promotion window, so they are not retained as an O3. We had to decide when to measure their family characteristics while modeling the probability of being retained as an O3. One approach to measuring family characteristics is to measure them at the end of the previous milestone. In our example, this would mean measuring family characteristics when personnel were promoted to O3. The problem with this approach is that there can be a number of years between promotion windows. Within those years, an officer's marital and dependents status can change considerably, so we would measure family characteristics with considerable error if we used family characteristics as of the previous milestone. Another problem is that this approach would further limit our sample sizes, since any officer in the analytic file would need to have had at least one promotion after 2000 to observe his or her family characteristics at the previous milestone. Instead, we used a second approach. Specifically, we measured characteristics of those who left at the time of exit and characteristics of those who stayed at the time of the milestone. Thus, an O3 who left before reaching the O4 promotion window would have his or her family characteristics measured at exit, rather than at the time of the O3 promotion, while an individual who stays would have

his or her characteristics measured at the beginning of the O4 promotion window. A disadvantage of this second approach is that those who leave will have their characteristics measured before those who stay.

As in Asch, Miller, and Malchiodi (2012), we only analyzed results for complete promotion windows. In other words, if the end of the data in 2010 occurred prior to the end of the promotion eligibility window or the end of a retention window, we excluded the observation from the analysis. In short, we were able to analyze results for all post-2000 officer career milestones from entry through the last full promotion window that ended prior to September 2010. Table 2.1 shows the officer cohorts that are included in analyses for each career milestone in both the phase 1 and the current analyses.

Also, as with the phase 1 analysis, the phase 2 analysis drew on more-recent officer cohorts to study early career milestones. Older officer cohorts were used to study late career milestones. For example, the phase 2 analysis of promotion to O2 drew on the 1998–2005 officer cohorts, whereas analyses of promotion to O6 drew on the 1976–1988 cohorts. It is also important to note that because of the sample restric-

Table 2.1
Career Progression Milestones and Cohorts Used in Phase 1 and 2 Analyses

Career Milestone	Entering Cohorts Used (Phase 1)	Entering Cohorts Used (Phase 2)
Retained as O1	1988–2002	1998–2005
Promoted to O2	1988–2002	1998–2005
Retained as O2	1986–2002	1996–2005
Promoted to O3	1986–2002	1996–2005
Retained as O3	1983–2002	1988–2002
Promoted to O4	1983–1999	1988–2002
Retained as O4	1977–1993	1984–1993
Promoted to O5	1977–1993	1984–1993
Retained as O5	1971–1991	1976–1988
Promoted to O6	1971–1991	1976-1988

tions imposed by the availability of DEERS data, the phase 2 analyses for each milestone drew on later officer cohorts than the phase 1 analysis. For example, the earliest cohort used to study promotion to O6 is the 1971 cohort for the phase 1 analysis, versus the 1976 cohort in the phase 2 analysis.

Table 2.1 shows that, in the phase 1 analysis, we only included observations through 2002, whereas the phase 2 analysis drew on observations through 2010. We limited the phase 1 sample to pre-2003 observations because the federal government changed the way that race and ethnicity was recorded beginning January 1, 2003. Since the phase 1 analysis focused on differences in career progression by race and ethnicity, as well as by gender, we were unable to include observations after 2002. The phase 2 analysis focused on differences by gender, so we included observations after 2002.

A clear distinction between the phase 2 analysis and the phase 1 analysis, as well as the Hosek et al. (2001) study, is that the phase 2 analysis focused on officer retention and promotion behavior from 2000 to 2010, when many officers were deployed for the wars in Iraq and Afghanistan. It is also possible that career-progression decisions during wartime might relate quite differently to family status. For example, officers might choose to delay marriage and childbearing to serve their country during a time of great need. Likewise, officers might be more willing to accept family-related hardships during wartime than during peacetime. While our focus on the wartime cohorts limits the comparability of our results to past studies, and might paint a different picture, the choice was made because of the data constraints described above. Nevertheless, the choice to focus on later cohorts is not without merit, as it allows us to paint a descriptive picture of the relationship between family status and officer career progression during the recent past, a period when the military has been focused on improving the gender diversity of the officer corps.

Table 2.2 shows a comparison of the percentage of officers reaching each retention and promotion in the current analysis versus the phase 1 analysis. The cohorts included in the phase 2 analysis have slightly higher promotion and retention rates at all career milestones,

Table 2.2.
Phase 2 Analysis and Phase 1 Analysis of Officers Retained or Promoted

Milestone	Phase 1 Analysis[a]	Phase 2 Analysis
	Promotion (%)	
O1 to O2	97.3	98.0
O2 to O3	90.8	92.7
O3 to O4	76.1	83.5
O4 to O5	74.6	84.5
O5 to O6	46.4	58.7
	Retention (%)	
O1	99.8	99.9
O2	99.3	99.5
O3	70.3	82.0
O4	88.5	91.5
O5	80.3	85.8

SOURCE: The updated analysis is based on the authors' calculations. The phase 1 analysis results are from Asch, Miller, and Malchiodi (2012).

[a] The phase 1 analysis did not include the data elements from DEERS. The addition of these elements meant that we only had usable data after 2000.

which might reflect differing promotion processes and retention behavior for cohorts entering after 2002; the phase 1 study did not include officer cohorts entering after 2002. Nevertheless, the general patterns are similar across data sets—high retention and promotion at O1 and O2, lower retention rates at O3 and O5, and lower promotion rates to O6. Moreover, the observed differences between male and female officers are qualitatively similar across both data sets. Chapter Four will show the differences in the percentages of reaching each milestone for male and female officers; the largest differences occur at the same milestones in the new analysis as in the phase 1 analysis.

Characteristics Included in the Analysis

The resulting analytic file includes the demographic and job-related factors from the phase 1 analysis but also adds the family-related characteristics we drew from the DEERS. More specifically, we included the following covariates from Asch, Miller, and Malchiodi (2012) in our models: service, source of commission, prior enlisted service, occupation group, deployment experience, and education.

The addition of DEERS allowed us to also include additional covariates: marital status, joint marriage to another service member, numbers and ages of dependents, and new dependents (e.g., recent birth or adoption).[2] These variables add richness to our analysis by permitting us to consider family status in describing career pipeline differences between male and female officers; past studies (reviewed in Chapter One) have pointed to the role of family factors in retention and promotion outcomes for female officers. That said, it is important to recognize that the DEERS data only allowed us to observe family status while officers were in the military. Female officers who deferred marriage or childbearing because of concern about the effects on their early career outcomes or who left the military to get married or have children will appear as unmarried or without children in our analysis. Consequently, we could not quantitatively assess the causal effects of family status on career outcome differences, as we discuss later in this chapter.

Finally, we included indicator variables of entry year. As shown in Table 2.1, the entry cohort calendar years differ for each milestone. To facilitate reporting of the results, we included indicators of year of entry relative to the first entry cohort. For example, our model of retention as an O3 includes entry cohorts from 1988 to 2002. For this milestone,

[2] The DEERS data allow us to identify single parents in our data and the children of single- versus non-single parents. In our initially regression analysis, we included separate covariates for the dependents for single versus non-single parents, but we found that the samples were not large enough and the variables were generally not statistically significant. We therefore considered marital status as married versus unmarried and separately considered the presence of children of difference age groups. Finally, we conducted exploratory analysis of whether spouses and children were collocated but found that it was not always easy to identify collocation with the DEERS data. Future analysis should consider these topics in more depth.

the first entry cohort represents 1988, the second entry cohort represents 1989, and so on, through the 14th entry cohort, which represents 2002. On the other hand, our model of promotion to O6 includes entry cohorts from 1976 to 1988, so entry cohort 1 for this milestone represents 1976, while entry cohort 12 represents 1988.

It is important to recognize that we did not include all factors that can influence career progression, such as performance, behavior, and physical fitness, because we lack data on these factors. Furthermore, while we included broad occupational group categories, we did not control for individual occupation within each group in our analysis. Thus, to the extent that there are promotion and retention differences across more narrowly defined occupations within an occupational group, our occupational variables will not account for these differences in estimating gender differences and the role of observable factors.

In sum, we use a number of variables to capture differences in observable characteristics between male and female officers and the association of these characteristics with career outcome variables. The variables we used are

- marital status
- joint-duty status
- number of children
- ages of children
- entry cohort year
- service branch
- source of commission
- prior enlisted service
- occupational group
- cumulative months of deployment
- education
- race
- ethnicity.

Approach

This second stage of our study focuses on the question of what factors account for observed differences in the achievement of each career milestone between male and female officers. Observed differences in outcomes between male and female officers can be attributed to

- differences in the job and individual characteristics that influence the achievement of each milestone
- differences in the effect of these characteristics on outcomes.

The first source of difference focuses on *explainable* factors—the differences in the observed characteristics themselves. It is important to recognize that these characteristics can include both those observed in the data, such as occupation, and those unobserved, such as performance and tastes and attitudes toward service. The second source of difference focuses on *structural* factors—differences in how the same characteristics for male and female officers affect outcomes. For example, the occupations that male and female officers enter differ (as will be shown in Chapter Four). To what extent are differences between male and female officers in the probability of being retained and being promoted over an officer career attributable to these occupational differences? To what extent is the likelihood of being promoted and being retained different for male and female officers in the same occupational group?

Oaxaca (1973) and Blinder (1973) developed a method to decompose differences in outcomes between their explainable and structural components. The method has been widely used in the literature—for example, to decompose differences in male and female pay into explainable and structural components—and the method has been refined over time.[3]

[3] This literature uses different terminology for the two components. Some studies refer to them as the *explainable* and *unexplainable components*, while others refer to them as the *observable* and *structural components*. We refer to them as the *explainable* and the *association components*.

We use the Blinder-Oaxaca method to decompose the observed differences in milestones for male and female officers. Neumark (1988), Cotton (1988), and Fortin (2007) further extended the methodology, and we used their extended methodology. Appendix A presents the methodology we used in this analysis, drawing on Jann (2008) and Fortin, Lemieux, and Firpo (2011). The appendix also discusses methodological challenges and the implications for the interpretation of the results. We provide a brief summary of the methods here.

The Blinder-Oaxaca method requires a regression analysis that provides estimates of the relationship between each observed characteristics and the outcome of interest. In our analysis, we considered ten milestones, so there were ten regression analyses. We then used these regressions to decompose the observed mean difference in each outcome between male and female officers into two parts:

1. the part attributable to mean differences in observed characteristics
2. the part attributable to differences in the association between that characteristic and the outcome.

The second part shows the difference in mean outcome for male and female officers with the same observed characteristics.

In performing the analysis, there are three issues we address, as we describe in more detail in Appendix A. The first concerns the choice of benchmark for evaluating differences in outcomes. The choice of benchmark is arbitrary and could lead to differing results. We followed the recent literature and pooled information on both male and female officers in a single regression analysis for each outcome and used the pool regression estimates in our decomposition. The second issue relates to how to specify categorical variables in the regression analysis given that the choice of omitted categories can affect the Blinder-Oaxaca decomposition. Again, we followed the literature and transformed the categorical variables so that the decomposition was independent of the choice of omitted category. The transformation means that we included a category that is traditionally omitted, and we have regres-

sion coefficients for each category, as shown in Table B.2, where we show the regression results.

The final issue relates to why the second part of our two-part Blinder-Oaxaca composition only shows the different associations and not the difference in the effects of characteristics on outcomes. That is, the second part does not show gender differences in the effects of marriage, children, and other characteristics on outcomes, only gender differences in the association between these variables and outcomes. We are unable to give a causal interpretation of the results because of the potential influence of self-selection and endogeneity. Officers at a given career milestone are those who made retention decisions or were selected for promotion in the past and who possibly made those decisions based on future promotion and retention prospects. This selectivity effect could differ for men and women and be based on unobserved characteristics and result in biased regression coefficient estimates of the causal effect of an observed characteristic on a specific outcome.

Observed characteristics, especially those related to family formation, could be endogenous. Individuals might choose the timing of marriage and childbearing based on their expectations about current and future promotions, as well as retention plans. Officers might marry and have children and then decide whether to stay or leave. Alternatively, they might leave because they plan to marry or have children or they might defer marriage or childbearing until after completing an obligation or achieving a promotion. As with the case of self-selection, not accounting for this endogeneity could result in biased coefficient estimates. Similarly, characteristics that we do not observe might be correlated with observed characteristics, and the correlation might differ for male and female officers. This could also bias the coefficient estimates of the causal effects of observed characteristics with an outcome.

Because of this third issue, we did not give a causal interpretation to the decomposition of the second part. In the results that we present, we refer to the first part as the *observable* part and the second part as the *association* part.

CHAPTER THREE

Descriptive Statistics and Regression Results

This chapter presents means of the characteristics in our analysis and the regression results. We begin by showing differences in outcomes for male versus female officers—specifically the differences in the percentages of male and female officers who are retained or promoted at each milestone. We then examine differences in the observed characteristics of male and female officers at each milestone, focusing on the milestones where we observe the largest differences in outcomes. Next, we show the results of the pooled regression model of the likelihood of achieving each milestone. By *pooled*, we mean including both male and female officers. As we show in Chapter Four, the Blinder-Oaxaca decomposition results will depend not only on differences in observed characteristics but also on the pooled regression estimates.

Differences in Mean Outcomes

Table 3.1 shows the differences in career progress for male and female officers. Specifically, it shows percentages of male officers and female officers reaching each milestone and the differences between percentages, not controlling for other factors that could be correlated with career progression. Thus, these are raw means.

The table shows large differences in the percentages of male and female officers in the O3 promotion window who are subsequently promoted to O3 and large differences in the retention of those promoted to O3. Specifically, we find a difference of 3.6 percentage points in the percentage of male versus female officers promoted to O3, condi-

Table 3.1
Officers Retained or Promoted in Phase 2 Analysis: Male Versus Female Officers

Milestone	Overall (%)	Male Officers (%)	Female Officers (%)	Difference (Male Minus Female)
Retained as O1	99.9	99.9	99.8	0.1
Promotion to O2	98.1	98.2	97.2	1.0
Retained as O2	99.5	99.6	99.2	0.4
Promotion to O3	92.7	93.3	89.6	3.6
Retained as O3	82.0	83.2	71.6	11.8
Promotion to O4	83.6	84.2	78.1	6.0
Retained as O4	92.3	92.4	91.3	1.2
Promotion to O5	85.4	85.6	83.5	2.1
Retained as O5	86.2	87.2	76.3	10.9
Promotion to O6	59.2	59.3	58.0	1.3

NOTE: The last column was calculated before the percentages were rounded. The largest gender differences are highlighted.

tional on O3 promotion eligibility. Given a promotion to O3, we find a difference of 11.8 percentage points in the retention of male versus female officers as an O3. Thus, fewer female officers are promoted to O3, and, of those promoted, fewer stay. Furthermore, of those who stay as an O3, considerably fewer female officers are subsequently promoted to O4, a difference of 6.0 percentage points. These results are consistent with those found in our first study. As in that study, we find that female officers have slower career progression in the company grades—primarily because of lower retention but also because of lower promotion.

Conditional on making the field grade of O4, we find that career progression between male and female officers is broadly similar, until O5, in terms of promotion and retention; we find that percentages of male officers who are retained as an O4 and who are promoted to O5 are slightly greater than the percentages of female officers. How-

ever, the percentage of male officers who are retained as an O5, conditional on promotion to that grade, is significantly higher, a difference of 10.9 percentage points. Thus, female officers are more likely to leave after reaching O5. Given that those who retire with 20 years of service are generally an O5, the O5 retention results suggest that female officers have a higher retirement rate than male officers, though it is important to note that the results in Table 3.1 show retention over all years of service that an individual is an O5 (up to the O6 promotion window). Among those who stay after reaching O5, the promotion rate to O6 is slightly less for female officers, 57.7 percent, compared with 58.8 percent for male officers.

In short, like the stage 1 analysis, we find that female officers experience different career progression than male officers—primarily because of lower retention and, to a lesser extent, lower promotion rates to O3 and O4. The purpose of the stage 2 analysis is to assess the extent to which these differences are attributable to differences in observed characteristics, such as family factors and occupational group. Before we make that assessment, we first examine the extent to which observed characteristics differ between male and female officers at each career milestone.

Mean Characteristics at Each Milestone

Our analysis considers observed job-related characteristics, including source of commission, occupational group, cumulative months deployed, and service branch, as well as individual characteristics, including race and ethnicity, education, marital status, and existence and age of dependents. For each career milestone, we computed the percentage of all officers at that milestone (or, in the case of months deployed, the mean number of months) with a given characteristic, the percentage of male officers, and then the percentage of female officers. The samples used to compute these means are the ones that are the basis for the regression analysis and the Blinder-Oaxaca decomposition.

Because we consider ten milestones and a large number of characteristics, the discussion here highlights a selected set of characteristics.

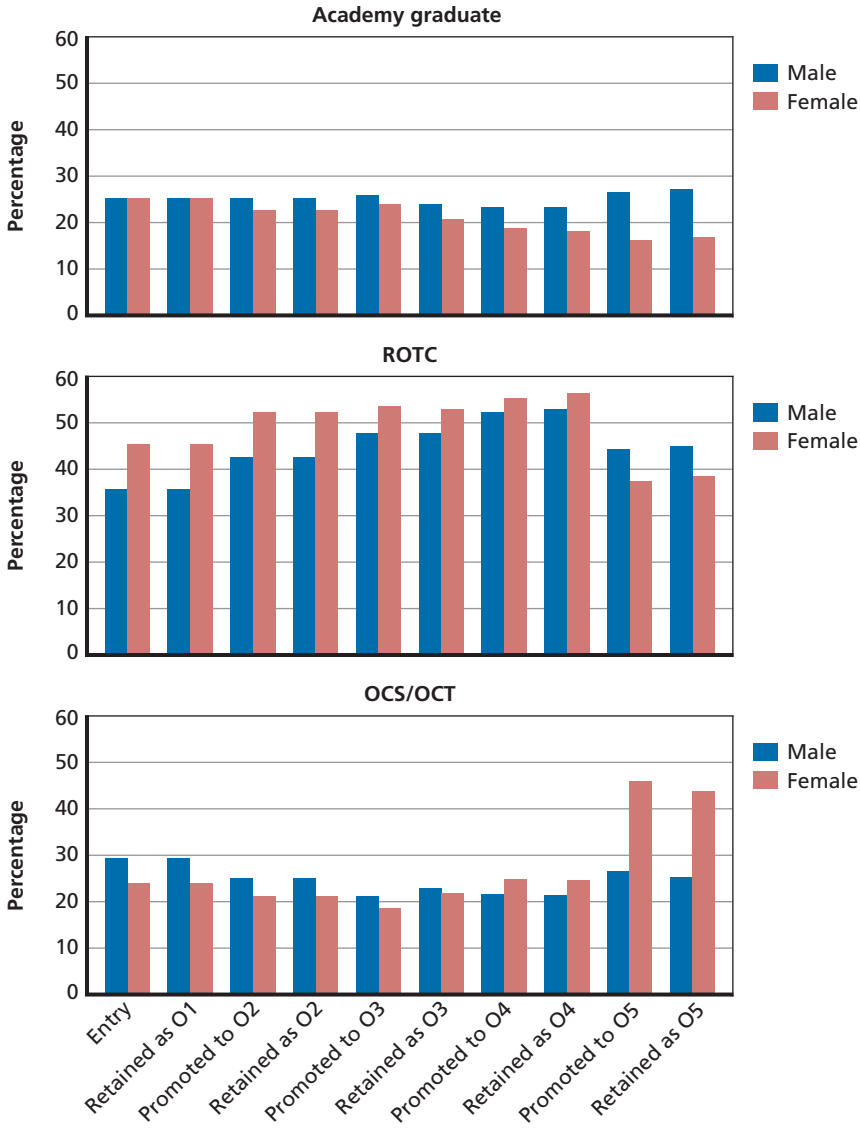
Appendix B presents a table of descriptive statistics (Table B.1) that gives all of the mean characteristics for each milestone for all officers, male officers, and female officers.

