

## **E. APPENDIX**



March 2009

# WOMEN'S PAY

## Gender Pay Gap in the Federal Workforce Narrows as Differences in Occupation, Education, and Experience Diminish



GAO

Accountability \* Integrity \* Reliability

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## Abbreviations

CPDF	Central Personnel Data File
CPS	Current Population Survey
EEOC	Equal Opportunity Employment Commission
LWOP	leave without pay
OPM	Office of Personnel Management
PATCOB	Professional, Administrative, Technical, Clerical, Other White-Collar and Blue-Collar

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United States Government Accountability Office  
Washington, DC 20548

March 17, 2009

The Honorable Edward M. Kennedy  
Chairman  
Committee on Health, Education, Labor  
and Pensions  
United States Senate

The Honorable Tom Harkin  
Chairman  
Subcommittee on Labor, Health and Human  
Services, Education, and Related Agencies  
Committee on Appropriations  
United States Senate

The Honorable Carolyn B. Maloney  
Chair  
Joint Economic Committee  
House of Representatives

Although the pay gap between men and women in the U.S. workforce has narrowed since the 1980s, numerous studies have found that a disparity still exists. In 2003, we found that women in the general workforce earned, on average, 20 cents less for every dollar earned by men in 2000 when differences in work patterns, industry, occupation, marital status, and other factors were taken into account.<sup>1</sup> Other research indicates that this disparity existed for federal workers as well. For example, a 1998 study showed that the pay gap between men and women in the federal workforce decreased significantly between 1976 and 1995, but in 1995 white women still earned 14 cents less for every dollar earned by white men and African-American women earned 8 cents less for every dollar earned by African-American men after available factors related to pay were taken into account.<sup>2</sup>

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<sup>1</sup>GAO, *Women's Earnings: Work Patterns Partially Explain Difference between Men's and Women's Earnings*, GAO-04-35 (Washington, D.C.: Oct. 31, 2003).

<sup>2</sup>Gregory B. Lewis, "Continuing Progress toward Racial and Gender Pay Equality in the Federal Service: An Update," *Review of Public Personnel Administration*, vol. 18, no. 2 (Spring 1998) 23-40.

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In light of concerns that a pay gap may continue to exist between men and women in the workplace, you asked us to examine pay disparity issues and the role the federal government has played in enforcing anti-discrimination laws. In agreement with your staff, we addressed these questions in two separate, consecutive reports, the first of which focused on enforcement and outreach efforts in the private sector and among federal contractors.<sup>3</sup> This second report addresses the following question: To what extent has the pay gap between men and women in the federal workforce changed over the past 20 years and what factors account for the gap?

To answer this question, we used two approaches to analyze data from the Central Personnel Data File (CPDF)—maintained by the Office of Personnel Management (OPM)—covering a 20-year period. First, we looked at “snapshots” of the federal workforce at three points in time (1988, 1998, and 2007) to show changes in the federal workforce over a 20-year period.<sup>4</sup> Second, we examined the cohort (or group) of employees who joined the federal workforce in 1988 and tracked their careers over the course of 20 years to look for differences in the pay gap in this group. We used CPDF data to generate summary statistics on the federal workforce and to perform multivariate analyses, which we used to identify the amount of the gender pay gap attributable to differences in measurable factors—such as work-related and demographic characteristics of men and women. To further inform our analyses, we reviewed existing literature and reports on gender and pay and interviewed officials at the Office of Personnel Management and the Equal Employment Opportunity Commission (EEOC).

We conducted our work from March 2008 to March 2009 in accordance with all sections of GAO’s Quality Assurance Framework that are relevant to our objectives. The framework requires that we plan and perform the engagement to obtain sufficient and appropriate evidence to meet our stated objectives and to discuss any limitations in our work. We believe

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<sup>3</sup>GAO, *Women’s Earnings: Federal Agencies Should Better Monitor Their Performance in Enforcing Anti-Discrimination Laws*, GAO-08-799 (Washington, D.C.: Aug. 11, 2008).

<sup>4</sup>The CPDF contain personnel data for most of the executive branch departments and agencies as well as a few agencies in the legislative branch. For the purposes of this report, we refer to workers covered by the CPDF data as the federal workforce. Our “snapshot” findings are based on an analysis of a 20 percent random sample of federal employees in the CPDF for each of the three points in time. See appendix II for further details on the agencies not covered by the CPDF.



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that the information and data obtained, and the analysis conducted, provide a reasonable basis for our findings and conclusions.

On January 26, 2009, we briefed your staff on the results of our work. This report formally conveys the information provided during that briefing (see app. I). In summary, we found:

- From 1988 to 2007, the gender pay gap—the difference between men’s and women’s average annual salary in the federal workforce—declined from 28 cents to 11 cents on the dollar. For each year we examined, all but about 7 cents of the gap can be accounted for by differences in measurable factors such as the occupations of men and women and, to a lesser extent, other factors such as years of federal experience and level of education. The pay gap narrowed as men and women in the federal workforce increasingly shared similar characteristics in terms of the jobs they held, their levels of experience, and educational attainment. Factors for which we lacked data or are difficult to measure, such as work experience outside the federal government and discrimination, may account for some or all of the remaining 7 cent gap.
- Our case study analysis of workers who entered the federal workforce in 1988 showed that their pay gap grew from 22 cents in 1988 to a maximum of 28 cents in 1993 through 1996 and then declined to 25 cents in 2007. As with the federal workforce, differences between men and women that can affect pay, especially occupation, accounted for a significant portion of the pay gap over the 20-year period. In addition, our analysis found that differences in the use of leave without pay and breaks in federal service accounts for little of the pay gap for this group. The portion of the gap that we could not explain increased over time from 2 cents in 1988 to 9 cents in 2007. However, the results of the 1988 cohort are not necessarily representative of other cohorts

Ultimately, the gender pay gap for the entire federal workforce has declined primarily because the men and women in the federal workforce are more alike in characteristics related to pay than in past years. We cannot be sure why a persistent unexplained pay gap remains for both our analyses, but this may be due to the inability to account for certain factors that cannot effectively be measured or for which data are not available.

We received written comments on a draft of this report from OPM, which manages the CPDF data that were used in our analysis, and from EEOC. OPM reviewed our methodology and found our use of the CPDF data to be appropriate. They had two suggestions regarding variables in our analysis, which we considered carefully. As a result of their comments, we clarified

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our discussion of the empirical results in the appendices, but did not alter the main findings of our report. OPM's full comments and our responses to them are presented in appendix VI.

EEOC stated that our study has a solid research design and modeling analysis and will serve as an important source of information to the federal sector. In addition, EEOC suggested that we expand our report to show how the gender pay gap evolved for different protected groups. We acknowledge that the difference in wages between men and women may vary further by race, age, disability status, and other factors that we analyzed. However, to appropriately report on the influence of factors related to other protected groups would require substantial analysis that is beyond the scope of our study's objective. EEOC also provided technical comments for our consideration. Their full comments and our responses to them are presented in appendix VII.

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As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution of this report until 30 days from the report date. At that time, we will provide copies to the Chair of EEOC, the Director of OPM, relevant congressional committees, and other interested parties. We will make copies available to others upon request. In addition, the report will be available at no charge on GAO's Website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-7215 or [sherrilla@gao.gov](mailto:sherrilla@gao.gov). Contacts for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix VIII.



Andrew Sherrill  
Director, Education, Workforce,  
and Income Security Issues

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# Appendix I: Briefing Slides

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## WOMEN'S PAY: Gender Pay Gap in the Federal Workforce Narrows as Differences in Occupation, Education, and Experience Diminish

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### **Briefing for Congressional Requesters January 26, 2009**

\*The briefing slides were subsequently updated to reflect comments that EEOC provided on our draft report. See appendix VII for EEOC's comments and our response.

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## Overview

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- Key Question
  - Scope and Methodology
  - Summary of Results
  - Background
  - Findings
    - Entire Federal Workforce
    - Case Study
  - Concluding Observations
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## Key Question

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In response to your request, we answered this question:

- To what extent has the pay gap between men and women in the federal workforce changed over the past 20 years and what factors account for the gap?



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## Scope and Methodology

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- To answer our key question, we looked at data covering the last 20 years in two different ways:
  1. We examined the federal workforce at 3 points in time (1988, 1998, and 2007) to show changes in the pay gap within the federal workforce as a whole over a 20-year period<sup>a</sup>
  2. We examined a cohort (group) of federal workers, i.e., those who entered the federal workforce in 1988, to look for differences in the pay gap for this group over time<sup>b</sup>

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<sup>a</sup>For this analysis, we used a 20 percent random sample of federal employees in the CPDF for each of the 3 years.

<sup>b</sup>We followed the careers of workers in this group, including those who left the federal workforce and later returned.



## Scope and Methodology (cont.)

- Our data came from the Central Personnel Data File (CPDF), which:
  - Is maintained by the Office of Personnel Management.
  - Contains information on gender, annual salary, and other demographic and occupational factors for federal workers.
  - Covers federal employees within most of the executive branch as well as a few agencies in the legislative branch, but does not cover employees in the judicial branch and federal contractors.<sup>a</sup>
- We used CPDF data to compute the overall pay gap between men and women. We then performed multivariate analysis to estimate how much of the overall pay gap could be explained by demographic, occupational, and other measurable factors for which we have data.

<sup>a</sup>For the purposes of this briefing, we refer to workers covered by the CPDF data as the federal workforce. See appendix II for further details on our data and data reliability analyses, as well as the employees excluded from the CPDF.



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## Scope and Methods (cont.)

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- To inform our analyses, we:
  - Reviewed existing literature and reports on gender and pay
  - Consulted officials at the Office of Personnel Management and the Equal Employment Opportunity Commission—agencies that are in part responsible for overseeing the employment practices of federal agencies





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## Summary of Results

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- Our analysis of the federal workforce shows that:
  - From 1988 to 2007, the gender pay gap—the difference between men’s and women’s average pay<sup>a</sup> before controlling for other factors—narrowed from 28 cents to 11 cents on the dollar.
  - For each year we analyzed, all but about 7 cents of the gap was accounted for by differences in measurable factors—predominantly the occupations of men and women and, to a lesser extent, other factors such as experience and education.
  - Factors that we could not measure may have accounted for some or all of the unexplained 7 cent gap.

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<sup>a</sup>Pay refers to annual salary.



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## Summary of Results (cont.)

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- Our case study analysis of one cohort of employees, i.e., those who entered the federal workforce in 1988, showed that between 1988 and 2007:
    - The gender pay gap grew from 22 cents in 1988 to a maximum of 28 cents in 1993 and then declined to 25 cents in 2007.
    - After controlling for differences between men and women, all but 2 to 9 cents (depending on the year) of the pay gap over this period was accounted for by differences in measurable factors. Occupation is the measurable factor that contributed most to the gap.
    - Differences in usage of unpaid leave and breaks in federal service accounted for less than 1 cent of this pay gap.
  - These results are not necessarily representative of other cohorts.
-



## Background: Previous Studies Have Sought to Measure the Pay Gap between Men and Women

- For the entire U.S. workforce:
  - Previously, GAO found that after accounting for certain measurable differences such as years of experience and part-time work status, women earned about 20 cents less for every dollar earned by men in 2000<sup>a</sup>
- For the federal workforce:
  - Research shows that the gap dropped significantly between 1976 and 1995, but in 1995 white women still earned 14 cents less for every dollar earned by white men, and African-American women earned 8 cents less for every dollar earned by African-American men after accounting for differences in measurable factors between men and women

<sup>a</sup> GAO, *Women's Earnings: Work Patterns Partially Explain Difference between Men's and Women's Earnings*, GAO-04-35 (Washington, D.C.: Oct. 31, 2003).



## Background: Federal Workers Are Classified in Six General Categories

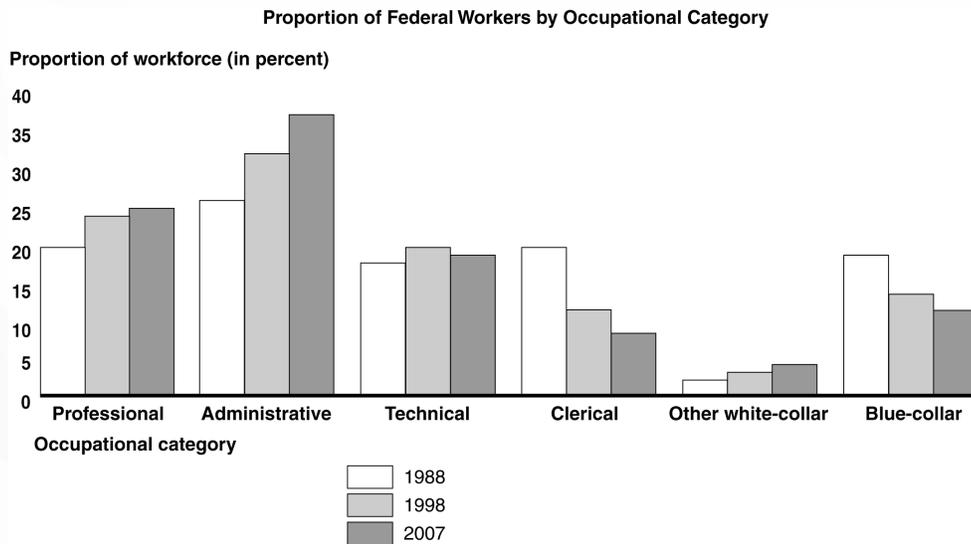
Occupational category	Description
Professional	Requires knowledge in a specific discipline, typically acquired through a bachelor's or higher degree in a specialized field. Examples include accounting and engineering.
Administrative	Does not have a specific educational requirement, but involves skills typically gained through general college education. Examples include human resources management and budget analysis.
Technical	Occupations typically associated with and supportive of a professional or administrative field. Includes medical technicians, safety technicians, and food inspectors.
Clerical	Involves structured work in support of office, business, or fiscal operations. Examples include typists, dispatchers, and clerks.
Other white-collar	Includes positions that do not fall into other white-collar groups. Most of these positions are related to law enforcement or protective services.
Blue-collar	Occupations comprising the crafts, trades, and manual labor, including foremen.

Source: OPM.



## Background: Federal Employees are Increasingly Concentrated in Professional and Administrative Jobs

- However, the proportion of clerical and blue-collar jobs decreased significantly



Source: GAO analysis of CPDF data.



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## **Background: Federal Employees Are Increasingly Concentrated in Professional and Administrative Jobs (cont.)**

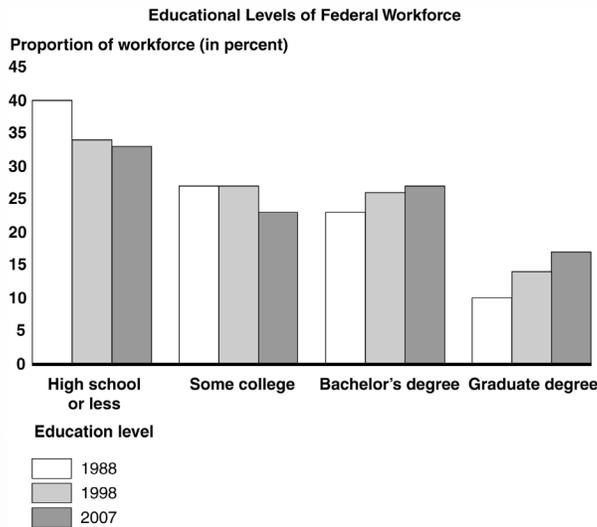
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- The decline in clerical and blue-collar employment may be due to the following trends:
  - Many defense-related jobs being phased out following the end of the Cold War
  - Government efforts to increase efficiency through automation and by contracting out jobs



## Background: The Federal Workforce Has Increasingly More Education

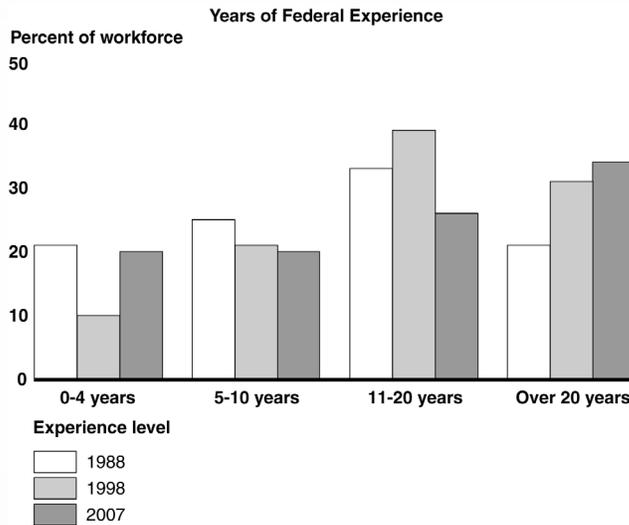
- The proportion of federal workers with a bachelor's degree or higher increased from 33% in 1988 to 44% in 2007



Source: GAO analysis of CPDF data.



## Background: The Federal Workforce Has Become More Experienced



- In addition, the average years of federal experience increased from about 13 years in 1988 to 15 years in 2007

Source: GAO analysis of CPDF data.

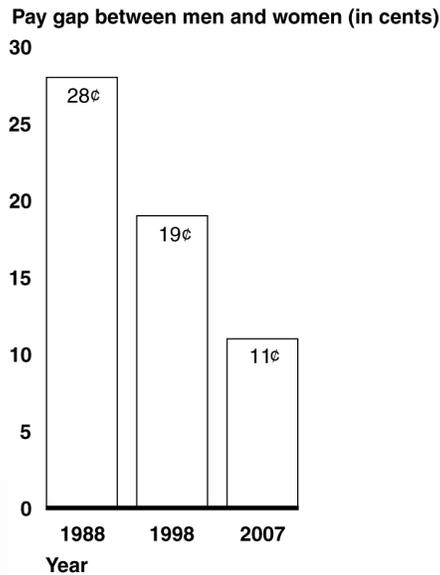


Findings: Federal Workforce



## The Pay Gap—before Accounting for Differences between Men and Women in Factors Related to Pay—Has Decreased Significantly Since 1988

Total Pay Gap between Men and Women in the Federal Workforce



Source: GAO analysis of CPDF data.

Findings : Federal Workforce



## **The Pay Gap Does Not Take into Account Differences in Measurable Factors between Men and Women**

- The gap is a measure of the differences in pay for all men and all women in the federal workforce before accounting for any factors, such as differences in occupation or education
- We found that some of the gap can be accounted for by differences in measurable factors

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Findings: Federal Workforce



## We Used Multivariate Analysis to Account for the Following Factors:

- Work characteristics including occupational category, agency, and state
- Worker characteristics including education level, federal experience, bargaining unit status, part-time work status, and veteran status
- Demographic characteristics including gender, age, race and ethnicity, and disability status

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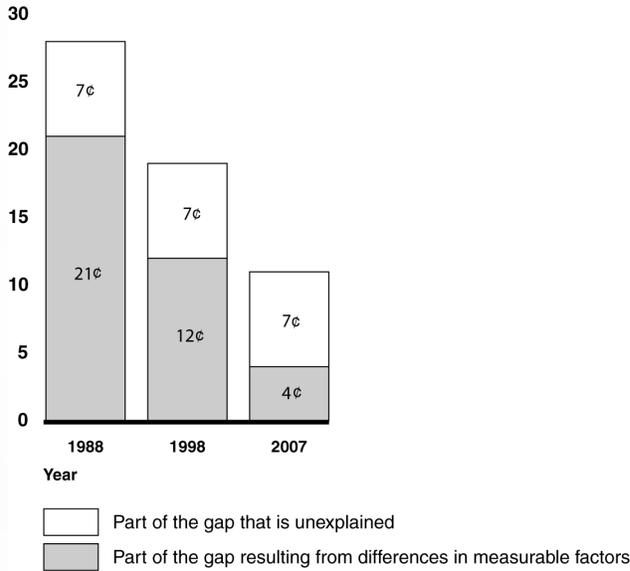
Findings: Federal Workforce



# Measurable Factors Account for a Significant Portion of the Gap

Federal Workforce: Proportion of Pay Gap that Can and Cannot be Explained by Available Data

Pay gap between men and women (in cents)



Source: GAO analysis of CPDF data.

