

The O*NET: A Challenging, Useful Resource for Investigating Auditing and Accounting Work

Audrey N. Scarlata, Dan N. Stone, Keith T. Jones, and Clement C. Chen

ABSTRACT: The Occupational Information Network database (O*NET), a publicly available employment and occupation resource, contains considerable relevant data on accountants' and auditors' work and employment. Created and maintained by the U.S. Department of Labor, the O*NET is organized into six categories; annual updates derived from multiple sources including job analysts, surveys of employers and employees, and labor economists' employment projections. The extensive resources supporting its creation and maintenance have resulted in statistically defensible sampling methods but considerable variability in the validity of O*NET conceptual constructs and measures. Users of the O*NET include scholars, state employment agencies, employers, career counselors, and job seekers. Although we are unaware of current applications of the O*NET in professional accounting, we suggest ten applications. A small body of accounting research uses the O*NET; we suggest additional future research applications. The limitations of the O*NET include overly broad categories of accounting work, issues related to biases and construct validity, and poor organization and ease-of-use. But for scholars with patience and tenacity, the O*NET provides an important publicly available, longitudinal, and cross-sectional resource for investigating accountancy employment and work.

Keywords: auditor employment; entrants; occupations; professional accountancy; recruiting.

Audrey N. Scarlata is an Assistant Professor at East Carolina University, Dan N. Stone is a Professor at the University of Kentucky, Keith T. Jones is an Associate Professor at the University of North Alabama, and Clement C. Chen is an Associate Professor at the University of Michigan Flint.

Sincere thanks to Paul Madsen, Jason Bergner, Jeff Cohen, Tim Miller, Tim Mitchell, Bob Ramsay, Jackie Thompson, and two anonymous reviewers for comments on previous drafts. The authors gratefully acknowledge the financial support of East Carolina University, the Gatton College of Business, the Von Allmen School of Accountancy, the University of Kentucky, the Department of Accounting at Illinois State University, the Department of Accounting and Business Law at the University of North Alabama, and the University of Michigan Flint.

Author order is arbitrary; the authors contributed equally to this project.

Submitted: February 2010
Accepted: May 2011
Published Online: December 2011
Corresponding author: Dan N. Stone
Email: dstone@uky.edu

INTRODUCTION

This paper introduces a data resource, the Occupational Information Network database (O*NET), that partially fills the need for a publicly available database that is relevant to investigating accounting and auditing work. The O*NET is a unique occupational data resource regarding U.S. worker attributes, attitudes, knowledge and skill, and job characteristics. With current, annual U.S. federal government funding of over \$6 million (Tippins and Hilton 2009), no existing database shares the O*NET's financial resources or lofty goal of providing a comprehensive, cross-sectional, and longitudinal database of U.S. occupations. But while the O*NET is promoted as a "free" resource, users "pay" for the O*NET with their time; the database is highly complex and oddly configured, includes acronyms unfamiliar to all but Department of Labor economists, and offers multiple, complex levels of data (Tippins and Hilton 2009). But for scholars who "pay the cost" of comprehending its complexities and eccentricities, the O*NET is a valuable resource regarding accountant and auditor occupations and employment.

Multiple organizations have observed the need for better information about accounting and auditing work. For example, the fourth recommendation of the Advisory Committee on the Auditing Profession (ACAP) argues the importance, and paucity, of data about the nature of professional accounting and auditing practice:

comparable, consistent, periodic information regarding the demographic profile of professional accountants and auditors, related higher education program capacity, entry-level supply and demand of personnel, accounting firm retention and compensation practices, and similar particulars are fundamental to a meaningful understanding of the human capital circumstances impacting the public company auditing profession and its future and sustainability.

Historically, there has been neither an ongoing collection of data nor a centralized location where the general public can access data. (ACAP 2008, 65)

We are unaware of a data resource that provides a comprehensive, long-term, longitudinal, centralized, publicly available data set regarding professional accountants and auditors. Fortuitously, however, many cross-sectional, nonrecurring data sets provide insight into aspects of accounting and auditor employment. Nonrecurring investigations into the nature of auditor and accountant's work would include, beginning in circa 1960, Roy and MacNeill's (1963, 1966) investigation into the nature of, and changes in, the accounting profession. Published practice analyses of accounting work that followed Roy and MacNeill include those sponsored by the IMA (Siegel and Sorensen 1994, 1999) investigating managerial accounting work, and by the AICPA (AICPA Board of Examiners 2008) investigating public accounting work as a part of revising the CPA examination.