It is important to recognize that the tabulations are intended as background and to assist in the interpretation of the regression results in Chapter Four, where we consider to what extent observed gender differences in reaching key milestones are attributable to differences in observed characteristics at those milestones. The tabulations themselves are not intended to provide information on how the characteristics of an entry cohort of officers changed through each subsequent retention and promotion milestone. Differences in characteristics across career milestones, presented in Figures 3.1–3.4, are due to differences in retention and promotion across milestones *and* cohort effects. That is, the figures do not show differences in characteristics for a given cohort but for many cohorts. This is because our data draw from multiple cohorts and show the characteristics of those cohorts at each milestone over our data period, 2000–2010. Consequently, characteristics of those at the O4 to O6 milestones are those who entered prior to 2000, given that it usually takes at least ten years to achieve those milestones. As was shown in our earlier report (Asch, Miller, and Malchiodi, 2012), entry characteristics differ across cohort. Importantly, the representation of female officers was lower among earlier entry cohorts and less likely to be academy graduates and more likely to be in administrative occupations. For that reason, we must be careful not to interpret the results shown in Figures 3.1–3.4 as reflecting how characteristics change as members of cohort moves through their careers. Instead, we must interpret the results as the characteristics at each milestone, reflecting both changes as the cohort moves and differences in characteristics across cohorts.

Job-Related Characteristics

Figure 3.1 shows the percentage of officers with a given source of commission at each milestone. For example, the figure shows that, at entry, 24.9 percent of male officers are academy graduates, 36.0 percent of male officers have Reserve Officer Training Corps (ROTC) as their source of commission, and 29.2 percent have Officer Candidate School

Figure 3.1
Officers with a Given Source of Commission at Each Milestone



RAND *RR1288-3.1*

or Officer Candidate Training (OCS/OCT) as their source of commission.[1] The corresponding figures for female officers at entry are 24.9 percent, 45.6 percent, and 24.0 percent, respectively.

The top panel in the figure shows that while the percentages of male and female officers who are academy graduates are the same at entry, a smaller percentage of females are academy graduates at later career milestones, and the gap between the male and female percentage is larger at subsequent career milestones, especially at O5. For example, among those recently promoted to O4, 23.0 percent of male officers are academy graduates, compared with 18.5 percent of females, a difference of 4.5 percentage points. Among those recently promoted to O5, the difference is larger, 10.5 percentage points (26.4 percent for men minus 15.9 percent for women). Again, it is important to reiterate that the smaller percentage of female academy graduates at later career milestones could fully or partially reflect the lower representation of female academy graduates among less recent entry cohorts of officers.

The bottom two panels in Figure 3.1 show that the larger gap in the field grades between male and female officers in the representation of academy graduates, shown in the top panel, is not due to greater representation of ROTC graduates among female officers; the gap is due to greater representation of OCS/OCT graduates. In fact, we find that representation of ROTC graduates among female officers is greater than for males among those recently promoted to O4 (55.4 percent versus 52.3 percent) but is lower among those recently promoted to O5 (37.4 percent for females versus 44.5 percent for males). However, OCS/OCT representation among male and female officers is greater for those recently promoted to O4 and to O5 and dramatically larger among women recently promoted to O5. Thus, among women recently promoted to O5, nearly half—45.9 percent—are OCS/OCT graduates, while 37.4 percent are ROTC graduates and 15.9 percent are academy graduates.

These differences in source of commission between male and female officers among those recently promoted to O4 and to O5 are also

[1] The figures do not sum to 100 percent because some officers have other sources of commission.

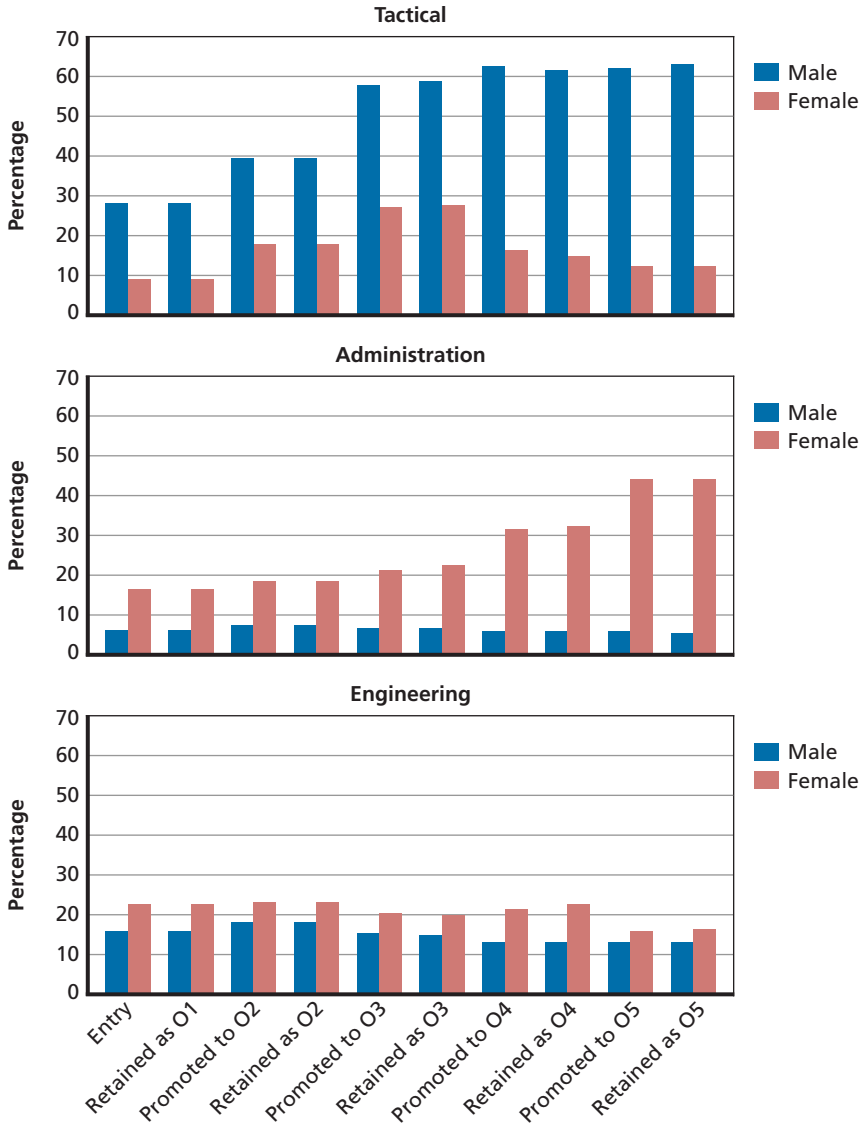
generally observed among those who are retained as an O4 until the O5 promotion eligibility window and among those who are retained as an O5 until the O6 promotion eligibility window. For example, we find that 43.8 percent of women retained as an O5 are OCS/OCT graduates, just slightly less than the 45.9 percent of women who were recently promoted to O5.

Figure 3.2 shows the percentage of male and female officers at each career milestone who are in each DoD occupational group. The overall pattern is that tactical occupations are underrepresented among female officers, while the other groups, especially the administration DoD occupational group, are overrepresented.

In contrast, the representation of administrative occupations is greater at later career milestones for female officers, as seen in the second panel in Figure 3.2, again potentially reflecting the greater representation of this occupational group among earlier entry cohorts. In the administrative occupations, representation is generally stable across the career pipeline for men, so that the difference in representation of administrative occupations is larger later in the career, especially in the field grades. In short, in the field grades, female officers are far more likely to be administration than in tactical occupations, compared with O3, when female officers are more likely to be in tactical occupations.

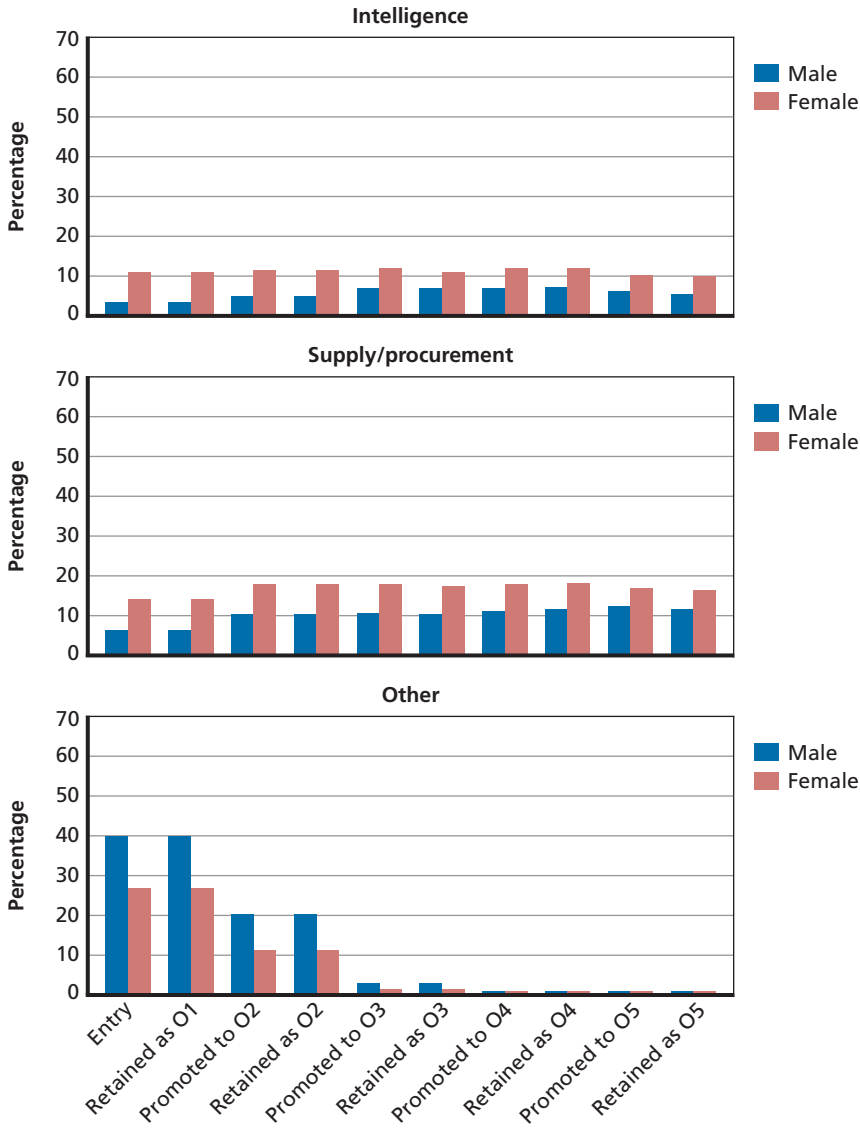
In terms of how representation varies across subsequent career milestones, the top panel shows that, among men, the representation of tactical occupations is larger later in the career, especially in the company grades. For example, representation of tactical occupations among male officers is greater later in the career—28.0 percent at entry and 57.8 percent among those recently promoted to O3. In the field grades of O4 and O5, the representation among male officers stabilizes at around 63 percent. For female officers, representation of tactical occupations also increases during the company grades, albeit the level is lower than for male officers; unlike male officers, representation drops sharply at the O4 and O5 levels. For example, 27.8 percent of female officers who are retained as an O3 are in tactical occupations, but this figure drops to 16.5 percent among those recently promoted to O4 and drops further to 12.2 percent among those recently promoted

Figure 3.2
Officers in Each DoD Occupational Group at Each Milestone



RAND *RR1288-3.2a*

Figure 3.2—Continued



RAND *RR1288-3.2b*

to O5. Thus, the difference in the representation of tactical occupations between male and female officers is larger later in the career pipeline.

It should be recalled that the tabulations in Figures 3.1 and 3.2 are raw percentages and do not hold constant other characteristics that could affect representation of occupational groups. For example, the differences in source of commission observed in Figure 3.1 could affect the representation of occupational groups insofar as academy, OCS/OCT, and ROTC graduates are not equally represented in all occupations. That is, the lower representation of tactical specialties among women could reflect the lower representation of academy graduates among female officers beyond the entry point, because those in tactical occupations are more likely to be academy graduates.

Similarly, the differences we observe in representation among male and female company grade versus field grade officers could reflect differences in the entry cohorts used in our analysis. As noted, given that we only include observations from 2000 to 2010, those in more-junior grades are likely to have entered service more recently than those in more-senior grades. Thus, the differences across subsequent career milestones could reflect differences in the entry characteristics of recent versus older entry cohorts. For example, representation of academy graduates might have been greater among more-recent female entrants relative to later female entry cohorts and could account for the drop in the representation of academy graduates among the field grade relative to the company grades, as observed in Figure 3.1.

These observations highlight the importance of controlling for confounding factors, such as source of commission and entry cohort, in our regression analysis.

Table B.1 in Appendix B shows tabulations of other job-related characteristics that we consider in our analysis. As shown there, we find that the average cumulative months of deployment increase over the career, unsurprisingly, but that the average number of months is less for female than for male officers at each milestone. Similar to the pattern in Figure 3.2 for tactical specialties, the gap between male and female officers is greater in the more-senior field grades. We also consider the percentage of officers with prior enlisted service. This percentage is lower at higher grades for both male and female officers and is lower

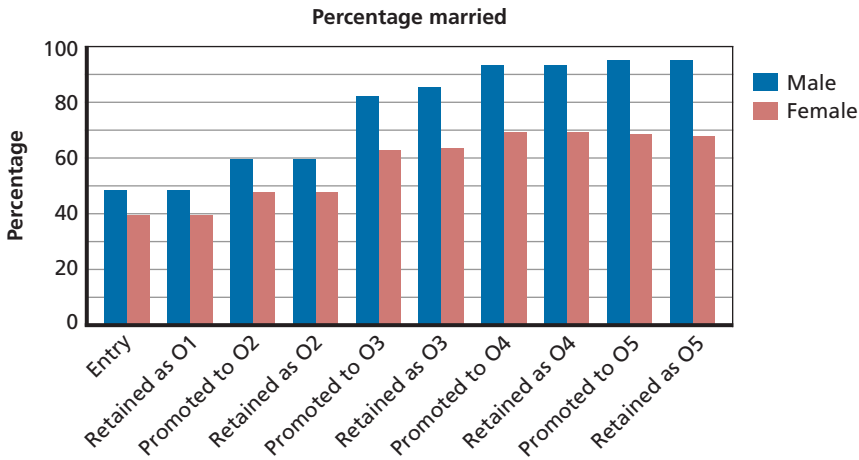
for female than male officers. That said, the difference in the percentage with prior service, among female and male officers, declines with grade; the difference is 1.1 percentage points (13.2 percent for men and 12.1 percent for women) among those retained as an O5, compared with 6.1 percentage points among those at entry (29.3 percent for men and 23.1 percent for women).

Individual-Related Characteristics

We next consider individual characteristics of officers, highlighting marital status and dependents. Again, our full tabulations are in Table B.1 in Appendix B.

Figure 3.3 shows the percentage of officers who are married at each career milestone. The percentage of officers who are married is greater among later career milestones for both male and female officers, but female officers are less likely to be married at each milestone. Furthermore, the gap between male and female officers is greater at later milestones. Specifically, at entry, 39.5 percent of female officers and 48.2 percent of male officers were married, a difference of 8.7 percentage points. Among those promoted to O3, given that they were retained

Figure 3.3
Officers Who Are Married at Each Milestone

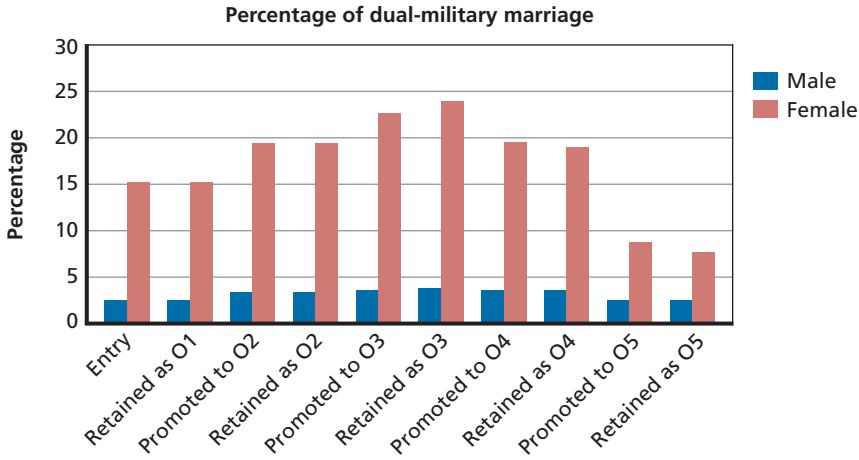


RAND *RR1288-3.3*

as an O2, the difference is 18.8 percentage points (62.9 percent for female officers versus 81.7 percent for male officers). The gap is even larger among those who were retained as an O3, given that there was first a promotion to O3, equal to 22.0 percentage points (63.7 percent versus 85.7 percent for female and male officers, respectively). Among the field grades of O4 and O5, the percentage married among female officers is roughly the same, around 68 percent, but is even higher for male officers. Thus, among those who were retained as an O5, almost all male officers were married, while only about two-thirds of female officers were. The two-thirds figure for female officers is higher than what was observed for earlier cohorts. For example, Hosek et al. (2001) found a marital rate for female officers at the later career milestones of around 55 percent.