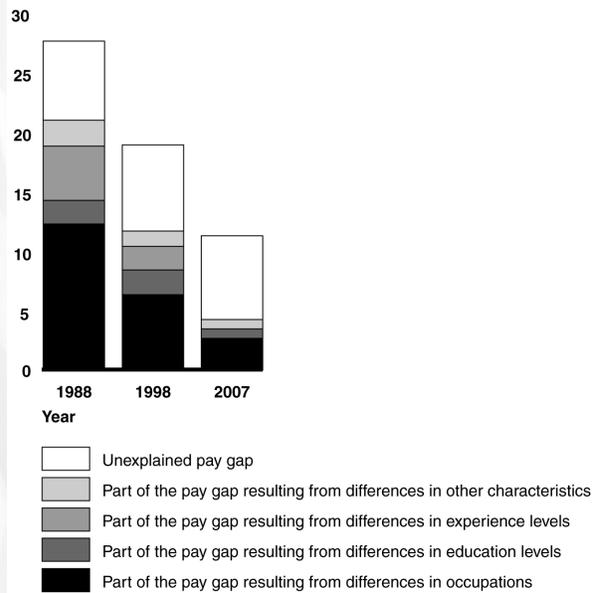


Findings: Federal Workforce

# Occupation, Education, and Experience are the Measurable Factors that Contribute Most to the Gap

Federal Workers: Proportion of Pay Gap Due to Differences in Measurable Factors between Men and Women

Pay Gap between men and women (in cents)



Source: GAO analysis of CPDF data.

Findings: Federal Workforce



## **Other Factors That We Could Not Measure May Account for the Persistent Unexplained 7 Cent Gap<sup>a</sup>**

- Factors for which we lacked data or are difficult to measure, such as work experience outside the federal government and discriminatory practices, could account for some of the unexplained gap
- Our analysis neither confirms nor refutes the presence of discriminatory practices

<sup>a</sup>The size of the unexplained gap varies slightly depending on the number of occupational categories used in the analysis. See appendix III for further details.

Findings: Federal Workforce



## **Converging Characteristics of Men and Women in the Workplace Help Explain the Narrowing Gap**

- Men and women in the federal workforce became more alike in several characteristics, especially in:
  - The occupations they hold,
  - Their educational attainment, and
  - Their years of federal work experience

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Findings: Federal Workforce



## Some Federal Occupational Categories Have Become More Integrated by Gender

- Professional, administrative, and clerical occupations—which accounted for 68 percent of federal jobs in 2007—have become more integrated by gender since 1988. For example, between 1988 and 2007, the proportion of females in professional positions rose from 30 to 43 percent and in administrative positions rose from 38 to 45 percent
- Other occupations—accounting for 32 percent of the workforce in 2007—have become or remained less integrated. Between 1988 and 2007, the proportion of females in technical occupations rose from 52 to 60 percent, in blue collar occupations ranged between 9 to 10 percent, and in other white-collar occupations rose slightly from 12 to 13 percent.

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Findings: Federal Workforce



## **The Decline of the Clerical Workforce Accounts for a Large Reduction in the Gap**

- In 1988, there were 312,000 female clerical workers in the federal workforce, accounting for 38% of all women in the government
- By 2007, this number dropped to 97,000, with female clerical workers accounting for only 13% of all female federal employees
- Clerical workers are primarily female (85% in 1988 and 69% in 2007)
- Clerical workers are among the lowest paid group in the federal government

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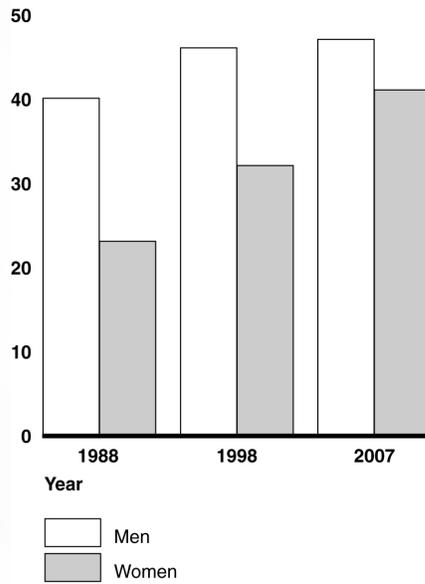
Findings: Federal Workforce



# Men and Women in the Federal Workforce Have Increasingly Similar Levels of Education

Proportion of Men and Women in the Federal Workforce with a Bachelor's Degree or Higher

Percentage of workforce with a Bachelor's degree or higher

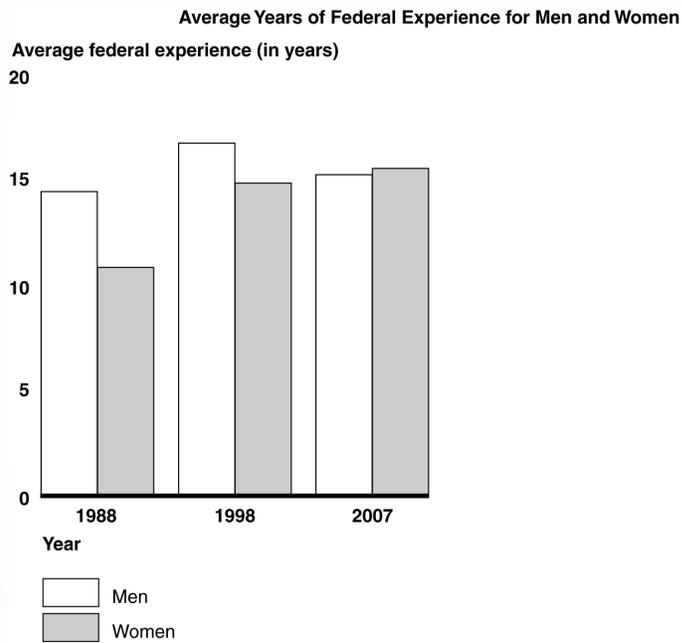


Source: GAO analysis of CPDF data.

Findings: Federal Workforce



## Men and Women in the Federal Workforce Have Increasingly Similar Levels of Federal Experience



Source: GAO analysis of CPDF data.

Findings: Case Study



## Analysis of Pay Gap among the Employees Who Began Working for the Federal Government in 1988

- To better understand changes in the gender pay gap over time, we compiled a data set on the people who began working for the federal government in 1988, which allowed us to track their federal pay and leave patterns over a 20-year period<sup>a</sup>
- We accounted for differences between men and women in leave patterns (unpaid leave and breaks in service<sup>b</sup>) as well as occupation, agency, region, education level, bargaining unit status, part-time work status, veteran status, gender, age, race and ethnicity, disability status

<sup>a</sup>Data on work patterns came from the CPDF dynamics file.

<sup>b</sup>A break in service happens when an employee leaves the federal government and later returns.

Findings: Case Study



## The 1988 Cohort Is Different from Our Analysis of the Entire Government in Important Ways

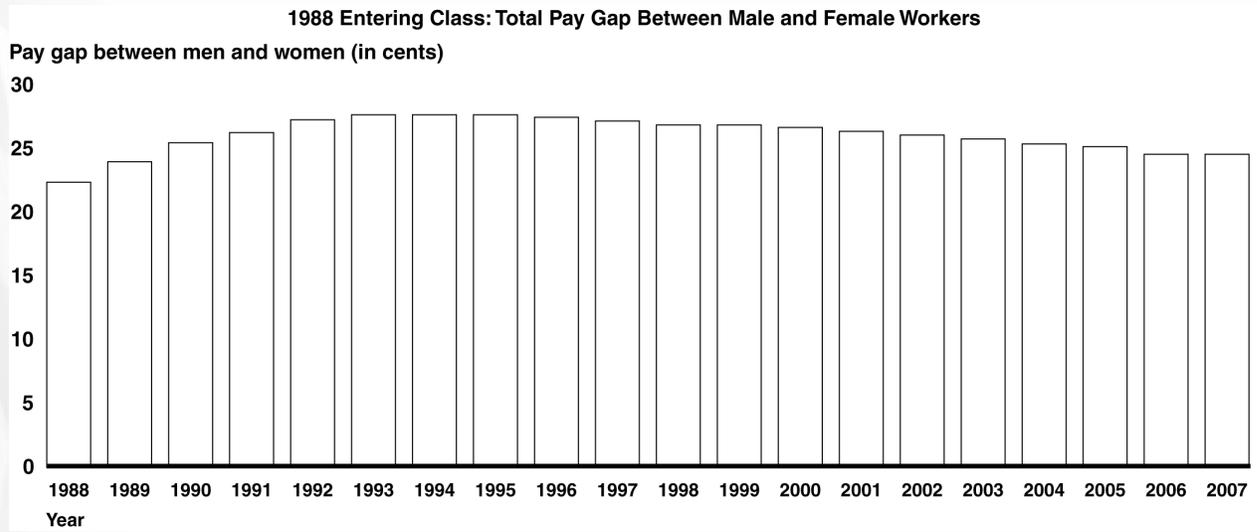
- The cohort only includes individuals who started working for the federal government in 1988, and as a result:
  - This group became much smaller over time due to workers leaving the government, declining from about 90,000 in 1988 to about 29,000 in 2007
  - By definition, new workers did not enter this group over the study period
- Additionally, this cohort is not necessarily representative of other cohorts

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Findings: Case Study



## Analysis of the 1988 Entering Class Shows that the Pay Gap Increased in Earlier Years Before Declining

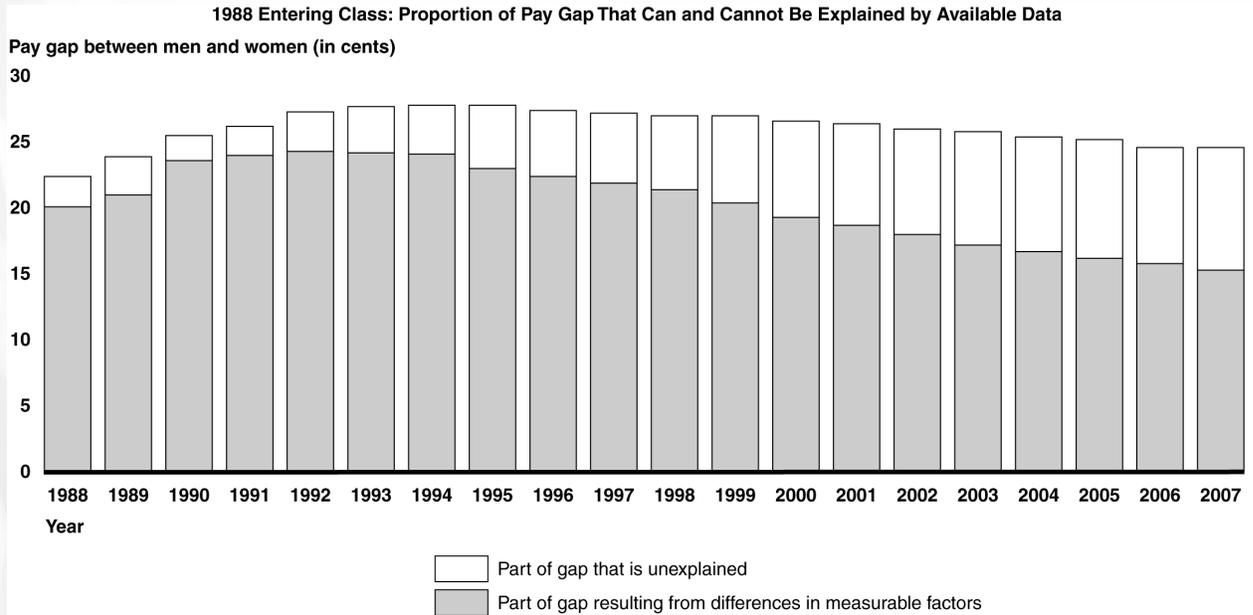


Source: GAO analysis of CPDF data.



Findings: Case Study

## Differences Between Men and Women in Measurable Factors Account for A Significant but Declining Portion of the Gap



Source: GAO analysis of CPDF data.



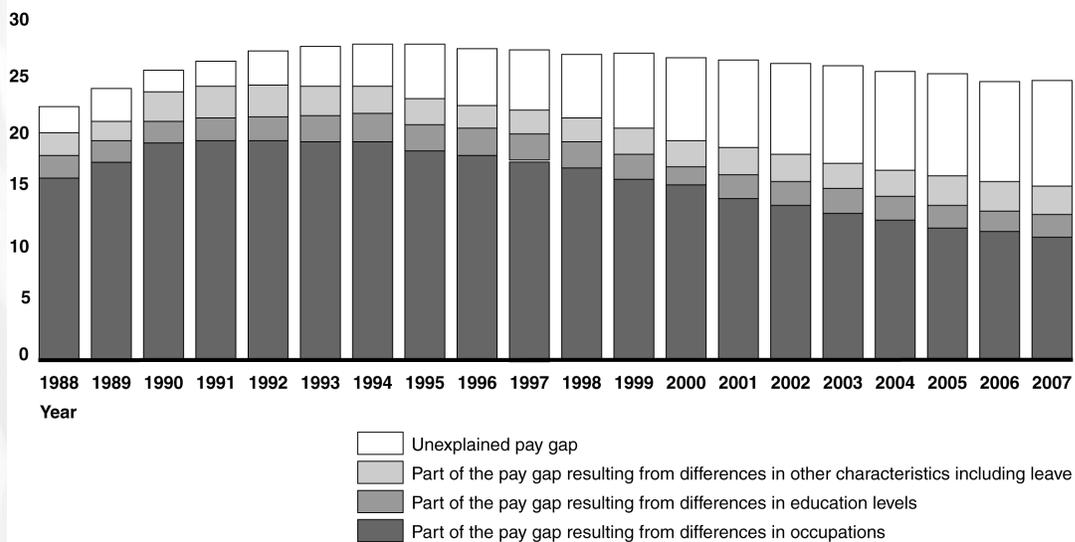
Findings: Case Study

## For the 1988 Entering Class, Differences in Occupation Account for Much of the Pay Gap

- The portion of the gap that cannot be explained grew from 2¢ in 1988 to 9¢ in 2007

1988 Entering Class: Proportion of Pay Gap Due to Differences in Measurable Factors between Men and Women

Pay gap between men and women (in cents)



Source: GAO analysis of CPDF data.

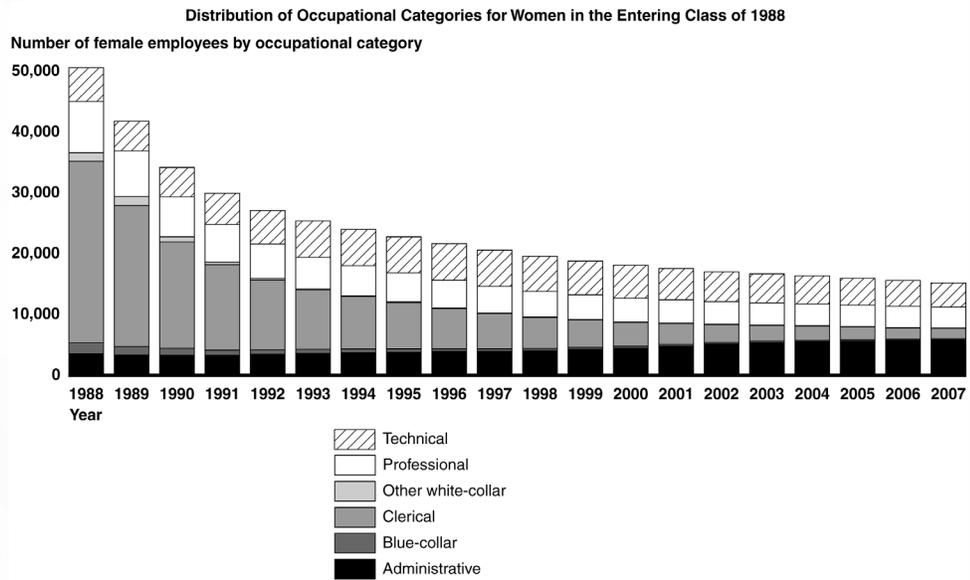




Findings: Case Study

## For Women in the Entering Cohort of 1988, the Decrease in the Clerical Workforce Was also Significant

- Over the same period, the number of female administrative workers increased



Source: GAO analysis of CPDF data.



Findings: Case Study

**Women in the 1988 Entering Cohort Were More Likely to Take Unpaid Leave or Have a Break in Service, but Neither Significantly Affected the Pay Gap**

	Women	Men
<b>Took Unpaid Leave at Least Once between 1988-2007</b>	18%	11%
<b>Had a Break in Service at Least Once between 1988-2007</b>	17%	15%

Source: GAO analysis of CPDF data.

- In spite of differences in leave patterns between men and women, taking unpaid leave and having a break in service consistently accounted for less than 1 cent of the pay gap for this cohort of federal workers<sup>a</sup>

<sup>a</sup>See appendix IV for additional explanation of these results.

Findings: Case Study



## **Our Data Do Not Allow Us to Describe Why the Unexplained Pay Gap Grew**

- As with our analysis of the federal workforce, other factors not captured by our data, such as experience outside the federal government and discrimination, could account for some of the unexplained pay gap
- Our analysis neither confirms nor refutes the presence of discriminatory practices
- We could not accurately measure the duration of instances of unpaid leave or determine why it was taken

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## Concluding Observations

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- The decline in the pay gap for the federal workforce is primarily due to men and women in the federal workforce becoming more alike in characteristics related to pay
- We cannot be sure why a persistent unexplained pay gap remains for both analyses, but this may be due to the inability to account for certain factors that cannot effectively be measured or for which data are not available







G A O

Accountability \* Integrity \* Reliability

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United States Government Accountability Office  
Washington, DC 20548

September 20, 2010

The Honorable Carolyn B. Maloney  
Chair  
Joint Economic Committee  
United States Congress

The Honorable John D. Dingell  
House of Representatives

Subject: *Women in Management: Analysis of Female Managers' Representation, Characteristics, and Pay*

According to data from the Bureau of Labor Statistics, women made up nearly 47 percent of the total workforce in the United States in July 2010.<sup>1</sup> Women's participation in the labor force, particularly among women with children, is much higher today than several decades ago. For example, using data from the Current Population Survey, the Bureau of Labor Statistics reported that couples in which only the husband worked represented 18 percent of married couple families in 2007, compared with 36 percent in 1967.<sup>2</sup> In addition, an increasing proportion of women are attaining higher education. Among women aged 25 to 64 in the labor force, the proportion with a college degree roughly tripled from 1970 to 2008. Further, the Equal Employment Opportunity Commission found that the percentage of female officials and managers in the private sector increased from just over 29 percent in 1990 to 36.4 percent in 2002.<sup>3</sup>

Although women's representation across the general workforce is growing, there remains a need for information about the challenges women face in advancing their careers. In 2001, using 1995 and 2000 data from the Current Population Survey, we

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<sup>1</sup>U.S. Department of Labor, Bureau of Labor Statistics, USDL-10-1076, *The Employment Situation—July 2010* (Washington, D.C., Aug. 6, 2010).

<sup>2</sup>U.S. Department of Labor, Bureau of Labor Statistics, *Women in the Labor Force: A Databook* (Washington, D.C., September 2009).