Many published cross-sectional studies quantitatively investigate aspects of professional accounting work. For example, Almer et al. (2005) overview many of these studies as a part of developing a framework of the relationship between auditors and public accounting firms. In addition, human resource management issues are fundamental to accounting control systems and are a periodic topic of investigation in accounting research (e.g., Jarvenpaa 2007; Drake et al. 2007; Davila 2005; Hooks and Higgs 2002; Rowe 2004). Unfortunately, however, the above studies are nonrecurring data sources. Most studies that include longitudinal data relate to publicly reported *outputs* of accounting and auditing work, such as audit report delays (Krishnan and Yang 2009), rather than recurring data on the nature of professional accounting work.

Two resources, known to many accounting professionals and scholars, provide recurring data on selected aspects of auditor and accountant employment. First, the AICPA publishes biennial reports on the supply of, and demand for, accountancy profession entrants (AICPA 2008). Second, the Institute of Management Accountants (IMA) (Schroeder et al. 2010) reports annual salary

data—including demographic information such as gender, education, years of work experience, and industry—from surveys of its members.

In contrast, the O*NET is the only data source that comprehensively measures occupations both longitudinally (over time) and cross-sectionally (across occupations) (Handel 2009; Tippins and Hilton 2009).¹ Its statistically rigorous, multifaceted sampling strategy and exacting data-collection protocols help ensure accurate and valid data. Importantly, the financial resources supporting the data set far exceed those available to any individual or group of researchers, and these resource commitments have been sustained over many years. The O*NET's easy availability makes it a primary data resource for job analysis, designing job interview questions, job development, and job redesign.

We next consider the history, organization, and validation of the O*NET, followed by a discussion of its potential value in nonaccounting, professional accounting, and scholarly accounting applications. Discussion of the O*NET's accounting-relevant limitations, and its potential value to accounting practice and scholarship, follows.

DEVELOPMENT, ORGANIZATION, AND VALIDATION OF THE O*NET

History and Development

The Great Depression motivated the creation of the O*NET's predecessor, the Dictionary of Occupational Titles (DOT). The Depression's economic devastation prompted Congress to initiate an agency—the Department of Labor—to document employment, occupations, and job opportunities with a goal of better matching labor skill supply with demand (Advisory Panel for the Dictionary of Occupational Titles 1993). The DOT was updated infrequently (four times) between its origination in 1939 and 2001. Development of the O*NET, a much more comprehensive database of occupations, began in the early 1990s, with a 1998 release of job analysts' occupational assessments. Recent updates have expanded the data sources to include employee surveys, economic projections of occupational demand, more occupations, and additional data sources. In addition, revisions of the O*NET's sampling methodologies have grown increasingly sophisticated and reliable, resulting in more representative occupational samples.

The O*NET Content Model

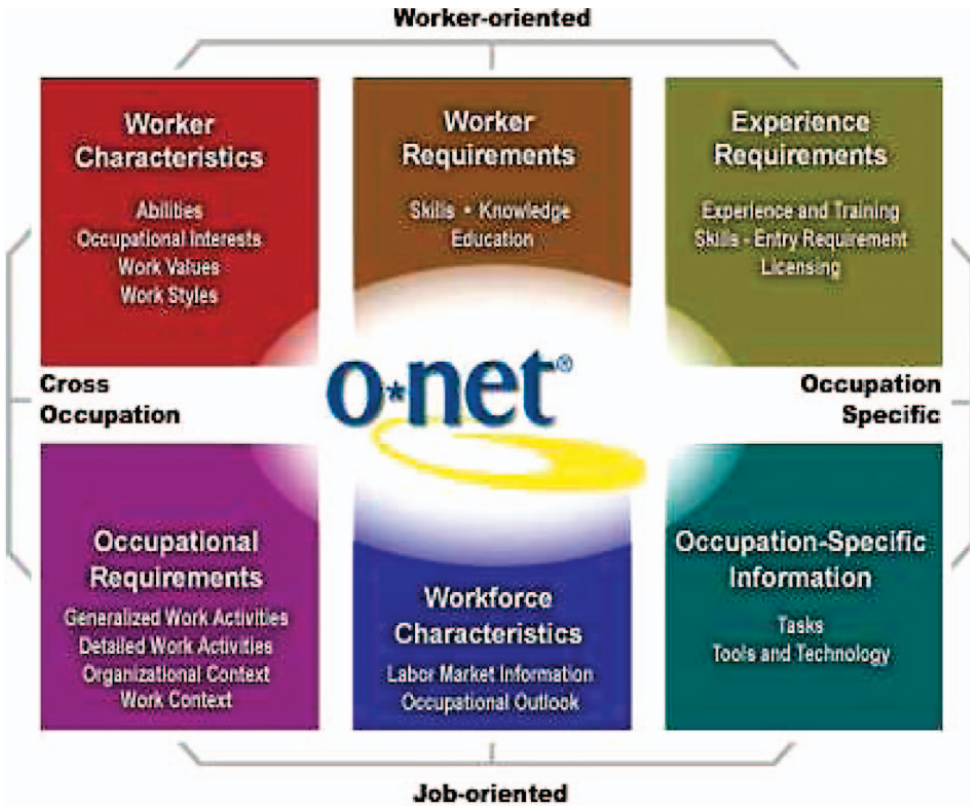
The content model, around which the O*NET is organized, includes six “domains” or categories, each of which identifies a related set of activities and characteristics of workers and occupations. Figure 1 illustrates these domains; we next discuss each, progressing clockwise from the upper left (O*NET Resource Center undated #1):²