We also consider the incidence of dual-military service among married personnel across subsequent career milestones. As shown in Figure 3.4, about 3 to 4 percent of male officers who were married were married to another service member. Female officers were far more likely to be married to another service member, and the incidence of such marriages varies across milestones. The percentage of married

Figure 3.4
Officers Who Have a Spouse in the Military, Among Those Married, at Each Milestone

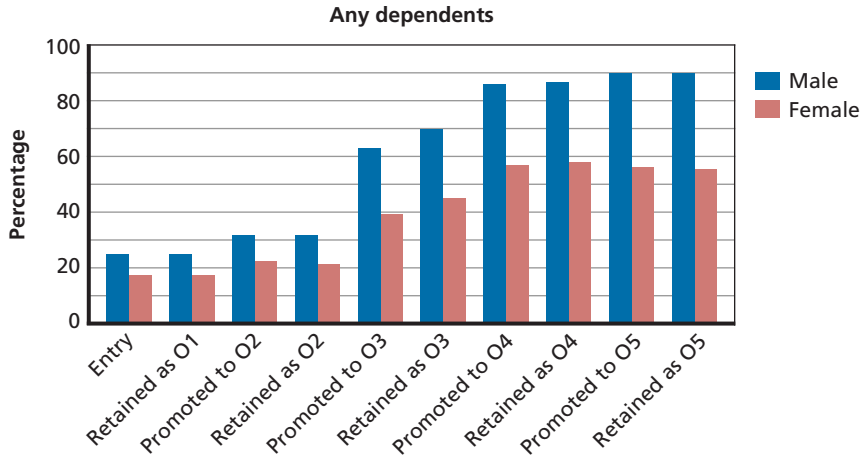


RAND *RR1288-3.4*

female officers married to another service member is greatest among O3s, both those recently promoted to O3 (22.7 percent of female officers) and those retained as an O3 (23.9 percent). This figure decreases at subsequent career milestones. Among married female officers recently promoted to O5, only 8.7 percent were married to another member, and among those retained as an O5, the figure is 7.8 percent.

The review of the literature pointed to the potential importance of children as a factor affecting female officers' retention and promotion outcomes. Figure 3.5 shows the percentage of male and female officers at each career milestone who have any dependents. Table B.1 shows the percentages with dependents in the age groups of birth to three, four to six, seven to 18, and 19 and older. The figure shows that the percentage of officers with dependents is higher at subsequent career milestones, though it flattens out for female officers for those at O4 and O5 milestones. That said, the percentage is lower among female officers, with the gap between male and female officers larger at higher grades. Thus, among those promoted to O5, given that they were retained as an O4, 56.1 percent of female officers had dependents, compared with

Figure 3.5
Officers with a Dependent, at Each Milestone



RAND *RR1288-3.5*

90.5 percent of male officers. This is compared with 17.3 percent of female officers at entry versus 25.2 percent for men.

The tabulations in Table B.1 show that the ages of dependents vary across career milestones for both male and female officers.[2] The percentage of both male and female officers with very young dependents, ages birth to three, is greatest among O3s, though the percentage is higher for men than for women even among O3s. Similarly, the percentage of officers with dependents ages four to six peaks for both male and female officers at O4; the percentage of officers with dependents ages seven to 18 peaks at O5 for both male and female officers, though in each case the percentage is lower for female officers. The results for the incidence of adult dependents over age 18 differ slightly, however. Here, we find that the incidence peaks at O5, as in the case of the incidence of dependents ages seven to 18, but unlike this younger category, the incidence is slightly higher for female officers than for male officers for grades O1 to O4. That is, a slightly higher percentage of female officers in grades O1 to O4 had adult dependents, but among those at O5, a much higher percentage of male officers than female officers had adult dependents. Specifically, among those retained as an O4, 12.6 percent of female officers had adult dependents, compared with 11.1 percent of male officers, but among those promoted to O5, these percentages are 17.0 percent and 29.2 percent, respectively. It is unclear what drives the differing pattern for the incidence of adult children versus younger children. One possibility is that the pattern for younger children reflects childbearing at younger ages among officers and the aging of those children as officers progress in their careers, while the pattern for adult children could reflect both the aging of children and the incidence of divorce and subsequent remarriage with new spouses with adult children.

In addition to marriage and dependents status, we also consider education, including the percentage of officers with only a bachelor's degree versus an advanced degree, and race and ethnicity. In the case of education, the percentage of officers with an advanced degree is dramatically higher in the field grades relative to the company grades, and

[2] In our analysis, dependents do not include spouses.

the percentage among those in the field grades is higher for female officers relative to male officers. Thus, the incidence of advanced degrees is higher among female officers.

Pooled Regression Results

To perform the Blinder-Oaxaca decomposition, we must estimate the vector of estimated coefficients from the pooled regression for each milestone, or β^*, in the regression equation $Y = X\beta^* + v$ (see Appendix A). Specifically, we estimate linear probability models of achieving each milestone using ordinary least squares.[3] The variable Y is a zero-one indicator variable that equals 1 if the officer achieves the milestone, conditional on achieving the previous one, and zero otherwise. It is a pooled regression because we pool together data for male and female officers. The pooled regression results for each milestone are shown in Table B.2 in Appendix B. Note that the pooled regressions are estimated with the constraint that the indicator variables sum to one, to address the problem of the choice of omitted group in defining categorical variables for the Blinder-Oaxaca decomposition. This constraint results in transformed or normalized estimates on the categorical variables, and the interpretation of the coefficient estimate is the deviation from the grand mean of the coefficients for all categories. Thus, the results in Table B.2 show the estimates with the normalized

[3] Many have argued for the use of limited dependent variable models for binary choice, such as the probit and logit, instead of the linear probability model. These arguments are typically made on two grounds: (1) ordinary least squares imposes heteroscedasticity in the case of a binary outcome, and (2) linear probability estimates are not constrained to the unit interval. We can and do easily address the first argument by using heteroscedasticity-robust standard errors. While the second argument is more concerning and a natural and unattractive feature of the linear probability model, it is well-established that any bias stemming from this issue dissipates and approaches zero as the share of predicted probabilities falling outside the unit interval approaches zero (Horace and Oaxaca, 2006). Thus, the linear probability model is generally considered appropriate in cases where the mean outcome is not close to zero or one. While we do apply our model to all milestones, we are primarily interested in those milestones that have the lowest rates of attainment, and hence are furthest away from one. More specifically, we limit our discussion to outcomes with attainment rates significantly below one: retention at O3, promotion to O4, retention at O5, and promotion to O6.

coefficient estimates. As explained in Chapter Two, these regression estimates together with the mean differences in characteristics are the inputs to the Blinder-Oaxaca decompositions (shown in the next chapter). Here, we present a brief overview of some of the key results.

As shown earlier this chapter, female officers are less likely to be academy graduates and more likely to be ROTC graduates, except in the later career, when they are more likely to be OCS/OCT graduates. In the pooled regressions, we find that being an academy graduate is positively related to reaching a given milestone, except in the midcareer; this is seen in the likelihood of being retained as an O3 and being promoted to O4. On the other hand, being an OCS/OCT graduate is negatively associated with the probability of reaching later milestones, including promotion to O5 and retention as an O5. As we show in Chapter Four, some of the explainable differences in reaching these later career milestones are attributable to commissioning source.

We also showed that female officers are far less likely than male officers to be in tactical occupations and far more likely to be in administrative occupations, especially later in the career. Officers in administrative occupations have a lower probability of reaching early career milestones, through promotion to O3, but we generally find no statistically different probability of reaching later career milestones, relative to the overall average effect of all occupation groups. The exception is the finding that the probability of being retained as an O5, given that it is preceded by O5 promotion, is positively associated with being in an administrative occupation. We find that generally being in a tactical occupation is positively associated with the probability of achieving each milestone except O4, where the likelihood of being promoted to O4 is negatively related to being in a tactical occupation and is negatively related to the probability of being retained as an O4, conditional on promotion until that point. We find that occupational group is among the group of characteristics that tend to contribute the most to the observable differences between male and female officers in the probability of reaching various career milestones, as shown in Chapter Four.

The cumulative months of deployment is another characteristic we consider. Female officers have fewer months, especially at later career

milestones, and we find that having more months is positively related to achieving retention and promotion milestones, with the exception of retention as an O3 and promotion to O5. For these milestones, the probability of attaining these milestones are negatively related to cumulative months of deployment.

We find that female officers are more likely than male officers to be in the Army and Air Force during early career milestones but less likely to be in the Army during later career milestones and about equally likely to be in the Air Force later in the career. Thus, the distribution of female to male officers across service branch varies over the career. These percentages are shown in Table B.1. In the pooled regressions, we find that being in the Air Force is positively associated or has no statistically significant association with the likelihood of reaching each milestone. In contrast, being in the Navy often has a negative association. That is, relative to the overall average effect across the services, naval officers generally have a lower likelihood of achieving each milestone. In the Marine Corps and Army, the relationship is mixed—sometimes negative, sometimes positive.

In terms of individual characteristics, female officers were less likely to be married at each milestone and more likely to be a dual-military spouse. In the pooled regressions, we find that married personnel were more likely to be promoted to each milestone and less likely to be retained, relative to single personnel. As we show in Chapter Four, the difference in marital status between male and female officers is a key contributor to the observable differences in their career pipelines. Similarly, female officers were less likely to have dependents, and we find that, in general, having dependents of any age was positively related to the probability of reaching a given milestone. The exception is retention as an O5, where the likelihood of being retained as an O5 was negatively related to having dependents younger than 18 but positively related to having dependents 19 or older.

CHAPTER FOUR

Decomposition of Gender Differences in the Likelihood of Achieving Career Milestones

To what extent do differences in characteristics explain gender differences in career progression, and which specific characteristics have the most important role in contributing to differences in observables versus associations? We address these questions in this chapter by showing results of the Blinder-Oaxaca decomposition approach, described in Chapter Two and Appendix A. The characteristics we consider are marital status, joint-duty status, number of children, ages of children, entry cohort year, service branch, source of commission, prior enlisted service, occupational group, cumulative months of deployment, education, race, and ethnicity.

We begin the discussion by first showing the decomposition of gender differences in the probability of reaching each milestone into the part that is attributable to differences in observables versus differences in associations. As discussed in Chapter Two, differences in *observables* refer to the part of the gender difference in outcomes attributable to differences in observed characteristics, while differences in *associations* refer to the part attributable to gender differences in the association of the characteristic and the outcome. The second part shows the differences in the outcomes when male and female officers have the same observed characteristics. This discussion provides information on the relative importance of observed differences versus differences in associations in contributing to the overall gender gap in the probability of reaching each milestone.

We then further decompose the observable and association components into the contributions of each individual characteristic for selected milestones. The decomposition of the gender difference in the probability of reaching each milestone is shown in Appendix B. In the main text, we show the results graphically.[1] The chapter concludes with a discussion of the overall contribution of specific factors, focusing on the probability of reaching milestones with the largest gender gap.

Decomposition into the Observable and Association Components

Table 3.1 in Chapter Three showed the probability of reaching each milestone for male and female officers and the difference in these probabilities. We used the Blinder-Oaxaca methodology to decompose the differences shown the last column of Table 3.1 into an observable and association components.

To illustrate the method, Table 4.1 shows an example of the decomposition, using retention as an O3. The left three columns of the table replicate information from Table 3.1. Male officers have 83.2-percent likelihood of being retained as an O3 until the O4 promotion window, conditional on promotion to O3, while female officers have 71.6-percent likelihood, for a difference of 11.8 percentage points. Using the Blinder-Oaxaca decomposition method, the portion of the 11.8-percentage-point difference that is due to differences in observables is 7.9 percentage points. That is, differences in observed characteristics account for 7.9 percentage points out of the 11.8-percent total, while 3.9 percentage points are attributable to the unexplained part. Of the 7.9 percentage points, 2.9 percentage points, or about one-

[1] Given that different services have adopted different policies and programs to help address gender differences in officer career progression, we checked to see whether the patterns in contributors to explained and unexplained gender differences in officer career progression varied by service. We did this by running our models specifically for the Navy. The results for Navy officers are qualitatively similar to those for the military as a whole, which suggests that patterns are likely similar across services. We thus present results for the military as a whole, but results for each service are available upon request.

Table 4.1
Example of the Decomposition of the Difference of Officers Retained as an O3

				Part Due to Differences in Observables (%)			
Milestone	Male Officers (%)	Female Officers (%)	Difference (Male Minus Female)	Overall	Part Due to Having Any Dependents	Part Due to Having Any Dependent Ages 0–3	Part Due to Differences in Associations (%)
Retained as O3	83.2	71.6	11.8	7.9	2.9	1.0	3.9

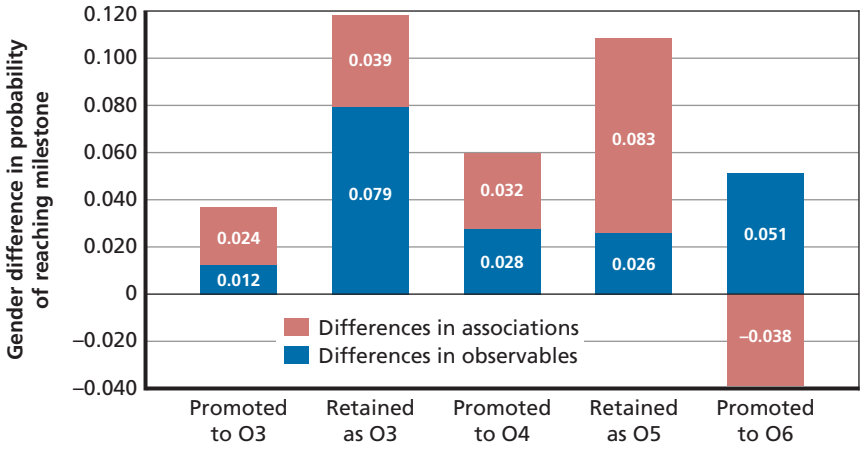
third of the observable difference, is attributable to gender differences in the percentage of officers with dependents. As shown in Chapter Three, female officers were less likely to have dependents. Furthermore, 1 percentage point is due to differences in the percentage with young dependents (birth to three). Thus, of the part of the gender difference that can be explained (7.9 percentage points), about one-third (2.9 percentage points) is due to differences in the presence of children, and about one-third of that (1 percentage points) is due to differences in the presence of babies and toddlers. Female officers were less likely to have young children, and those with young children were more likely to have been retained as an O3.

In our example, differences in the presence of young children for male and female officers contributed positively to the observable gender difference in the likelihood of being retained as an O3. Because the difference in the O3 retention milestone is positive—men were more likely to be retained as an O3—and because small children contributed positively to that difference, the difference in this characteristic was therefore disadvantageous to female officers. Put differently, the fact that female officers were less likely to have small children than their male counterparts helps explain why women are more likely to leave before being promoted to O4.

As a reminder, our results should be considered descriptive and not causal and can reflect selection factors and endogeneity of the marriage and childbearing decisions. For example, it is possible that female officers are less likely to have children at the O3 milestone, because those with children are less likely to be promoted or retained at earlier milestones (possibly leaving the military at an earlier milestone to have children). We consider this issue later in the chapter.

Figure 4.1 shows the decomposition of the gender difference in the probability of reaching specific milestones into the two main components: differences in observables characteristics and differences in associations. The largest gender differences in the probability of reaching a given milestone occur at promotion to O3, retention as an O3, promotion to O4, and retention as an O5. The discussion in this section focuses on these, as well as the final milestone, promotion to O6, because of the relatively large size of the two components.

Figure 4.1
Probability of Achieving Key Career Milestones: Decomposition of the Gender Differences Attributable to Observable and Association Components



NOTE: A positive difference in the figure is disadvantageous for female officers because it contributed to a larger gender difference in career progression.

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We find that differences in observed characteristics account for only part of the gender differences in the officer career pipeline. In the case of retention as an O3, the mean gender difference is 11.8 percentage points in the probability of achieving this milestone, with about two-thirds of this difference attributable to observed factors, or 7.9 percentage points. In the case of promotion to O4, differences in observed characteristics explain only about half of the mean gender difference in the probability of reaching this milestone (0.028 of 0.06). In the case of gender differences in the probability of being retained as an O5, observed factors account for about one-quarter of the overall difference (0.026 out of 0.109), implying that differences in associations account for about three-quarters of the observed difference. Thus, observed factors play a less prominent role at the later retention milestone.

The mean gender difference in the probability of being promoted to O6 is only about 1 percentage point (see Table 3.1). Figure 4.1 shows that while observable factors contributed positively to the gender dif-

ference, differences in associations contributed negatively by an almost offsetting amount. This suggests that female officers at the O6 promotion point had observed characteristics that worked against them relative to male officers, but differences in the association between characteristics and promotion worked for them.

Further Decomposing the Observable Components into Contributions Because of Differences in Specific Characteristics

Our analysis is designed to answer not only how much of the gender difference is due to differences in observed characteristics but which specific characteristics contributed the most to this difference. We further decompose the observable differences shown in Figure 4.1 into the contributions of differences in individual observed characteristics, as explained in Appendix A. We show the results graphically, focusing on the key milestones shown in Figure 4.1, with the full results provided in Appendix B.

Three issues should be kept in mind regarding this analysis. First, to reduce clutter in the graphics, we show the combined contribution of categorical variables. The combined contribution is the sum of the contributions of the subcategories. For example, we show the contribution of occupational group, equal to the sum of the contribution of being in each DoD occupational group (tactical, intelligence, engineering, supply and procurement, administration, and other). The categorical variables for which we show the combined effects are source of commission, entry year, occupational group, race and ethnicity, and service branch. We also combined marital status and any dependents to create a family-status variable.

Second, as discussed in the context of Table 4.1, some characteristics contributed positively, while others contributed negatively to the gender difference in the probability of achieving a given milestone. A positive contribution means that the gender difference in the characteristic, together with the estimated effect of the characteristic, increased the observable component of the gender difference in the probability of

achieving the milestone. That is, a positive contribution means that the difference in the characteristic is disadvantageous to female officers. A negative contribution means that the gender difference in the characteristic is advantageous to female officers because it reduces the difference between male and female officers in the probability of reaching a given milestone, attributable to observed factors.

Finally, we use the same scale across milestones to show the results of the detailed decompositions. Using the same scale facilitates comparisons of the relative importance of specific characteristics across milestones. One result of the use of a common scale is that some of the decompositions will appear to be rather "squashed."

We first summarize the overall findings in Table 4.2, before showing specific results. The table shows the main contributors to the differences in the probability of reaching the selected milestones, attributable to observed differences in terms of magnitude and in terms of being statistically different from zero.

The table shows that both individual characteristics and job characteristics contributed to differences in observed characteristics. In terms of individual characteristics, family-related factors, specifically marital status and presence of children, are major contributors to the positive gender gap in career milestones attributable to observed characteristics. In particular, we find that female officers were less likely to be married and less likely to have children, whereas being married and having children were generally positively related to career progression. Thus, family status contributed positively to the observed component

Table 4.2
The Main Contributors to Gender Differences in Reaching Selected Milestones, Observed Characteristics

Key Milestone	Difference in Gender Gap Attributable to Differences in Observed Characteristics
Retained as O3	Family status, occupation, entry year
Promoted to O4	Family status, occupation, entry year
Retained as O5	Occupation
Promoted to O6	Family status, deployment experience

of the gender gap. These results are consistent with research findings on the work outcomes of civilian women with more education. Thus, as with their civilian counterparts, better-educated women in the military postponed marriage and childbirth. Yet, also like their civilian counterparts, married men had better career outcomes (A. Miller, 2011; Buckles, 2008; Lundberg and Rose, 2000; Waite, 1995).