<sup>3</sup>U.S. Equal Employment Opportunity Commission, *Glass Ceilings: The Status of Women as Officials and Managers in the Private Sector* (Washington, D.C., March 2004). In addition, Bureau of Labor Statistics data show that the number of employed women working as chief executives and general and operations managers increased from 24 percent in 2004 to 27 percent in 2008.

found women were less represented in management than in the overall workforce in 4 of the 10 industries reviewed.<sup>4</sup> We also found differences in the characteristics and pay of male and female managers, which we explored using statistical modeling techniques. To respond to your request that we update this information to 2007, this report addresses the following three questions: (1) What is the representation of women in management positions compared to their representation in nonmanagement positions by industry? (2) What are the key characteristics of women and men in management positions by industry? and (3) What is the difference in pay between women and men in full-time management positions by industry?<sup>5</sup>

Enclosed are fact sheets that provide detailed results of our analysis (see enclosure I). In summary, we found the following:

- Based on our own analysis of 13 industry sectors in both 2000 and 2007, we found that in 2007 women comprised an estimated 40 percent of managers and 49 percent of nonmanagers on average for the industry sectors we analyzed—industries that comprised almost all of the nation’s workforce—compared to 39 percent of managers and 49 percent of nonmanagers in 2000. In all but three industry sectors women were less than proportionately represented in management positions than in nonmanagement positions. Women were more than proportionately represented in management positions in construction and public administration, and there was no statistically significant difference between women’s representation in management and nonmanagement positions for the transportation and utilities sector.
- According to our estimates, female managers in 2007 had less education, were younger on average, were more likely to work part-time,<sup>6</sup> and were less likely to be married or have children, than male managers. While the average female married manager earned the majority of her own household’s wages, her share of household wages was smaller than the share contributed by the average male married manager to his household’s wages. These findings were generally similar to findings for 2000.
- The estimated difference in pay between female managers working full time and male managers working full time narrowed slightly between 2000 and 2007 after adjusting for selected factors that were available and are commonly used in examining salary levels, such as age, hours worked beyond full time, and education. When looking at all industry sectors together and adjusting for

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<sup>4</sup>GAO, *Women in Management: Analysis of Selected Data from the Current Population Survey*, GAO-02-156 (Washington, D.C.: Oct. 23, 2001).

<sup>5</sup>We reported on the years 2000 through 2007 to avoid concerns about the role of the recession that began in December 2007 and to avoid any complications to the analysis due to the change of survey questions in the data set we used that were made in 2008.

<sup>6</sup>Our definition of individuals working part-time included those who were not working full time, but reported usually working some hours per week, weeks worked, and wages earned, all over the past 12 months.



these factors, we estimated that female managers earned 81 cents for every dollar earned by male managers in 2007, compared to 79 cents in 2000. The estimated adjusted pay difference varied by industry sector, with female managers' earnings ranging from 78 cents to 87 cents for every dollar earned by male managers in 2007, depending on the industry sector.

Enclosure I also includes separate fact sheets on the findings for each industry sector in alphabetical order by industry. Enclosure II provides summary information on the characteristics we analyzed by industry.

Our findings were based on data we analyzed from the U.S. Census Bureau's American Community Survey (ACS) for the years 2000 through 2007. We selected ACS rather than the Current Population Survey due to the greater number of observations in ACS. We analyzed managers across all of the broad industry categories used in ACS, representing the entire workforce, except for the agriculture and mining sectors, individuals living in group quarters, and those who were not living in a U.S. state or the District of Columbia.<sup>7</sup> We defined "managers" as all individuals classified under the "manager occupation" category in ACS. In our multivariate analysis of the differences in pay between male and female managers working full time and year round by industry,<sup>8</sup> we used annual earnings as our dependent variable, adjusting for certain characteristics that were available in the dataset and commonly used to estimate adjusted pay differences. These include age, hours worked beyond full-time, race and ethnicity, state, veteran status, education level, citizenship, marital status, and presence of children in the household.<sup>9</sup> In addition to analyses of ACS data, we reviewed selected GAO and other reports and consulted with experts in conducting this analysis. We assessed the reliability of the ACS generally and of data elements that were critical to our analyses by reviewing documentation on the general design and methods of the ACS and on the specific elements of the data that were used in our analysis, interviewing U.S. Census Bureau officials knowledgeable about the ACS data, and completing our own electronic data testing to assess the accuracy and completeness of the data used in our analyses. Based on these efforts, we determined that they were sufficiently reliable for our analyses. See Enclosure III for a detailed description of our methodology.

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<sup>7</sup>We excluded agriculture because, according to the Bureau of Labor Statistics, farmers may have other sources of income, such as from federal subsidies, which may not be reported in ACS as income and would complicate our analysis on pay differentials. We excluded mining because we found a relatively limited number of observations in the mining industry. According to ACS, group quarters is a place where people live or stay in a group living arrangement that is owned or managed by an entity or organization providing housing and/or services for the residents. Examples include college residence halls, nursing homes, group homes, military barracks, correctional facilities, and mental hospitals.

<sup>8</sup>Our definition of individuals working full time were those who, over the past 12 months, reported usually working greater than or equal to 35 hours per week and 50 weeks per year, and reported positive wages earned.

<sup>9</sup>When we looked at all industries together, we also adjusted for industry sector.

Our analysis is descriptive in nature. Our analysis neither confirms nor refutes the presence of discriminatory practices. Some of the unexplained differences in pay seen here could be explained by factors for which we lacked data or are difficult to measure, such as level of managerial responsibility, field of study, years of experience, or discriminatory practices, all of which can be found in the research literature as affecting earnings. More detailed information on the characteristics of women in management in specific industries could help policymakers to identify actions, if any, to help women advance to management positions. For example, starting in 2009, the ACS included a question on field of study, a variable recognized as important in examining differences in pay and advancement. Improvements to the type of data available, such as this one, could help researchers to better understand the determinants of salary and advancement.

We conducted our work from February 2010 to September 2010 in accordance with all sections of GAO's Quality Assurance Framework that are relevant to our objectives. The framework requires that we plan and perform the engagement to obtain sufficient and appropriate evidence to meet our stated objectives and to discuss any limitations in our work. We believe that the information and data obtained, and the analysis conducted, provide a reasonable basis for any findings and conclusions in this product.

### **Agency Comments and Our Evaluation**

We provided a draft of this report to the Departments of Commerce and Labor for review and comment. Both agencies provided technical comments, which we incorporated where appropriate.

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As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the Secretaries of Commerce and Labor, relevant congressional committees, and other interested parties. In addition, the report will be available at no charge on GAO's Web site at <http://www.gao.gov>.

If you or your staff have any questions concerning this report, please contact me at (202) 512-7215 or [sherrilla@gao.gov](mailto:sherrilla@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in enclosure IV.

A handwritten signature in black ink that reads "Andrew Sherrill". The signature is written in a cursive, flowing style.

Andrew Sherrill, Director  
Education, Workforce, and  
Income Security Issues

Enclosures-4



**Women in the Workforce**

**Women and mothers**

On average, we estimated that women comprised 40 percent of managers and 49 percent of nonmanagers in 2007, compared to 39 percent of managers and 49 percent of nonmanagers in 2000. Women were less than proportionately represented in management positions than in nonmanagement positions in all but three industry sectors in 2007. Women were more than proportionately represented in management positions in construction and public administration; there was no statistically significant difference between women’s representation in management and nonmanagement positions for the transportation and utilities sector.

Similarly, mothers with children under 18 were less than proportionately represented in management than in the rest of the workforce in most industry sectors in 2007. On average, we estimated that mothers comprised 17 percent of nonmanagers and 14 percent of managers. Results were similar in 2000.

**Top earners and board members**

While neither the ACS nor any other federal database tracks women’s participation on corporate boards, according to data from a nonprofit organization that specializes in women in business, women comprised 6.3 percent of top earner positions in Fortune 500 companies in 2009 and held 15.2 percent of board directors’ seats at Fortune 500 companies, up from 11.7 percent of seats in 2000.<sup>1</sup>

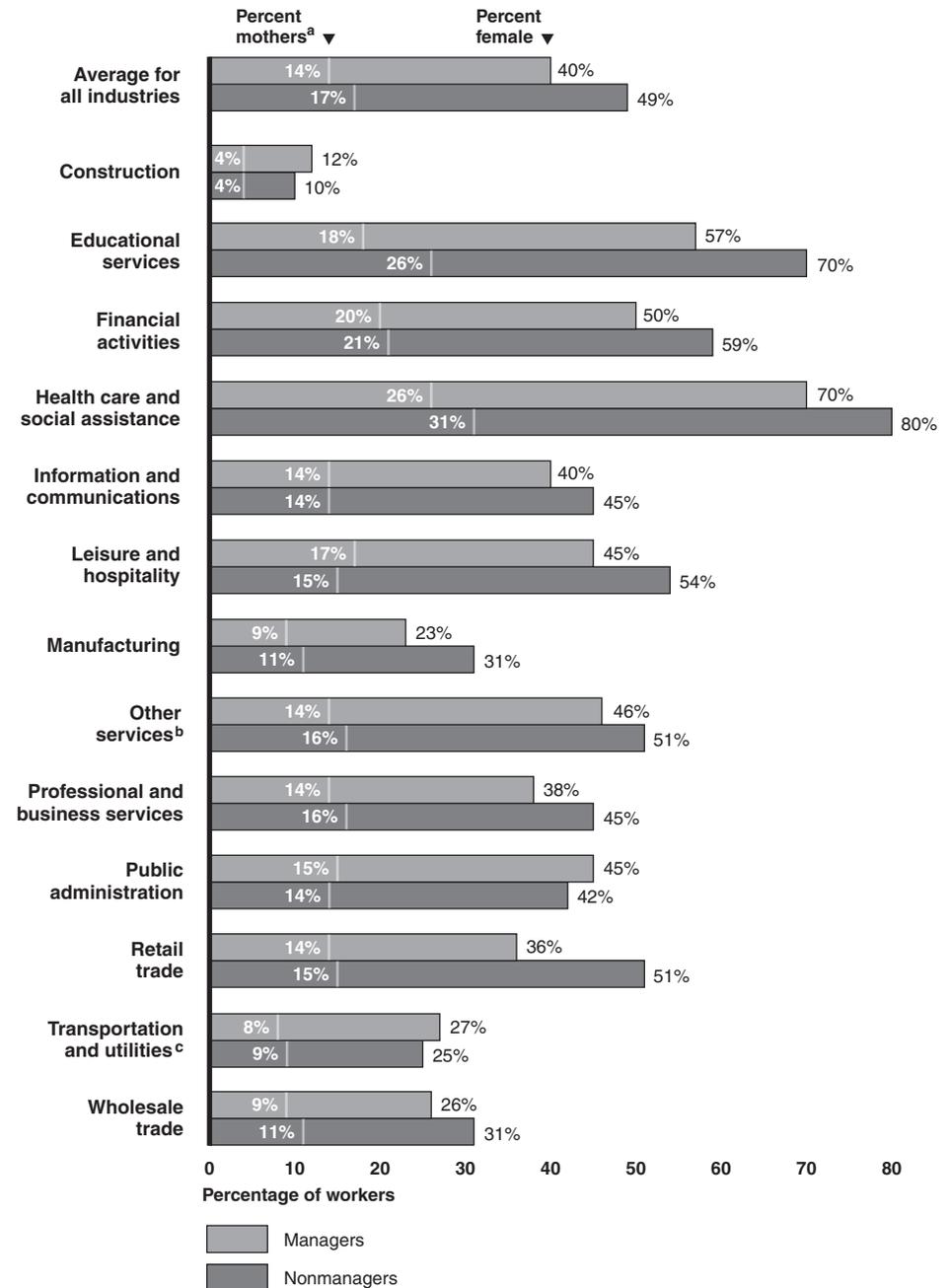
**Enclosure I**

**Analysis of Female Managers’ Representation, Characteristics, and Pay**

**WOMEN’S AND MOTHERS’ WORKFORCE REPRESENTATION**

**Analysis of All Industry Sectors, Combined and Separate**

**Estimated Female Representation by Industry, 2007**



Source: GAO analysis of American Community Survey data.

<sup>a</sup>Mothers refers to women with their own children under age 18 living in the household.

<sup>b</sup>Positions included, for example, auto repair shop managers and parking lot managers.

<sup>c</sup>The difference in proportions of female managers and nonmanagers was not statistically significant.

<sup>1</sup>Data reported by Catalyst, New York, NY. See Women in U.S. Management Quick Takes, March 16, 2010 and 2009 Catalyst Census: Fortune 500 Women Executive Officers and Top Earners. Top earners were defined as current executive officers who were among the five most highly compensated employees in each company.



# KEY CHARACTERISTICS OF WOMEN IN MANAGEMENT

## Analysis of All Industry Sectors Combined

### Industry Characteristics

The 13 broad industry sectors we selected represent all industries in the U.S. workforce, except agriculture and mining, and individuals living in group quarters, and those who were not living in a U.S. state or the District of Columbia.

#### Total workers<sup>2</sup>

2000: 141.1 million  
2007: 147.7 million

#### Total management positions

2000: 11.7 million  
2007: 12.9 million

#### Estimated female representation

**2000**  
Managers: 39 percent  
Nonmanagers: 49 percent  
**2007**  
Managers: 40 percent  
Nonmanagers: 49 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$48,000  
Male managers: \$70,000  
**2007**  
Female managers: \$52,000  
Male managers: \$75,000

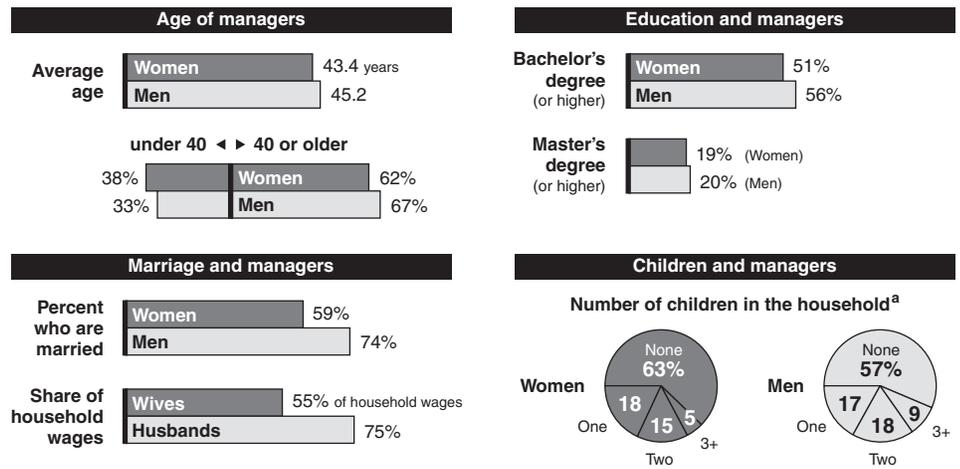
#### Percent working part-time

**2000**  
Female managers: 27 percent  
Male managers: 17 percent  
**2007**  
Female managers: 25 percent  
Male managers: 17 percent

Source: GAO analysis of American Community Survey data.

### Estimates for Characteristics of Managers by Gender, 2007

According to our estimates, for most industries in 2007, female managers were younger, had less education, were more likely to work part-time, and were less likely to be married or have children in the household than male managers. While the average female married manager earned the majority of her own household's wages, her share of household wages was smaller than the share contributed by the average male married manager to his household's wages.



Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.

### Further Analysis of Characteristics of Managers by Gender

- These results were largely similar for 2000.
- While both male and female managers experienced increases in attainment of bachelor's degrees or higher, women's gains surpassed men's. According to our estimates, male managers with a bachelor's degree or higher increased from 53 percent in 2000 to 56 percent in 2007, while female managers with a bachelor's degree or higher increased 6 percentage points from 45 percent in 2000 to 51 percent in 2007. Similarly, while the share of male managers with a master's degree or higher went up less than 1 percentage point from 2000 to 2007, the share of female managers with a master's degree or higher rose nearly 4 percentage points.
- When looking at all industries together, we estimated a statistically significant difference in racial composition between male and female managers in both 2007 and 2000. However, we did not find differences in every industry. In all of the industries with differences in 2007, female managers were more likely than male managers to be African American.

<sup>2</sup>Our counts of total workers and management positions may differ from those of the Census Bureau due to differences in definitions of workers and other factors.



## DIFFERENCES IN PAY

### Analysis of All Industry Sectors Combined

#### Examining Pay Differences

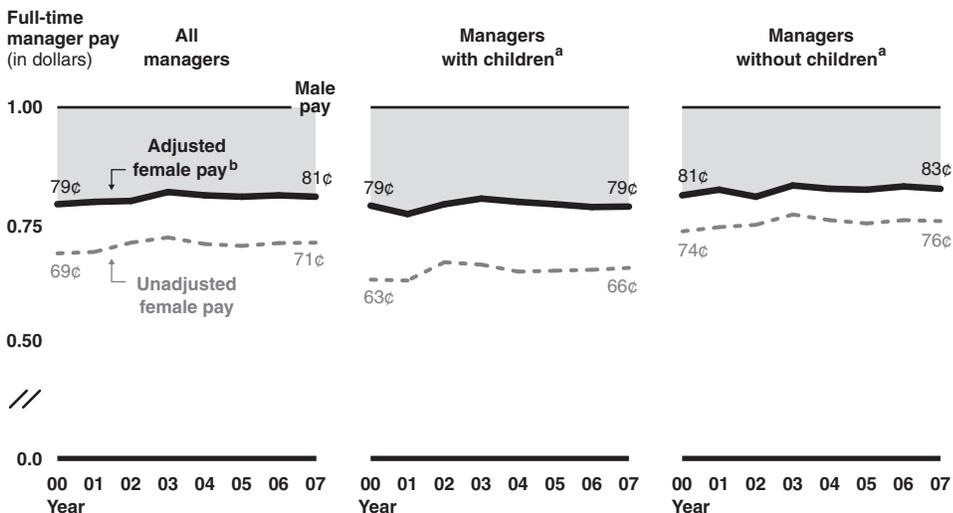
Researchers have not agreed on the reasons for differences in pay between women and men. Some maintain these pay differences are due to differences in personal characteristics of working women and men, such as educational attainment. Others attribute pay differences to the types of jobs in which women and men typically work, with women more often working in lower paying occupations and jobs than men.

Our analysis adjusted for a select number of variables that were available and are commonly used when examining pay differences. However, we acknowledge that there are many variables and methods of analysis, other than those we included, that could be used that would yield different numbers for an adjusted pay difference than our analysis yielded.

Some of the unexplained differences in pay seen here could be explained by factors for which we lacked data or are difficult to measure, such as level of managerial responsibility, field of study, years of experience, or discriminatory practices, all of which may affect earnings. Our analysis neither confirms nor refutes the presence of discriminatory practices.

#### Estimated Pay Differences for Full-Time Managers, 2000-2007

When looking at all industry sectors together, the estimated difference in pay between female and male managers working full time narrowed slightly between 2000 and 2007 when adjusting for selected factors that are important and available when examining salary levels.



Source: GAO analysis of American Community Survey data.

Note: The narrowing of the gap between 2000 and 2007 for all managers and managers without children in the household was statistically significant at the 95 percent confidence level. For 2001-2007, the margins of error for pay gaps differed for any single year by no greater than plus or minus 2 cents. See enclosure III for a table of margins of error for each year.

<sup>a</sup>Children refer to children under age 18 living in a household with a manager.

<sup>b</sup>For this analysis, we adjusted for age, hours worked beyond full time, race and ethnicity, state, veteran status, education, industry sector, citizenship, marital status, and presence of children in the household. We adjusted for industry sector to control for the possibility that pay differences occur because female managers tended to be employed in industries that had lower rates of pay. However, we acknowledge that the distribution of female managers by industry sector itself might reflect some level of discrimination associated with hiring, promotion, or other employer practices. For the subsequent industry-specific analyses, we adjusted for the same variables, except we excluded industry sector.