1. Worker characteristics: enduring characteristics that influence work performance, and the capacity to acquire the knowledge and skills needed for effective work performance. These include abilities, occupational interests, work values, and work styles.
2. Worker requirements: work-related attributes that are acquired or developed through education. Requirements include experience and training, basic skills, cross-functional skills, and knowledge and education.

¹ Thanks to Paul Madsen (2011b) for noting, in relation to this point, that it is also possible to construct occupational panel data from other sources, including the U.S. Census (Minnesota Population Center 2010) and National Survey of College Graduate (National Science Foundation undated) data.

² A minor annoyance of the O*NET website is that most URLs are undated. Hence, the necessity, in this paper, of repeated citations to “undated” O*NET website locations.

FIGURE 1
O*NET Structure and Content



Source: O*NET Resource Center (undated #1).

- Experience requirements: requirements related to previous work activities that are explicitly linked to specific work activities. These include experience and training, basic and cross-functional skills required for entry, and sparse data on licensing requirements. One criticism of the O*NET model is that some “experience” requirements, e.g., “basic skills,” overlap with those defined in the previous category as “worker” requirements (Tippins and Hilton 2009).
- Occupational requirements: expected job-related behaviors and activities including the organizational and occupational contexts (e.g., “Is the work mostly performed indoors or outside?”). This category includes generalized work activities, detailed work activities, organizational context, and work context.
- Workforce characteristics: labor market data including occupational outlook (i.e., growing, stable, or declining), wages and compensation, and current and projected occupational employment demand.
- Occupation-specific information: attributes and knowledge related to specific or unique occupational demands. These include listings of occupational tasks, and in a supplemental

database, i.e., the T2 Tool and Technology Database (T2DB), the tools and technologies required to complete these tasks (O*NET Resource Center undated #5).

Data Sources and Updating

Since its 1998 release, the O*NET has been updated 13 times, with at least annual updates beginning in 2001. The current production O*NET database (Version 15.0, released in June 2010) includes about 1,100 occupations, although complete information is not available for every occupation. The most recent database included updates to 121 occupations, although none of the recently updated occupations were accounting-related. The O*NET classifies occupations into 23 major groups, according to the Standard Occupational Classification (SOC) System ([U.S. Bureau Labor of Statistics 2010](#)).

Evolution of the O*NET data-collection program has progressed, with the assistance of statistical sampling experts, from a simple, nonrandom sampling method in the original DOT database, to a highly sophisticated, reliable, representative sampling methodology ([U.S. Department of Labor, Employment, and Training Administration 2008](#)). Multiple sources contribute to O*NET data, including occupational analysts, semiannual surveys of employers and employees, and labor economist projections based on the employer surveys and macro-economic data ([U.S. Department of Labor, Employment, and Training Administration 2008](#)).

Multiple programs encourage and reward employer and employee data contributions. For example, the O*NET has an organizational partnership program—currently with about 600 partners; O*NET partners pledge to complete O*NET questionnaires (O*NET Resource Center undated #11), and to urge other organizations and individuals to do likewise (O*NET Resource Center undated #2). Current O*NET accounting partner organizations include the American Institute of Certified Public Accountants (AICPA), Institute of Management Accountants (IMA), Association of Government Accountants (AGA), Information Systems Audit and Control Association (ISACA), and the American Institute of Professional Bookkeepers (AIPB). In addition, the Department of Labor provides gifts and certificates to organizational point of contact (POC) individuals, who coordinate O*NET data collection within organizations.³ Finally, participating employers receive the “O*NET Toolkit for Business”—a compendium of resources that includes instructions on writing job descriptions and using the O*NET for human resource planning and management.

