



Institutional Policies and Practices Regarding Postsecondary Faculty: Fall 2003

U.S. Department of Education
NCES 2007-157

First Look

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Foreword

This report presents information collected from 2- and 4-year degree-granting postsecondary institutions that were sampled for the 2004 National Study of Postsecondary Faculty (NSOPF:04). NSOPF:04 surveyed institutions as well as faculty and instructional staff who were employed in these institutions in the United States in fall 2003. This report describes recent hiring and retirement patterns as well as tenure-related changes and actions taken by institutions.

NSOPF:04 is the fourth in a series of data collections on postsecondary faculty conducted by the National Center for Education Statistics (NCES). The first was conducted in 1987–88, the second in 1992–93, and the third in 1998–99. Readers should consult appendix B of this report for more technical information about NSOPF:04.

The estimates presented in this report were produced using the NCES Data Analysis System (DAS), a web-based table-generating application that provides the public with direct, free access to NSOPF data as well as other postsecondary datasets collected by NCES. The DAS produces the design-adjusted standard errors necessary for testing the statistical significance of differences in the estimates (all differences reported in the text are statistically significant at the .05 level). Public-access data files and descriptive reports for this and other postsecondary datasets collected by NCES are available at <http://nces.ed.gov/das>.

Acknowledgments

We acknowledge and greatly appreciate all who contributed to the 2004 National Study of Postsecondary Faculty (NSOPF:04) and this report. NSOPF:04 was conducted for the National Center for Education Statistics (NCES) by RTI International and MPR Associates. At RTI International, Margaret Cahalan, who was succeeded by Patricia Green, served as project director for NSOPF:04. Brian Kuhr's efforts at institutional contacting and response were particularly invaluable to the institution survey results. We also appreciate the hard work of the rest of the RTI team as well as the coordinators at sampled institutions who took the time to complete the institution survey for NSOPF:04.

At MPR, Vicky Dingler and Joanna Wu prepared the data files, and John Vavricka oversaw creation of the Data Analysis System for the institution data from NSOPF:04. Barbara Kridl, Patti Gildersleeve, and Annabelle Yang prepared this report for publication.

At NCES, Linda Zimbler oversaw NSOPF:04 operations and guided this report through the publication process. Additional substantive and technical reviews of this report were conducted by Paula Knepper, Marilyn Seastrom, Dennis Carroll, James Griffith, and Tracy Hunt-White at NCES. The final report was also reviewed by Duc-Le To, Bruce Taylor, Heather Kelly, Dick Richardson, and Valerie Martin Conley.

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Introduction

This report describes selected policies and practices at public and private not-for-profit postsecondary institutions that offered an associate's or higher degree in fall 2003 and participated in federal Title IV student aid programs. The 2004 National Study of Postsecondary Faculty (NSOPF:04) included a survey of postsecondary faculty and instructional staff as well as a survey about postsecondary institutions completed by a survey coordinator at each sampled institution. The data in this report are from the institution component of NSOPF:04. The tables present data on institutional policies and practices such as faculty attrition and recent tenure-related changes and actions, with selected results described in the next section.¹ A glossary of variables in appendix A provides details about institution type, which is derived from the 2000 Carnegie Classification, and other variables used in this report. All comparisons made in the text were tested using Student's *t* statistic, and all differences cited were statistically significant at the .05 level. Standard errors for estimates in this report are available at <http://nces.ed.gov/das/library/reports.asp>. The technical notes in appendix B supply additional information about the methodology of the data collection, file preparation, and analysis.

NSOPF:04 is the fourth in a series of data collections describing postsecondary faculty and instructional staff at 2- and 4-year degree-granting institutions. Previous administrations of NSOPF, including the institution survey, took place in 1987–88, 1992–93, and 1998–99. The responses represent approximately 3,380 public and private not-for-profit, Title IV-participating, degree-granting institutions in the 50 states and the District of Columbia.² Information about institutions in NSOPF:04 is based on survey data from a nationally representative sample of about 1,070 eligible institutions, using a web-based questionnaire that was either self-administered or conducted via telephone with a trained interviewer. About 920 institutions completed the survey, resulting in a weighted response rate of 84 percent.³

¹ These data are similar to those presented in *Institutional Policies and Practices: Results From the 1999 National Study of Postsecondary Faculty, Institution Survey* (Berger, Kirshstein, and Rowe 2001) for fall 1998, except that report uses the 1994 Carnegie Classification; whereas the tables presented here use the 2000 Carnegie Classification.

² Throughout this report, institution counts are rounded to the nearest 10 to protect the confidentiality of responding institutions. Percentages cited are based on the original unrounded numbers.

³ See technical notes for more information on response rates and nonresponse bias analysis.

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Selected Results

- Thirty-two percent of postsecondary institutions had unions that represented at least some of their faculty in fall 2003 (figure 1). Public institutions were more likely than private institutions to have their faculty represented by a union. This is consistent with some legal developments that may limit collective bargaining by faculty in private institutions (Smallwood 2005).⁴
- In fall 2003, public institutions granting doctoral, master's, and associate's degrees employed two-thirds (25, 12, and 31 percent, respectively) of the nation's faculty and enrolled three-quarters (23, 15, and 39 percent, respectively) of the nation's postsecondary students (table 1).
- Institutions reported that in fall 2003, some 8 percent of all full-time faculty were hired the previous year from outside the institution (table 2). Fourteen percent of all new full-time faculty were previously employed in part-time positions at the institution. Public associate's institutions were particularly likely to hire part-time faculty into full-time positions at the institution. About one-fifth (21 percent) of all new full-time hires at public associate's institutions had previously been employed as part-time faculty at the institution, compared with 7–9 percent at public and private master's and doctoral institutions.
- Institutions reported that in fall 2003, some 7 percent of all full-time faculty had left their institutions during the previous year (table 3). Thirty-six percent of those who left retired, and the remaining 64 percent left for a variety of other reasons. Some of these departures may have been related to actions taken by the institutions.
- At least 90 percent of all doctoral or master's institutions had tenure systems (table 4). They were less common at public associate's (64 percent) institutions. Most institutions (71 percent) had tenure systems in place in fall 2003.
- The majority (82 percent) of institutions that had tenure systems in fall 2003 limited the number of years that a faculty member could remain on tenure track without receiving tenure (table 4). About 64 percent of institutions limit time on tenure track to 6 or 7 years. Fifty-three percent of public associate's institutions with tenure systems limited the maximum time that faculty could be on tenure track without receiving tenure to less than 5 years.
- Between 1998 and 2003, two-thirds (67 percent) of all institutions took at least one action related to tenure (table 5). The most common action taken was to offer early or phased retirement to tenured faculty members. This action was taken by a larger proportion of institutions (52 percent) than other tenure-related actions (10–15 percent) during the past

⁴ The Yeshiva Decision of the United States Supreme Court in 1980 limited the ability of faculty in the private sector to unionize. This decision applies only to private sector schools and not to public institutions.