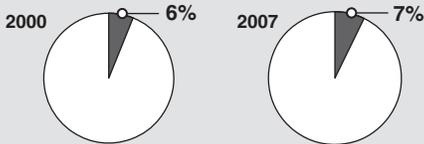
#### Further Analysis of Pay Differences by Gender

- The adjusted difference in pay between male and female managers with children in the household was larger than the difference in pay for those without children in the household. Specifically, we found that across all the years, female managers with children in the household earned on average 79 cents for each dollar earned by male managers with children in the household. Female managers without children in the household earned an average of 82 cents for each dollar earned by male managers without children in the household. We did not adjust for factors that may influence pay for managers with children, such as time off of work.
- The adjusted pay difference varied by industry; female managers' earnings ranged from 78 to 87 cents for every dollar earned by male managers in 2007, depending on the industry.

# CONSTRUCTION

## Industry Snapshot

Percentage of construction employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the construction sector included, for example, construction managers, electrical contractors, and building construction contractors. There was a smaller proportion of female managers in construction than within any other industry.

#### Total workers

2000: 8.9 million  
2007: 10.7 million

#### Total management positions

2000: 900,000  
2007: 1.1 million

#### Estimated female representation

**2000**  
Managers: 12 percent  
Nonmanagers: 10 percent  
**2007**  
Managers: 12 percent  
Nonmanagers: 10 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$51,000  
Male managers: \$63,000  
**2007**  
Female managers: \$52,000  
Male managers: \$70,000

#### Percent working part-time

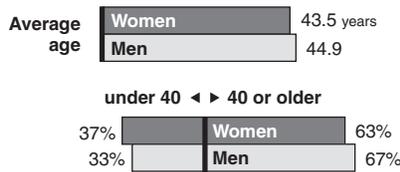
**2000**  
Female managers: 28 percent  
Male managers: 21 percent  
**2007**  
Female managers: 28 percent  
Male managers: 17 percent

Source: GAO analysis of American Community Survey data.

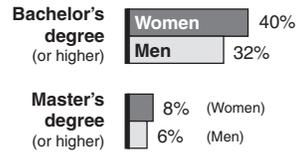
### Estimates for Characteristics of Managers by Gender, 2007

In construction, female managers were younger on average, less likely to be married or have children in the household, and more likely to work part time than male managers. In this industry, female managers had more education than male managers. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>3</sup>

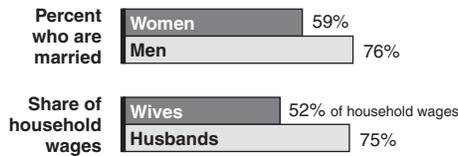
#### Age of managers



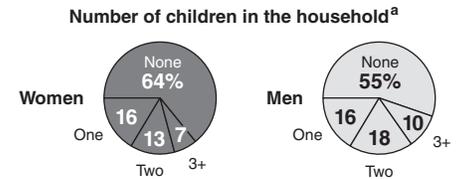
#### Education and managers



#### Marriage and managers



#### Children and managers

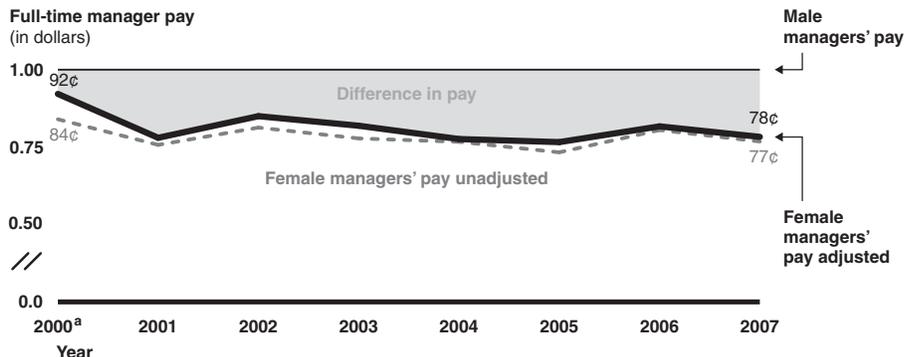


Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference fluctuated between 2000 and 2007. In 2000, the adjusted pay difference between female and male managers was not statistically significant.



Source: GAO analysis of American Community Survey data.

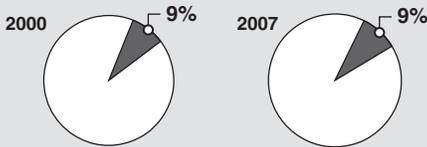
<sup>a</sup>There was no statistically significant difference between female and male managers' pay in 2000.

<sup>3</sup>In 2000, the differences in average age and in the percentages of managers who were aged 40 and older, worked part-time, and had bachelor's and master's degrees were not statistically significant. Other results were similar to results in 2007.

# EDUCATIONAL SERVICES

## Industry Snapshot

Percentage of educational services employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the educational services sector included, for example, school principals, directors of admissions, and directors of research.

#### Total workers

2000: 12.2 million  
2007: 13.6 million

#### Total management positions

2000: 800,000  
2007: 1.0 million

#### Estimated female representation

2000  
Managers: 53 percent  
Nonmanagers: 71 percent  
2007  
Managers: 57 percent  
Nonmanagers: 70 percent

#### Median salaries for full-time managers (2007 dollars)

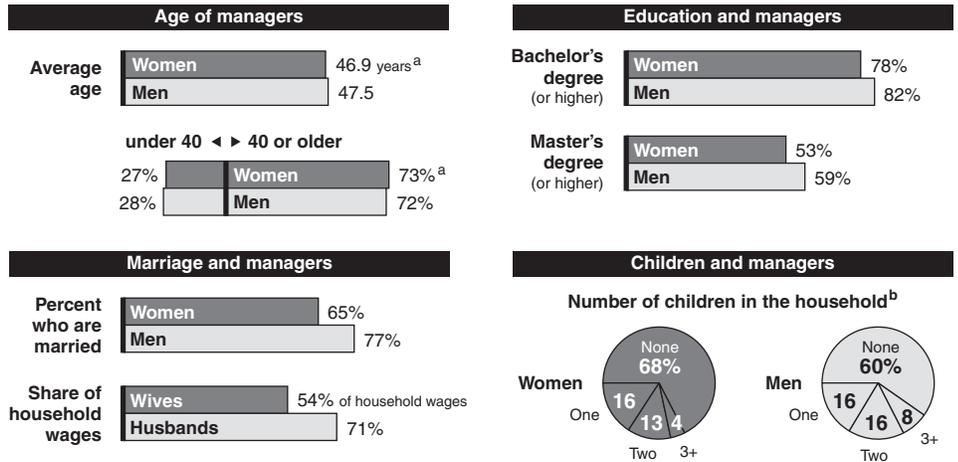
2000  
Female managers: \$54,000  
Male managers: \$66,000  
2007  
Female managers: \$59,000  
Male managers: \$70,000

#### Percent working part-time

2000  
Female managers: 38 percent  
Male managers: 29 percent  
2007  
Female managers: 33 percent  
Male managers: 25 percent

### Estimates for Characteristics of Managers by Gender, 2007

Female managers in educational services had less education on average, were less likely to be married or have children in the household, and were more likely to work part-time than male managers. The differences in average age and in the percentage of managers aged 40 and older were not statistically significant. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>4</sup>



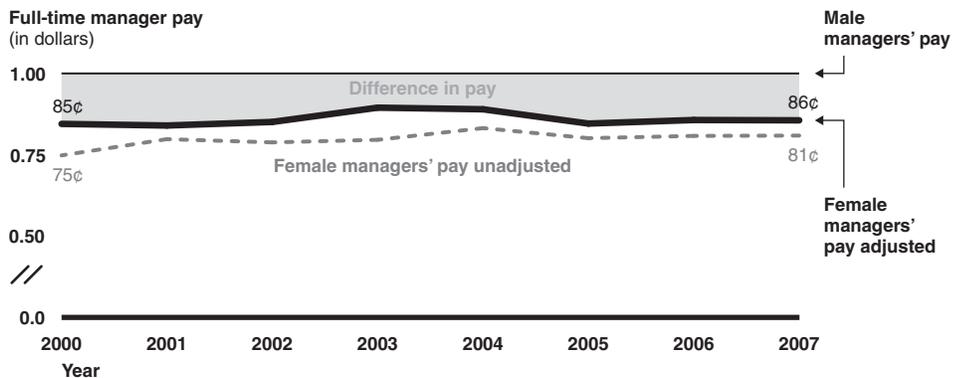
Source: GAO analysis of American Community Survey data.

<sup>a</sup>There was no statistically significant difference between female and male managers.

<sup>b</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference varied slightly between 2000 and 2007, with female managers earning around 85 or 86 cents for every dollar earned by male managers in most years.



Source: GAO analysis of American Community Survey data.

Source: GAO analysis of American Community Survey data.

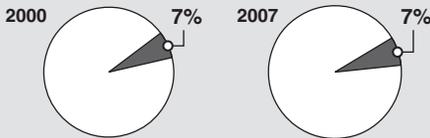
<sup>4</sup>Results were generally similar in 2000. However, the difference in the percentage of male and female managers who had children in the household was not statistically significant in 2000.



# FINANCIAL ACTIVITIES

## Industry Snapshot

Percentage of financial activities employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the financial activities sector included, for example, loan and credit managers, bank cashiers, actuarial managers, real estate office managers, and apartment managers.

#### Total workers

2000: 9.3 million  
2007: 10.3 million

#### Total management positions

2000: 1.5 million  
2007: 1.8 million

#### Estimated female representation

**2000**  
Managers: 53 percent  
Nonmanagers: 61 percent  
**2007**  
Managers: 50 percent  
Nonmanagers: 59 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$46,000  
Male managers: \$72,000  
**2007**  
Female managers: \$50,000  
Male managers: \$85,000

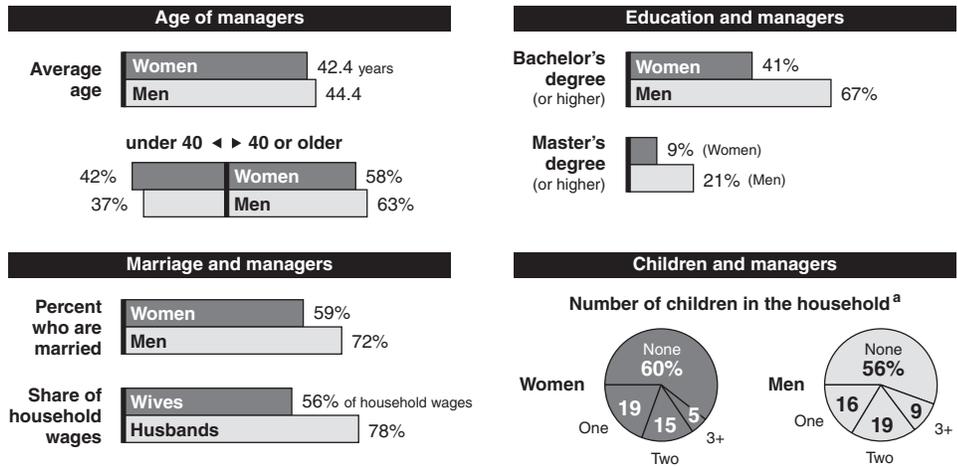
#### Percent working part-time

**2000**  
Female managers: 24 percent  
Male managers: 20 percent  
**2007**  
Female managers: 22 percent  
Male managers: 18 percent

Source: GAO analysis of American Community Survey data.

### Estimates for Characteristics of Managers by Gender, 2007

Female managers in financial activities were younger and had less education on average, were less likely to be married or have children in the household, and were more likely to work part-time than male managers. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>5</sup>

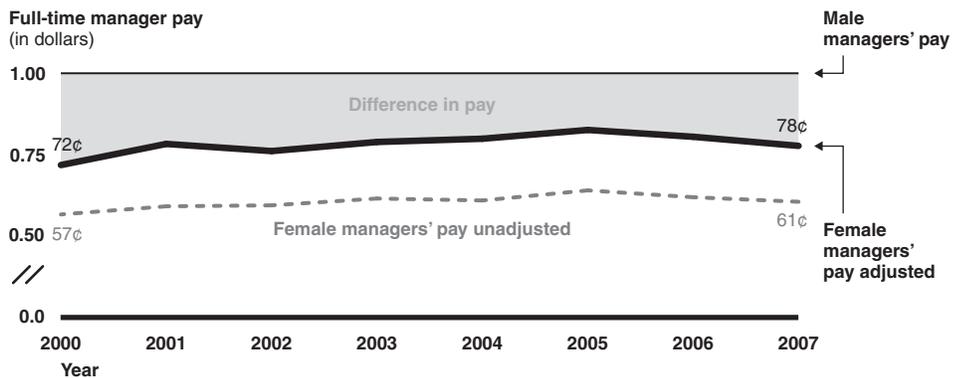


Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference varied between 2000 and 2007. Female managers earned between 78 and 81 cents for every dollar earned by male managers in most years, with a low of 72 cents and a high of 83 cents.



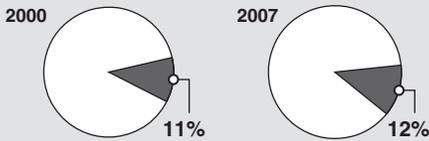
Source: GAO analysis of American Community Survey data.

<sup>5</sup>Results were generally similar in 2000. However, the differences in the percentages of male and female managers who worked part-time and had children in the household were not statistically significant in 2000.

# HEALTH CARE AND SOCIAL ASSISTANCE

## Industry Snapshot

Percentage of health care and social assistance employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the health care and social assistance sector included, for example, hospital administrators, clinical directors, nursing superintendents, and community center directors. There was a larger proportion of female managers in health care and social assistance than within any other industry.

#### Total workers

2000: 15.6 million  
2007: 18.4 million

#### Total management positions

2000: 1.0 million  
2007: 1.1 million

#### Estimated female representation

**2000**  
Managers: 66 percent  
Nonmanagers: 81 percent

**2007**  
Managers: 70 percent  
Nonmanagers: 80 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$48,000  
Male managers: \$66,000

**2007**  
Female managers: \$52,000  
Male managers: \$70,000

#### Percent working part-time

**2000**  
Female managers: 26 percent  
Male managers: 17 percent

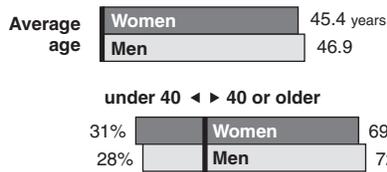
**2007**  
Female managers: 22 percent  
Male managers: 15 percent

Source: GAO analysis of American Community Survey data.

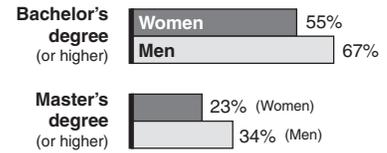
### Estimates for Characteristics of Managers by Gender, 2007

Female managers were younger and had less education on average, were less likely to be married, and were more likely to work part-time than male managers. The difference in the percentage of managers who had children in the household was not statistically significant. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>6</sup>

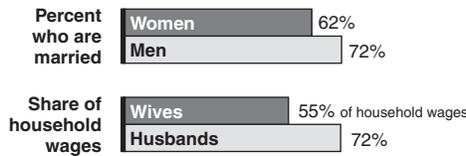
#### Age of managers



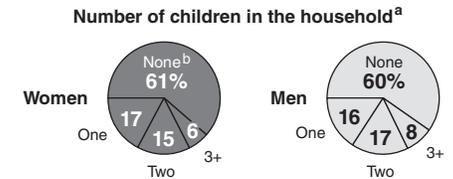
#### Education and managers



#### Marriage and managers



#### Children and managers



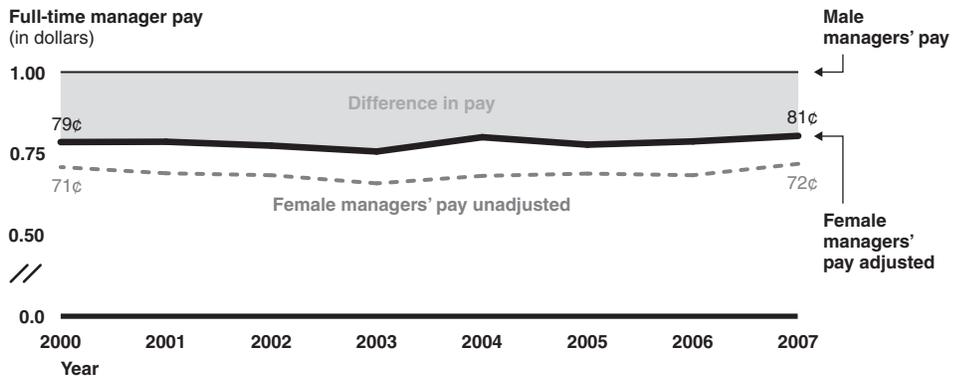
Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.

<sup>b</sup>There was no statistically significant difference between female and male managers.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference stayed about the same between 2000 and 2007. Female managers earned between 76 and 81 cents for every dollar earned by male managers.



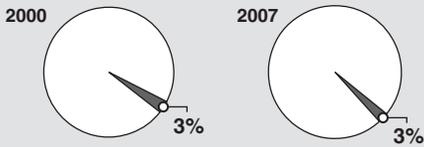
Source: GAO analysis of American Community Survey data.

<sup>6</sup>In 2000, the differences in average age and in the percentage of managers aged 40 and older were not statistically significant. Other results were similar to 2007.

# INFORMATION AND COMMUNICATIONS

## Industry Snapshot

Percentage of information and communications employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the information and communications sector included, for example, radio station managers and data processing managers.

#### Total workers

2000: 4.4 million  
2007: 3.7 million

#### Total management positions

2000: 600,000  
2007: 600,000

#### Estimated female representation

**2000**  
Managers: 40 percent  
Nonmanagers: 48 percent  
**2007**  
Managers: 40 percent  
Nonmanagers: 45 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$60,000  
Male managers: \$84,000  
**2007**  
Female managers: \$62,000  
Male managers: \$84,000

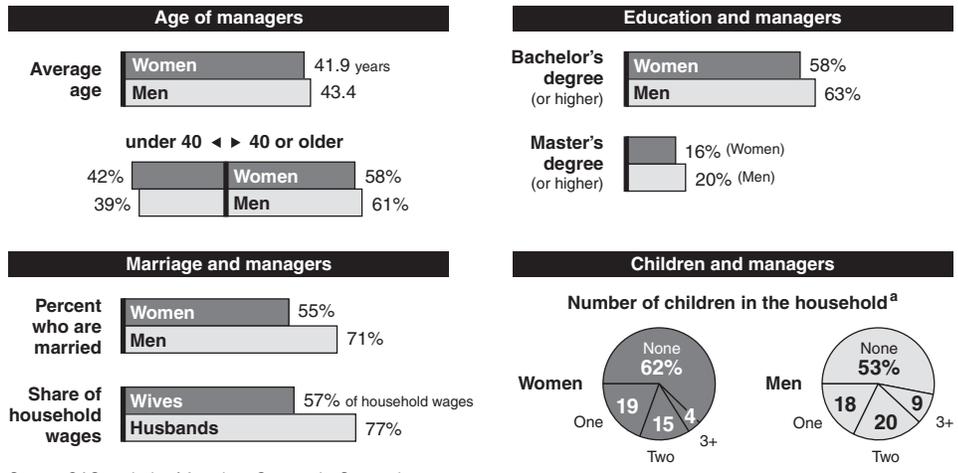
#### Percent working part-time

**2000**  
Female managers: 25 percent  
Male managers: 16 percent  
**2007**  
Female managers: 23 percent  
Male managers: 15 percent

Source: GAO analysis of American Community Survey data.