We cannot infer from these results that family status causes gender differences in career progression. In fact, the results might reflect reverse causality. That is, female officers might be less likely to be married and be retained because they leave so that they can marry. Because those who leave the service to get married appear as single in our data, it can appear that retention is higher among those who marry. If this is the case, we should expect to find that single women were more likely to leave than married women. We find no evidence to support this argument. The estimated coefficient for marriage is not statistically significant in the O1, O2, or O5 retention regressions for female officers. It is statistically significant but the wrong sign in the O3 and O4 regressions for female officers.[2] We find that single female officers were more likely to stay, not leave, as an O3 and as an O4. Thus, while we find that the lower marriage rate among female officers contributed to the positive gender gap in O3 retention, we do not find evidence to suggest that the lower marriage rate occurred at the O3 level because single women leave as an O3.

A similar argument could also be made for young children, from birth to age three. Female officers might have left service to bear children, with the results appearing as if having young children improved retention relative to those without young children. In this case, we do find some evidence consistent with this argument at the O3 retention milestone. In the O3 retention regression for female officers (see Appendix B), we find that female officers with dependents ages zero to three had higher O3 retention relative to those without young dependents. Thus, it is possible that those without young dependents leave as an O3 to have additional young children. However, this result is also consistent with other arguments, including that military service pro-

[2] The tables in Appendix B omit the results for O1, O2, and O4 retention.

vides a positive incentive to have young children, in the form of access to health care, thereby inducing greater retention. We find that having older children—ages four to six, ages seven to 18, and over 18—was also positively related to O3 retention, suggesting that children in general, not specifically having new children or young children, are positively associated with O3 retention. This lends some support to the argument that incentive argument for the relationship between children and O3 retention. That said, because we do not have a behavioral model of marriage formation or childbearing decisions, we are unable to distinguish between these arguments.

It is interesting to note that, unlike the O3 retention result, we find that having young children (birth to three) is negatively associated with retention for female officers at the O4 and, especially, O5 retention milestones. These results run counter to the argument that female officers without young children leave to have them. However, the negative coefficient estimate on the variable for children ages zero to three for female officers could suggest that higher-ranked military positions are not conducive to raising small children, and so these women are more likely to leave. It could also suggest that female officers with young children are more responsive to retirement benefits and so are more likely to leave, since officers are typically at the O5 level when they become eligible for these benefits. We note that the coefficient estimates for the variable for children ages zero to three are also negative for male officers, so these arguments could also be relevant to male officers. Again, we are unable to distinguish between the various explanations for our results.

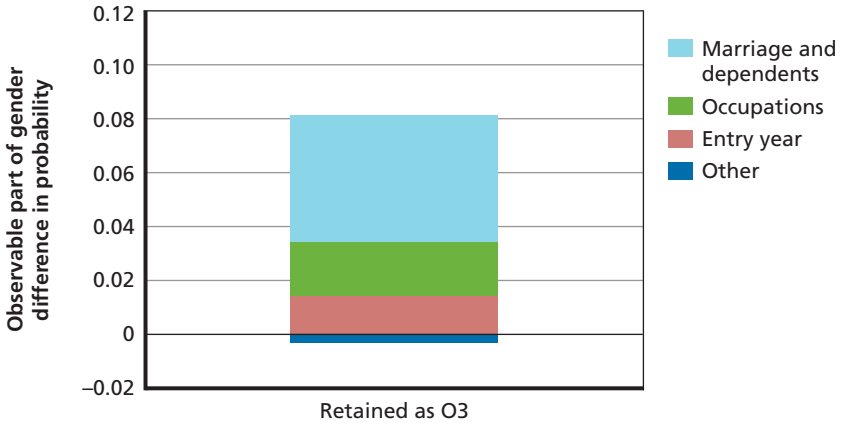
In terms of job-related characteristics, differences in occupational groups are a major contributor—usually a positive contributor, though in the case of promotion to O4, a negative contributor—to differences in the gender gap in the probability of reaching career milestones attributable to observed characteristics. Related, since the amount of deployment will depend on occupation, we find that cumulative months of deployment were also a contributor, especially later in the career (promotion to O6); this characteristic is usually disadvantageous to female officers when it is a main contributor.

Results for Specific Milestones

We next show specific results for each milestone, first considering retention as an O3 to the O4 promotion window, conditional on promotion to O3. Figure 4.2 shows the decomposition of the 7.9-percentage-point difference in O3 retention between male and female officers that is due to observed characteristics. We find that most of this difference is attributable to family factors and occupational groups. Together, these two factors account for 85 percent of the difference in observables in the probability of retention as an O3, with 60 percent attributable to the lower incidence among female officers of marriage and the lower likelihood of having any dependents. In the case of dependents, 2.9 percentage points of the overall 7.9-percentage-point difference is attributable to differences in presence of children.

With respect to occupation, an additional 25 percent of the gender difference attributable to observed characteristics in the probability of being retained as an O3 is due to differences in the occupational distribution of male and female officers. Finally, differences in

Figure 4.2
Probability of Retention as an O3: Decomposition of the Part of the Gender Difference Attributable to Observed Characteristics



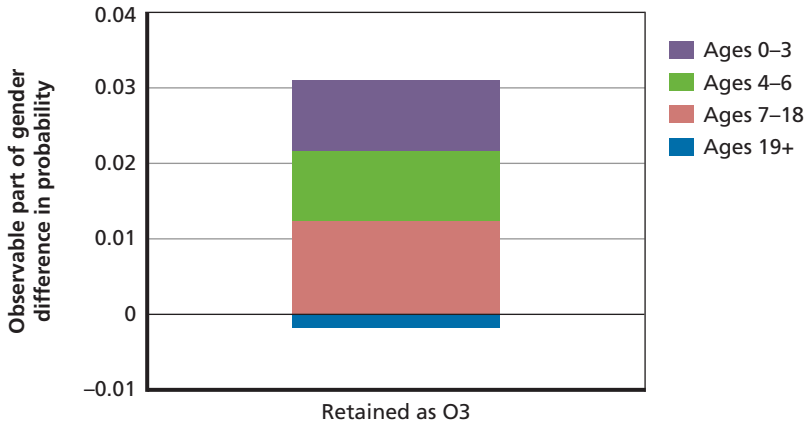
NOTE: The "other" category includes the contributions of prior service, race, ethnicity, commissioning source, service branch, education, and cumulative deployment.

RAND *RR1288-4.2*

entry year also contributed positively to the observable component in O3 retention. Female officers at the O3 retention decision point were more likely than male officers to have entered recently, and those who entered more recently had a lower probability of being retained. Thus, the contribution of entry year was disadvantageous to female officers at the career milestone of O3 retention.

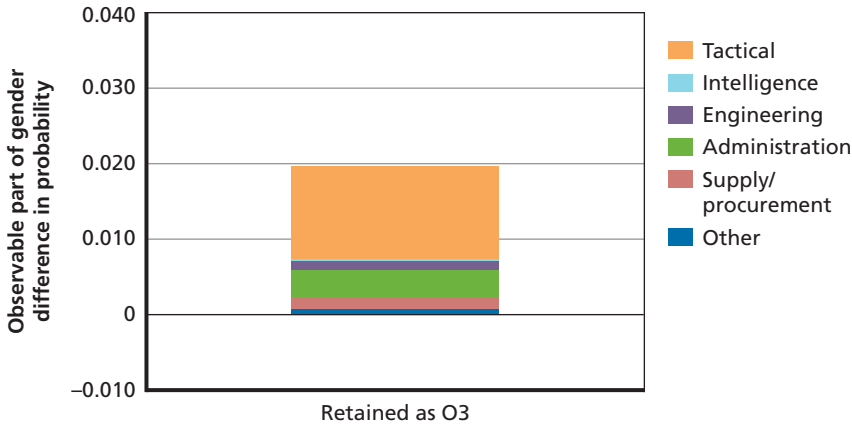
As mentioned earlier, the graphs show the combined effects of categorical variables. But given the relative importance of dependents in the detailed decomposition in Figure 4.2, we further decomposed the "dependents" contribution into the contribution associated with specific age groups (Figure 4.3). The birth-to-three, four-to-six, and seven-to-18 age groups contributed about equally to the total, roughly one-third each. We also further decomposed the occupation category into the contribution of specific occupational groups (Figure 4.4). Similarly, after further decomposing the role of occupational group, we find that of the 1.9 percentage points attributable to occupations in Figure 4.2, the majority (1.2 percentage points) is due to the role of tactical occupations. Thus, the substantially lower probability of find-

Figure 4.3
Probability of Retention as an O3: Decomposition of the "Any Dependents" Part of the Gender Difference Attributable to Observed Characteristics



RAND *RR1288-4.3*

Figure 4.4
Probability of Retention as an O3: Decomposition of the "Occupations" Part of the Gender Difference Attributable to Observed Characteristics



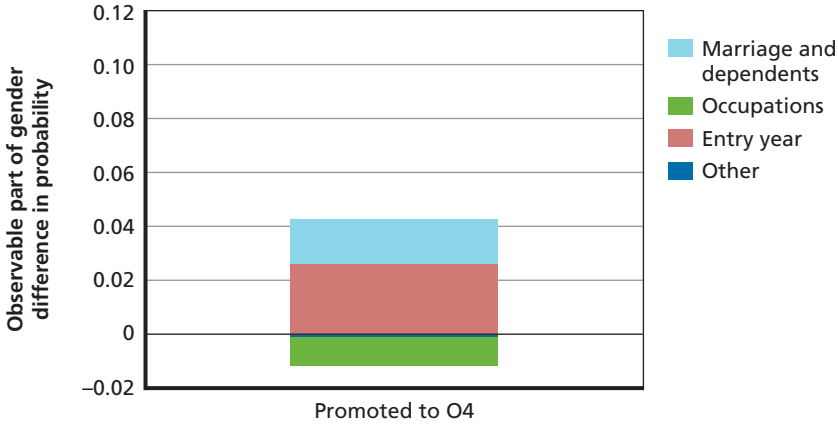
NOTE: The "other" category refers to all other occupational groups in the data, including science/professionals and those classified as nonoccupational.

RAND *RR1288-4.4*

ing female officers in tactical occupations and the positive relationship between being in a tactical occupation and retention as an O3 contributed importantly to the lower probability of retention as an O3 for female relative to male officers.

Figure 4.5 shows the detailed decomposition for the next milestone, probability of promotion to O4, conditional on retention as an O3. Here, entry year played a prominent role in contributing to the component attributable to differences in observed characteristics. Female officers had a higher representation in more-recent entry years, but these entry years are associated with lower promotion to O4, conditional on retention as an O3. Family status—specifically, differences in marital rate and presence of dependents between male and female officers—also contributed positively to the gender gap in the probability of an O4 promotion. However, gender differences in occupation contributed negatively and were advantageous to female officers in terms of promotion to O4.

Figure 4.5
Probability of Promotion to O4: Decomposition of the Part of the Gender Difference Attributable to Observed Characteristics

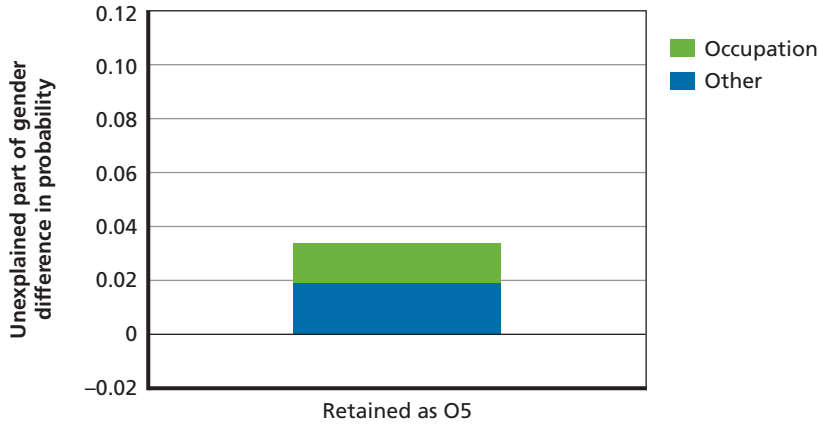


NOTE: The "other" category includes the contributions of prior service, race, ethnicity, commissioning source, service branch, education, and cumulative deployment.
RAND *RR1288-4.5*

The result for occupation (Figure 4.5) is surprising, given that occupation was a positive contributor to the gender gaps we observed, but here it was a negative contributor. Female officers eligible for an O4 promotion were less likely to be in tactical occupations, conditional on retention to the O4 promotion window, but unlike other milestones, we find that being in a tactical occupation was negatively associated with O4 promotion. This finding could be due to selectivity factors related to occupation that affect eligibility for O4 promotion. For example, those in administrative occupations were less likely to stay as an O3, but those who stayed might have more strongly preferred the military or had better O4 promotion prospects and so experienced greater probability of promotion.

Figure 4.6 shows the decomposition of the gender differences that is attributable to observed characteristics in the probability of being retained as an O5. The observable component is relatively small (as shown in Figure 4.1), with occupational differences being the main contributor.

Figure 4.6
Probability of Retention as an O5: Decomposition of the Part of the Gender Difference Attributable to Observed Characteristics



NOTE: The "other" category includes the contributions of prior service, entry year, dependents, marital status, race, ethnicity, commissioning source, service branch, education, and cumulative deployment.

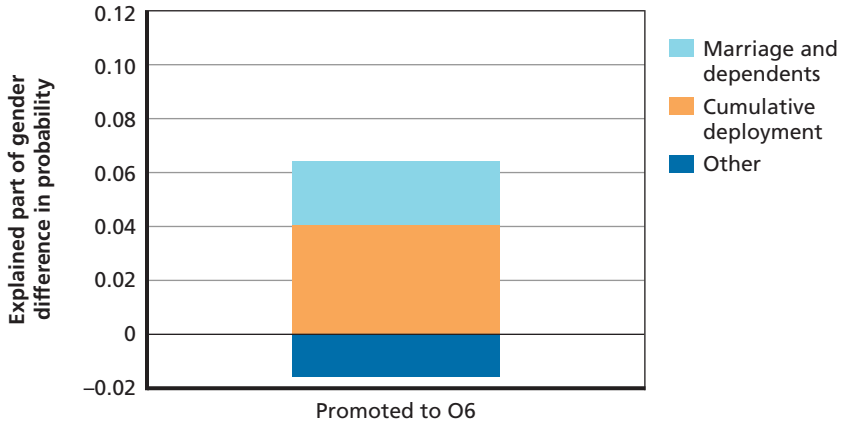
RAND *RR1288-4.6*

The last milestone we consider is promotion to O6. As shown in Figure 4.1, most of the gender difference attributable to observed characteristics in the probability of reaching this milestone was offset by the portion attributable to the difference in associations. The latter portion is 5.1 percentage points. The two major contributors to the portion attributable to differences in observed characteristics are marital status and number of dependents and cumulative months of deployment, as shown in Figure 4.7. Female officers eligible for O6 promotion had less deployment experience and were less likely to be married. Both of the factors contributed the observable portion of the gender difference. For example, the contribution of cumulative deployment experience is 3.9 percentage points.

Decomposing the Contribution of Being a Dual-Military Spouse

Past studies have suggested that female officers married to other military members might face unique issues, compared with officers married to civilians, such as maintaining a joint domicile or ensuring adequate

Figure 4.7
Probability of Promotion to O6: Decomposition of the Part of the Gender Difference Attributable to Observed Characteristics



NOTE: The "other" category includes the contributions of dependents, prior service, occupations, commissioning source, race, ethnicity, service branch, entry year, and education.

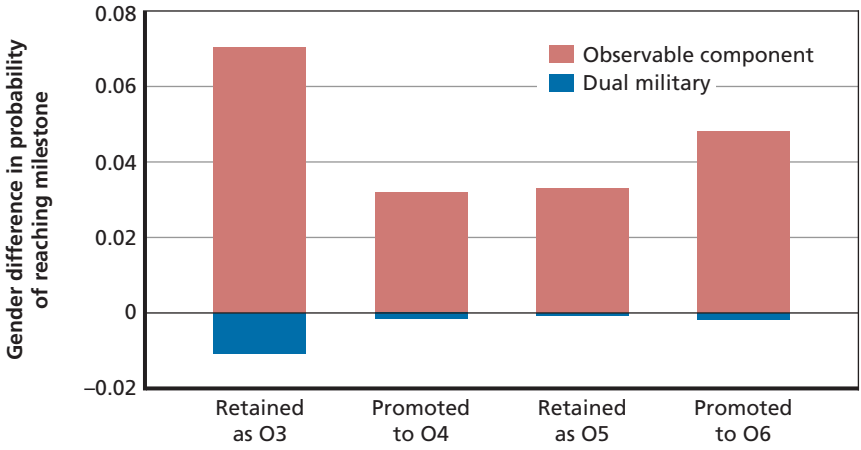
RAND *RR1288-4.7*

childcare during deployments. Consequently, being a dual-military spouse might be a contributing factor to gender differences in the officer career pipeline. As shown in Figure 3.4, female officers were more likely to be married to a fellow service member over the career pipeline than male officers.

We examine the role of being a dual-military spouse, in the observable part of differences in career progression between male and female married officers, by further decomposing the role of marital status into the portion attributable to being married to a civilian versus another service member. Figure 4.8 shows how much of the gender difference in the probability of reaching each career milestone is attributable to differences in observed characteristics (similar to Figure 4.1) and how much of the observed differences are, in turn, attributable to being a dual-military spouse.

We find that being a dual-military spouse contributed little to the portion of the gender differences in the officer career pipeline that is attributable to differences in observed characteristics. In fact, except for

Figure 4.8
Probability of Achieving Key Career Milestones: Decomposition of the Gender Difference in the Observable Component and Part Attributable to Dual-Military Status



RAND *RR1288-4.8*

retention as an O3, dual-military status had no role in contributing to the observable portion of the gender gap for married officers. And, in the case of retention as an O3, the contribution of being a dual-military spouse is negative. In other words, being a dual-military spouse is advantageous to female officers for this career milestone.

This finding is surprising given the level of attention that issues and challenges facing dual-military couples have received from the research and policy communities (L. Miller et al., 2011; Smith, 2010; Moini, Zellman, and Gates, 2006; Steinberg, Harris, and Scarville, 1993; Teplitzky, 1988). Our study does not imply that dual-military couples do not face challenges with such issues as colocation and finding adequate and dependable childcare, as past research has demonstrated. However, it does suggest that such factors might not translate to material differences in the career progression of dual-military spouses. On the one hand, it could be that civilian spouses of officers tend to have high-stress professional careers that could also contribute to the lower retention rates of their officer spouses. On the other hand, it could be that dual-military spouses exhibit higher attachment to their military

careers, which might counterbalance the negative influence of those challenges. Finally, it could be that the programs and policies that the services have developed to address issues for dual-military spouse, such as programs to prioritize the colocation of spouse duty, have helped to ameliorate those issues.