5 years. Other tenure-related actions include replacing some tenured faculty with full-time faculty on fixed-term contracts, changing policy for granting tenure, making standards more stringent for granting tenure, and downsizing tenured faculty.

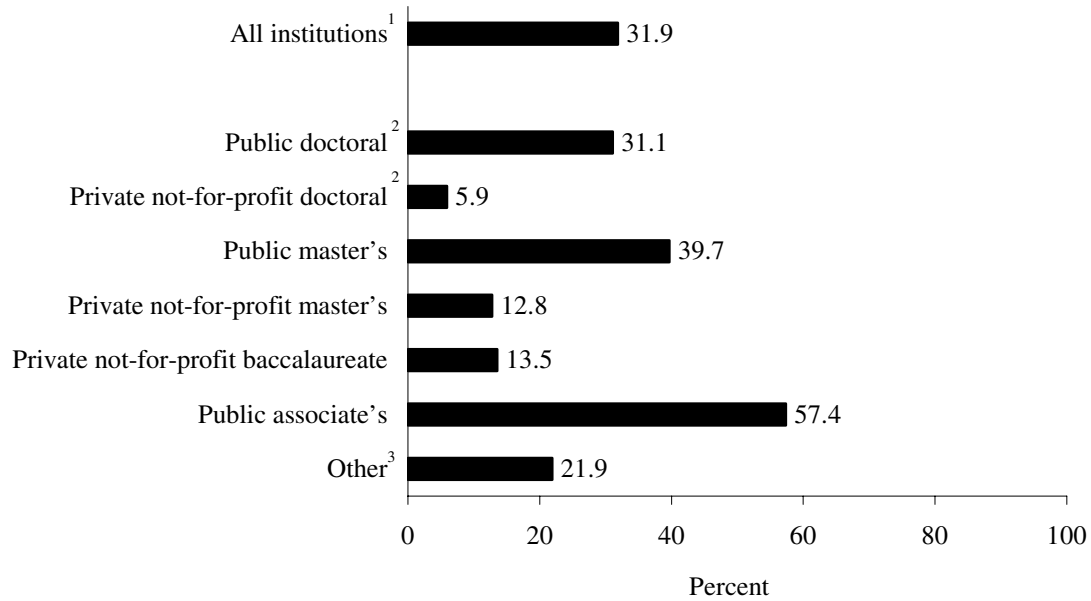
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Figures and Tables

Figure 1. Percentage of institutions with full- or part-time faculty represented by a union, by institution type: Fall 2003



¹ All public and private not-for-profit Title IV degree-granting institutions in the 50 states and the District of Columbia.

² Doctoral includes research/doctoral institutions and specialized medical schools and medical centers as classified by the 2000 Carnegie Classification.

³ Includes public baccalaureate, private not-for-profit associate's, and other specialized institutions except medical schools and medical centers.

NOTE: Standard error tables are available at <http://nces.ed.gov/das/library/reports.asp>.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

Table 1. Percentage distribution of postsecondary education institutions, faculty, and students enrolled, by institution type: Fall 2003

| Institution type | Institutions | Faculty | | | Students enrolled |
|--|--------------|---------|-----------|-----------|-------------------|
| | | Total | Full-time | Part-time | |
| All institutions ¹ | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Public doctoral ² | 6.3 | 24.8 | 36.1 | 12.0 | 22.9 |
| Private not-for-profit doctoral ² | 3.6 | 11.3 | 14.3 | 8.0 | 6.5 |
| Public master's | 8.9 | 12.1 | 13.9 | 10.1 | 15.1 |
| Private not-for-profit master's | 10.3 | 9.3 | 6.8 | 12.0 | 7.3 |
| Private not-for-profit baccalaureate | 15.7 | 6.0 | 6.5 | 5.6 | 4.6 |
| Public associate's | 32.3 | 31.1 | 17.7 | 46.2 | 39.1 |
| Other ³ | 22.9 | 5.4 | 4.7 | 6.2 | 4.5 |

¹ All public and private not-for-profit Title IV degree-granting institutions in the 50 states and the District of Columbia.

² Doctoral includes research/doctoral institutions and specialized medical schools and medical centers as classified by the 2000 Carnegie Classification.

³ Includes public baccalaureate, private not-for-profit associate's, and other specialized institutions except medical schools and medical centers.

NOTE: Faculty includes all faculty and instructional staff. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2004.

Table 2. Percentage of newly hired full-time faculty and percentage of new full-time faculty who were part-time faculty at that same institution in November 2002, by institution type: Fall 2003

| Institution type | Percent of full-time faculty hired within the past year from outside the institution | Percent of new full-time faculty who were previously part time at the same institution |
|--|--|--|
| All institutions ¹ | 8.4 | 14.3 |
| Public doctoral ² | 8.5 | 9.2 |
| Private not-for-profit doctoral ² | 8.9 | 7.7 |
| Public master's | 8.6 | 6.7 |
| Private not-for-profit master's | 8.3 | 7.4 |
| Private not-for-profit baccalaureate | 9.2 | 12.5 |
| Public associate's | 6.4 | 21.3 |
| Other ³ | 10.4 | 13.8 |

¹ All public and private not-for-profit Title IV degree-granting institutions in the 50 states and the District of Columbia.

² Doctoral includes research/doctoral institutions and specialized medical schools and medical centers as classified by the 2000 Carnegie Classification.

³ Includes public baccalaureate, private not-for-profit associate's, and other specialized institutions except medical schools and medical centers.

NOTE: Faculty includes all faculty and instructional staff. Standard error tables are available at <http://nces.ed.gov/das/library/reports.asp>.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

Table 3. Percentage of full-time faculty who left institutions between fall 2002 and fall 2003 and percentage distribution by reason for leaving, by institution type: Fall 2003

| Institution type | Full-time faculty who left | Of those who left, reason for leaving | |
|--|-------------------------------|---------------------------------------|--------------|
| | | Retired | Other reason |
| All institutions ¹ | 6.9 | 35.6 | 64.4 |
| Public doctoral ² | 8.0 | 29.9 | 70.1 |
| Private not-for-profit doctoral ² | 7.5 | 24.0 | 76.0 |
| Public master's | 8.0 | 43.2 | 56.8 |
| Private not-for-profit master's | 6.0 | 31.0 | 69.0 |
| Private not-for-profit baccalaureate | 7.8 | 16.8 | 83.3 |
| Public associate's | 6.4 | 46.1 | 53.9 |
| Other ³ | 6.8 | 36.9 | 63.1 |

¹ All public and private not-for-profit Title IV degree-granting institutions in the 50 states and the District of Columbia.

² Doctoral includes research/doctoral institutions and specialized medical schools and medical centers as classified by the 2000 Carnegie Classification.

³ Includes public baccalaureate, private not-for-profit associate's, and other specialized institutions except medical schools and medical centers.