### Estimates for Characteristics of Managers by Gender, 2007

Female managers in information and communications were younger and had less education on average, were less likely to be married or have children in the household, and were more likely to work part-time than male managers. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>7</sup>

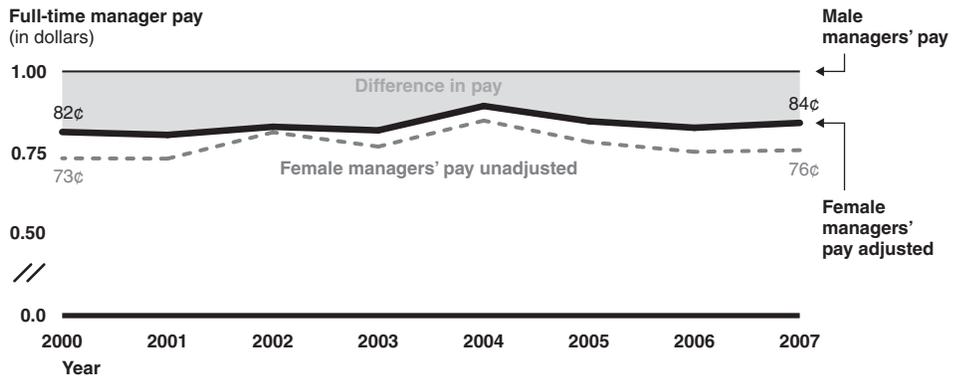


Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference fluctuated between 2000 and 2007; female managers earned between 81 and 85 cents for every dollar earned by male managers in most years, but this rate jumped to 90 cents in 2004.



Source: GAO analysis of American Community Survey data.

<sup>7</sup>In 2000, the differences between male and female managers in average age and in the percentages of managers who were aged 40 and older, had bachelor's and master's degrees, and had children in the household were not statistically significant. Other results were similar to 2007.

# LEISURE AND HOSPITALITY

## Industry Snapshot

Percentage of leisure and hospitality employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the leisure and hospitality sector included, for example, entertainment directors, recreation facility managers, food production managers, and hotel managers.

#### Total workers

2000: 12.6 million  
2007: 14.5 million

#### Total management positions

2000: 1.1 million  
2007: 1.3 million

#### Estimated female representation

**2000**  
Managers: 43 percent  
Nonmanagers: 54 percent

**2007**  
Managers: 45 percent  
Nonmanagers: 54 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$35,000  
Male managers: \$45,000

**2007**  
Female managers: \$35,000  
Male managers: \$45,000

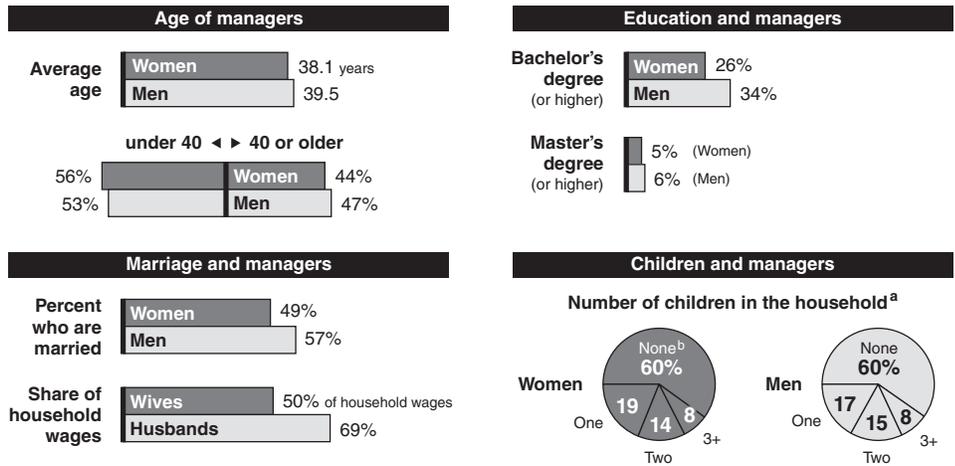
#### Percent working part-time

**2000**  
Female managers: 31 percent  
Male managers: 19 percent

**2007**  
Female managers: 32 percent  
Male managers: 21 percent

### Estimates for Characteristics of Managers by Gender, 2007

Female managers were younger and had less education on average, were less likely to be married, and were more likely to work part-time than male managers. However, the difference in the percentage of managers who had children in the household was not statistically significant. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>8</sup>



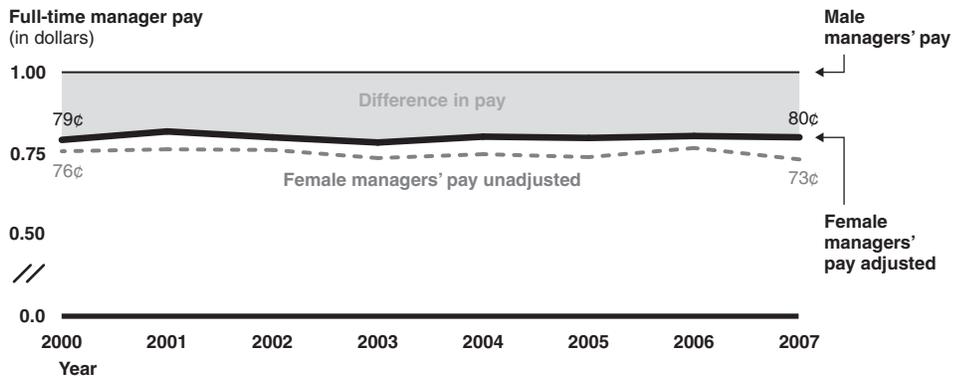
Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.

<sup>b</sup>There was no statistically significant difference between female and male managers.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference between male and female managers stayed about the same from 2000 and 2007. In most years, female managers earned 79 to 80 cents for every dollar earned by male managers.



Source: GAO analysis of American Community Survey data.

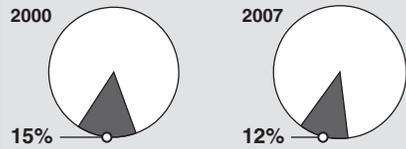
Source: GAO analysis of American Community Survey data.

<sup>8</sup>In 2000, the differences between male and female managers in average age and in the percentages of managers who were aged 40 and older and had master's degrees were not statistically significant. Other results were similar to 2007.

# MANUFACTURING

## Industry Snapshot

Percentage of manufacturing employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the manufacturing sector included, for example, production superintendents, manufacturing directors, and factory superintendents involved in the manufacturing of beverages, textiles, machinery, and a wide variety of other goods.

#### Total workers

2000: 20.5 million  
2007: 17.4 million

#### Total management positions

2000: 1.8 million  
2007: 1.8 million

#### Estimated female representation

**2000**  
Managers: 22 percent  
Nonmanagers: 34 percent  
**2007**  
Managers: 23 percent  
Nonmanagers: 31 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$61,000  
Male managers: \$84,000  
**2007**  
Female managers: \$67,000  
Male managers: \$86,000

#### Percent working part-time

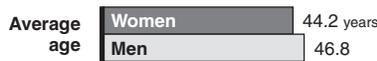
**2000**  
Female managers: 24 percent  
Male managers: 13 percent  
**2007**  
Female managers: 19 percent  
Male managers: 13 percent

Source: GAO analysis of American Community Survey data.

### Estimates for Characteristics of Managers by Gender, 2007

Female managers in manufacturing were younger on average, less likely to be married or have children in the household, and more likely to work part-time than male managers. The difference in the percentage of managers with a bachelor's degree was not statistically significant. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>9</sup>

#### Age of managers



#### under 40 < > 40 or older



#### Education and managers

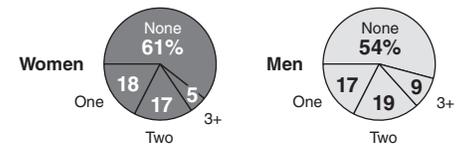


#### Marriage and managers



#### Children and managers

##### Number of children in the household<sup>b</sup>



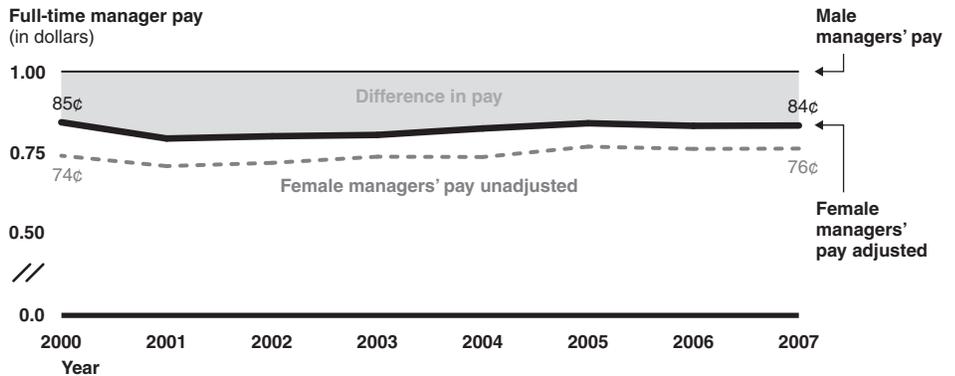
Source: GAO analysis of American Community Survey data.

<sup>a</sup>There was no statistically significant difference between female and male managers.

<sup>b</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference between male and female managers fluctuated between 2000 and 2007, with female managers earning between 80 and 85 cents for every dollar earned by male managers.



Source: GAO analysis of American Community Survey data.

<sup>9</sup>Results were generally similar in 2000. However, the difference in the percentage of male and female managers with a master's degree was not statistically significant.

# OTHER SERVICES

## Industry Snapshot

Percentage of other services employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

The other services sector included industries not specifically provided for elsewhere in the classification system. Management positions included, for example, auto repair shop managers, funeral directors, and parking lot managers.

#### Total workers

2000: 6.4 million  
2007: 6.3 million

#### Total management positions

2000: 500,000  
2007: 500,000

#### Estimated female representation

**2000**  
Managers: 45 percent  
Nonmanagers: 53 percent  
**2007**  
Managers: 46 percent  
Nonmanagers: 51 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$44,000  
Male managers: \$48,000  
**2007**  
Female managers: \$49,000  
Male managers: \$55,000

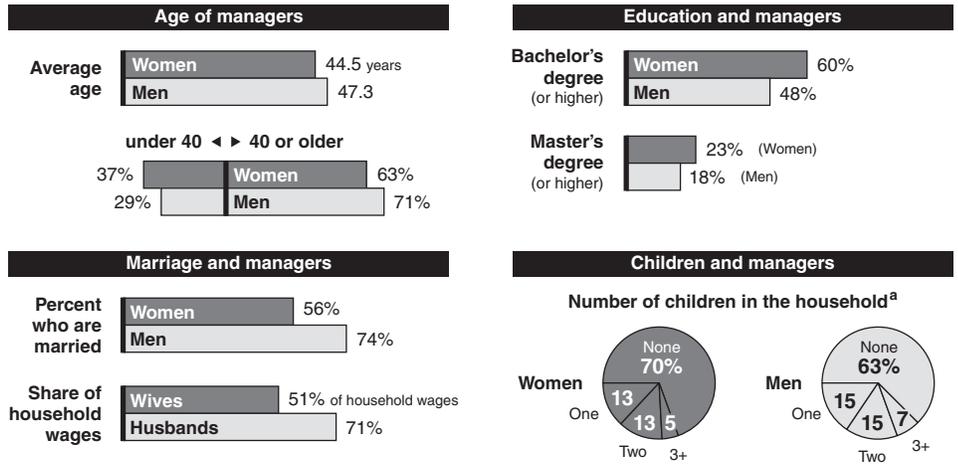
#### Percent working part-time

**2000**  
Female managers: 31 percent  
Male managers: 19 percent  
**2007**  
Female managers: 32 percent  
Male managers: 21 percent

Source: GAO analysis of American Community Survey data.

### Estimates for Characteristics of Managers by Gender, 2007

Female managers were younger on average, less likely to be married or have children in the household, and more likely to work part-time than male managers. In contrast to most other industries, female managers in other services had more education than male managers. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>10</sup>

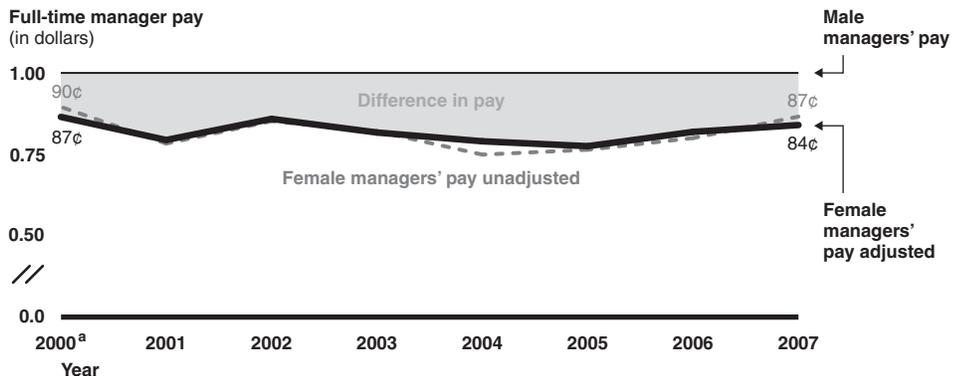


Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference fluctuated between 2000 and 2007. In 2000, the adjusted difference in pay between female and male managers was not statistically significant.



Source: GAO analysis of American Community Survey data.

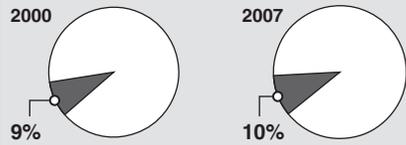
<sup>a</sup>There was no statistically significant difference between female and male managers' pay in 2000.

<sup>10</sup>In 2000, the differences in the percentages of managers who were aged 40 and older, had master's degrees, and had children in the household were not statistically significant. Other results were similar to 2007.

# PROFESSIONAL AND BUSINESS SERVICES

## Industry Snapshot

Percentage of professional and business services employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the professional and business services sector included, for example, account executives and administrative services managers.

#### Total workers

2000: 12.6 million  
2007: 14.7 million

#### Total management positions

2000: 1.2 million  
2007: 1.6 million

#### Estimated female representation

**2000**  
Managers: 40 percent  
Nonmanagers: 46 percent  
**2007**  
Managers: 38 percent  
Nonmanagers: 45 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$52,000  
Male managers: \$84,000  
**2007**  
Female managers: \$63,000  
Male managers: \$90,000

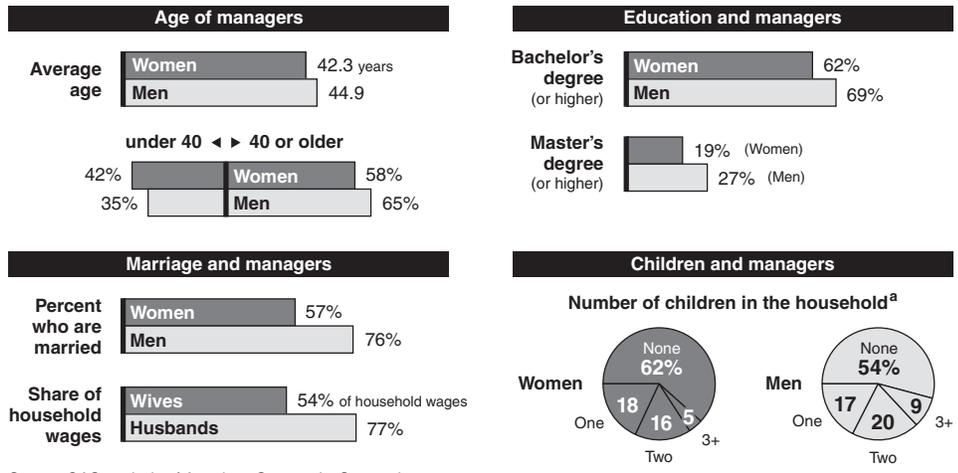
#### Percent working part-time

**2000**  
Female managers: 24 percent  
Male managers: 16 percent  
**2007**  
Female managers: 26 percent  
Male managers: 16 percent

Source: GAO analysis of American Community Survey data.

### Estimates for Characteristics of Managers by Gender, 2007

Female managers in professional and business services were younger and had less education on average, were less likely to be married or have children in the household, and were more likely to work part-time than male managers. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>11</sup>

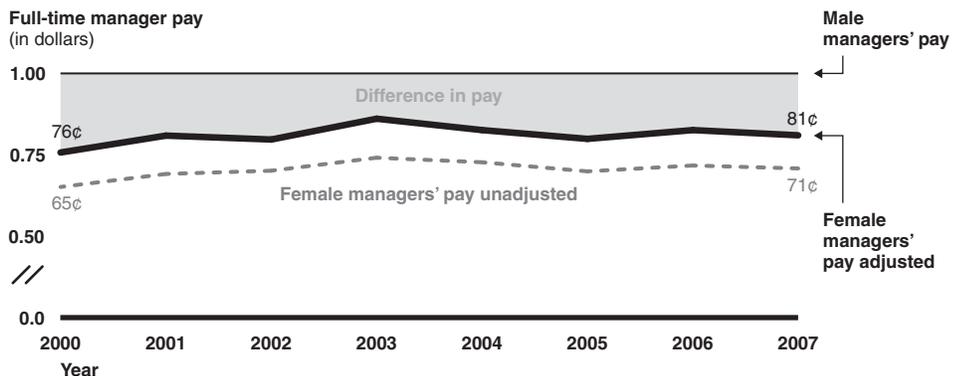


Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference fluctuated between 2000 and 2007. Female managers earned between 80 and 83 cents for every dollar earned by male managers in most years, with a low of 76 cents and a high of 86 cents.



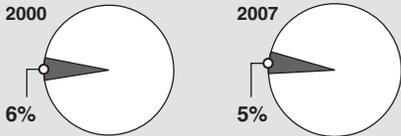
Source: GAO analysis of American Community Survey data.

<sup>11</sup>Results were generally similar in 2000. However, the difference in the percentage of male and female managers who had children in the household was not statistically significant in 2000.

# PUBLIC ADMINISTRATION

## Industry Snapshot

Percentage of public administration employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the public administration sector included, for example, city and tribal council members, county supervisors, and tax commissioners.

#### Total workers

2000: 7.9 million  
2007: 7.8 million

#### Total management positions

2000: 700,000  
2007: 700,000

#### Estimated female representation

**2000**  
Managers: 41 percent  
Nonmanagers: 42 percent  
**2007**  
Managers: 45 percent  
Nonmanagers: 42 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$51,000  
Male managers: \$64,000  
**2007**  
Female managers: \$60,000  
Male managers: \$74,000

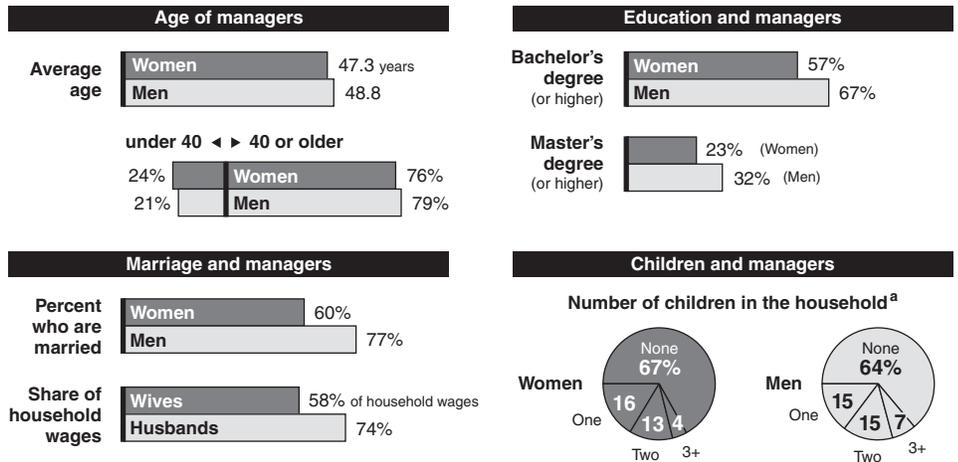
#### Percent working part-time

**2000**  
Female managers: 24 percent  
Male managers: 17 percent  
**2007**  
Female managers: 20 percent  
Male managers: 16 percent

Source: GAO analysis of American Community Survey data.