Further Decomposing the Association Components into Contributions of Specific Characteristics

We further decomposed the gender differences attributable to differences in the association of characteristics, shown in Figure 4.1, into the contributions of specific characteristics. That is, we held a given characteristic constant for male and female officers and asked to what extent gender differences in the association between that characteristic and the outcome contributed to the association component. Thus, this analysis provides information on the extent to which a given characteristic translated differently for male and female officers in terms of reaching a specific milestone, given that they were both eligible for that milestone. The association component is related to differences in the regression-coefficient estimates for female and male officers at each milestone, but those differences were normalized relative to the pooled regression-coefficient estimates and further normalized to account for the role of omitted categorical variables. Thus, while the differences in coefficient estimates for male and female officers are what we captured with the association component, the actual computation is more complicated (as shown in Appendix A), as is the interpretation of the component. We show the results graphically, focusing on the key milestones, shown in Figure 4.1, with the full results shown in Appendix B.

We first summarize the overall findings in Table 4.3, expanding on Table 4.2.

The main finding is that multiple factors contributed to the gender difference in terms of the probability of reaching the selected milestones attributable to differences in the association between outcomes and characteristics, with no single factor being the dominate contributor. That said, family status is a statistically significant contributing

Table 4.3
Summary of the Main Contributors to Gender Differences in Reaching Selected Milestones

Key Milestone	Difference in Gender Gap Attributable to Differences in Observed Characteristics	Difference in Gender Gap Attributable to Differences in the Association Between Characteristic and Outcome
Retained as O3	Family status, occupation, entry year	Family status, occupation, deployment experience, prior service, entry year
Promoted to O4	Family status, occupation, entry year	Family status, race/ethnicity
Retained as O5	Occupation	Prior service, entry year
Promoted to O6	Family status, deployment experience	Family status, deployment experience, race/ethnicity

factor to association differences in all of the milestones we considered, except retention as an O5. As we will discuss, few factors are statistically significant in the case of retention as an O5.

We find that male and female officers with the same family status—marital status and age and presence of dependents—had different likelihoods of being retained at O3 (conditional on being promoted to O3), being promoted to O4 (conditional on being retained as an O3), and being promoted to O6 (conditional on being retained as an O5). For example, we find that having dependents ages seven to 18 was positively associated with O6 promotion for male officers but negatively associated with O6 promotion for female officers. (It is important to recall that the different likelihoods for male and female officers with the same characteristics could be attributable to differential self-selection and gender differences in the causal effects of family on retention and promotion.)

More specifically, we find that among married officers, men had higher retention and promotion rates than women, holding other observed characteristics constant, contributing to the positive gender gap in retention and promotion rates between male and female officers. In only one case is marital status statistically significant for female officers—at the O3 retention milestone—and the estimated coefficient

is negative, indicating that married female officers were more likely to leave. In contrast, marital status is positive and statistically significant for male officers at every milestone.

The role of very young children (birth to three), varies at the different milestones. We find that having very young dependents was positively associated with O3 retention for both male and female officers, but the relationship is stronger for males. That is, those with young children have higher O3 retention, but more so for men. The weaker relationship for women contributed positively (though not statistically significantly) to the O3 retention gap between male and female officers. In the case of O5 retention, having very young children was negatively associated with O5 retention for both male and female officers—both male and female officers with young children were more likely to leave. But the relationship is much stronger (and more negative) for female officers; female officers with young children were far more likely to leave as an O5 than were male officers, and this difference contributed positively to the gender gap in O5 retention for male and female officers. Interestingly, that contribution is relatively small in magnitude (less than one percentage point). The findings for the two promotion milestones—O4 and O6—are similar. Among those with very young children, men had higher promotion rates, while women had lower promotion rates relative to those without very young children, and these differences contributed positively to the gender gap in O4 and O6 promotion.

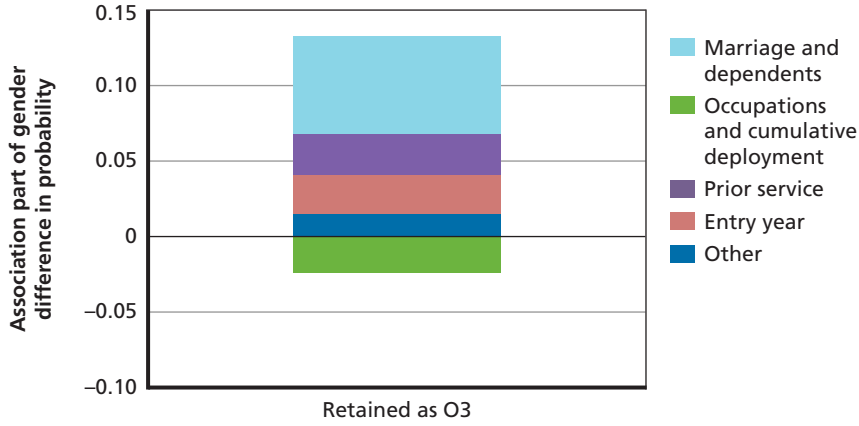
As for the role of preschool-age children (four to six), school-age children (seven to 18), and adult children, we find both male and female officers with children in these age groups were more likely to stay as an O3 relative to those without children in these age groups, and the relationship is stronger for female than male officers. This difference contributed to a narrowing of the gender gap in O3 retention. That is, the presence of children in these older age groups was advantageous to female officers in the sense that it reduced the retention rate gap between male and female officers that was attributable to the association component of the gap. As for the other milestones—promotion to O4, retention as an O5, and promotion to O6—we generally do not find that the contributions of having children in these older age groups are statistically significant.

Differences in coefficient estimates for the occupational group variables and, related, cumulative months deployed contributed to the part of the gender gap in retention and promotion rates attributable to the association component. Both male and female officers in tactical occupational specialties had a higher O3 retention rate, with the estimated relationship stronger for female than for male officers. The stronger relationship narrowed the gender gap in O3 retention. Related to this finding, the relationship between additional months of deployment and O3 retention is positive and statistically significant for female officers but negative and statistically significant for male officers. This difference in the association between deployment and O3 retention also narrowed the gender gap in O3 retention; it contributed negatively to the association component of the gender gap. Another notable finding with respect to deployment time is that cumulative months of deployment were positively associated with O6 promotion, for both male and female officers, but there was a stronger relationship for female officers. Consequently, months of deployment were advantageous to female officers, with respect to the gender gap in O6 promotion that is attributable to the association component.

Results for Specific Milestones

We next turn to the specific results at each milestone. We begin with retention as an O3 and the O4 promotion window (conditional on being promoted to O3), though, as shown in Figure 4.1, association differences are relatively unimportant for this milestone, accounting for 3.9 out of the 11.9-percentage-point difference in the likelihood of reaching this milestone for men and women. Figure 4.9 shows the decomposition of the component because of differences in associations, though the individual contributions do not sum to 3.9 percentage points, because we omit the contribution associated with the difference in the constant term. The figure shows that several factors contributed to this component, though family status is clearly particularly important. Family status was positively related to retention as an O3 for men (conditional on promotion to O3) but negatively associated with retention for female officers. Thus, a married female officer was less likely to stay, while a married male officer was more likely to stay.

Figure 4.9
Probability of Retention as an O3: Decomposition of the Part of the Gender Difference Attributable to the Association Between Outcome and Characteristics

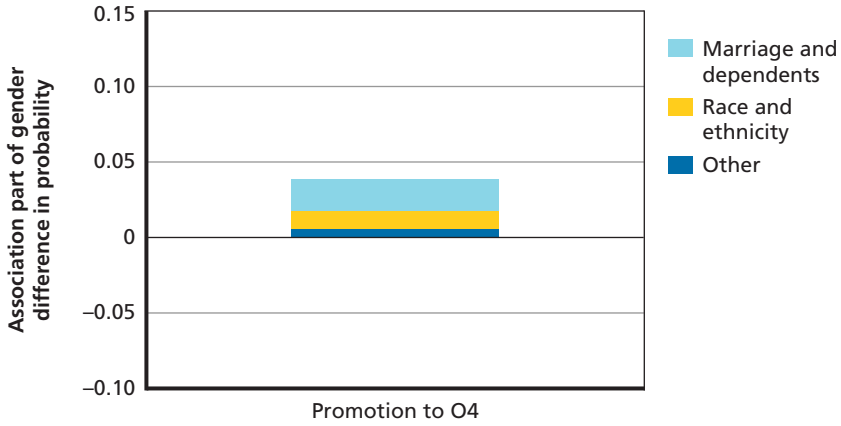


NOTE: The "other" category includes the contributions of commissioning source, race, ethnicity, service branch, and education.

RAND *RR1288-4.9*

Figures 4.10 to 4.12 show similar decompositions of the association component for promotion to O4 (conditional on retention as an O3), retention as an O5 (conditional on promotion to O5), and promotion to O6 (conditional on retention as an O5). As in Figure 4.9, the decompositions do not show the contribution of the difference in constant terms. For the two promotion milestones—promotion to O4 and to O6—family factors and race and ethnicity are key contributors to the gender difference because of differences in the associations between characteristics and these two outcomes. Being married is positively associated with promotion to O4 for male officers (conditional on retention as an O3) and with promotion to O6 (conditional on retention as an O5). But the association between marital status and promotion to either O4 or O6 is not statistically different from zero for female officers. Regarding the result for race, we find that white male officers had a higher O4 promotion rate relative to other groups, while the O4 promotion rate for white female officers is not statistically

Figure 4.10
Probability of Promotion to O4: Decomposition of the Part of the Gender Difference Attributable to the Association Between Outcome and Characteristics



NOTE: The "other" category includes the contributions of prior service, occupations, commissioning source, entry year, service branch, cumulative deployment, and education.

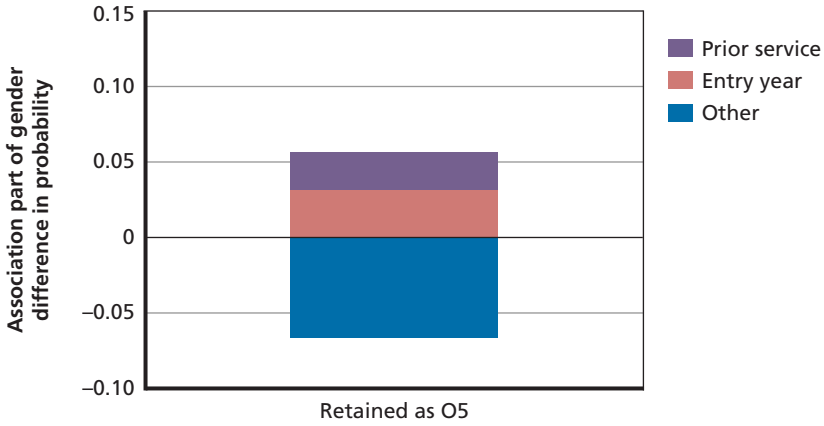
RAND *RR1288-4.10*

significant. This difference in the association between being white and O4 promotion contributed positively to the gender gap in O4 promotion. It is important to note that in the case of promotion to O4, association differences were relatively unimportant in general, and, in the case of O6, cumulative deployment experience was also a contributor.

Figure 4.1 showed that for retention as an O5, the association component is a major share of the overall gender difference in the likelihood of reaching this milestone. We find that almost none of the characteristics had a statistically significant contribution to this component; the constant term was the main contributor that was statistically significant. This means that "being female" relative to "being male" was the main contributor in terms of statistical significance. Thus, other than entry year and prior service status, we are unable to decompose the association component, given the characteristics we include in our analysis.

Given the role of marital status as a contributor to the part of the gender differences in promotion to O4 and O6 and in retention as an

Figure 4.11
Probability of Retention as an O5: Decomposition of the Part of the Gender Difference Attributable to the Association Between Outcome and Characteristics



NOTE: The "other" category includes the contributions of family status, race and ethnicity, occupations, commissioning source, service branch, cumulative deployment, and education.

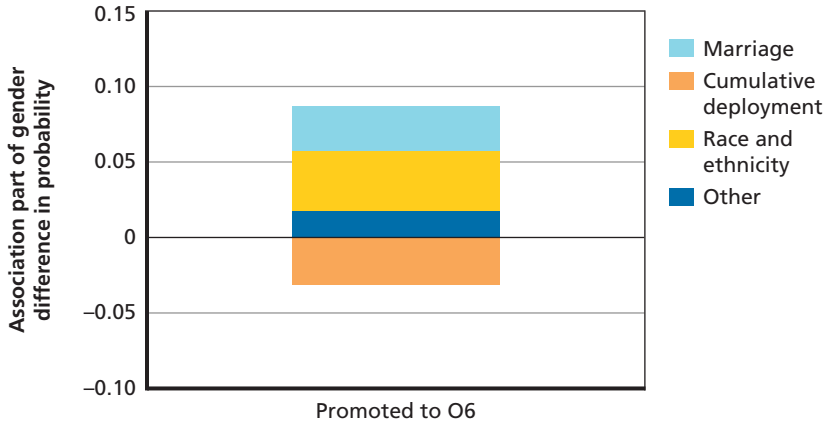
RAND *RR1288-4.11*

O3, attributable to differences in associations, we further decompose the contributions of marital status. The additional decomposition is shown in Figure 4.13. We find being a dual-military spouse contributed little to the association component. That said, unlike the part of the gender difference attributable to differences in observed characteristics (shown in Figure 4.9), being a dual-military spouse contributed positively to the gender difference (i.e., it is disadvantageous to female officers), but in none of these cases was the contribution statistically different from zero.

Decomposing the Gender Gap into Contributions of Specific Characteristics

So far, we have discussed the contribution of specific characteristics to the observed and the association components of the gender gap. We conclude this chapter by summing the contributions and showing the

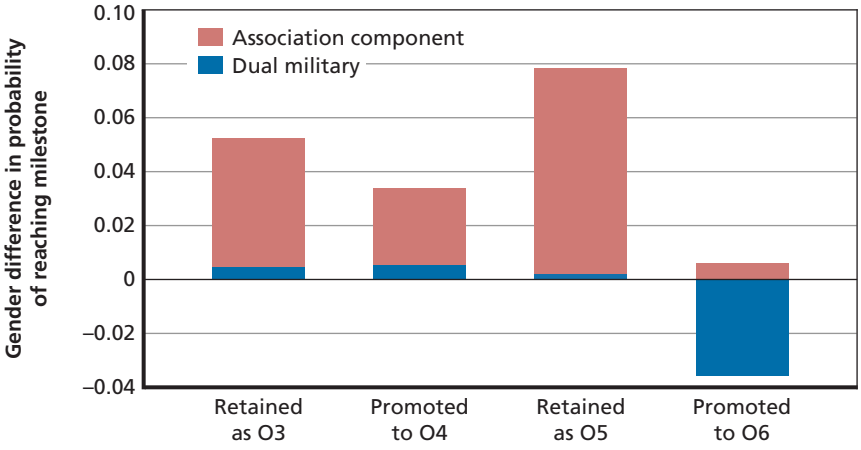
Figure 4.12
Probability of Promotion to O6: Decomposition of the Part of the Gender Difference Attributable to the Association Between Outcome and Characteristics



NOTE: The "other" category includes the contributions of dependents, prior service, occupations, commissioning source, entry year, service branch, and education.

RAND *RR1288-4.12*

Figure 4.13
Probability of Achieving Key Career Milestones: Decomposition of Gender Difference in the Association Component and Part Attributable to Dual-Military Status

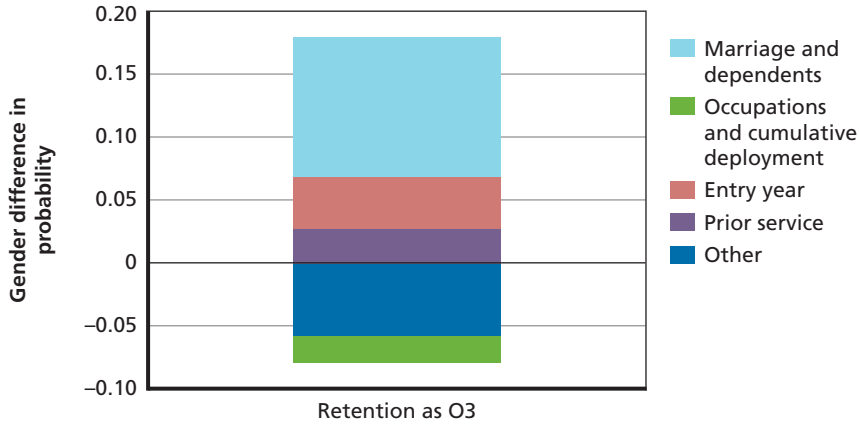


RAND *RR1288-4.13*

total contribution of specific characteristics to the gender gap in the probabilities of reaching different career milestones. We focus the discussion on the three milestones with the larger gender gaps (shown in Table 3.1): retention as an O3, promotion to O4, and retention as an O5.

With respect to family status, we find that marital status and dependent status contributed positively to the gender gap in the probability of being retained as an O3 (Figure 4.14) and of being promoted to O4 (Figure 4.15), with no statistically significant effects in general for the probability of being retained as an O5 (Figure 4.15). Focusing on the results for marital status, being married was positively associated with retention as an O3 and promotion to O4. Female officers were also less likely to be married. At the same time, we find that among those who were married, male officers were more likely to be retained as an O3 and promoted to O4, and female officers were less likely to be retained as an O3 and had no statistically different promotion to O4 relative to unmarried female officers. Thus, both differences in observed marital rates and differences in the association between mar-

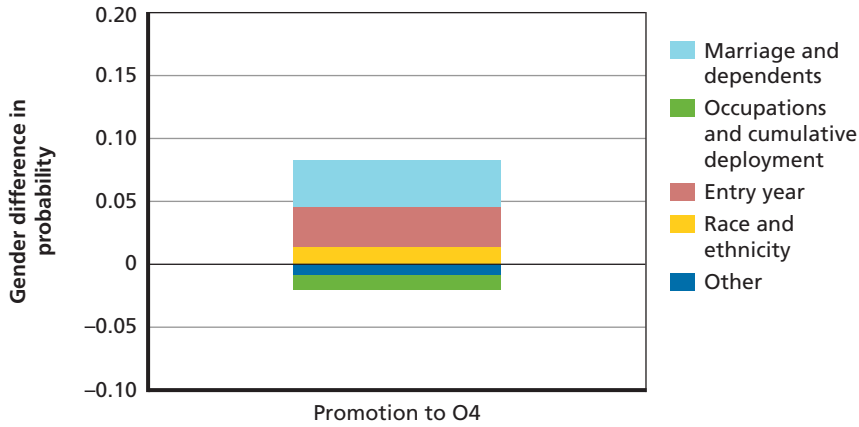
Figure 4.14
Probability of Retention as an O3: Decomposition of the Gender Difference Attributable to Specific Characteristics



NOTE: The "other" category includes the contributions of commissioning source, service branch, education, race and ethnicity, and the constant term.

RAND *RR1288-4.14*

Figure 4.15
Probability of Promotion to O4: Decomposition of the Gender Difference Attributable to Specific Characteristics



NOTE: The "other" category includes the contributions of being prior service, commissioning source, service branch, education, and the constant term.
RAND *RR1288-4.15*

riage and the probability of O3 retention and O4 promotion contributed to the positive gender gap.