NOTE: Faculty includes all faculty and instructional staff. Standard error tables are available at <http://nces.ed.gov/das/library/reports.asp>.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

Table 4. Percentage of institutions with tenure systems, percentage that limit time on tenure track, and percentage distribution of the maximum number of years on tenure track without tenure, by institution type: Fall 2003

| Institution type | Institutions with tenure systems | Institutions that limit time on tenure track | Maximum number of years on tenure track | | | | |
|--|----------------------------------|--|---|---------|---------|---------|-------------------|
| | | | Less than 5 years | 5 years | 6 years | 7 years | More than 7 years |
| All institutions ¹ | 71.5 | 82.5 | 21.4 | 10.3 | 32.6 | 31.4 | 4.4 |
| Public doctoral ² | 100.0 | 92.7 | # | 1.2 | 40.9 | 48.2 | 9.8 |
| Private not-for-profit doctoral ² | 92.1 | 89.3 | # | 3.6 | 36.1 | 38.6 | 21.7 |
| Public master's | 97.9 | 98.7 | # | 22.2 | 37.2 | 40.2 | 0.4 |
| Private not-for-profit master's | 92.8 | 83.3 | # | 8.5 | 48.2 | 33.5 | 9.8 |
| Private not-for-profit baccalaureate | 83.8 | 89.8 | 0.6 | # | 59.2 | 36.0 | 4.2 |
| Public associate's | 63.9 | 84.5 | 52.6 | 19.9 | 9.8 | 16.5 | 1.2 |
| Other ³ | 50.3 | 58.1 | 46.8 | 3.2 | 18.0 | 31.6 | 0.4 |

Rounds to zero.

¹ All public and private not-for-profit Title IV degree-granting institutions in the 50 states and the District of Columbia.

² Doctoral includes research/doctoral institutions and specialized medical schools and medical centers as classified by the 2000 Carnegie Classification.

³ Includes public baccalaureate, private not-for-profit associate's, and other specialized institutions except medical schools and medical centers.

NOTE: Detail may not sum to totals because of rounding. Standard error tables are available at <http://nces.ed.gov/das/library/reports.asp>.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

Table 5. Percentage of institutions that took specific actions related to tenure during the past 5 years, by institution type: Fall 2003

| Institution type | Actions related to tenure ¹ | | | | | |
|--|--|---|--|------------------------------------|---|--|
| | Took at least one action related to tenure | Offered early or phased retirement to tenured faculty | Replaced some tenured faculty with full-time faculty on fixed-term contracts | Changed policy for granting tenure | Made standards more stringent for granting tenure | Downsized tenured faculty ² |
| All institutions ³ | 66.6 | 51.8 | 14.2 | 12.0 | 10.4 | 14.6 |
| Public doctoral ⁴ | 72.3 | 55.4 | 28.3 | 14.7 | 17.0 | 17.0 |
| Private not-for-profit doctoral ⁴ | 77.4 | 59.1 | 14.0 | 17.2 | 23.7 | 6.5 |
| Public master's | 73.0 | 53.6 | 29.5 | 6.3 | 6.3 | 9.3 |
| Private not-for-profit master's | 62.5 | 25.3 | 21.6 | 17.1 | 14.1 | 0.4 |
| Private not-for-profit baccalaureate | 66.0 | 55.3 | 4.6 | 14.6 | 14.3 | 12.1 |
| Public associate's | 69.4 | 63.1 | 9.1 | 3.9 | 4.4 | 12.6 |
| Other ⁵ | 57.4 | 45.8 | 10.7 | 18.6 | 9.5 | 32.1 |

¹ Institutions also reported whether they discontinued the tenure system. Overall, less than 1 percent of institutions discontinued their tenure system during the past 5 years.

² Institutions that have downsized may have laid off faculty, replaced departing tenured faculty with nontenure track faculty, or not hired new faculty to replace departing faculty.

³ All public and private not-for-profit Title IV degree-granting institutions in the 50 states and the District of Columbia.

⁴ Doctoral includes research/doctoral institutions and specialized medical schools and medical centers as classified by the 2000 Carnegie Classification.

⁵ Public baccalaureate, private not-for-profit associate's, and other specialized institutions except medical schools and medical centers.

NOTE: Faculty includes all faculty and instructional staff. Standard error tables are available at <http://nces.ed.gov/das/library/reports.asp>.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

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Appendix A—Glossary

This glossary includes descriptions of the variables that were used in the tables of this report. The 2004 National Study of Postsecondary Faculty (NSOPF:04) Institution Data Analysis System (DAS) and the 2004 Integrated Postsecondary Education Data System (IPEDS:04) DAS were used to generate the tables in this report. Readers may refer to appendix B for more information on the DAS application.

Variables are listed in the glossary index below by general topic area and in the order in which they appear in the tables. The glossary that follows is organized alphabetically by variable name (displayed in capital letters to the right of the variable label).

GLOSSARY INDEX

NATIONAL STUDY OF POSTSECONDARY FACULTY INSTITUTION DATA

INSTITUTION SURVEY: 2004

Institution type X121Q0
Faculty represented by a union X01I12
Full-time faculty hired in past year X03I2
New full-time faculty who were part time X04I2
Full-time faculty who left X05I2
Of those who left, percent who retired..... X09I2
Of those who left, percent who left for other
reason..... X10I2
Has tenure system I3
Maximum years on tenure track I6
Taken action related to tenure X01I7
Offered early retirement..... I7E
Replaced tenured faculty with fixed-term faculty..... I7D
Changed tenure policy I7A
Adapted more stringent tenure policy I7B
Downsized tenured faculty I7C

INTEGRATED POSTSECONDARY EDUCATION DATA SYSTEM

INSTITUTIONAL CHARACTERISTICS AND STUDENT CHARGES: 2004

Degree-granting status DEGGRANT
Postsecondary and Title IV institution
indicator PSET4FLG
Carnegie Classification Code..... CARNEGIE
Control of institution..... CONTROL
Total enrollment..... ENRTOT

EMPLOYEES BY ASSIGNED POSITION: 2004

Total employees EAPTOT
Primary function and intensity of
employee EAPRECTP

Carnegie Classification code

CARNEGIE

Indicates the 2000 Carnegie classification code of an institution

| | |
|---------------|--|
| Doctoral | Includes doctoral/research universities—extensive, doctoral/research universities—intensive, medical schools and medical centers |
| Master’s | Includes masters colleges and universities I, masters colleges and universities II |
| Baccalaureate | Includes baccalaureate colleges—liberal arts, baccalaureate colleges—general, baccalaureate/associates colleges |
| Associate’s | Includes associates colleges |
| Other | Includes theological seminaries and other specialized faith-related institutions, other separate health profession schools, schools of engineering and technology, schools of business and management, schools of art, music, and design, schools of law, teachers colleges, other specialized institutions, tribal colleges |

Control of institution

CONTROL

A classification of whether an institution is operated by publicly elected or appointed officials or by privately elected or appointed officials and derives its major source of funds from private sources.

- Public
- Private not-for-profit
- Private for-profit

Degree-granting status

DEGRANT

A code indicating the degree-granting status of the institution. Degree-granting institutions offer an associate’s, bachelor’s, master’s, doctor’s or a first-professional degree. Non-degree-granting offers certificates or other formal awards.