### Estimates for Characteristics of Managers by Gender, 2007

Female managers in public administration were younger and had less education on average, were less likely to be married, and were more likely to work part-time than male managers. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>12</sup>

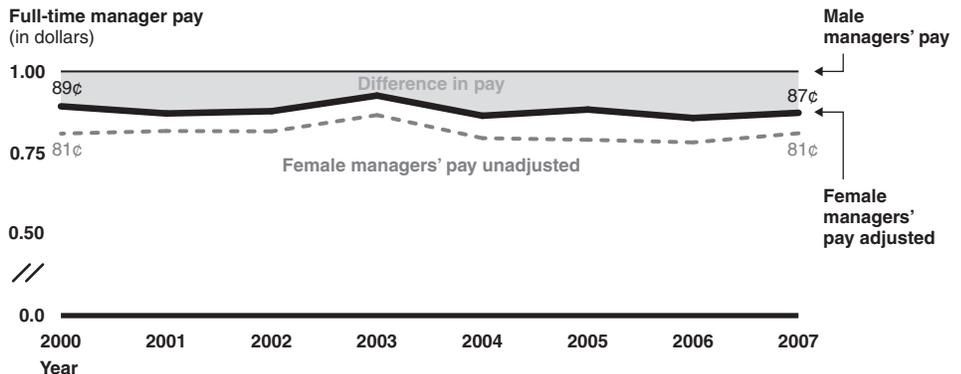


Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference fluctuated between 2000 and 2007. Female managers earned 86 to 89 cents for every dollar earned by male managers in most years, but earned a high of 93 cents in 2003.



Source: GAO analysis of American Community Survey data.

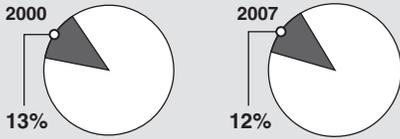
<sup>12</sup>In 2000, the differences in the percentages of male and female managers who were aged 40 and older, worked part-time, and had children in the household were not statistically significant. Other results were similar to results in 2007.



# RETAIL TRADE

## Industry Snapshot

Percentage of retail trade employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the retail trade sector included, for example, department store managers, merchandise managers, and motor vehicle dealership managers.

#### Total workers

2000: 17.7 million  
2007: 18.0 million

#### Total management positions

2000: 700,000  
2007: 500,000

#### Estimated female representation

**2000**  
Managers: 38 percent  
Nonmanagers: 51 percent  
**2007**  
Managers: 36 percent  
Nonmanagers: 51 percent

#### Median salaries for full-time managers (2007 dollars)

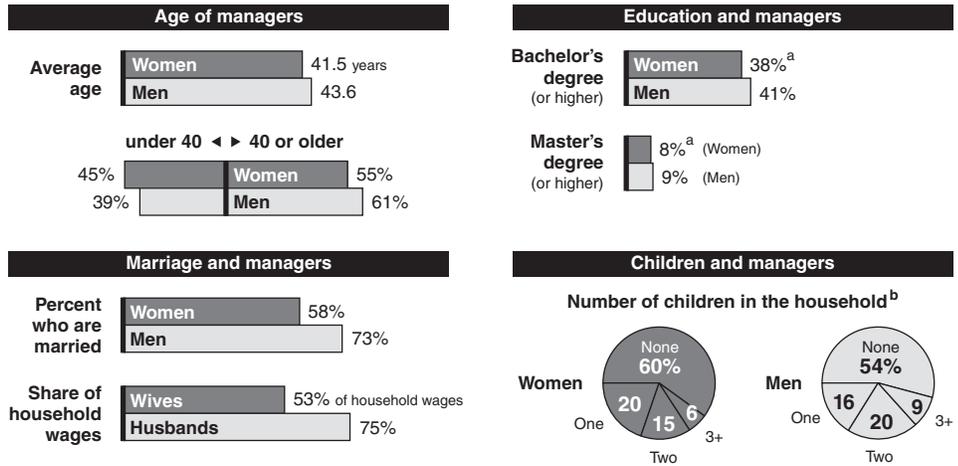
**2000**  
Female managers: \$39,000  
Male managers: \$63,000  
**2007**  
Female managers: \$48,000  
Male managers: \$67,000

#### Percent working part-time

**2000**  
Female managers: 24 percent  
Male managers: 15 percent  
**2007**  
Female managers: 22 percent  
Male managers: 14 percent

### Estimates for Characteristics of Managers by Gender, 2007

Female managers in retail trade were younger on average, less likely to be married or have children in the household, and more likely to work part-time than male managers. The differences in the percentages of managers with bachelor's and masters' degrees were not statistically significant. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>13</sup>



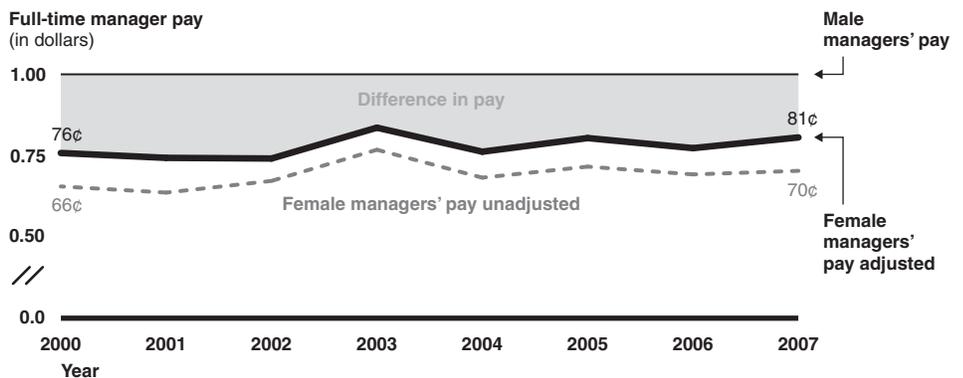
Source: GAO analysis of American Community Survey data.

<sup>a</sup>There was no statistically significant difference between female and male managers.

<sup>b</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference narrowed between 2000 and 2007 despite fluctuation.



Source: GAO analysis of American Community Survey data.

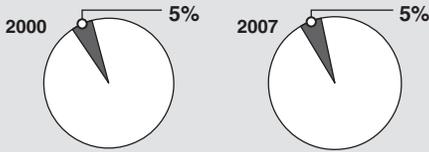
Source: GAO analysis of American Community Survey data.

<sup>13</sup>In 2000, the differences in the percentages of managers who were aged 40 and older and had children in the household were not statistically significant. In addition, the difference in the percentage of managers with bachelor's degrees was statistically significant, with female managers less likely to have a bachelor's degree than male managers. Other results in 2000 were similar to results in 2007.

# TRANSPORTATION AND UTILITIES

## Industry Snapshot

Percentage of transportation and utilities employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions within the transportation and utilities sector included, for example, transportation supervisors, electrical superintendents, and warehouse managers.

#### Total workers

2000: 7.4 million  
2007: 7.6 million

#### Total management positions

2000: 500,000  
2007: 600,000

#### Estimated female representation

**2000**  
Managers: 26 percent  
Nonmanagers: 26 percent  
**2007**  
Managers: 26 percent  
Nonmanagers: 25 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$48,000  
Male managers: \$66,000  
**2007**  
Female managers: \$52,000  
Male managers: \$70,000

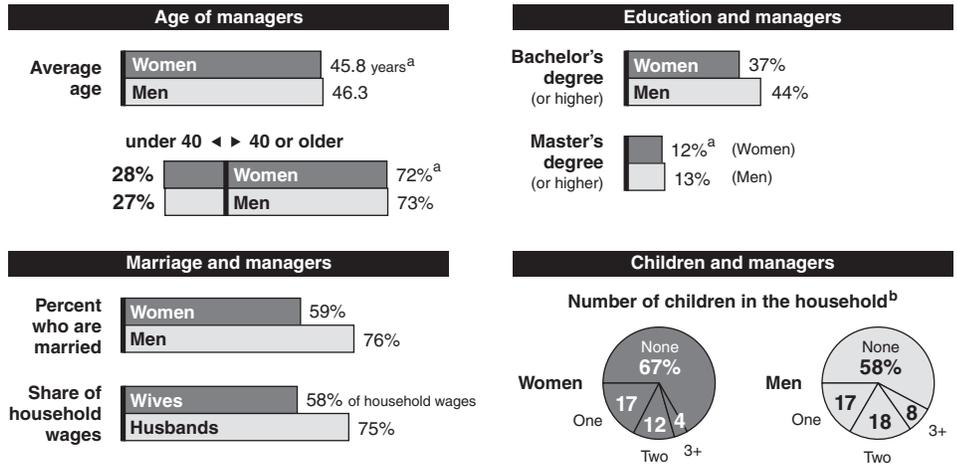
#### Percent working part-time

**2000**  
Female managers: 25 percent  
Male managers: 11 percent  
**2007**  
Female managers: 22 percent  
Male managers: 15 percent

Source: GAO analysis of American Community Survey data.

### Estimates for Characteristics of Managers by Gender, 2007

Female managers had less education on average, were less likely to be married or have children in the household, and were more likely to work part-time than male managers. The differences in average age and in the percentages of managers aged 40 and older and with master's degrees were not statistically significant. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>14</sup>



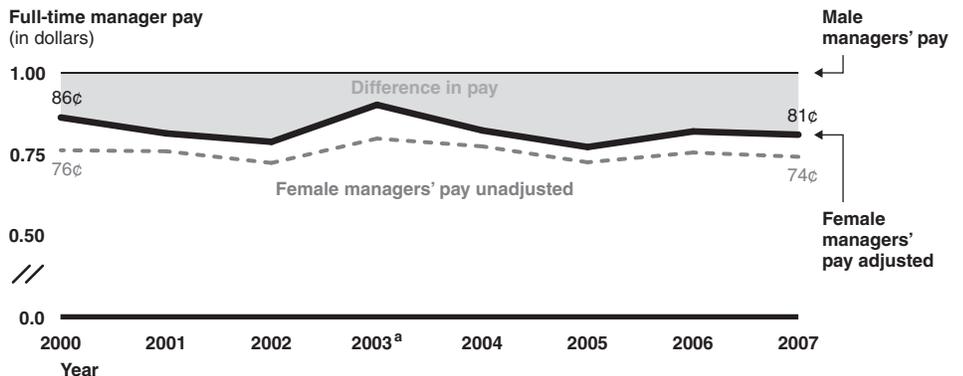
Source: GAO analysis of American Community Survey data.

<sup>a</sup>There was no statistically significant difference between female and male managers.

<sup>b</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted difference in pay fluctuated between 2000 and 2007, but was not statistically significant in 2003.



Source: GAO analysis of American Community Survey data.

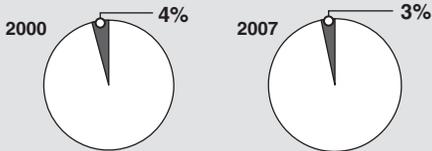
<sup>a</sup>There was no statistically significant difference between female and male managers in 2003.

<sup>14</sup>In 2000, the differences in age and in the percentage of managers aged 40 and older were statistically significant; on average, female managers were younger and less likely to be 40 and older than male managers. In addition, the differences in the percentages of managers with bachelor's degrees and with children were not statistically significant. Other results were similar to results in 2007.

# WHOLESALE TRADE

## Industry Snapshot

Percentage of wholesale trade employees among all industries



Source: GAO analysis of American Community Survey data.

### Industry Characteristics

Management positions in the wholesale trade sector included, for example, purchasing managers and general operations managers.

#### Total workers

2000: 5.5 million  
2007: 4.7 million

#### Total management positions

2000: 400,000  
2007: 400,000

#### Estimated female representation

**2000**  
Managers: 24 percent  
Nonmanagers: 31 percent

**2007**  
Managers: 26 percent  
Nonmanagers: 31 percent

#### Median salaries for full-time managers (2007 dollars)

**2000**  
Female managers: \$47,000  
Male managers: \$72,000

**2007**  
Female managers: \$55,000  
Male managers: \$76,000

#### Percent working part-time

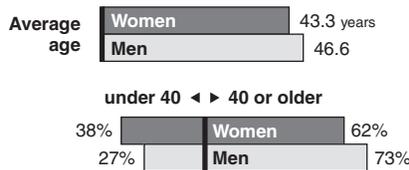
**2000**  
Female managers: 17 percent  
Male managers: 15 percent

**2007**  
Female managers: 23 percent  
Male managers: 15 percent

### Estimates for Characteristics of Managers by Gender, 2007

Female managers were younger on average, less likely to be married or have children in the household, and were more likely to work part-time than male managers. The differences in the percentages of managers with bachelor's and master's degrees were not statistically significant. Among married managers, women contributed a smaller share than men of their respective household wages.<sup>15</sup>

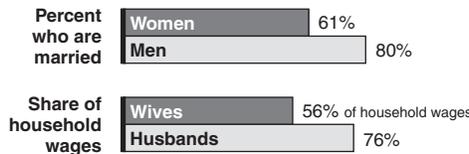
#### Age of managers



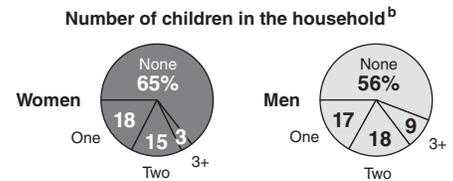
#### Education and managers



#### Marriage and managers



#### Children and managers



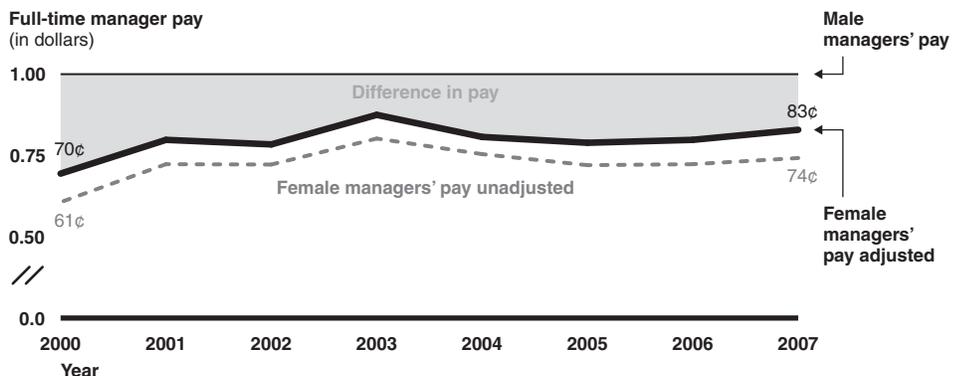
Source: GAO analysis of American Community Survey data.

<sup>a</sup>There was no statistically significant difference between female and male managers.

<sup>b</sup>This refers to the number of children under age 18 living in a household with a manager.

### Estimated Pay Differences for Full-Time Managers, 2000-2007

The adjusted pay difference fluctuated between 2000 and 2007. In most years, female managers earned 79 to 83 cents for every dollar earned by male managers.



Source: GAO analysis of American Community Survey data.

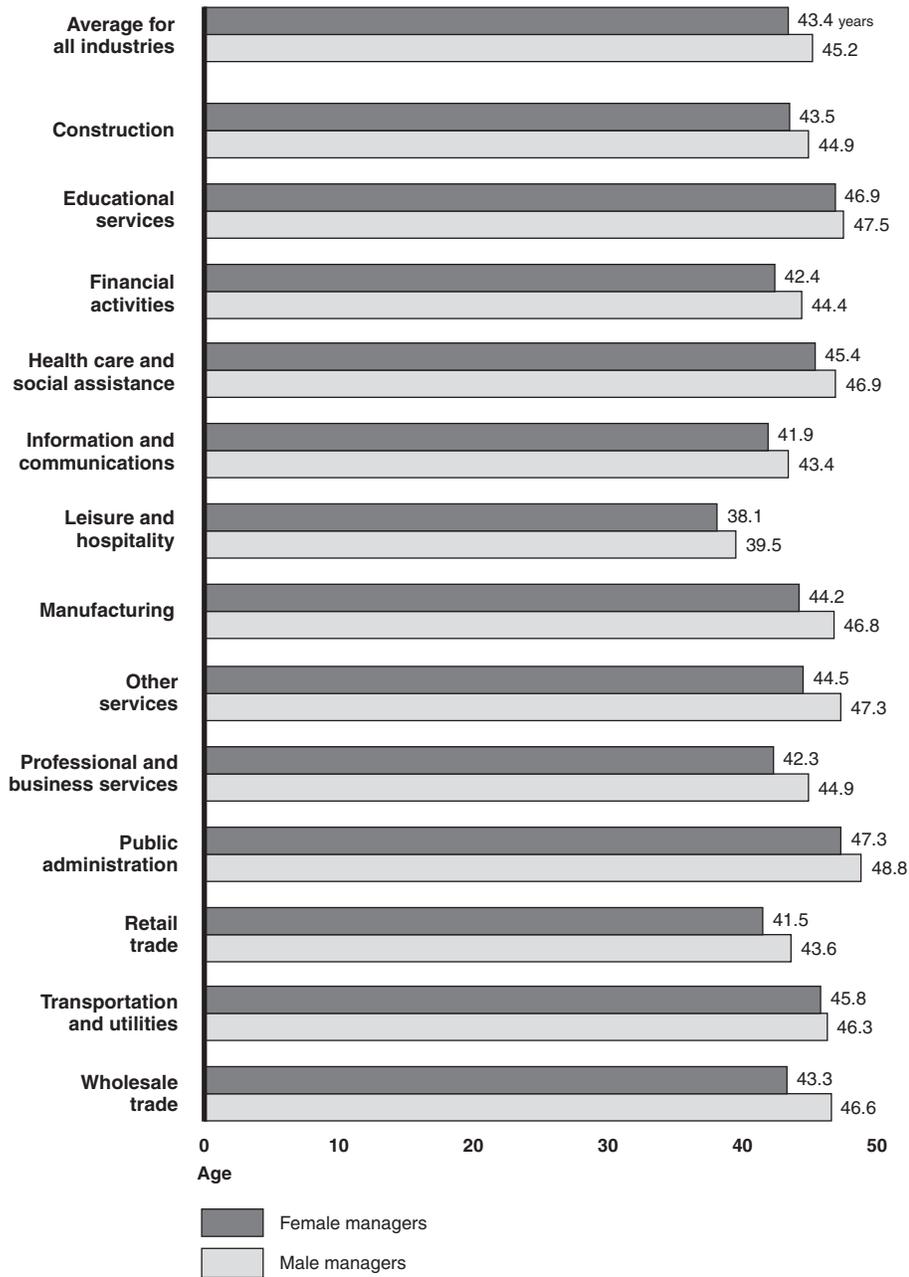
<sup>15</sup>In 2000, the difference in the percentage of managers with bachelor's degrees was statistically significant with female managers being less likely to have a bachelor's degree than male managers. The differences in the percentages of managers who were aged 40 and older, worked part-time, and had children in the household were not statistically significant. Other results were similar to 2007.