The results for dependent status are similar in the sense that gender differences in the incidence of dependents and in the association between dependents status and the probability of O3 retention and O4 promotion contributed positively to the gender gap. For example, female officers were less likely to have very young children (birth to three), and the association between having young children and retention as an O3 was weaker for women than men. In the case of promotion to O4, male officers with very young children were more likely to be promoted, while female officers were less likely.

Turning to the results for occupational group, we combine the contribution of occupational group with that of cumulative months of deployment, because the two variables are related insofar as amount of deployment reflects occupational distribution within a given occupational grouping. Earlier, we found that the association component narrowed the gender gap in the probability of being retained as an O3,

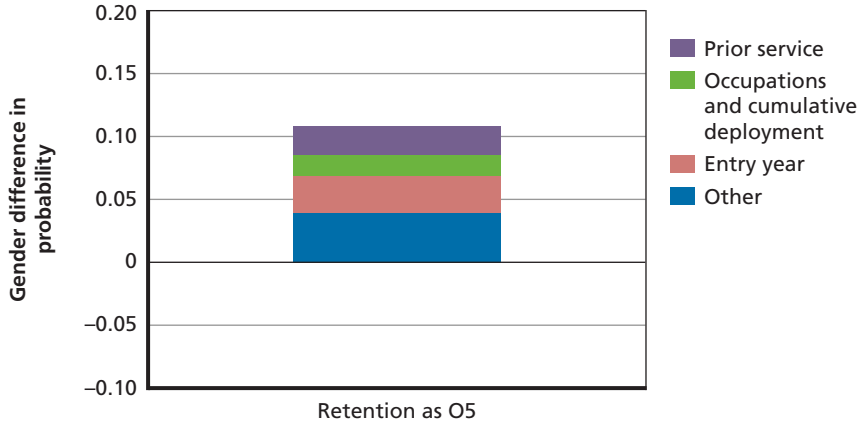
while the observed component increased the gender gap; the two components work in opposite directions. The overall contribution of occupational group and cumulative months of deployment to the gender gap in O3 retention is negative, but relatively small in magnitude (Figure 4.14). Female officers were less likely to be in tactical occupations, contributing positively to the observed component of the gender gap in O3 retention, but O3 retention was higher among officers in tactical occupations, with the association stronger for female officers. The overall contribution of being in a tactical occupation to O3 retention is negative but small in magnitude. The overall contribution of occupational group and cumulative months of deployment in O4 promotion is also negative. In this case, the key driver for this result is our finding that being in a tactical occupation is negatively associated with O4 promotion (see Figure 4.5).

As for retention as an O5, the contribution of occupational group and cumulative months of deployment operated in the same direction; these variables contributed positively to both the observed and association components of the gender gap. Female officers were less likely to be in tactical occupations and had fewer cumulative months of deployment, and both variables are positively associated with retention as an O5. At the same time, both variables are positively associated with O5 retention for male officers but are not statistically different from zero for female officers, also contributing to a positive gender gap in O5 retention. Taken together, the total effect is also positive (Figure 4.16).

In the case of O4 promotion, we find that race and ethnicity contributed positively to the gender gap (Figure 4.15). Here, the main driver was not differences in the contribution to the observed component. Instead, the main driver was the differences in the contribution to the association component. Specifically, as discussed in the context of Figure 4.10, white male officers had a higher O4 promotion rate relative to other groups, while the O4 promotion rate for white female officers is not statistically significant. As a result, being white was a positive contributor to the gender gap in O4 promotion.

Finally, entry year is another variable that contributed to the gender gap in career progression; specifically, it had an overall positive contribution to the gender gap in the probability of being retained as

Figure 4.16
Probability of Retention as an O5: Decomposition of the Gender Difference Attributable to Specific Characteristics



NOTE: The "other" category includes the contributions of marital status; having dependents ages zero to three, four to six, seven to 18, and over 18; commissioning source; service branch; education; and the constant term.

RAND *RR1288-4.16*

an O3, promoted to O4, and retained as an O5. For example, in the case of O3 retention, entry year contributed 4.1 percentage points to the overall 11.8-percentage-point difference between male and female officers in the probability of staying as an O3. Female officers were less represented in the earlier entry years and more represented in the later entry years. Entering in the early years was positively associated with O3 retention, while entering in the later years was negatively associated with O3 retention. Thus, observed differences in entry year contributed to the gender gap. Differences in associations also contributed to the gender gap in a disadvantageous way. Female officers who entered in earlier years had higher O3 retention than male officers, while female officers who entered in the later years had lower O3 retention than their male counterparts. Thus, both the association component and the observed component of the entry year are relevant to the gender gap at O3 retention.

CHAPTER FIVE

Concluding Thoughts

The largest differences between male and female officers' career progression occurred in the probabilities of being retained as an O3, being promoted to O4, and being retained as an O5. Our study of the factors explaining gender differences in the officer career pipeline, focusing on these milestones, leads to the following findings:

- The observed differences in job and individual characteristics between male and female officers explain some but not all of the differences in the likelihood of reaching retention and promotion milestones. At most, observed differences explain about two-thirds of the gender difference, with the remaining differences being attributable to differences in the association of characteristics and retention and promotion outcomes.
- Among the differences in observed characteristics, family factors—specifically, marital status and age and presence of dependents—are consistently important. Women's lower likelihood of being in a tactical occupation, lower levels of deployment experience, and increased likelihood to have entered in a recent cohort are also notable contributors to gender differences in the career pipeline. That is, family factors, occupational and deployment experience, and entry cohort tended to be major contributors toward explaining why women were less likely to be retained and promoted over their officer careers.
- Among the differences in the association between characteristics and outcomes, family factors had some role, but so did other characteristics.

- Overall, considering both the observed component and association component of the gender gap, marital status and dependents status are generally major positive contributors to gender differences in officer career progression. Both the observed component and association component played a role in the contribution of family factors.
- Among married officers, being a dual-military spouse appears to have had little or no role in contributing to gender differences in career progression.
- Overall, considering both the observed component and association component of the gender gap, occupational group contributed negatively to the gender gap in the midcareer (O3 retention and O4 promotion) but positively later in the career (O5 retention). Although female officers were less likely to be in tactical occupations, the negative contribution occurred because the role of that difference was outweighed by the negative contribution attributable to differences in the association between retention and promotion and being in a tactical occupation.
- Entry year contributed to the gender gap. Female officers were more likely to be represented in recent cohorts, and the association between entry year and retention and promotion differed between male and female officers in a way that led to lower retention and promotion rates for female officers.

Our study is descriptive and did not evaluate why these observed differences in characteristics occurred or why these characteristics' effects on retention and promotion outcomes might differ for male and female officers. Furthermore, our study did not evaluate any existing policies aimed at reducing differences in characteristics, such as opening occupations to female officers, or at reducing gender differences in career progression. That said, our study does suggest several implications with respect to policies aimed at closing the gender gap in officer career progression.

Given that observed differences in the characteristics of male and female officers contributed to differences in career progression, policies aimed at reducing those differences will contribute to narrow-

ing the gender gap in career progression. For example, policies that increase the representation of female officers in tactical occupations, such as the 2013 repeal of the policy banning women from serving in infantry, artillery, armor, and other tactical occupations at the battalion size or smaller, will reduce occupational differences between male and female officers and contribute to reducing the part of the gender gap in the retention and promotion outcomes attributable to observed differences. Interestingly, our finding that dual-military officers exhibited similar patterns of career progression to other officers suggests that further efforts to address issues that are unique to dual-military officers might have little impact on reducing the gender gap in officer career progression.

While much of the recent policy focus has been on improving gender equality with respect to roles in combat and in all military occupations, our analysis suggests that, among policies that aim to reduce observed differences in characteristics, policies that target work-family balance could have an important impact on reducing the explained gender gap in career progression. DoD currently has some policies in place. For example, a policy allows a four-month deferment of an overseas assignment after the birth of a child, and the Career Intermission Pilot Program provides a one-time temporary transition from active duty to the Individual Ready Reserve for one to three years to pursue personal or professional obligations, including childbirth. The Air Force recently indicated that it is considering longer maternity leave, similar to changes recently announced by the Navy that would extend maternity leave to 18 weeks ("Air Force Considering Longer Maternity Leave," 2015). Our analysis does not indicate which policies that improve work-life balance are effective or would improve the gender gap in officer career progression. Instead, the analysis points to this area as one that deserves closer attention in the future, given the role of family factors in explaining the gender gap in career progression.

Still, our analysis indicates that policies that reduce observed differences in characteristics are unlikely to fully eliminate the gender gap in career progression. Differences in the association between specific factors and retention and promotion outcomes also play a role; for some career milestones, these differences were the major contributor

to gender differences. The associations we estimated captured structural factors (e.g., the factors that cause retention and promotion outcomes to differ for male and female officers with the same observed characteristics), as well as the role of self-selection and endogeneity of both observed and unobserved characteristics. With respect to unobserved characteristics, gender differences in taste for the military and performance could be important. For example, taste for the military might be influenced by perceptions about the climate and acceptance of women in service, as well as ongoing issues related to sexual harassment and assault. Thus, policies aimed at reducing gender differences must also tackle differences in structural factors and differences in factors that are more difficult to measure.

In short, our analysis indicates that gender differences in career progression can be partly explained by differences in job-related characteristics, such as occupational differences and deployment experience, as well as individual characteristics, such as marital status and age and presence of dependents. Policies that reduce these differences will contribute to reducing the gender gap in officer career progression but will not eliminate it. Additional attention must be given to structural factors, including how retention decisions and the promotion process differ for male and female officers with the same characteristics, and to differences in factors that are more difficult to observe, such as differences in attitudes toward military service and performance.

APPENDIX A

Blinder-Oaxaca Methodology

The Blinder-Oaxaca method begins with two groups (in our case, male and female officers) and an outcome variable for each group (in our case, a retention or promotion outcome). We denote *group* with the subscript g (where g equals either male officers or female officers), and we denote the outcome for each group as Y_g.[1] The outcome for each group is assumed to be linearly related to a set of observed characteristics, X_g, where β_g is the slope parameters, and unobserved characteristics are v_g: $Y_g = X_g \beta_g + v_g$, for g = male, female. We assume that the unobserved and observed characteristics are independent: $E(v_g|X_g) = 0$, where $E()$ is the expectation operator, so that we can decompose the difference in mean outcome between groups into the explained and structural components.[2] We also assume $E(v_g) = 0$. The difference in the mean outcome between groups, R, is given by:

$$R = E(Y_m) - E(Y_f) = \overline{Y}_m = -\overline{Y}_f = E(X_m)\beta_m - E(X_f)\beta_f = \overline{X}_m \beta_m - \overline{X}_f \beta_f.$$

We simplified the notation and replaced expected values with sample averages—e.g., we replaced $E(Y_m)$ with $\overline{Y}_m$. Through simple

[1] We have ten retention and promotion outcomes to consider, as shown in Table 2.1, so we should also subscript each outcome by i, where i varies from one to ten. However, to reduce the clutter of notation, we drop the i subscript here and refer to a single outcome, though it should be recalled throughout that we have ten outcomes to consider. Later in this appendix, we discuss selectivity bias and how a given outcome later in the career can depend on the sample selection that occurs earlier in the career.

[2] Later in this appendix, we discuss what happens when this assumption is violated, as is likely the case in our analysis, and the implications for interpretation of the results.

algebraic manipulation, adding and subtracting terms, R can be expressed as

$$R = \bar{X}_m\beta_m - \bar{X}_f\beta_f = (\bar{X}_m - \bar{X}_f)\beta_f + \bar{X}_m(\beta_m - \beta_f) = E + S.$$

The first term, $(\bar{X}_m - \bar{X}_f)\beta_f$, is the composition portion, or the explained portion, of the difference in the mean outcome because it represents the contribution of group differences in characteristics to the overall difference in the mean outcome. We denote this term as E. The second term is the contribution of the differences in the coefficients (including differences in the intercept), $\bar{X}_m(\beta_m - \beta_f)$. Insofar as the coefficients capture structural factors in the retention decision process and in the promotion process that translates characteristics into outcomes, this term is often termed the *structural portion* of the difference in mean outcomes.[3]

The expression for S presupposes that the appropriate benchmark for the female coefficients is the male coefficients. The expression implicitly assumes that the assessment of the structure of the retention decision and promotion processes for female officers should be based on how it compares with those processes for male officers. However, using the coefficients for male officers as the benchmark could be problematic. For example, in the literature on labor market discrimination, researchers have argued that using the male coefficients as the reference group in an Blinder-Oaxaca decomposition could overstate the degree of discrimination against women if some of the observed differences between male and female labor market outcomes are due to discrimination (possibly positive discrimination) directed toward men and in any case, the choice of reference group (either female or male) yields different results (Cotton, 1988; Oaxaca and Ransom, 1994). As we will discuss, we do not argue that the term S measures discrimination. Nor do we argue that S has a structural interpretation, as in the

[3] The decomposition for R is not unique. An alternative expression for R is $R = (\bar{X}_m - \bar{X}_f)\beta_m + \bar{X}_f(\beta_m - \beta_f)$. Here, the differences in characteristics are weighted by the coefficients for male officers, rather than female officers, while the differences in coefficients are weighted by the characteristics for female officers, rather for male officers. The choice of which to use is arbitrary.

labor market discrimination literature. Still, using the coefficients for male officers as the benchmark is somewhat arbitrary, so we consider an alternative proposed in the literature.

Following Neumark (1988) and Fortin (2007), we use the coefficients from a pooled regression as the benchmark.[4] The pooled regression is $Y = X\beta^* + v$.

Again, using simple algebra, we can express R as

$$R = (\bar{X}_m - \bar{X}_f)\beta^* + \bar{X}_m(\beta_m - \beta^*) - \bar{X}_f(\beta_f - \beta^*) = E^* + S^*.$$

Here, the explained component of the decomposition that accounts for group differences in characteristics, E^* is weighted by β^*, while the structural component, S^*, has two elements. The first is related to the difference between the male coefficients and the benchmark, and the second is related to the difference between the female coefficients and the benchmark:

$$U^* = \bar{X}_m(\beta_m - \beta^*) - \bar{X}_f(\beta_f - \beta^*).$$

In the literature, the first structural component is called the *advantage to men* $[\bar{X}_m(\beta_m - \beta^*)]$, while the second structural component is called the *disadvantage to women* $[-\bar{X}_f(\beta_f - \beta^*)]$.

In Chapter Four, we presented estimates of E^* and S^* for each career milestone. These estimates provided information on the overall explained and structural component of differences in mean outcome between male and female officers for each milestone. As we discuss below, we interpret S^* as the unexplained component rather than the structural component.

We can further decompose E^* and S^* to get the detailed contribution of each characteristic to the explained and structural compo-

[4] An issue discussed in the literature is that the use of pooled regression estimates without a dummy variable for group membership (e.g., an indicator for female officers) can inappropriately attribute some of the unexplained component to the explained component. This is a classic omitted-variable problem. We follow the approach taken in the literature (see Jann, 2008) and include a female-officer indicator in the pool-regression models as an additional covariate.

nents. The individual contribution of each characteristic is straightforward because the total component is a simple sum over the individual contributions of each characteristic. For example, consider E^*. It can be decomposed to the individual characteristics as follows:

$$E^* = (\bar{X}_m - \bar{X}_f)\beta^* = (\bar{X}^1_m - \bar{X}^1_{mf})\beta^*_1 + (\bar{X}^2_m - \bar{X}^2_{mf})\beta^*_2 + \ldots,$$

where $\bar{X}^1$, $\bar{X}^2$, . . . are the means of the single characteristics, and β^*_1, β^*_2, . . . are the associated coefficients. The first element in the right-hand side is the contribution of the group differences in $\bar{X}^1$ and so forth. A similar detailed decomposition can be made of S^*. In Chapter Four, we presented both the overall and the detailed decompositions for milestones with the largest differences in outcomes.

Issues

There are two issues we must address regarding performing the Blinder-Oaxaca decomposition in our study. The first has to do problems with performing detailed decompositions with indicator variables when the choice of the omitted category is arbitrary. We address this issue by using a normalization procedure discussed in Yun (2005) and summarized in Jann (2008) and Fortin (2007). The second issue has to do with self-selection and endogeneity, which imply a violation of a key assumption, $E(v|X) = 0$.

The Problem of the Choice of the Omitted Group for Categorical Variables

The first issue arises because most of the characteristics we consider in our regression analysis, such as occupational group, are categorical, or indicator, variables. As is well-known in the literature, one category is omitted in linear regression models to avoid perfect collinearity with the intercept. For example, we estimate a pooled regression model with indicator variables for each occupational group, with tactical occupations as the omitted category. The problem for the Blinder-Oaxaca decomposition is that the contributions to the structural part, S^*, of the decomposition of these indicator variables will arbitrarily depend

on which category is omitted. For example, in our analysis, if we choose a different occupational group as the omitted group—e.g., administrative occupations—the contribution of each occupation to the structural portion differs from when we choose tactical occupations as the omitted group. Since the choice of which group to omit is arbitrary, the detailed decomposition, which changes when the omitted group is changed, is arbitrary as well. It is important to note that the detailed decomposition of the explained part is unaffected by this problem.

We handle this issue by transforming the estimates of the categorical variables for a given characteristic so the decomposition is independent of the choice of omitted category. For example, suppose the characteristic is occupational group and we have six groups to consider, with one as the omitted category. First, given that the coefficient on the omitted category is zero, by definition, we take the average of the coefficient estimates for the characteristic, (including the zero estimate for the omitted category), where the average is given by c. Second, we then add c to the intercept and subtract c from each coefficient estimate, including the zero coefficient for the omitted category. Thus, the coefficients are expressed as deviations from the overall mean of the coefficients across all subcategories. The results are that the coefficient estimates (including the omitted category) sum to zero, and the transformed model is equivalent to the untransformed model. These transformed coefficient estimates are then used in the decomposition. This approach yields the same detailed decomposition regardless of which category is omitted. The approach is described by Yun (2005) and Fortin (2007), and we make use of the DEVCON program created by Jann (2005) in Stata to implement the approach.

The Problem of Self-Selection and Endogeneity

We face two issues that result in the violation of the independence assumption [$E(v|X) = 0$]. The first issue is self-selection and the problem that, at any given career milestone, the group of officers eligible to proceed to the next milestone (i.e., the group that participates in a particular milestone) is a self-selected group of personnel. The second issue is that our data do not include unobserved factors (by definition), and

these factors, as well as observed factors, could be correlated with the factors that we do observe. We discuss each issue in turn.

Self-selection is particularly a problem when the self-selection process differs for male and female officers and might be partially based on factors that are unobservable in our data. For example, those eligible for promotion to O4 are those who were promoted to O3 and stayed until the promotion eligibility window. The eligible group is not a random group of officers but consists of those who were selected for earlier promotions and who made retention decisions and opted to stay. These officers were likely to be personnel who stayed because they believed that they have a good chance of a future promotion, while those who thought that they had a poorer chance of future promotion were more likely to leave. Furthermore, those selected for promotion at earlier stages of the career pipeline were likely to be those who were viewed as having good career prospects. Consequently, the eligibility pool consisted of those who self-selected into the pool. Importantly, this self-selection might differ for male and female officers and is likely to be partially based on factors that are not observable in our data, such as ability and performance.