Primary function and intensity of employee

EAPRECTP

Primary function of the employee at the institution: includes counts of employees by full- and part-time status; by function or occupational category; and by faculty status and tenure status. This report cites all full-time employees with faculty status (2101), all part-time employees with faculty status (3101), all full-time employees, primarily instruction, without faculty status (2115), all part-time employees, primarily instruction, without faculty status (3115), all full-time employees, instruction combined with research/public service, without faculty status (2125), and all part-time employees, instruction combined with research/public service, without faculty status (3125).

Total employees

EAPTOT

Total number of employees whose function type is determined by **EAPRECTP** on the institution’s payroll as of November 2004.

| | |
|--|-----------------|
| <i>Total enrollment</i> | ENRTOT |
| Total men and women enrolled for credit in the fall of the academic year. | |
| <i>Has tenure system</i> | I3 |
| Indicates whether the institution had a tenure system for full-time faculty. | |
| <i>Maximum years on tenure track</i> | I6 |
| Indicates whether an institution limits the amount of time nontenured full-time faculty and instructional staff can spend on a tenure track (i.e., the maximum number of years staff can be on tenure track and not receive tenure). | |
| <ul style="list-style-type: none"> No maximum Less than 5 years 5 years 6 years 7 years More than 7 years | |
| <i>Changed tenure policy</i> | I7A |
| Indicates whether an institution changed its tenure policy for full-time faculty between 1998 and 2003. | |
| <i>Adapted more stringent tenure policy</i> | I7B |
| Indicates whether an institution adapted a more stringent tenure policy for full-time faculty between 1998 and 2003. | |
| <i>Downsized tenured faculty</i> | I7C |
| Indicates whether an institution downsized full-time tenured faculty between 1998 and 2003. | |
| <i>Replaced tenured faculty with fixed-term faculty</i> | I7D |
| Indicates whether an institution replaced tenured faculty with fixed-term faculty between 1998 and 2003. | |
| <i>Offered early retirement</i> | I7E |
| Indicates whether an institution offered early retirement to full-time faculty between 1998 and 2003. | |
| <i>Postsecondary and Title IV institution indicator</i> | PSET4FLG |
| Identifies institutions who participate in the Title IV financial aid program. | |

Taken action related to tenure**X0117**

Indicates whether the institution has taken any action related to tenure between 1998 and 2003.

Faculty represented by a union**X01112**

Indicates if any full-time or part-time faculty or instructional staff employed at the institution were legally represented by a union.

Full-time faculty hired in past year**X0312**

Indicates the percentage of full-time faculty who were newly hired during the 2002–03 academic year. This variable was calculated by dividing the number of new hires during the 2002–03 academic year by the total number of full-time faculty as of November 2003.

New full-time faculty who were part time**X0412**

Indicates the percentage of new full-time faculty who were previously part time at the institution. This variable was calculated by dividing the number of faculty who changed from part time to full time by the total number of new full-time faculty hired during the 2002–03 academic year.

Full-time faculty who left**X0512**

Indicates the percentage of full-time faculty who left between November 2002 and November 2003. This variable was calculated by dividing the number of full-time faculty who left by the total number of faculty in November 2002.

Of those who left, percent who retired**X0912**

Indicates the percentage of full-time faculty who retired out of all faculty who left the institution. This variable was calculated by dividing the number of faculty who retired by the total number of faculty who left the institution.

Of those who left, percent who left for other reason**X1012**

Indicates the percentage of full-time faculty who left for reasons other than retirement out of all faculty who left the institution. This variable was calculated by dividing the number of faculty who left for other reasons by the total number of faculty who left the institution.

Institution type**X121Q0**

This derived variable identifies the type of institution in which the respondent was employed. It was derived using the 2000 Carnegie Classification combined with the control (public or private not-for-profit) of the institution. The numeric Carnegie code is listed in parentheses after each category name. The 2000 Carnegie Classification included a number of changes, including a new category called “Baccalaureate/Associate’s Colleges” created to reflect the emergence of bachelor’s degrees being granted at 2-year institutions. These institutions are defined as colleges at which most of the degrees awarded are subbaccalaureate, but at least 10 percent of degrees awarded were bachelor’s degrees. This category includes 0.6 percent of faculty in NSOPF:04. For more information about the Carnegie

Institution type—continued**X121Q0**

Classification system adopted in 2000, see *The Carnegie Classification of Institutions of Higher Education* (The Carnegie Foundation for the Advancement of Teaching 2001). Public baccalaureate and private not-for-profit associate's institutions are not in separate categories because there are too few institutions of these types to yield reliable estimates.

| | |
|--------------------------------------|--|
| Public doctoral | Includes public institutions in the following categories: Doctoral/Research Universities—Extensive (15) Doctoral/Research Universities—Intensive (16) Medical schools and medical centers (52) |
| Private not-for-profit doctoral | Includes private not-for-profit institutions in the following categories: Doctoral/Research Universities—Extensive (15) Doctoral/Research Universities—Intensive (16) Medical schools and medical centers (52) |
| Public master's | Includes public institutions in the following categories: Master's Colleges and Universities I (21) Master's Colleges and Universities II (22) |
| Private not-for-profit master's | Includes private not-for-profit institutions in the following categories: Master's Colleges and Universities I (21) Master's Colleges and Universities II (22) |
| Private not-for-profit baccalaureate | Includes private not-for-profit institutions in the following categories: Baccalaureate Colleges—Liberal Arts (31) Baccalaureate Colleges—General (32) Baccalaureate/Associate's Colleges (33) |
| Public associate's | Includes public institutions in the following category: Associate's Colleges (40) |
| Other | Includes institutions in the following categories: Public baccalaureate (31, 32, and 33) Private not-for-profit associate's (40) Theological seminaries and other specialized faith-related institutions (51) Other separate health profession schools (53) Schools of engineering and technology (54) Schools of business and management (55) Schools of art, music, and design (56) Schools of law (57) Teachers colleges (58) Other specialized institutions (59) Tribal colleges (60) |

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Appendix B—Technical Notes and Methodology

Overview

This report uses data from the fourth cycle of the National Study of Postsecondary Faculty (NSOPF) institution survey conducted by the U.S. Department of Education’s National Center for Education Statistics (NCES) in 2003–04. NSOPF was designed to provide a national profile of faculty and instructional staff: their professional backgrounds, responsibilities, workloads, salaries, benefits, and attitudes. The institution survey of NSOPF:04 provides contextual information (e.g., faculty tenure policies, union representation, faculty attrition) about the policies and practices of institutions that pertain to faculty at the institution. Previous cycles were conducted in 1987–88, 1992–93, and 1998–99. Additional information concerning the first three cycles of NSOPF is available at the NSOPF web page (<http://nces.ed.gov/surveys/nsopf/>). For more information on data collection procedures for NSOPF:04, please see the *2004 National Study of Postsecondary Faculty (NSOPF:04) Methodology Report* (Heuer et al. 2006).