Source: GAO analysis of American Community Survey data.

## Enclosure II

### Key Characteristics of Managers by Industry

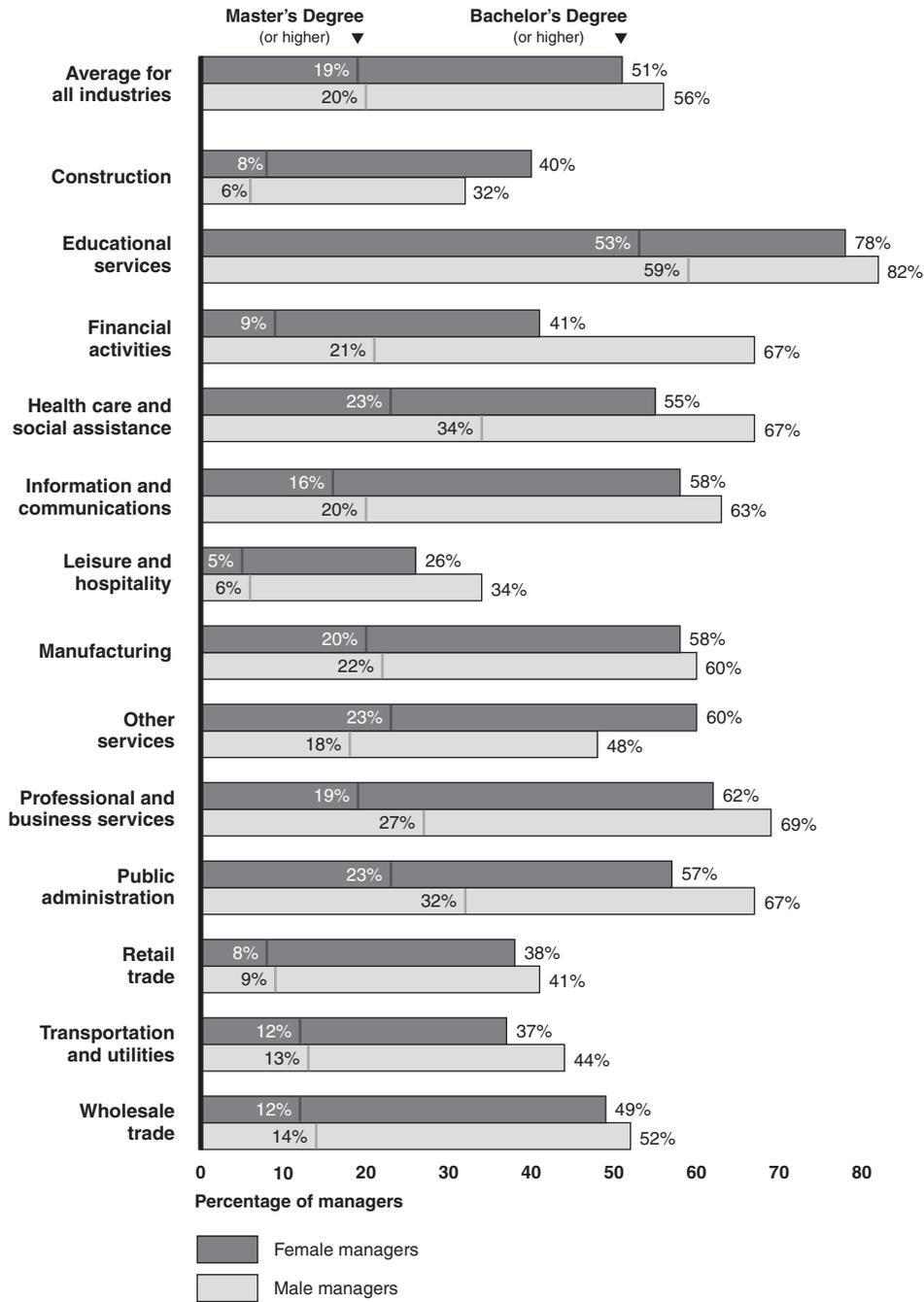
Figure 1: Estimated Average Age of Managers, 2007



Source: GAO analysis of American Community Survey data.

## Enclosure II

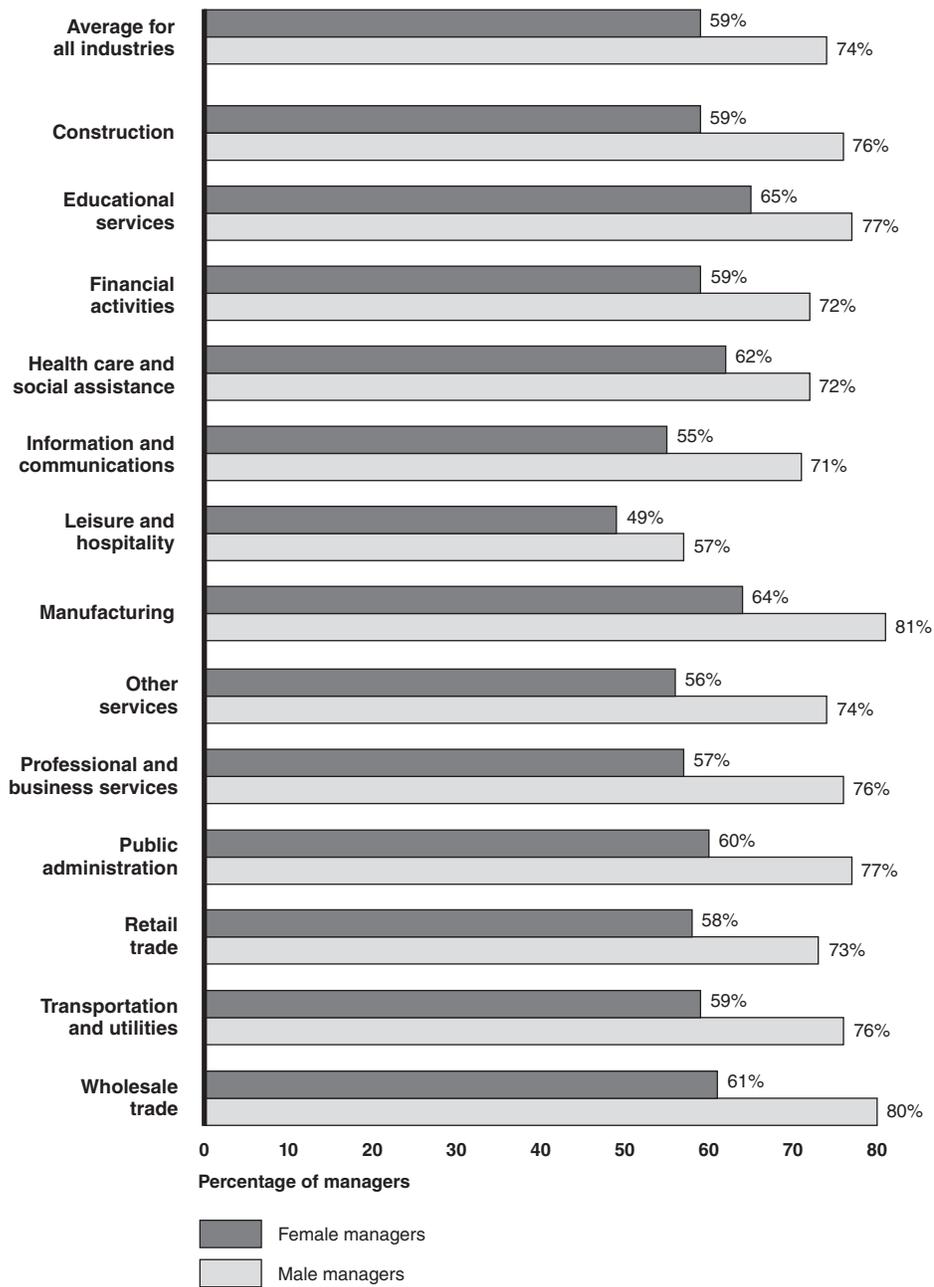
Figure 2: Estimated Educational Attainment of Managers, 2007



Source: GAO analysis of American Community Survey data.

## Enclosure II

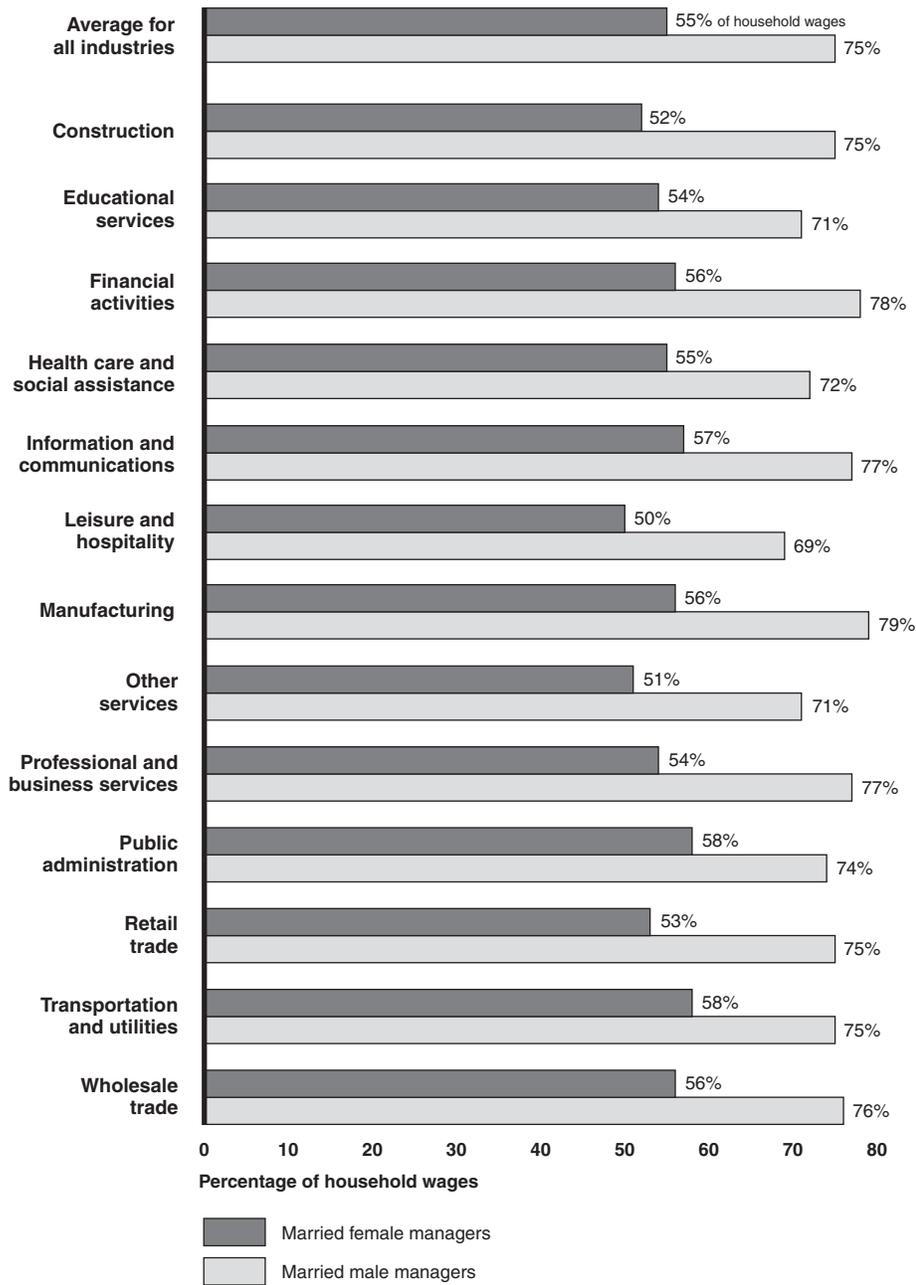
**Figure 3: Estimated Percentage of Managers Who Were Married, 2007**



Source: GAO analysis of American Community Survey data.

## Enclosure II

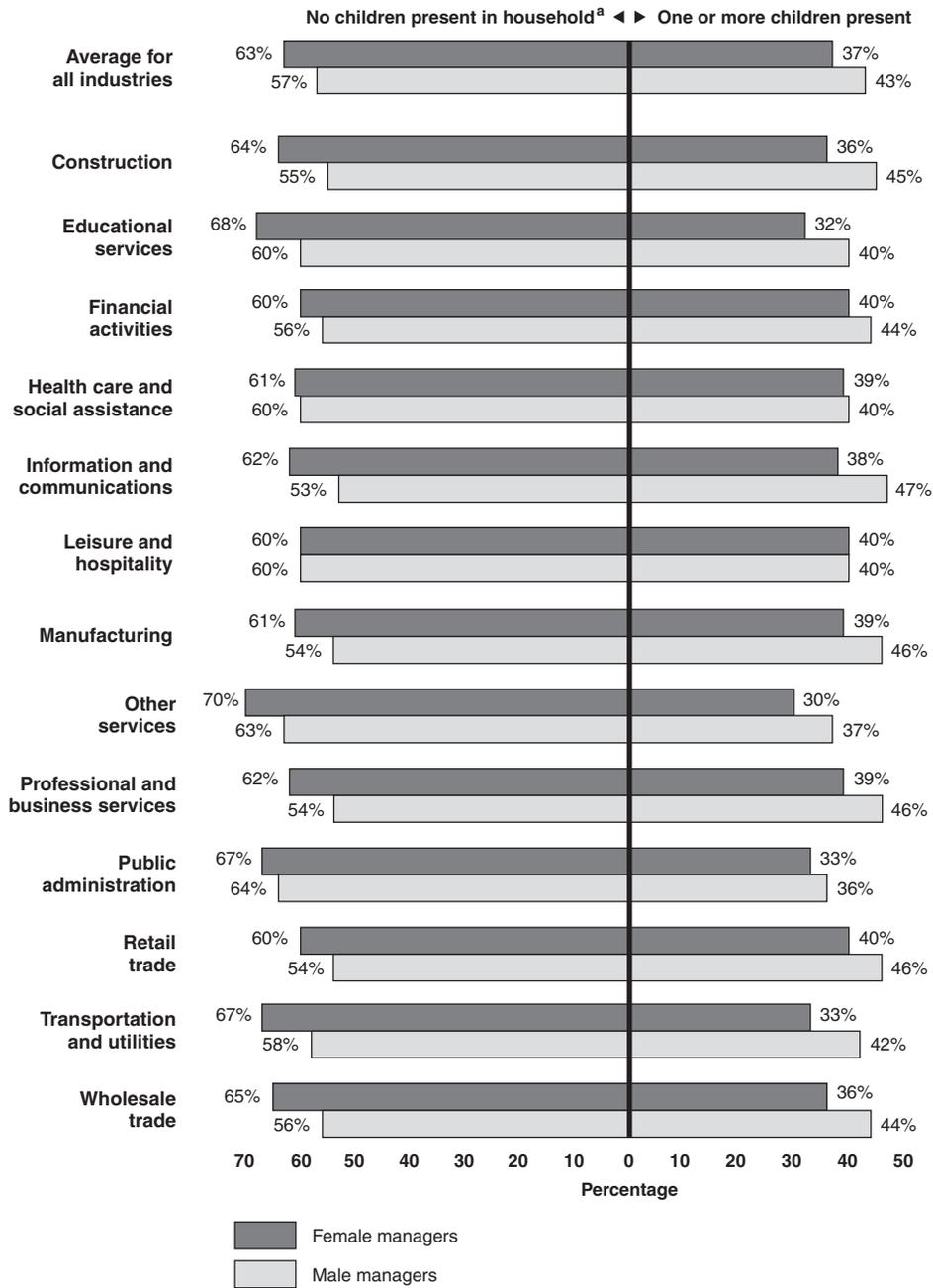
**Figure 4: Estimated Percentage Contribution Married Managers Made to the Total Wages of Their Households, 2007**



Source: GAO analysis of American Community Survey data.

## Enclosure II

Figure 5: Estimated Percentage of Managers With and Without Children in the Household, 2007



Source: GAO analysis of American Community Survey data.

<sup>a</sup>This refers to the number of children under age 18 living in a household with a manager.



## Enclosure III

### Objectives, Scope, and Methodology

Our review focused on (1) the representation of women in management positions compared to their representation in nonmanagement positions by industry, (2) the key characteristics of women and men in management positions by industry, and (3) the difference in pay between women and men in full-time management positions by industry. To answer these questions, we analyzed data from the Public Use Microdata Sample of the American Community Survey (ACS) for the years 2000 through 2007.

#### Data

For all three research questions, we used data from the U.S. Census Bureau's (Census Bureau) ACS database. We selected ACS rather than the Current Population Survey, which was used in GAO's 2001 report on this issue, due to the greater number of observations in ACS, which allowed us to have greater precision when looking at specific industries. ACS is an ongoing national survey conducted by the Census Bureau that collects information from a sample of households. ACS replaced the decennial census long-form questionnaire as a source for social, economic, demographic, and housing information.

#### Industry Selection

We organized approximately 250 discrete industries represented in ACS into 13 industry sectors that generally follow the ACS broad industry sectors with some minor modifications. For example, we renamed some sectors, and separated educational services from health care and social assistance. The industry sectors we included represent the entire workforce, except for the agriculture and mining sectors.

We excluded agriculture because, according to the Bureau of Labor Statistics, farmers may have other sources of income, such as from federal subsidies, which may not be reported in ACS as income and would complicate our analysis on pay differentials. We excluded mining because we found a relatively limited number of observations in the mining industry. We also excluded from the analysis those individuals living in group quarters and those who were not living in a U.S. state or the District of Columbia.<sup>1</sup> These restrictions resulted in a loss of about 3 percent of the managers and 4 percent of nonmanagers represented in 2007.

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<sup>1</sup>According to ACS, a group quarters is a place where people live or stay in a group living arrangement. Examples include college residence halls, nursing homes, group homes, military barracks, correctional facilities, and mental hospitals.

## Enclosure III

### Definitions

- Our definition of working full time included those who, over the past 12 months, reported usually working 35 hours or more per week and 50 weeks or more per year, and those with wages greater than zero.
- Our definition of individuals working part-time included those who were not working full time, but reported usually working some hours per week, weeks worked, and wages earned, all over the past 12 months.
- Workers were individuals who reported working one or more weeks during the past 12 months and reported receiving wage and salary income. Our sample did not include self-employed workers unless they also received wage and salary income. We relied on the individual's reported industry of employment; however, it may be that some individuals are employed in multiple industries, which our analysis did not capture.
- We defined managers as all individuals classified under the manager occupation category in ACS, which includes a wide range of more than 1,000 job titles.<sup>2</sup> Job titles under the manager code include positions such as school principals, radio station managers, zoo directors, parking garage managers, nurse administrators, and chief executives. The ACS manager occupation does not include first-line supervisors who have largely the same duties and same levels of education as those they supervise.
- Due to the structure of ACS data, our definition of having children varied depending on whether we were looking at only women or comparing women and men. The ACS records information on the presence of children in two ways: (1) at the household level and (2) with respect to individuals' own children within the household. We used the household-level variable to compare women and men, and the individual-level variable to calculate estimates for women only. The two variables are generally consistent with one another. For example, in 2007, about 36 percent of female managers had one or more of their own children living with them (according to the individual-level variable), and about 37 percent lived in a household where there were one or more of the householder's own children (according to the household-level variable). In both cases, a person's "own child" includes children by birth, marriage (step), or adoption.

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<sup>2</sup>According to Census Bureau officials, occupations refer to categories of job titles. Some job titles directly match to a specific occupation, such as Chief Executive Officer to chief executive; others may cross into more than one occupation. Occupations may also be restricted by industry.