With the exception of the skills and abilities data—which are completed by occupational analysts based on employee responses (O*NET Resource Center undated #1)—the O*NET is populated using one of two data-collection methods; these are the (1) establishment and (2) occupation expert methods. The “establishment” method employs a stratified, two-stage probability sampling design of occupations, structured with a sampling frame of organizations and their employees. Stage one samples employees within occupations, within organizations, where the probability of organizational selection is proportional to the expected number of employed workers in the surveyed occupations ([U.S. Department of Labor, Employment, and Training Administration 2008](#)). The stage one sampling frame is about 15 million organizations, stratified by number of employees. Employees in the targeted occupations, within the sample organizations, are the focus of the second-stage sample. Statistical analysis results dictate that a minimum sample size of 15 occupation respondents is required for the use the establishment sampling method. About 75 percent of occupations are populated using the establishment sampling method. For the period from

³ Between 2002 and 2004, the [U.S. Department of Labor, Employment, and Training Administration \(2008\)](#) conducted an incentives experiment; specifically, they provided \$20 cash to point of contact (POC) individuals. This incentive had no effect on organizational participation or response rates. Hence, it was discontinued in 2005.

June 2001 through September 2007, O*NET sample sizes for occupations completed using the establishment sampling method were 95,048 organizations and 128,401 employees (U.S. Department of Labor, Employment, and Training Administration 2008).

For the approximately 25 percent of occupations for which the establishment sample results are inadequate, i.e., because of a too-small or nonrepresentative sample, the “occupational expert” method populates the database using data from a stratified random sample of occupational experts. Occupational experts must have significant (at least five years in the occupation), recent (within the last six months) job experience. The sampling frames of occupational experts are often professional or industry associations (e.g., the AICPA membership roster). A minimum sample of 20 occupational experts is required for inclusion of that occupation in the database. O*NET skills and abilities data are populated from analyses provided by trained occupational analysts, i.e., graduate students in human resource (HR) disciplines.

Validity and Validation

Given its long history, and the extensive U.S. government resources supporting its development, maintenance, and dissemination, it is unsurprising that a considerable body of research assesses, and proposes improvements in, the validity of the O*NET.⁴ For example, the O*NET website lists 48 research reports, the first completed in 1993, with three reports published in 2010; all of these reports investigate aspects of the validity of the O*NET (National Center for O*NET Development 2010). Peterson and American Psychological Association (1999) consists of 20 chapters, each of which discusses some aspect of O*NET validity and validation. In addition, Department of Labor publications (e.g., U.S. Department of Labor, Employment, and Training Administration 2008) provide additional information regarding the processes, validity, and evolution of the statistical sampling procedures used in the O*NET.

The O*NET’s sampling plan, developed by statistical experts, is an important strength that increases the generalizability and external validity of O*NET data. Much accounting research investigating individual-level issues uses a small, convenience sampling plan, with participants drawn, based on availability, from a few participating accounting firms or universities (e.g., see Lindsay 1993, 1994, 1995). In contrast, the O*NET’s substantial financial resources enable a sampling plan that strives for a representative sample of all U.S. job incumbents by occupation (U.S. Department of Labor, Employment, and Training Administration 2008).

Recently, Tippins and Hilton (2009) and Handel (2009) provide independent (of the Department of Labor) comprehensive reviews and assessments of the O*NET that discuss content, data collection, current and potential uses, and data validation. Both reviews commend the O*NET for the considerable knowledge, expertise, and resources that are devoted to achieving valid across-occupation samples, and for the encouraging results of validation tests comparing the responses of job analysts with job-holders. However, Tippins and Hilton (2009) argue that there is considerable variability in the construct validity of the taxonomies of O*NET descriptors:

across the different domains included in the content model. For example, in the abilities domain, the descriptors reflect a long history of psychological research on the nature and measurement of human abilities, but many of the descriptors in the skills domain lack such an extensive research base. (Tippins and Hilton 2009, 3)

⁴ Peterson et al. (1999, 2001) and Tippins and Hilton (2009) provide more complete descriptions of O*NET validation research and of the uses and limitations of the O*NET database (see also U.S. Department of Labor, Employment and Training Administration 2008).

The construct concerns regarding the O*NET include redundancy among constructs, and therefore redundancy in measures, with corresponding data-collection inefficiency (Handel 2009). One implication of this redundancy is the need to reduce the (large) number of constructs and measures in practical applications of the O*NET through data-reduction methods such as factor, and principal components, analysis (Smith and Campbell 2006). Appendix A provides additional information on the development, structure, validation, and usefulness of the O*NET.