Sample Design

The NSOPF:04 institution sample consisted of 1,070 eligible institutions¹ in the 50 states and the District of Columbia. This section provides information about the sample design for the 2004 National Study of Postsecondary Faculty (NSOPF:04). The NSOPF:04 methodology report provides more detailed information.

Institution Sample and Selection

A single sampling stage for institutions was used for the administration of NSOPF:04. The institutions eligible for NSOPF:04 included those in the traditional sector of postsecondary education: degree-granting institutions that were eligible to participate in the federal financial aid programs included in Title IV of the Higher Education Act, that provide formal instructional degree programs of at least 2 years’ duration, that are public or private not-for-profit, and that are designed primarily for students who have completed the requirements for a high school diploma or its equivalent. NSOPF:04 does not include private for-profit or less-than-2-year institutions.

¹ Numbers are rounded to the nearest 10 to protect the confidentiality of responding institutions. Percentages cited are based on the original unrounded numbers.

The institution frame for NSOPF:04 was taken from the 2001–02 Integrated Postsecondary Education Data System (IPEDS) Institutional Characteristics (IPEDS-IC) file. In order to allow precise survey estimates for institutional sectors of interest, this universe of institutions was stratified based on institution control and level of degree offered. Institution control distinguished between public and private not-for-profit, while level of degree offered used the 2000 Carnegie Classification system. Table B-1 summarizes the number of eligible institutions for each of the resulting 10 primary institutional strata, based on the IPEDS-IC file.

Table B-1. Distribution of NSOPF:04 institution universe and sample, by control and Carnegie Classification

| Carnegie Classification | Total | | Public | | Private not-for-profit | |
|-------------------------|----------|--------|----------|--------|------------------------|--------|
| | Universe | Sample | Universe | Sample | Universe | Sample |
| Total | 3,380 | 1,080 | 1,700 | 680 | 1,680 | 400 |
| Doctoral | 300 | 300 | 190 | 190 | 110 | 110 |
| Master's | 590 | 200 | 270 | 120 | 320 | 80 |
| Baccalaureate | 570 | 160 | 90 | 30 | 480 | 130 |
| Associate's | 1,180 | 350 | 1,030 | 340 | 150 | 10 |
| Other | 730 | 70 | 110 | 10 | 620 | 60 |

NOTE: Universe and sample numbers are rounded to the nearest 10. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

The institution sampling frame for NSOPF:04 was constructed from the IPEDS-IC files. The institutions on the sampling frame were partitioned into 10 institutional strata based on institutional control, highest level of offering, and Carnegie Classification. Ultimately, a sample of 1,080 institutions² was selected using probability proportional to size (PPS) based on the number of faculty and students at each institution, using Chromy's sampling algorithm (1979). Sample sizes and their corresponding sampling rates were established using a customized cost/variance optimization procedure, which aimed to identify the allocation that would accommodate all analytical objectives of this survey while minimizing data collection costs. Table B-1 summarizes the distribution of the resulting sample of institutions for NSOPF:04. Table B-2 shows the distribution of eligible sampled institutions by institutional characteristics, as well as their corresponding weighted response rates.³

² In order to account for the institutions that became eligible for NSOPF:04 after construction of the institution sampling frame from the Winter:02 IPEDS, some institutions were added to the sample.

³ Some institutions either merged or closed after sample selection, and therefore were ineligible for NSOPF:04.

Table B-2. Counts of eligible and responding institutions, and response rates, by institution type: 2004

| Institution type | Institution count | | Weighted response rate (percent) |
|------------------------------------|-----------------------|------------|----------------------------------|
| | Eligible ¹ | Responding | |
| Total | 1,070 | 920 | 84.2 |
| Public doctoral | 190 | 170 | 84.7 |
| Public master's | 120 | 110 | 89.6 |
| Public bachelor's | 30 | 30 | 100.0 |
| Public associate's | 330 | 290 | 83.6 |
| Public other | 10 | 10 | 98.9 |
| Private not-for-profit doctoral | 110 | 90 | 83.7 |
| Private not-for-profit master's | 80 | 70 | 79.8 |
| Private not-for-profit bachelor's | 130 | 110 | 77.7 |
| Private not-for-profit associate's | 10 | 10 | 86.0 |
| Private not-for-profit other | 60 | 50 | 76.2 |

¹Some institutions either merged or closed after sample selection and therefore were ineligible for NSOPF:04.

NOTE: Numbers of eligible and participating institutions are rounded to the nearest 10. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

Data Quality Procedures

Perturbation

To protect the confidentiality of NCES data that contain information about specific individual cases, NSOPF:04 data were subject to perturbation procedures to minimize disclosure risk. Perturbation procedures, which have been approved by the NCES Disclosure Review Board, preserve the central tendency estimates, but may result in slight increases in nonsampling errors.

Imputation of Missing Data

All NSOPF:04 institution variables with missing data used in this report, as well as those included in the related Data Analysis System (DAS) release, have been imputed. The imputation process for the missing data from the institution questionnaire involved similar steps to those used for imputation of the faculty data. The missing data for variables were imputed using the weighted sequential hot-deck method. For this purpose, variables were partitioned into unconditional and conditional groups. The first group (unconditional) consisted of variables that apply to all responding institutions, while the second group (conditional) consisted of variables that apply to only a subset of the institutions. The unconditional variables were sorted by

percentage missing and then imputed in the order from the lowest percentage missing to the highest. The conditional group was partitioned into three subgroups based on the level of conditionality for each variable, and then imputed in that order. The imputation classes for both unconditional and conditional variables were defined in terms of the institution sampling stratum with implicit sorting variables based on the number of full-time and part-time faculty members. Within each subgroup, variables were imputed in the order from the lowest to the highest percentage missing. Overall, 87 variables from the institution questionnaire were imputed, including 58 variables with 1 to 5 percent imputed, 15 variables with 5 to 10 percent imputed, 11 variables with 10 to 15 percent imputed, and 3 variables with more than 15 percent imputed (none of these 3 variables are used in this report).

Weighting

All estimates in this report are weighted to represent the target population described in the sample design section. The weights compensate for the unequal probability of selection of institutions in the NSOPF sample. See table B-3 for a complete list of NSOPF:04 weights. The weights also adjust for frame multiplicity,⁴ nonresponse, and poststratification. The steps taken to calculate the study weights, WTB00, for the sample institutions data are summarized next.

Base weights

The institution sampling frame for NSOPF:04 included a total of 3,380 eligible units, detailed composition of which is provided in section 2.1.1 of the *2004 National Study of Postsecondary Faculty (NSOPF:04) Methodology Report* (Heuer et al. 2006). Reflecting the probability proportional to size scheme of sample selection, the probability of selection for institution i in stratum r was calculated by:

$$\pi_{ri} = \begin{cases} \frac{n_r S_{ri}}{S_{r+}}, & \text{for non-certainty selections} \\ 1, & \text{for certainty selections} \end{cases}$$

where:

n_r = sample size for stratum r ,

S_{ri} = composite measure of size for institution i in stratum r , and

⁴ It was determined after institution sample selection that in some cases, either an institution had merged with another institution, or faculty lists for two or more campuses were submitted as one combined faculty list. In these instances, the institution weights were adjusted for the joint probability of selection.