When participation in the eligibility pool for a particular milestone is based on unobserved factors, the expected value of a given outcome is no longer $\bar{X}_g\beta_g$ but is instead given by $E(Y) = \bar{X}\beta^* + E(v|eligibility)$. This expression can be rewritten as $E(Y) = \bar{X}\beta^* + \bar{\lambda}\sigma^*$, where $\bar{\lambda}$ is the mean of the usual inverse Mills ratio term that is obtained by estimating a probit model of the likelihood of eligibility, and σ^* is the coefficient on the Mills ratio term in a pooled regression, related to the variance of the error term of the selection eligibility process and the covariance between that error and v. Performing standard ordinary least squares regression without accounting for the term $\bar{\lambda}\sigma^*$ will lead to biased estimates of β^* if the eligibility selection process is correlated with the outcome of interest. This is likely to be the case in our analysis. Selection bias will also affect the decomposition. The Blinder-Oaxaca decomposition becomes $R = (\bar{X}_m - \bar{X}_f)\beta^* + \bar{X}_m(\beta_m - \beta^*) - \bar{X}_f(\beta_f - \beta^*) + (\bar{\lambda}_m - \bar{\lambda}_f)\sigma^* + \bar{\lambda}_m(\sigma_m - \sigma^*) - \bar{\lambda}_f(\sigma_f - \sigma^*) = E^* + S'$.

E^* is defined as before, but the structural portion now includes not only $\bar{X}_m(\beta_m - \beta^*) - \bar{X}_f(\beta_f - \beta^*)$ but additional terms related to dif-

ferences attributable to unobserved characteristics, $(\overline{\lambda}_m - \overline{\lambda}_f)\sigma^*$, as well as differences in the effects of those unobservables (e.g., the coefficients on the unobservables), $\overline{\lambda}_m(\sigma_m - \sigma^*) - \overline{\lambda}_f(\sigma_f - \sigma^*)$. If the self-selection processes differs for men and women, the additional terms in S' do not disappear.

One approach to addressing this issue is to use a correction procedure, such as the one recommended by Heckman (1974, 1976), though Neuman and Oaxaca (2004) argued that the Heckman approach introduces fundamental ambiguities about how to interpret the structural component of the decomposition. However, even if valid, these procedures require an instrumental variable that predicts eligibility but not the outcome of interest. That is, there is an exclusion criterion.

Unfortunately, we lack such an instrument, given the state of the data we have available. Consequently, we cannot give a causal interpretation to our results. The explained portion and the structural portion of the decomposition of the gender differences in the officer career pipeline will reflect factors that affected the likelihood of reaching a given milestone *and* the selection factors that resulted in an officer being eligible to reach that milestone. Furthermore, because S' also includes differences attributable to unobserved characteristics and differences in the selection processes, we can no longer interpret this part as structural. Instead, we call this the *unexplained part* of the decomposition because it includes both the structural part—how a given characteristic affects the gender gap in reaching a given milestone—and the differential selection process that leads male and female officers to be eligible to reach that milestone.

Thus, we are unable to state that a given observed difference in male and female characteristics cause a given gender gap in the career pipeline or state that unexplained differences are due to structural differences and possibly discrimination in how men and women are treated in the military. Instead, we can only state the factors that contribute to the gender gap when the contribution reflects both causal factors and selection factors.

The second issue we must confront is endogeneity of the characteristics. With respect to the unobserved characteristics, we assume that the observed and unobserved characteristics are independent, but

it is possible that they are correlated. For example, having an advanced degree (observed) might be correlated with taste for the military or with ability (unobserved). If so, and we did not account for this correlation, the coefficient estimates would be biased.

Similarly, observed characteristics, especially those related to family formation, could be endogenous. Individuals might choose the timing of marriage and childbearing based on their expectations about current and future promotions, as well as retention plans. Officers might marry, have children, and then decide whether to stay or leave. Alternatively, they might leave because they plan to marry or have children or they might defer marriage or childbearing until completing an obligation or achieving a promotion. As with the case of unobserved characteristics and self-selection, not accounting for this endogeneity could result in biased coefficient estimates.

Given that we have no means to correct for this issue, we must use caution in interpreting our results as causal effects; acknowledge that the decompositions we compute can reflect correlations between observed and unobserved characteristics; and only argue that our analysis shows the contributions of a given factor, where that contribution reflects both causal relationships and possible correlation with observed and unobserved factors.

In sum, we decompose observed differences in retention and promotion outcomes for male and female officers into a part attributable to differences in observed characteristics and a part attributable to differences in the associations between these characteristics and the outcomes. The second part shows the differences in outcomes for male and female officers with the same observed characteristics. Because we cannot give a causal interpretation to the estimated regression coefficients—because of self-selection and endogeneity related to both observed and unobserved characteristics—the second part does not show the differences in the effects of the observed characteristics, just the differences in their associations.

APPENDIX B

Detailed Results

Chapter Four presents an overview of the results of our analysis. This appendix provides detailed results.

Table B.1 shows the descriptive statistics for all of the variables included in our regression analysis and summarized in Chapter Three. Table B.2 shows the estimated parameters of the pooled regression at each milestone; the coefficient estimates are normalized so that the effects are expressed as deviations from the grand mean. Table B.3 shows, at each milestone, the Blinder–Oaxaca decomposition into the explained and unexplained components and the further detailed decomposition of the explained component.

Table B.1
Means of Variables at Each Career Milestone

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
Female (%)	14.9	14.9	14.8	14.8	10.5	9.1	8.5	8.4	9.3	8.3
Retained/ promoted (%)										
All	99.9	98.0	99.5	92.7	82.0	83.6	92.3	85.4	86.2	59.2
Male	99.9	98.2	99.6	93.2	83.2	84.1	92.4	85.6	87.2	59.3
Female	99.8	97.2	99.2	89.6	71.6	78.1	91.3	83.5	76.3	58.0
Education (%)										
Bachelor's degree										
All	94.6	94.6	95.7	95.8	93.8	93.7	54.9	53.9	24.5	24.6
Male	94.3	94.3	95.7	95.7	94.1	94.0	56.2	55.3	25.3	25.3
Female	96.2	96.2	96.1	96.1	91.1	90.5	41.1	39.2	16.7	16.8
More than bachelor's degree										
All	5.4	5.4	4.3	4.2	6.2	6.3	45.1	46.1	75.5	75.4
Male	5.7	5.7	4.3	4.3	5.9	6.0	43.8	44.7	74.7	74.7

Table B.1—Continued

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
Female	3.8	3.8	3.9	3.9	8.9	9.5	58.9	60.8	83.3	83.2
DoD occupational group (%)										
Tactical										
All	24.4	24.4	36.2	36.2	54.7	56.0	58.8	57.9	57.4	59.2
Male	27.0	27.0	39.4	39.4	57.8	58.8	62.7	61.9	62.1	63.4
Female	9.0	9.0	18.0	18.0	27.5	27.8	16.5	15.0	12.2	12.4
Intelligence										
All	4.7	4.7	5.9	5.9	7.5	7.2	7.5	7.6	6.6	6.1
Male	3.6	3.6	4.9	4.9	7.0	6.8	7.0	7.1	6.2	5.8
Female	10.7	10.7	11.4	11.5	12.0	11.1	12.2	12.1	10.3	10.0
Engineering										
All	16.9	16.9	18.8	18.8	15.6	15.3	13.6	13.9	13.5	13.4
Male	16.0	16.0	18.0	18.1	15.1	14.9	12.9	13.1	13.3	13.2
Female	22.2	22.3	22.9	23.0	20.1	19.8	21.7	22.3	15.9	16.5

Table B.1—Continued

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
Administration										
All	7.8	7.8	8.9	8.9	8.1	7.8	7.9	8.0	9.2	8.6
Male	6.3	6.3	7.2	7.2	6.5	6.4	5.7	5.8	5.6	5.4
Female	16.5	16.5	18.5	18.5	21.2	22.5	31.5	32.1	44.1	44.1
Supply/ procurement										
All	7.3	7.3	11.2	11.2	11.2	10.7	11.6	12.0	12.7	12.1
Male	6.1	6.1	10.1	10.1	10.5	10.1	11.0	11.4	12.3	11.7
Female	14.2	14.2	17.9	17.9	17.6	17.5	17.8	18.3	16.8	16.3
Other										
All	39.0	39.0	19.0	19.0	2.9	3.0	0.6	0.6	0.6	0.5
Male	41.0	41.0	20.4	20.3	3.1	3.1	0.7	0.7	0.6	0.5
Female	27.4	27.3	11.3	11.1	1.5	1.4	0.3	0.3	0.6	0.6
Cumulative deployment (months)										
All	0.09	2.50	2.2	6.9	4.7	14.9	11.5	19.3	12.8	20.1

Table B.1—Continued

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
Male	0.09	2.48	2.2	7.0	4.7	15.2	11.9	20.0	13.6	21.0
Female	0.07	2.65	2.4	6.4	4.3	11.9	7.0	11.9	5.7	10.3
Prior enlisted service (%)										
All	28.5	28.5	23.1	23.1	22.0	24.3	18.2	17.6	14.7	13.1
Male	29.5	29.5	24.1	24.1	22.6	24.7	18.5	17.9	14.8	13.2
Female	22.7	22.7	17.3	17.3	16.3	20.0	15.1	14.3	13.3	12.1
Source of commission (%)										
Academy										
All	24.9	24.9	24.5	24.5	25.7	23.5	22.7	22.4	25.5	26.4
Male	24.9	24.9	24.8	24.8	25.9	23.8	23.0	22.9	26.4	27.2
Female	24.7	24.7	22.7	22.7	24.1	20.9	18.5	17.8	15.9	16.8
ROTC										
All	37.8	37.8	43.9	43.9	48.4	48.4	52.6	53.3	43.8	44.4
Male	36.3	36.3	42.4	42.4	47.8	48.0	52.3	53.0	44.5	44.9
Female	46.4	46.5	52.3	52.3	53.7	53.3	55.4	56.5	37.4	38.7

Table B.1—Continued

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
OCS/OCT										
All	28.0	28.0	24.4	24.5	20.9	22.6	21.9	21.5	28.4	26.8
Male	28.8	28.8	25.0	25.0	21.2	22.7	21.6	21.2	26.6	25.3
Female	23.4	23.4	21.0	21.0	18.6	21.7	24.7	24.6	45.9	43.8
Other										
All	9.3	9.3	7.1	7.1	5.0	5.4	2.9	2.8	2.3	2.4
Male	10.0	10.0	7.7	7.7	5.1	5.5	3.0	3.0	2.5	2.6
Female	5.5	5.5	4.0	4.0	3.6	4.2	1.3	1.1	0.7	0.7
Service branch (%)										
Army										
All	28.8	28.8	31.4	31.5	25.2	23.0	25.6	26.7	21.2	20.0
Male	27.5	27.6	30.5	30.5	24.8	22.7	25.4	26.5	21.5	20.2
Female	35.8	35.9	36.9	37.1	28.5	26.5	28.2	28.9	19.1	17.9
Navy										
All	22.7	22.7	20.7	20.6	25.3	24.9	24.2	23.3	44.2	44.1
Male	23.3	23.3	21.4	21.4	25.7	25.3	24.0	23.1	43.6	43.6

Table B.1—Continued

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
Female	19.1	19.1	16.4	16.2	21.8	21.6	26.5	25.3	49.6	49.7
Marines										
All	14.3	14.3	10.7	10.7	9.9	10.1	8.2	7.9	3.5	3.7
Male	15.4	15.4	11.5	11.5	10.5	10.7	8.7	8.5	3.8	3.9
Female	8.1	8.1	5.8	5.8	4.4	4.2	2.4	2.2	1.2	1.2
Air Force										
All	24.9	24.9	30.1	30.1	34.6	36.5	39.1	39.3	28.7	29.8
Male	23.7	23.7	28.9	28.9	33.8	35.8	38.8	39.0	28.7	29.7
Female	31.5	31.5	36.9	36.9	41.7	43.4	41.7	42.5	29.4	30.5
Race/ethnicity (%)										
White										
All	75.5	75.5	76.9	77.0	81.1	81.0	85.7	85.4	89.0	89.1
Male	77.3	77.3	78.7	78.7	82.2	82.2	86.7	86.4	89.8	89.8
Female	65.1	65.2	67.0	67.0	71.2	69.2	74.4	74.0	81.6	80.9
Black										
All	9.4	9.4	8.9	8.9	8.0	8.1	7.4	7.5	6.2	6.1

Table B.1—Continued

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
Male	8.2	8.2	7.7	7.7	7.1	7.2	6.5	6.6	5.5	5.4
Female	16.6	16.6	15.8	15.8	15.2	17.2	16.3	16.8	12.5	13.3
Hispanic										
All	5.8	5.8	5.3	5.2	3.8	3.7	2.3	2.3	1.7	1.7
Male	5.7	5.7	5.2	5.1	3.8	3.7	2.3	2.2	1.6	1.6
Female	6.4	6.4	5.8	5.8	3.9	3.7	2.8	2.8	2.3	2.3
Asian/Pacific										
All	9.3	9.3	8.9	8.9	7.1	7.1	4.7	4.8	3.1	3.2
Male	8.9	8.9	8.4	8.4	6.8	6.9	4.5	4.7	3.0	3.1
Female	11.8	11.8	11.3	11.3	9.7	9.8	6.5	6.4	3.6	3.5
Marital status (%)										
Married										
All	46.8	46.8	57.6	57.7	79.8	83.7	91.0	91.3	92.7	93.1
Male	48.1	48.1	59.3	59.3	81.7	85.7	93.0	93.4	95.2	95.4
Female	39.0	39.1	47.9	47.9	62.9	63.7	69.5	69.0	68.5	67.6

Table B.1—Continued

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
Married (not dual military)										
All	42.4	42.5	51.7	51.8	74.2	78.1	86.1	86.4	89.5	90.0
Male	45.6	45.6	55.7	55.8	78.2	81.9	89.4	89.8	92.6	92.8
Female	24.6	24.6	28.6	28.7	40.2	39.8	50.0	50.0	59.8	59.7
Married (dual military)										
All	4.3	4.3	5.9	5.9	5.5	5.6	4.9	4.9	3.2	3.0
Male	2.6	2.6	3.5	3.5	3.5	3.8	3.6	3.6	2.6	2.6
Female	14.5	14.4	19.3	19.3	22.7	23.9	19.5	19.0	8.7	7.8
Not married										
All	53.2	53.2	42.4	42.3	20.2	16.3	9.0	8.7	7.3	6.9
Male	51.9	51.9	40.7	40.7	18.3	14.3	7.0	6.6	4.8	4.6
Female	61.0	60.9	52.1	52.1	37.1	36.3	30.5	31.0	31.5	32.4

Table B.1—Continued

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
Dependents (%)										
Any dependents (all ages)										
All	24.1	24.1	29.8	29.9	60.9	67.4	83.5	84.3	87.3	87.6
Male	25.4	25.4	31.2	31.3	63.4	69.6	85.9	86.8	90.5	90.5
Female	16.9	16.9	21.9	21.8	39.6	44.9	57.0	57.6	56.1	55.5
Any dependents ages 0–3										
All	13.6	13.7	19.0	19.0	37.5	40.2	26.6	25.8	9.2	8.7
Male	14.8	14.8	20.2	20.2	39.2	41.9	27.2	26.4	9.4	9.1
Female	6.8	6.8	12.3	12.3	22.6	23.4	19.6	18.8	6.4	4.3
Any dependents ages 4–6										
All	8.7	8.7	8.6	8.6	24.7	28.2	32.0	32.3	15.6	15.1
Male	9.3	9.3	9.3	9.4	26.2	29.6	33.3	33.5	16.0	15.5

Table B.1—Continued

Variable	Entry	Retained as O1	Promoted to O2	Retained as O2	Promoted to O3	Retained as O3	Promoted to O4	Retained as O4	Promoted to O5	Retained as O5
Female	4.8	4.8	4.1	4.0	11.4	14.1	18.9	19.5	11.3	10.0
Any dependents ages 7–18										
All	11.8	11.8	12.7	12.7	26.9	31.4	62.3	64.0	73.6	73.9
Male	12.3	12.3	13.2	13.2	28.2	32.5	64.8	66.5	77.0	76.8
Female	9.4	9.4	9.7	9.8	16.3	20.8	35.7	37.0	41.4	42.0
Any dependents ages 18+										
All	1.5	1.5	1.8	1.8	4.7	5.5	11.0	11.2	28.1	29.3
Male	1.4	1.4	1.7	1.7	4.5	5.2	10.9	11.1	29.2	30.4
Female	2.3	2.3	2.8	2.8	6.4	8.4	12.5	12.6	17.0	17.9
Joint spouse (%)										
All	4.5	4.5	5.9	5.9	5.5	5.6	4.9	4.9	3.2	3.0
Male	2.7	2.7	3.5	3.5	3.5	3.8	3.6	3.6	2.6	2.6
Female	15.3	15.3	19.3	19.3	22.7	23.9	19.5	19.0	8.7	7.8
Total observations	68,559	68,487	93,021	92,585	68,190	55,714	35,268	32,563	11,653	10,045

Table B.2
Pooled Regression Estimates, Male Officer Regression Estimates, and Female Officer Regression, Selected Milestones (Linear Probability Model with Normalized Categorical Variables)

	Probability Retained as O3			Probability Promoted to O4			Probability Retained as O5			Probability Promoted to O6		
Variable	Pooled	Males	Females	Pooled	Males	Females	Pooled	Males	Females	Pooled	Males	Females
Female indicator	−0.0396***			−0.030***			−0.0757***			0.0355*		
Cumulative months of deployment	−0.000448*	−0.000638**	0.00227**	0.0015***	0.00149***	0.00180***	0.0008***	0.00076**	0.00143	0.0038***	0.0036***	0.0063***
Married	0.0465***	0.0598***	−0.0120**	0.0202***	0.0258***	−0.00354	0.00948	0.0193**	−0.00316	0.0467***	0.0676***	0.0178
Not married	−0.0465***	−0.0598***	0.0120**	−0.020***	−0.0258***	0.00354	−0.00948	−0.0193**	0.00316	−0.0467***	−0.0676***	−0.0178
Any dependents ages 0–3	0.0275***	0.0265***	0.0165***	0.00321*	0.00428**	−0.0206***	−0.0215***	−0.0147***	−0.123***	0.0109	0.0156*	−0.0900**
No dependents ages 0–3	−0.0275***	−0.0265***	−0.0165***	−0.00321*	−0.00428**	0.0206***	0.0215***	0.0147***	0.123***	−0.0109	−0.0156*	0.0900**
Any dependents ages 4–6	0.0321***	0.0292***	0.0554***	0.0094***	0.00859***	0.00766	−0.0115***	−0.0107**	−0.0270	0.0140**	0.0154**	−0.00552
No dependents ages 4–6	−0.0321***	−0.0292***	−0.0554***	−0.009***	−0.00859***	−0.00766	0.0115***	0.0107**	0.0270	−0.0140**	−0.0154**	0.00552
Any dependents ages 7–18	0.0517***	0.0513***	0.0612***	0.0082***	0.00890***	0.00475	−0.00638*	−0.00826**	0.00632	0.00850	0.0144**	−0.0337*