## Enclosure III

### Data Reliability

We assessed the reliability of the ACS generally and of data elements that were critical to our analyses and determined that, despite the limitations outlined below, they were sufficiently reliable for our analyses. Specifically, we:

- reviewed documentation on the general design and methods of the ACS and on the specific elements of the ACS data that were used in our analysis,
- interviewed Census Bureau officials knowledgeable about the ACS data and consulted these officials periodically throughout the course of our study, and
- completed our own electronic data testing to assess the accuracy and completeness of the data used in our analyses.

As a result of these efforts, we identified the following limitations with the data:

- **Inconsistency of data sample.** The data sample was not consistent in size over 2000 to 2007. Since 2000, the ACS expanded its survey across the United States. However, currently available Public Use Microdata Sample files for the earliest years of ACS include sufficient data from a supplemental survey effort to generate reliable national-level estimates. Based on discussions with Census Bureau staff responsible for the ACS sampling, we determined the overall sample sizes are large enough to produce statistically reliable results for each industry sector during each year. However, in cases where a difference was not statistically significant in one year but was in another, we could not rule out the possibility that an analysis of a larger sample would have found statistically significant differences in both years.
- **Manager definition.** The manager category in the ACS was a slightly imperfect measure of the true population of managers in the workforce. The manager category in ACS included positions which may have disparate levels of responsibility. ACS did not include variables describing the level of responsibility of a manager, nor years of experience. Therefore, we were not able to analyze these separately in our analysis of pay differentials. In addition, the “manager” category does not include persons with de facto management responsibilities not reflected in their titles. For example, a partner in a law firm may not be listed as a manager even though he or she may have work responsibilities similar to those of a manager.

## Enclosure III

- **Self-guided survey.** The structure of data collection for ACS may introduce errors. Since information was collected through a self-guided survey without interviews, there was no opportunity during data collection to clarify responses.<sup>3</sup>
- **Underreporting of part-time hours.** The survey questionnaire had an open-ended question regarding number of hours usually worked each week. Some researchers studying this ACS question found that part-time workers tended to under-report their weekly hours worked.<sup>4</sup> Because part-time workers are more likely to be women, their hourly earnings may be more likely to be over-estimated in the data. We restricted the sample for the analysis of pay differentials to full-time workers to address this data limitation.
- **Coding of open-ended responses.** There are inherent limitations in coding open-ended responses. We interviewed Census Bureau officials and reviewed documentation regarding their protocol for coding occupation and industry for ACS data entry and internal controls on coding open-ended survey responses, and have judged them to be sufficiently reliable for our purposes.

The studies by Catalyst, Inc., on the representation of women among boards of directors and top earners at Fortune 500 companies were reviewed by multiple analysts, including a social scientist with expertise in estimation from survey data. In addition, we interviewed and consulted with staff members from Catalyst, Inc., who were knowledgeable about the organization's methods of collecting, analyzing, and reporting data in these studies. We determined, based both on these interviews and on our review of the studies, that the data and methods were sufficiently reliable for generating the estimates we present in this report.

## Methods

### Descriptive Statistics

To analyze our first question on the representation of women in management positions, we used ACS to estimate the percentage of management positions within each industry held by women compared to the percentage of nonmanagement positions held by women in the same industry to take account of industries having different gender compositions. We performed the same analysis to compare the percentage of managers and nonmanagers who were mothers with children under 18 in the household.

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<sup>3</sup>According to Census Bureau officials, Computer Assisted Telephone Interviewing and Computer Assisted Personal Interviewing are available for respondents who do not complete the paper questionnaire.

<sup>4</sup>Nathaniel Baum-Snow and Derek Neal, "Mismeasurement of Usual Hours Worked in the Census and ACS," *Economics Letters*, Vol. 102, Issue 1 (2009).

### Enclosure III

For the second question, we used ACS to generate descriptive statistics on male and female managers' education levels, age, part-time status, marital status, and the presence and number of children in the household. For married managers, we computed their share of household wages for the years 2000 and 2007. For full-time managers, we computed the median salary. Where we presented data on median salaries, we adjusted the salaries to 2007 dollars, and rounded the salaries to the nearest one thousand.

To take account of the sample design used in the ACS, we used the person weight present in the ACS data file.<sup>5</sup> For each measure, we tested whether the difference between men and women was statistically significant at a 95 percent confidence level in 2007 or in 2000. In addition, we tested whether the change for each gender between 2000 and 2007 was statistically significant. For the differences in percentages, we calculated sampling errors using the design-factor method described in Census Bureau documentation on the proper use of ACS data. For 2007, we also estimated confidence intervals using replicate weights provided with the ACS; these weights were not available for 2000 ACS data. When the statistical significance of differences calculated using the two methods differed, we present the results from the replicate method of variance estimation.

We chose to report on the years 2000 through 2007 to avoid concerns about the role of the recession that began in December, 2007 and to avoid any complications to the analysis due to the change of survey questions ACS made in 2008. However, for each measure, we tested whether the difference between men and women was statistically significant at a 95 percent confidence level in 2008 as well to see any changes since 2007. In addition, we tested whether the change between 2007 and 2008 was statistically significant for each gender. Except for the percentage of workers that were part-time, which was affected by a change in a survey question in 2008, we found there were very few statistically significant differences between 2007 and 2008 for any of the descriptive statistics.

#### Multivariate Regression Analysis Approach

For the third question, we used multivariate regression analysis to examine the differences in pay between male and female managers. We limited the analysis to those working full-time, because of limitations with calculating wages and hours for part-time workers. For each industry, and for all industries combined, we conducted a regression analysis of full-time managers within the ACS data set, which includes men and women. In this analysis, we used an indicator variable for gender to measure the average difference between men and women's salaries. By including additional variables in the regression, we adjusted for other characteristics of men and women, and determined the extent to which the difference was (or was not) explained by the addition of those variables. Specifically:

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<sup>5</sup>In the ACS data, each person represents different numbers of people in the population because of the ACS sampling design. To account for this, the Census Bureau recommends using a "person weight" to adjust the sample to represent the full population.

### Enclosure III

- In order to determine the extent to which gender differences persist when other characteristics of managers are taken into account, we performed multivariate regression analysis to predict the logarithm of annual salary.

$$\text{(Without controlling for factors) Ln(annual salary)} = \alpha + \beta * (\text{female}) + \varepsilon$$

$$\begin{aligned} \text{(With controlling for factors) Ln(annual salary)} &= \alpha + \beta * (\text{female}) \\ &+ \delta * (\text{set of characteristics of the individual}) + \varepsilon \end{aligned}$$

- Because we used the logarithm of the annual salary, the standard interpretation of  $\beta$ , the coefficient on female, is that it represents the average log point difference between men and women, after adjusting for the other variables in the model. Following practice in the economic literature, that coefficient was modified, to more closely approximate a percent difference (by  $\exp(\text{coefficient on female})$ ).<sup>6</sup>
- We performed this analysis for 8 years of ACS data (2000-2007), for each industry separately, and for all industries combined. To take account of the sample design used in the ACS, we used the person weight present in the ACS data file.
- Our regression model included age, age squared, hours worked beyond full time, dummy variables for race,<sup>7</sup> Hispanic status, state, veteran status, education level, citizenship, marital status, and presence of children in the household. In addition, our regression that combined all industries included a dummy variable for each industry.

We acknowledge there are many variables and methods of analysis that could be used that would yield different numbers for the adjusted differences in pay. Some variables we would have included but were not available included managerial responsibility, field of study, and years of experience.

The estimated 95 percent confidence intervals around the estimated adjusted differences in pay for 2000 through 2007 are presented in table 1.

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<sup>6</sup>Francine Blau and Lawrence Kahn, "Gender Differences in Pay," *The Journal of Economic Perspectives*, Vol. 14, No. 4 (2000). This is an issue that is especially important if the pay gaps are large. See Robert Halvorsen and Raymond Palmquist, "The Interpretation of Dummy Variables in Semi-Logarithmic Equations," *American Economic Review*, Vol. 70, No. 3 (1980).

<sup>7</sup>While we included nine different racial categories in the regression, more than 95 percent of the individuals were White, African American, or Asian.

### Enclosure III

**Table 1: Estimates and Confidence Intervals for the Estimated Adjusted Differences in Pay, 2000-2007**

Industry	Year	Lower bound	Estimated female managers' earnings for every dollar earned by a male manager	Upper bound
<b>All industries combined</b>				
	2000	\$0.77	\$0.79	\$0.81
	2001	\$0.79	\$0.80	\$0.81
	2002	\$0.79	\$0.80	\$0.81
	2003	\$0.81	\$0.82	\$0.83
	2004	\$0.80	\$0.81	\$0.82
	2005	\$0.80	\$0.81	\$0.82
	2006	\$0.81	\$0.81	\$0.82
	2007	\$0.80	\$0.81	\$0.82
<b>Construction</b>				
	2000	\$0.78	\$0.92	\$1.09
	2001	\$0.72	\$0.78	\$0.84
	2002	\$0.77	\$0.85	\$0.94
	2003	\$0.74	\$0.82	\$0.91
	2004	\$0.71	\$0.78	\$0.85
	2005	\$0.73	\$0.77	\$0.81
	2006	\$0.78	\$0.82	\$0.86
	2007	\$0.75	\$0.78	\$0.82
<b>Educational services</b>				
	2000	\$0.79	\$0.85	\$0.91
	2001	\$0.81	\$0.84	\$0.88
	2002	\$0.82	\$0.85	\$0.89
	2003	\$0.85	\$0.90	\$0.95
	2004	\$0.85	\$0.89	\$0.93
	2005	\$0.82	\$0.85	\$0.87
	2006	\$0.84	\$0.86	\$0.88
	2007	\$0.84	\$0.86	\$0.88
<b>Financial activities</b>				
	2000	\$0.66	\$0.72	\$0.79
	2001	\$0.75	\$0.78	\$0.82
	2002	\$0.73	\$0.76	\$0.80
	2003	\$0.76	\$0.79	\$0.83
	2004	\$0.76	\$0.80	\$0.84
	2005	\$0.80	\$0.83	\$0.85
	2006	\$0.79	\$0.81	\$0.83
	2007	\$0.76	\$0.78	\$0.80

### Enclosure III

Industry	Year	Lower bound	Estimated female managers' earnings for every dollar earned by a male manager	Upper bound
<b>Health care and social assistance</b>				
	2000	\$0.73	\$0.79	\$0.85
	2001	\$0.75	\$0.79	\$0.83
	2002	\$0.74	\$0.78	\$0.81
	2003	\$0.72	\$0.76	\$0.80
	2004	\$0.76	\$0.80	\$0.84
	2005	\$0.75	\$0.78	\$0.80
	2006	\$0.77	\$0.79	\$0.81
	2007	\$0.78	\$0.81	\$0.83
<b>Information and communications</b>				
	2000	\$0.74	\$0.82	\$0.90
	2001	\$0.76	\$0.81	\$0.86
	2002	\$0.77	\$0.83	\$0.90
	2003	\$0.76	\$0.82	\$0.88
	2004	\$0.82	\$0.90	\$0.97
	2005	\$0.81	\$0.85	\$0.89
	2006	\$0.79	\$0.83	\$0.87
	2007	\$0.81	\$0.84	\$0.88
<b>Leisure and hospitality</b>				
	2000	\$0.72	\$0.79	\$0.87
	2001	\$0.78	\$0.82	\$0.86
	2002	\$0.76	\$0.80	\$0.85
	2003	\$0.73	\$0.79	\$0.84
	2004	\$0.76	\$0.80	\$0.85
	2005	\$0.77	\$0.80	\$0.83
	2006	\$0.78	\$0.81	\$0.83
	2007	\$0.78	\$0.80	\$0.83
<b>Manufacturing</b>				
	2000	\$0.79	\$0.85	\$0.90
	2001	\$0.77	\$0.80	\$0.83
	2002	\$0.77	\$0.80	\$0.83
	2003	\$0.78	\$0.81	\$0.84
	2004	\$0.79	\$0.83	\$0.86
	2005	\$0.82	\$0.84	\$0.87
	2006	\$0.81	\$0.83	\$0.86
	2007	\$0.82	\$0.84	\$0.86



**Enclosure III**

<b>Industry</b>	<b>Year</b>	<b>Lower bound</b>	<b>Estimated female managers' earnings for every dollar earned by a male manager</b>	<b>Upper bound</b>
<b>Other services</b>				
	2000	\$0.70	\$0.87	\$1.07
	2001	\$0.74	\$0.80	\$0.86
	2002	\$0.80	\$0.86	\$0.93
	2003	\$0.76	\$0.82	\$0.88
	2004	\$0.73	\$0.79	\$0.85
	2005	\$0.74	\$0.78	\$0.82
	2006	\$0.78	\$0.82	\$0.86
	2007	\$0.80	\$0.84	\$0.88
<b>Professional business services</b>				
	2000	\$0.70	\$0.76	\$0.82
	2001	\$0.78	\$0.81	\$0.85
	2002	\$0.76	\$0.80	\$0.84
	2003	\$0.82	\$0.86	\$0.90
	2004	\$0.79	\$0.83	\$0.87
	2005	\$0.78	\$0.80	\$0.83
	2006	\$0.81	\$0.83	\$0.85
	2007	\$0.79	\$0.81	\$0.84
<b>Public administration</b>				
	2000	\$0.82	\$0.89	\$0.97
	2001	\$0.83	\$0.87	\$0.91
	2002	\$0.84	\$0.88	\$0.92
	2003	\$0.88	\$0.93	\$0.98
	2004	\$0.83	\$0.87	\$0.90
	2005	\$0.86	\$0.88	\$0.91
	2006	\$0.83	\$0.86	\$0.89
	2007	\$0.85	\$0.87	\$0.90
<b>Retail trade</b>				
	2000	\$0.68	\$0.76	\$0.85
	2001	\$0.70	\$0.74	\$0.79
	2002	\$0.69	\$0.74	\$0.80
	2003	\$0.78	\$0.84	\$0.90
	2004	\$0.71	\$0.76	\$0.82
	2005	\$0.77	\$0.81	\$0.85
	2006	\$0.74	\$0.77	\$0.81
	2007	\$0.77	\$0.81	\$0.85
<b>Transportation and utilities</b>				
	2000	\$0.77	\$0.86	\$0.97

## Enclosure III

Industry	Year	Lower bound	Estimated female managers' earnings for every dollar earned by a male manager	Upper bound
	2001	\$0.76	\$0.82	\$0.88
	2002	\$0.72	\$0.79	\$0.86
	2003	\$0.77	\$0.90	\$1.06
	2004	\$0.75	\$0.82	\$0.90
	2005	\$0.74	\$0.77	\$0.81
	2006	\$0.78	\$0.82	\$0.86
	2007	\$0.78	\$0.81	\$0.85
Wholesale trade				
	2000	\$0.60	\$0.70	\$0.81
	2001	\$0.74	\$0.80	\$0.87
	2002	\$0.72	\$0.79	\$0.86
	2003	\$0.81	\$0.88	\$0.95
	2004	\$0.74	\$0.81	\$0.89
	2005	\$0.74	\$0.79	\$0.84
	2006	\$0.75	\$0.80	\$0.85
	2007	\$0.79	\$0.83	\$0.88

Source: GAO calculations based on American Community Survey data.

Note: We calculated the margin of error by using a 95 percent confidence interval of the regression coefficient estimate.

### Alternative Models

To determine whether the results of our analysis for all industries combined were sensitive to the precise variables included, we estimated alternative versions of our reported model. Specifically, we estimated models that (1) did not include dummy variables for each industry, (2) did not adjust for marital status or presence of children, and (3) included an interaction effect between type of education and age. We found that not including a dummy variable for industry produced a larger gap, but the results of the other two models were similar. The ranges of estimates are shown in table 2.

**Table 2: Ranges of Estimates of Women's Pay Relative to Men's Under Alternative Models**

Model	Minimum estimate	Maximum estimate
Without industry controls	\$0.77 (+/-0.02)	\$0.79 (+/-0.01)
Without marital status or presence of children	\$0.78 (+/-0.02)	\$0.81 (+/-0.01)
Reported model	\$0.79 (+/-0.02)	\$0.82 (+/-0.01)
Including interaction effect between education and age	\$0.80 (+/-0.02)	\$0.82 (+/-0.01)

Source: GAO analysis of American Community Survey data. The 95 percent margin of error is placed in parenthesis. For all models, the minimum was estimated in 2000 and the maximum was estimated in 2003.

## **Enclosure III**

### Including Children in the Salary Gap Analysis

In addition to the analysis described above, we also estimated a segregated model designed to examine the impact of having children in the household on the differences in pay between men and women for our analysis of all industries combined. To do this, we estimated the regression equation two additional times: first for managers with children in the household, and second for managers without children in the household.

The segregated model allowed us to say whether the differences in pay varied for individuals with and without children in the household. Additionally, the segregated model did not assume the importance of factors that influence income (such as education) are the same for those with and without children in the household. Segregated analysis also allowed us to report two results for the differences in pay: one for managers with children in the household—comparing the salary of women with children in the household to that of men with children in the household—and one for managers without children in the household—comparing the salary of women without children in the household to the salary of men without children in the household—in addition to any baseline differences in pay we report for all individuals.

### **Document Reviews and Interviews**

We reviewed selected GAO and other articles and reports on this topic and consulted with experts and Census Bureau officials to review our methods and provide the appropriate context for the report.

### **Limitations of the Analysis**

This report did not attempt to provide an extensive explanation for the difference in earnings between male and female managers, such as by comparing the relative importance of any of the variables in explaining the differences. In addition, our analysis was not designed to determine the presence or absence of discrimination. As shown in table 2 above, models with different variables can result in differences in the estimates.

Because of concerns about disclosing identities of respondents, the Census Bureau limits reported salaries in the publicly available ACS data. The level of limit, or “top-code” varies by state and year. When the pay is top-coded, our calculations use an underestimate of the true salary. If male managers were more likely than female managers to earn the highest wages (and be top-coded), this may have led us to report a smaller average difference in pay than actually exists. For all of the managers in our data across all of the years, we found that approximately 5 percent had wages that were top-coded. However, we did not know the extent to which the true salary is above the top-code.

## **Enclosure IV**

### **GAO Contact and Staff Acknowledgments**

#### **GAO Contact**

Andrew Sherrill, (202) 512-7215 or [sherrilla@gao.gov](mailto:sherrilla@gao.gov)

#### **Staff Acknowledgments**

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## Related GAO Products

*Financial Services Industry: Overall Trends in Management-Level Diversity and Diversity Initiatives, 1993-2008.* [GAO-10-736T](#). Washington, D.C.: May 12, 2010.

*Women's Pay: Converging Characteristics of Men and Women in the Federal Workforce Help Explain the Narrowing Pay Gap.* [GAO-09-621T](#). Washington, D.C.: April 28, 2009.

*Women's Pay: Gender Pay Gap in the Federal Workforce Narrows as Differences in Occupation, Education, and Experience Diminish.* [GAO-09-279](#). Washington, D.C.: March 17, 2009.

*Women's Earnings: Federal Agencies Should Better Monitor Their Performance in Enforcing Anti-Discrimination Laws.* [GAO-08-799](#). Washington, D.C.: August 11, 2008

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*Women and Low-Skilled Workers: Efforts in Other Countries to Help These Workers Enter and Remain in the Workforce.* [GAO-07-989T](#). Washington, D.C.: June 14, 2007.

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*Gender Issues: Women's Participation in the Sciences Has Increased, but Agencies Need to Do More to Ensure Compliance with Title IX.* [GAO-04-639](#). Washington, D.C.: July 22, 2004.

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