Table B-3. Summary of weight components for NSOPF:04

| Weight name | Type of weight | Associated file | Adjustments | Purpose |
|-------------|------------------------------|-------------------------|--|--|
| WTB00 | Study weight | Institution DAS and ECB | Institution's probability of selection, adjusted - for institutions with multiple chances of selection | Final weight for computing point estimates from the institution survey data; represented population is 2- and 4-year degree-granting public and private not-for-profit institutions in the 50 states and the District of Columbia. |
| WTB01-WTB64 | Replicate weights | | - to match published totals to ensure population coverage | |
| WTA00 | Study weight | Faculty DAS and ECB | Faculty's probability of selection adjusted - for faculty members who taught at more than one institution | Final weight for computing point estimates from the faculty survey data; represented population is faculty and instructional staff at institution population described above. No institution survey responses may be analyzed with this weight. |
| WTA01-WTA64 | Replicate weights | | - for nonresponding faculty members with unknown eligibility - to compensate for nonresponding faculty members - to match known published totals to ensure population coverage | |
| WTC00 | Contextual weight | Faculty ECB only | Faculty's probability of selection adjusted - for faculty members who taught at more than one institution | Final weight for computing point estimates from the faculty survey data; represented population is faculty and instructional staff at institution population described above. For use when institution survey responses are merged with the faculty data for analysis. |
| WTC01-WTC64 | Replicate contextual weights | | - for nonresponding faculty members with unknown eligibility - to compensate for nonresponding faculty members - to match known published totals to ensure population coverage - for whether the respondent was at an institution with a completed institution survey | |

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

S_{r+} = composite measure of size for all institutions in stratum r .

The initial sample consisted of 1,220 institutions. However, this sample was reduced to a subsample of institutions, since a smaller sample was deemed adequate to secure all precision requirements of NSOPF:04. Therefore, the sampling weight for institution i in stratum r was calculated as a function of its initial and subsequent selection probabilities. With R_r representing the subsampling rate in stratum r , the sampling weight for the i -th institution in that stratum was calculated by:

$$WT1_{ri} = \frac{1}{\pi_{ri}} \times \frac{1}{R_r}$$

It should be noted that during the sample refreshing step, institutions were added to the sample of institutions, resulting in a total sample of 1,080 institutions for NSOPF:04.

Adjustment for institution multiplicity

During the institution recruitment and faculty list sampling stages, a number of institutions were identified that had two or more records listed on the Integrated Postsecondary Education Data System (IPEDS). In some cases this was caused by institutions that had recently merged, while in other cases the sample institution had sent a single faculty list covering multiple campuses. For sampling purposes, combined faculty lists that could not be separated were treated as merged institutions and identified under a single IPEDS ID for purposes of tracking survey results.

For institutions with more than one chance of selection, a multiplicity adjustment factor was calculated by estimating, as if the selections were independent, the probability that each record could be selected. Consequently, when an institution had n chances of selection, its probability of selection was calculated by:

$$P\left(\bigcup_{i=1}^n I_i\right) = 1 - \prod_{i=1}^n [1 - P(I_i)]$$

Next, a multiplicity adjustment factor for the i -th sample institution was calculated by:

$$WT2_i = \frac{1}{P\left(\bigcup_{i=1}^n I_i\right) \times WT1_i}$$

If the given institution did not require such adjustment, its multiplicity adjustment factor was set to unity. This way, the product of $WT1$ and $WT2$ equals the reciprocal of the resulting multiple chance of selection for the institutions with positive multiplicity, and equals $WT1$ for all other institutions.

Nonresponse adjustment

For calculation of the analysis weights for institutions responding to the institution questionnaire, an institution (questionnaire) level nonresponse adjustment factor ($WT3$) was constructed within each of the 10 sampling strata using a Generalized Exponential Model (GEM) (Folsom and Singh 2000).

Poststratification adjustment

A set of poststratification adjustment factors ($WT4$) was calculated for the 920 institutions responding to the questionnaire using the GEM program. Specifically, nonresponse-adjusted weights for these institutions were ratio-adjusted to the counts of institutions obtained from the sampling frame. Moreover, an additional adjustment factor was calculated to ensure that weighted counts of faculty obtained from the institution survey data would coincide with those obtained from the faculty survey data. With this last adjustment factor computed ($WT5$), the final analysis weight for each responding institution ($WTB00$) was calculated by:

$$WTB00 = WT1 \times WT2 \times WT3 \times WT4 \times WT5$$

The sample of institutions from which faculty were selected overlaps with, but is not identical to, the sample of institutions that completed the institution survey. With a license to use the restricted data, institution survey information can be merged onto the faculty data so that faculty outcomes can be compared across institutions according to variables from the institution survey. A contextual weight for the faculty data ($WTC00$) was developed for use in such situations—that is, when using institution survey items in analyses of faculty.

Quality of Estimates

Survey weights are computed with the goal of removing any bias that might result due to differential nonresponse and undercoverage. In order to measure the efficacy of bias-reducing adjustments, a series of analyses were conducted at the unit and item levels. In the subsequent sections, highlights of these analyses are summarized.

Unit response rates and bias analysis

The institution (unit) level response rates for NSOPF:04 institutions were reviewed, overall and within each sampling stratum. As shown in table B-2, 920 of the 1,070 eligible sample institutions were respondents (84.2 weighted percent). The weighted response rates by type of institution ranged from 76.2 for private not-for-profit other institutions to 100 percent for public bachelor's institutions. In all, the institution weighted response rate was below 85 percent for six of the ten types of institutions: public doctoral, public associate's, private not-for-profit doctoral, private not-for-profit master's, private not-for-profit bachelor's, and private not-for-profit other. When the weighted response rates were below 85 percent, an evaluation was conducted to assess the potential magnitude of nonresponse bias.

The steps for nonresponse bias analysis included estimating the nonresponse bias and testing (adjusting for multiple comparisons) to determine if the bias was significant at the 5 percent level. Second, nonresponse adjustment factors were computed to significantly reduce or eliminate nonresponse bias for variables included in the corresponding models. Third, after the weights were computed, any remaining bias was estimated and statistical tests were performed to determine their significance.

The bias in an estimated mean based on respondents, \bar{y}_R , is the difference between this estimate and the target parameter, μ , which is the mean that would result if a complete census of the target population was conducted and all units responded. This bias can be expressed as follows:

$$B(\bar{y}_R) = \bar{y}_R - \mu$$

However, for variables that are available from the frame, μ can be estimated by $\hat{\mu}$ without sampling error, in which case the bias in \bar{y}_R can then be estimated by:

$$\hat{B}(\bar{y}_R) = \bar{y}_R - \hat{\mu}$$

Moreover, an estimate of the population mean based on respondents and nonrespondents can be obtained by:

$$\hat{\mu} = (1 - \hat{\eta})\bar{y}_R + \hat{\eta}\bar{y}_{NR}$$

where $\hat{\eta}$ is the weighted unit nonresponse rate, based on weights prior to nonresponse adjustment. Consequently, the bias in \bar{y}_R can then be estimated by:

$$\hat{B}(\bar{y}_R) = \hat{\eta}(\bar{y}_R - \bar{y}_{NR})$$

That is, the estimate of the nonresponse bias is the difference between the mean for respondents and nonrespondents multiplied by the weighted nonresponse rate, using the institution-level design weight prior to nonresponse adjustment.