Table B.2—Continued

	Probability Retained as O3			Probability Promoted to O4			Probability Retained as O5			Probability Promoted to O6		
Variable	Pooled	Males	Females	Pooled	Males	Females	Pooled	Males	Females	Pooled	Males	Females
No dependents ages 7–18	−0.0517***	−0.0513***	−0.0612***	−0.008***	−0.00890***	−0.00475	0.00638*	0.00826**	−0.00632	−0.00850	−0.0144**	0.0337*
Any dependents ages 19+	0.0440***	0.0396***	0.0634***	−0.013***	−0.0171***	0.0140	0.0278***	0.0287***	0.0138	−0.0459***	−0.0453***	−0.0228
No dependents ages 19+	−0.0440***	−0.0396***	−0.0634***	0.013***	0.0171***	−0.0140	−0.0278***	−0.0287***	−0.0138	0.0459***	0.0453***	0.0228
Prior service	0.0242***	0.0204***	0.0576***	0.026***	0.0249***	0.0366***	−0.0552***	−0.0581***	−0.0227	0.0104	0.00854	0.0397
No prior service	−0.0242***	−0.0204***	−0.0576***	−0.026***	−0.0249***	−0.0366***	0.0552***	0.0581***	0.0227	−0.0104	−0.00854	−0.0397
White	−0.0156***	−0.0125***	−0.0247***	0.009***	0.0109***	−0.00673	−0.0135	−0.0113	−0.0428	0.0265**	0.0266*	−0.00754
Black	0.0111***	0.00185	0.0388***	−0.00650	−0.00789	−0.00820	−0.0117	−0.0221*	0.0286	−0.0150	0.00960	−0.153***
Hispanic	−0.00892	−0.00535	−0.0267	−0.00960	−0.0110*	0.00560	0.00377	0.00408	0.0479	−0.00575	−0.0189	0.0672
Asian	0.0134***	0.0160***	0.0126	0.00711	0.00790	0.00932	0.0214	0.0292*	−0.0337	−0.00579	−0.0173	0.0934
Academy	−0.0604***	−0.0590***	−0.0581***	−0.011***	−0.0116***	0.00745	0.0263***	0.0237***	0.0825	0.0693***	0.0684***	0.0928
ROTC	−0.0140***	−0.0113***	−0.0289***	0.00360	0.00462	−0.000121	0.0194**	0.0177**	0.0336	0.00830	0.00776	0.0161
OCS/OCT	0.0140***	0.0108***	0.0293**	−0.0077**	−0.0103***	0.0104	−0.0271***	−0.0221**	−0.112*	0.0131	0.0128	−0.00977
Other source of commission	0.0604***	0.0595***	0.0577***	0.0146***	0.0173***	−0.0178	−0.0186	−0.0194	−0.00452	−0.0907***	−0.0890**	−0.0991

Table B.2—Continued

	Probability Retained as O3			Probability Promoted to O4			Probability Retained as O5			Probability Promoted to O6		
Variable	Pooled	Males	Females	Pooled	Males	Females	Pooled	Males	Females	Pooled	Males	Females
Army	−0.0325***	−0.0363***	−0.0120	0.0579***	0.0574***	0.0558***	−0.0284***	−0.0284***	−0.0301	−0.00998	−0.0112	−0.0599
Navy	−0.00757***	−0.00733***	−0.0275**	−0.065**	−0.0645***	−0.0752***	−0.0464***	−0.0463***	−0.0260	−0.0256**	−0.0206	−0.106
Marines	−0.00951**	−0.00650*	−0.0135	−0.026***	−0.0260***	−0.0213	0.0689***	0.0686***	0.0265	−0.00409	−0.00899	0.192
Air Force	0.0495***	0.0501***	0.0531***	0.0329***	0.0332***	0.0407***	0.00590	0.00608	0.0296	0.0397***	0.0408***	−0.0266
Bachelor's degree only	0.00606**	0.00786***	0.000135	−0.021***	−0.0201***	−0.0253***	−0.00395	−0.00432	0.00719	−0.0406***	−0.0392***	−0.0623**
More than bachelor's degree	−0.00606**	−0.00786***	−0.000135	0.0212***	0.0201***	0.0253***	0.00395	0.00432	−0.00719	0.0406***	0.0392***	0.0623**
Tactical occupation	0.0401***	0.0386***	0.0673***	−0.030***	−0.0273***	−0.0519***	0.0281***	0.0296***	−0.00614	0.0139	0.00128	0.0312
Intelligence occupation	−0.00746*	0.000347	−0.0380***	0.0180***	0.0205***	0.0161	−0.0248**	−0.0267**	−0.00949	0.0234	0.00839	0.0419
Engineering occupation	−0.0252***	−0.0263***	−0.0211*	0.000814	0.00134	0.00641	0.0156	0.0164	0.00215	0.0213	0.0313*	−0.0716
Administration occupation	−0.0248***	−0.0304***	−0.0145	0.00546	−0.00324	0.0336***	0.00291	7.68e−05	0.0119	0.00201	0.0250	0.0201
Supply/ procurement occupation	−0.0236***	−0.0253***	−0.0128	0.00587	0.00595	0.0158	−0.0124	−0.0136	−0.00962	−0.0598	0.00712	−0.0450

Table B.2—Continued

	Probability Retained as O3			Probability Promoted to O4			Probability Retained as O5			Probability Promoted to O6		
Variable	Pooled	Males	Females	Pooled	Males	Females	Pooled	Males	Females	Pooled	Males	Females
Other DoD occupation	0.0409***	0.0430***	0.0192	6.54e–05	0.00278	–0.0201	–0.00948	–0.00572	0.0112	–0.0590	–0.0731	0.0234
Entry year 1	0.111***	0.0976***	0.218***	–0.141***	–0.145***	–0.110***	0.0797***	0.0749***	0.162***	–0.216***	–0.224***	–0.0851
Entry year 2	0.125***	0.113***	0.220***	0.130***	0.122***	0.189***	0.105***	0.0945***	0.233***	0.0601***	0.0523**	0.0836
Entry year 3	0.133***	0.125***	0.216***	0.119***	0.116***	0.139***	0.0723***	0.0716***	0.0856	–0.0463**	–0.0519**	–0.0182
Entry year 4	0.0925***	0.0856***	0.151***	0.119***	0.117***	0.127***	0.0124	0.0127	0.00250	0.0229	0.0332	–0.0592
Entry year 5	0.0648***	0.0623***	0.0788***	0.138***	0.135***	0.166***	–0.0603***	–0.0544***	–0.105*	0.0711***	0.0677***	0.0834
Entry year 6	0.0145***	0.0126**	0.0300	0.176***	0.175***	0.195***	–0.0252*	–0.0292**	0.00813	0.0396**	0.0560***	–0.0844
Entry year 7	–0.0406***	–0.0402***	–0.0532***	0.172***	0.175***	0.145***	–0.0919***	–0.0860***	–0.172***	–0.00146	0.00256	–0.0421
Entry year 8	–0.111***	–0.105***	–0.159***	0.155***	0.157***	0.149***	–0.114***	–0.105***	–0.212***	0.0382**	0.0372**	0.0278
Entry year 9	–0.109***	–0.101***	–0.183***	0.157***	0.158***	0.139***	–0.0774***	–0.0718***	–0.153***	0.00870	0.0135	–0.0495
Entry year 10	–0.108***	–0.101***	–0.168***	0.130***	0.133***	0.104***	0.0324**	0.0238	0.106	–0.0110	–0.0101	–0.0291
Entry year 11	–0.118***	–0.105***	–0.207***	0.121***	0.127***	0.0718***	0.0669	0.0687	0.0444	0.0345	0.0233	0.173
Entry year 12	–0.0727***	–0.0596***	–0.154***	0.0741***	0.0828***	0.0148						
Entry year 13	0.124***	0.114***	0.138***	–0.718***	–0.725***	–0.697***						
Entry year 14	–0.106***	–0.0993***	–0.129***	–0.632***	–0.629***	–0.632***						

Table B.2—Continued

	Probability Retained as O3			Probability Promoted to O4			Probability Retained as O5			Probability Promoted to O6		
Variable	**Pooled**	**Males**	**Females**	**Pooled**	**Males**	**Females**	**Pooled**	**Males**	**Females**	**Pooled**	**Males**	**Females**
Constant	0.929***	0.908***	0.975***	0.929***	0.705***	0.702***	0.850***	0.843***	0.756***	0.414***	0.395***	0.488***
Total observations	68,559	68,487	93,021	92,585	68,190	55,714	35,268	32,563	11,653	10,045		

NOTE: The table shows estimates for the categorical variables that are transformed so that the estimate shown is the deviation from the grand mean for the category. For example, the coefficient for tactical DoD occupational group is the estimate for this group relative to the overall mean effect for all occupation groups.

*** Statistically significant from the zero (in the case of noncategorical variables) and from the grand mean effect (for categorical variables) at the 1-percent level.

** Statistically significant from the zero (in the case of noncategorical variables) and from the grand mean effect (for categorical variables) at the 5-percent level.

* Statistically significant from the zero (in the case of noncategorical variables) and from the grand mean effect (for categorical variables) at the 10-percent level.

Table B.3
Blinder-Oaxaca Decomposition with Detailed Decompositions, by Selected Milestone

	Probability Retained as an O3		Probability Promoted to O4		Probability Retained as an O5		Probability Promoted to O6	
Predicted difference between male and female officers	0.11788***		0.06024***		0.10880***		0.01277***	
	Explained Difference	**Unexplained Difference**	**Explained Difference**	**Unexplained Difference**	**Explained Difference**	**Unexplained Difference**	**Explained Difference**	**Unexplained Difference**
Explained/ unexplained difference	0.07830***	0.039580***	0.030120***	0.030120***	0.03307***	0.075730***	0.04829***	–0.035520*
	Probability Retained as an O3		**Probability Promoted to O4**		**Probability Retained as an O5**		**Probability Promoted to O6**	
Variable	**Explained Difference**	**Unexplained Difference**	**Explained Difference**	**Unexplained Difference**	**Explained Difference**	**Unexplained Difference**	**Explained Difference**	**Unexplained Difference**
Cumulative months of deployment	–0.000190*	–0.012530***	0.005130***	–0.00379	0.00650**	–0.00435	0.040930***	–0.030500*
Married	0.008750***	0.047700***	0.004450***	0.019950***	0.00253	0.01805	0.012990***	0.039430**
Not married	0.008750***	–0.02413	0.004450***	–0.00942	0.00253	–0.00445	0.01299	–0.01035

Table B.3—Continued

Variable	Probability Retained as an O3		Probability Promoted to O4		Probability Retained as an O5		Probability Promoted to O6	
	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference
Any dependents ages 0–3	0.004580***	0.00212	0.000590*	0.006000***	−0.000650**	0.007200***	0.00051	0.004810**
No dependents ages 0–3	0.004580***	−0.00797	0.000590*	−0.01883	−0.000650**	−0.10135	0.00051	−0.10077
Any dependents ages 4–6	0.004760***	−0.003410***	0.001440***	0.00003	−0.000540**	0.00188	0.000770*	0.00218
No dependents ages 4–6	0.004760***	0.02277	0.001440***	−0.00095	−0.000540**	−0.01441	0.000770*	−0.01877
Any dependents ages 7–18	0.006120***	−0.00166	0.000960***	0.00094	−0.00226	−0.00671	0.00296	0.022260**
No dependents ages 7–18	0.006120***	0.00821	0.000960***	−0.00318	−0.00226	0.00787	0.00296	−0.02584
Any dependents ages 18+	−0.000840***	−0.001420***	0.000430***	−0.002490***	0.003390***	0.00265	−0.005750***	−0.00392
No dependents ages 18+	−0.000840***	0.02227	0.000430***	0.02856	0.003390***	−0.01228	−0.005750***	0.01851
Prior service	0.001520***	−0.006310***	0.001200***	−0.00239	−0.00086	−0.004750*	0.00012	−0.00378

Table B.3—Continued

Variable	Probability Retained as an O3		Probability Promoted to O4		Probability Retained as an O5		Probability Promoted to O6	
	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference
No prior service	0.001520***	0.03085	0.001200***	0.00931	–0.00086	0.03070	0.00012	0.02739
White	–0.001720***	0.00900	0.001170***	0.012560*	–0.00111	0.02593	0.002350*	0.02761
Black	–0.000890**	–0.00487	0.00065	0.00020	0.00082	–0.00562	0.00118	0.019640***
Hispanic	0.000010***	0.00083	0.00000	–0.00062	–0.00003	–0.00101	0.00004	–0.00189
Asian	–0.000380***	0.00028	–0.00021	–0.00018	–0.00012	0.00222	0.00002	–0.00383
Academy	–0.001060***	–0.00017	–0.000310**	–0.00400	0.002770***	–0.00963	0.007260***	–0.00417
ROTC	0.000820***	0.00929	–0.00019	0.00248	0.001380**	–0.00605	0.00051	–0.00326
OCS/OCT	0.000370***	–0.003520*	–0.00008	–0.004520*	0.005250***	0.04014	–0.00242	0.00993
Other source of commission	0.000910***	0.00005	0.000190**	0.00151	–0.00032	–0.00012	–0.001670**	0.00010
Army	0.000700***	–0.007710**	–0.001480***	0.00050	–0.001180**	0.00034	–0.00041	0.00900
Navy	–0.000300***	0.004410*	–0.002340***	0.00231	0.002780***	–0.01008	0.001560*	0.04192
Marines	–0.000580***	0.00050	–0.001720***	–0.00017	0.001770***	0.00050	–0.00011	–0.00256

Table B.3—Continued

Variable	Probability Retained as an O3		Probability Promoted to O4		Probability Retained as an O5		Probability Promoted to O6	
	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference
Air Force	−0.003900***	−0.00128	−0.002500***	−0.00330	−0.00004	−0.00691	−0.00033	0.02054
Bachelor's degree only	0.000180**	0.00707	−0.000740***	0.00475	−0.00034	−0.00195	−0.003480***	0.00401
More than bachelor's degree	0.000180**	−0.00063	−0.000740***	−0.00046	−0.00034	0.00956	−0.003480***	−0.01914
Tactical occupation	0.012170***	−0.008330**	−0.009360***	0.007780*	0.014000***	0.00512	−0.00040	−0.00267
Intelligence occupation	0.00038	0.004220**	−0.000770***	0.00036	0.00103	−0.00169	−0.00059	−0.00312
Engineering occupation	0.001260***	−0.00098	−0.000040***	−0.00101	−0.00041	0.00225	−0.00078	0.016750*
Administration occupation	0.003640***	−0.00254	−0.00088	−0.006900**	−0.00112	−0.00412	−0.00825	0.00072
Supply/ procurement occupation	0.001690***	−0.00209	−0.00044	−0.00173	0.00055	−0.00062	−0.00009	0.00826

Table B.3—Continued

Variable	Probability Retained as an O3		Probability Promoted to O4		Probability Retained as an O5		Probability Promoted to O6	
	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference
Other DoD occupation	0.00066	0.00038	0.00000	0.00036	0.00001	−0.00011	0.00004	−0.00057
Entry year 1	0.00011	−0.001550***	0.00019	−0.00063	0.002730***	−0.00632***	−0.005990**	−0.013070**
Entry year 2	0.00024	−0.005680***	−0.001070**	−0.004870***	0.00025	−0.00742***	−0.00036	−0.00214
Entry year 3	0.002580***	−0.004580***	0.0016800***	−0.00158	−0.001540**	−0.00097	0.00117	−0.00254
Entry year 4	0.001680***	−0.001130***	0.001210**	−0.00078	−0.00042	0.00090	−0.00083	0.00821
Entry year 5	0.001540***	−0.00126	0.002820***	−0.00240	0.001420**	0.00398	−0.001270*	−0.00109
Entry year 6	0.000230***	0.00111	0.002020***	−0.00161	0.00043	−0.00299	−0.00089	0.011830**
Entry year 7	−0.00071	0.00614	0.002330***	0.002680*	−0.00162	0.01383***	−0.00003	0.00661
Entry year 8	−0.00049	0.010580***	0.00112	0.00070	−0.00066	0.02091***	0.00094	0.00148
Entry year 9	0.00065	0.009310***	0.00043	0.00206	−0.00271***	0.01267***	0.00035	0.00917
Entry year 10	0.001940***	0.015340***	−0.001350**	0.003560*	−0.00001	−0.00349***	0.00009	0.00100
Entry year 11	0.004680***	0.001680***	−0.002450***	0.006640***	0.00006	0.00002	0.00003	−0.00019

Table B.3—Continued

	Probability Retained as an O3		Probability Promoted to O4		Probability Retained as an O5		Probability Promoted to O6	
Variable	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference	Explained Difference	Unexplained Difference
Entry year 12	0.000680***	–0.000160**	–0.000650***	0.00121				
Entry year 13	–0.000920***	0.00085	0.007800***	–0.00031				
Entry year 14	0.002320***	–0.06717	0.012550***	0.00003				
Constant		0.039580***		–0.00822		0.08642		–0.092710***

*** Statistically significant from the zero at the 1–percent level.

** Statistically significant from the zero at the 5–percent level.

* Statistically significant from the zero at the 10–percent level.

Abbreviations

DEERS	Defense Enrollment Eligibility Reporting System
DMDC	Defense Manpower Data Center
DoD	Department of Defense
FY	fiscal year
OCS/OCT	Officer Candidate School/Officer Candidate Training
ROTC	Reserve Officer Training Corps

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An ongoing concern in the Department of Defense is the lack of diversity among officers in the senior ranks. To address the gap in quantitative information on differences in the career progression of officers based on gender, as well as the factors that explain these differences, the authors analyzed career progression as a series of retention and promotion outcomes, using longitudinal data on officers to track cohorts of officers over their careers. The data include information on job-related characteristics, such as occupation, source of commission, and deployments and on individual characteristics such age and marital status (including dual-military status).

The report finds that gender differences in career progression can be explained partly by differences in job-related and individual characteristics and partly by differences in the association between these characteristics and the likelihood of achieving a given career milestone. For example, male and female officers with the same family status, in terms of marital status and age and presence of children, had different likelihoods of reaching several career milestones. Policies that reduce differences in job and individual characteristics will contribute to reducing the gender gap in officer career progression but will not eliminate it. Additional attention must be given to structural factors, including how retention decisions and the promotion process differ for male and female officers with the same characteristics, and to potential differences in factors that are more difficult to observe, such as gender differences in attitudes toward military service and performance.

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