This procedure parallels the one carried out for nonresponse bias analysis of the faculty data, but the institution data included a smaller sample size and a smaller number of attributes known for both respondents and nonrespondents. For the six institution types with nonresponse rates of 15 percent or higher, Table B-4 shows the percent significant nonresponse bias⁵ before weight adjustments (third row in table) and after weight adjustments (final row in table). The results show reduced nonresponse bias overall and for all institution types.

Table B-4. Summary of institution nonresponse bias analysis for institution types with nonresponse rates of 15 percent or higher: 2004

| Nonresponse bias statistics | All institutions | Public doctoral | Public associate's | Private not-for-profit doctoral | Private not-for-profit master's | Private not-for-profit bachelor's | Private not-for-profit other |
|----------------------------------|------------------|-----------------|--------------------|---------------------------------|---------------------------------|-----------------------------------|------------------------------|
| Before weight adjustments | | | | | | | |
| Mean estimated relative bias | 0.06 | 0.06 | 0.12 | 0.08 | 0.08 | 0.11 | 0.12 |
| Median estimated relative bias | 0.04 | 0.05 | 0.09 | 0.06 | 0.07 | 0.13 | 0.09 |
| Percent significant bias | 5.26 | 6.25 | 18.75 | 12.50 | 6.25 | 13.33 | # |
| After weight adjustments | | | | | | | |
| Mean estimated relative bias | 0.20 | 0.09 | 0.18 | 0.15 | 0.29 | 0.23 | 0.53 |
| Median estimated relative bias | 0.12 | 0.07 | 0.11 | 0.13 | 0.25 | 0.18 | 0.42 |
| Percent significant bias | 2.63 | 6.25 | 12.50 | 6.25 | # | 6.67 | # |

Rounds to zero.

NOTE: The percent significant bias is calculated as the ratio of the number of estimates with significant bias to the total number of estimates involved in the given analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

Finally, note that such unit-level bias analyses were not carried out when computing the institution component for the faculty analysis weights, since the weighted response rate for institutions providing lists of faculty and instructional staff exceeded 85 percent for all sectors.

⁵ The percent significant bias is calculated as the ratio of the number of estimates with significant bias to the total number of estimates involved in the given analysis. That is,

$$\text{Percent Significant Bias} = \frac{\text{Number of estimates with significant bias}}{\text{Number of estimates investigated}} \times 100$$

See chapter 3 of the *2004 National Study of Postsecondary Faculty (NSOPF:04) Methodology Report* for more information on institution list collection (Heuer et al. 2006).

Item-level bias analysis

Item response rates (*IRR*) are calculated as the ratio of the number of respondents for whom an in-scope response was obtained (I^x for item x) to the number of respondents who are asked to answer that item. The number asked to answer an item is the number of unit level respondents (I) minus the number of respondents with a valid skip item for item x (V^x).

$$IRR^x = \frac{I^x}{I - V^x}$$

An institution is defined to be an item respondent for an interview variable if that institution has data for that variable, including logical imputation and recoding based on information obtained elsewhere. Overall, the rates of missing data were low to moderate: nonresponse was less than 15 percent for most items.

A nonresponse bias analysis was conducted for those variables with a response rate of less than 85 percent (nonresponse above 15 percent) overall or for any institutional stratum. Table B-5 presents item response rates for items with less than 85 percent response rate for any institutional stratum before weight adjustments. Table B-6 summarizes the nonresponse bias analysis for qualifying variables used in this report. The nonresponse bias was estimated for variables known for both respondents and nonrespondents and tested (adjusting for multiple comparisons) to determine if the bias was significant at the .05 level. The percentage significant reflects the ratio of the number of biased estimates to the number of biased and unbiased estimates. Although there was 25 percent significant bias for public bachelor's institutions, the mean estimated bias was small (0.01), and its impact on the accuracy on estimates was judged to be minimal. Because there are so few public bachelor's institutions in the universe, public bachelor's institutions and faculty within them are not shown separately in figure 1 or tables 1–5 of this report, but are included in the “Other” category for these tables and figure.

Standard Errors

In order to facilitate computation of standard errors for both linear and nonlinear statistics, a vector of bootstrap sample weights has been added to the analysis file. These weights are zero for units not selected in a particular bootstrap sample; weights for other units are inflated for the bootstrap subsampling. The initial analytic weights for the complete sample are also included for the purposes of computing the desired estimates. The vector of replicate weights allows for

Table B-5. Institution item response rates for items with less than 85 percent response rate for any institution type before weight adjustments, overall and by institution type: 2004

| Variable | All institu- tions | Public | | | | | Private not-for-profit | | | | |
|--|--------------------------|----------|----------|-----------------|------------------|-------|------------------------|----------|-----------------|------------------|-------|
| | | Doctor's | Master's | Bach- elor's | Asso- ciate's | Other | Doctor's | Master's | Bach- elor's | Asso- ciate's | Other |
| Full-time tenure: changed tenure policy | 96.3 | 97.6 | 94.8 | 70.6 | 95.9 | 100.0 | 98.4 | 98.4 | 95.9 | 100.0 | 100.0 |
| Full-time tenure: more stringent tenure standards | 96.3 | 97.6 | 94.8 | 70.6 | 95.9 | 100.0 | 98.4 | 98.4 | 95.9 | 100.0 | 100.0 |
| Full-time tenure: downsized tenured faculty | 96.3 | 97.6 | 94.8 | 70.6 | 95.9 | 100.0 | 98.4 | 98.4 | 95.9 | 100.0 | 100.0 |
| Full-time tenure: replaced tenured with fixed term | 96.1 | 97.6 | 94.8 | 70.6 | 95.9 | 100.0 | 98.4 | 98.4 | 94.7 | 100.0 | 100.0 |
| Full-time tenure: offered early retirement | 96.3 | 97.6 | 94.8 | 70.6 | 95.9 | 100.0 | 98.4 | 98.4 | 95.9 | 100.0 | 100.0 |

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

Table B-6. Summary of institution item nonresponse bias analysis, overall and by institution type: 2004

| Variable | Public | | | | | | Private not-for-profit | | | | |
|--|-------------|----------|----------|------------|-------------|-------|------------------------|----------|------------|-------------|-------|
| | All faculty | Doctor's | Master's | Bachelor's | Associate's | Other | Doctor's | Master's | Bachelor's | Associate's | Other |
| Full-time tenure: changed tenure policy | | | | | | | | | | | |
| Mean estimated bias | † | † | † | 0.01 | † | † | † | † | † | † | † |
| Median estimated bias | † | † | † | # | † | † | † | † | † | † | † |
| Percent significant bias | † | † | † | 25.00 | † | † | † | † | † | † | † |
| Full-time tenure: more stringent tenure standards | | | | | | | | | | | |
| Mean estimated bias | † | † | † | 0.01 | † | † | † | † | † | † | † |
| Median estimated bias | † | † | † | # | † | † | † | † | † | † | † |
| Percent significant bias | † | † | † | 25.00 | † | † | † | † | † | † | † |
| Full-time tenure: downsized tenured faculty | | | | | | | | | | | |
| Mean estimated bias | † | † | † | 0.01 | † | † | † | † | † | † | † |
| Median estimated bias | † | † | † | # | † | † | † | † | † | † | † |
| Percent significant bias | † | † | † | 25.00 | † | † | † | † | † | † | † |
| Full-time tenure: replaced tenured with fixed term | | | | | | | | | | | |
| Mean estimated bias | † | † | † | 0.01 | † | † | † | † | † | † | † |
| Median estimated bias | † | † | † | # | † | † | † | † | † | † | † |
| Percent significant bias | † | † | † | 25.00 | † | † | † | † | † | † | † |
| Full-time tenure: offered early retirement | | | | | | | | | | | |
| Mean estimated bias | † | † | † | 0.01 | † | † | † | † | † | † | † |
| Median estimated bias | † | † | † | # | † | † | † | † | † | † | † |
| Percent significant bias | † | † | † | 25.00 | † | † | † | † | † | † | † |

† Not applicable.

Rounds to zero.

NOTE: The percent significant bias is calculated as the ratio of the number of estimates with significant bias to the total number of estimates involved in the given analysis.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

computing additional estimates for the sole purpose of estimating a variance. Assuming B sets of replicate weights, the variance of any estimate, $\hat{\theta}$, can be estimated by replicating the estimation procedure for each replicate and computing a simple variance of the replicate estimates; i.e.,

$$\text{Var}(\hat{\theta}) = \frac{\sum_{b=1}^B (\hat{\theta}_b - \hat{\theta})^2}{B}$$

where $\hat{\theta}_b$ is the estimate based on the b^{th} replicate weight and B is the number of replicates. Once the replicate weights are provided, this estimate can be produced by most survey software packages (e.g., SUDAAN [RTI 2004]).

The replicate weights were produced using a methodology and computer software developed by Kaufman (2004). This methodology allows for finite population correction factors at two stages of sampling. Application of this method incorporated the finite population correction factor at the first stage only where sampling fractions were generally high. At the second stage, where the sampling fraction was generally low, the finite population correction factor was set to 1.0.

Data Analysis System

The estimates presented in this report were produced using the NSOPF:04 Institution Data Analysis System (DAS). The DAS application on the Web makes it possible for users to specify and generate their own tables. With the DAS, users can replicate or expand upon the tables presented in this report. In addition to the table estimates, the DAS calculates proper standard errors⁶ and weighted sample sizes for these estimates. For example, table B-7 contains standard errors that correspond to estimates in table 2 of the report. If the number of valid cases is too small to produce a reliable estimate (fewer than 30 cases), the DAS prints the message “low n” instead of the estimate. All standard errors for estimates presented in this report can be viewed at <http://nces.ed.gov/das/library/reports.asp>. In addition to tables, the DAS will also produce a correlation matrix of selected variables to be used for linear regression models. Included in the output with the correlation matrix are the design effects (DEFTs) for each variable in the matrix. Since statistical procedures generally compute regression coefficients based on simple random sample assumptions, the standard errors must be adjusted with the design effects to take into account the stratified sampling method used in the survey.

⁶ The NSOPF:04 sample is not a simple random sample, and therefore, simple random sample techniques for estimating sampling error cannot be applied to these data. The DAS takes into account the complexity of the sampling procedures and calculates standard errors appropriate for such samples.

Table B-7. Standard errors for table 2: Percentage of newly hired full-time faculty and percentage of new full-time faculty who were part-time faculty at that same institution in November 2002, by institution type: Fall 2003

| Institution type | Percent of full-time faculty hired within the past year from outside the institution | Percent of new full-time faculty who were previously part time at the same institution |
|--------------------------------------|--|--|
| All institutions | 0.21 | 0.61 |
| Public doctoral | # | # |
| Private not-for-profit doctoral | 0.07 | 0.07 |
| Public master's | 0.73 | 1.35 |
| Private not-for-profit master's | 0.70 | 1.95 |
| Private not-for-profit baccalaureate | 1.66 | 2.92 |
| Public associate's | 0.69 | 2.25 |
| Other | 1.21 | 2.29 |

Rounds to zero.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 2004 National Study of Postsecondary Faculty (NSOPF:04).

The DAS can be accessed electronically at <http://nces.ed.gov/das/>. For more information about the NSOPF:04 Data Analysis System, contact:

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Statistical Procedures

The descriptive comparisons were tested in this report using Student's *t* statistic. Differences between estimates are tested against the probability of a Type I error,⁷ or significance level. The significance levels were determined by calculating the Student's *t* values for the differences between each pair of means or proportions and comparing these with published tables of significance levels for two-tailed hypothesis testing.

Student's *t* values may be computed to test the difference between estimates with the following formula:

⁷ A Type I error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present.

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}}$$

where E_1 and E_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors. This formula is valid only for independent estimates. When estimates are not independent, a covariance term must be added to the formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2 - 2(r)se_1 se_2}}$$

where r is the correlation between the two estimates.⁸ This formula is used when comparing two percentages from a distribution that adds to 100. If the comparison is between the mean of a subgroup and the mean of the total group, the following formula is used:

$$t = \frac{E_{sub} - E_{tot}}{\sqrt{se_{sub}^2 + se_{tot}^2 - 2p se_{sub}^2}}$$

where p is the proportion of the total group contained in the subgroup. The estimates, standard errors, and correlations can all be obtained from the DAS.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large t statistics may appear to merit special attention. This can be misleading since the magnitude of the t statistic is related not only to the observed differences in means or percentages but also to the number of respondents in the specific categories used for comparison. Hence, a small difference compared across a large number of respondents would produce a large t statistic.

A second hazard in reporting statistical tests is the possibility that one can report a “false positive” or Type I error. In the case of a t statistic, this false positive would result when a difference measured with a particular sample showed a statistically significant difference when there is no difference in the underlying population. Statistical tests are designed to control this type of error, denoted by alpha. The alpha level of .05 selected for findings in this report indicates that a difference of a certain magnitude or larger would be produced no more than one time out of twenty when there was no actual difference in the quantities in the underlying population. When we test hypotheses that show t values at the .05 level or smaller, we treat this

⁸ U.S. Department of Education, National Center for Education Statistics, *A Note from the Chief Statistician*, no. 2, 1993.

finding as rejecting the null hypothesis that there is no difference between the two quantities. Failing to detect a difference, however, does not necessarily imply the values are the same or equivalent.