O*NET APPLICATIONS

Nonaccounting Applications

The many applications of the O*NET have proven its value and usefulness “in workforce development, economic development, career development, academic and policy research, and human development management” (Tippins and Hilton 2009, 1). Of particular relevance to accounting professionals and scholars are applications of the O*NET in human resources (HR), which include investigations of:⁵

job autonomy levels (e.g., Andreassi and Thompson 2007), job control (Liu et al. 2005), work context (Dierdorff and Ellington 2008; Dierdorff and Morgeson 2007), knowledge and skill training, retraining time (AIR research), occupational literacy requirements (AIR research), skill level estimations (Wiita and Palmer 2009), and job level (Tracey et al. 2007). (Tippins and Hilton 2009, 173)

Accounting Occupations

The extent of O*NET data availability varies by occupation; the current production version of the O*NET includes about 23 accounting-related occupations.⁶ Table 1 identifies these occupations and reports their sample sizes and sampling dates; data for all included accounting-related occupations are derived from the establishment sampling method, described earlier. These occupations are organized into three major categories as follows (see Table 1):

1. 11-0000 Management Occupations: one occupation, i.e., treasurers and controllers,
2. 13-0000 Business and Financial Operations Occupations: consisting of 13 occupations, including accountants, auditors, management and financial analysts, personal financial advisors, fraud examiners, and tax preparers, examiners, collectors, and revenue agents,
3. 43-0000 Office and Administrative Support Occupations: consisting of nine primarily clerical occupations, including billing, payroll, cost, and rate clerks, and bookkeepers.

Professional Accounting Applications of the O*NET

Data from the O*NET has been used in academic accounting research, but we are unaware of *professional* accounting applications of the O*NET; might the O*NET benefit accounting professionals and firms? And if so, specifically how? The following ten applications, largely adapted from Tippins and Hilton (2009), hold relevance to professional accountancy work:

1. *Defining accounting jobs and positions.* Because of its extensive—some argue excessive—listing of required occupational skills and knowledge, the O*NET provides

⁵ The O*NET is also an important career counseling resource in middle, vocational, technical and high schools, colleges and universities, and in military career counseling and rehabilitation centers. In addition, the U.S. Army and Marines classify occupations partially based on the O*NET taxonomy (Tippins and Hilton 2009).

⁶ The precise number depends on the definition of an “accounting-related” occupation.

TABLE 1
O*NET Accounting Occupation Sample Sizes (n) and Sampling Dates

O*NET-SOC Code	Description	n	Date
11-3031.01	Treasurers and Controllers	173	Jun-06
13-1051.00	Cost Estimators	28	Jun-08
13-1072.00	Compensation, Benefits, and Job Analysis Specialists	20	Jun-09
13-1111.00	Management Analysts	81	Dec-05
13-2011.01	Accountants	192	Jun-09
13-2011.02	Auditors	25	Jun-08
13-2031.00	Budget Analysts	114	Jun-08
13-2051.00	Financial Analysts	87	Dec-05
13-2052.00	Personal Financial Advisors	93	Jun-07
13-2061.00	Financial Examiners	106	Dec-05
13-2081.00	Tax Examiners, Collectors, and Revenue Agents	123	Jul-05
13-2082.00	Tax Preparers	135	Dec-05
13-2099.01	Financial Quantitative Analysts	N&E	N&E
13-2099.04	Fraud Examiners, Investigators, and Analysts	N&E	N&E
43-3011.00	Bill and Account Collectors	144	Jun-09
43-3021.01	Statement Clerks	81	Dec-05
43-3021.02	Billing, Cost, and Rate Clerks	208	Dec-04
43-3021.03	Billing, Posting, and Calculating Machine Operators	86	Jul-05
43-3031.00	Bookkeeping, Accounting, and Auditing Clerks	120	Jun-09
43-3051.00	Payroll and Timekeeping Clerks	115	Jun-09
43-3061.00	Procurement Clerks	214	Jul-04
43-3071.00	Tellers	88	Jun-09
43-4011.00	Brokerage Clerks	67	Dec-05

N&E = new and emerging occupation—data not yet available ([National Center for O*NET Development 2009](#)).

a useful starting point for writing accounting job descriptions. For example, the O*NET could help define the minimum education requirements for a new, not-for-profit organization's accounting position, or the knowledge and skill tests that could be administered to determine the competence of applicants. The O*NET is also an important and useful resource for considering the redesign of accounting positions as organizational needs for accounting services evolve.

2. *Recruiting.* The O*NET's focus on entry-level positions makes it an important resource for recruiting accounting professionals and paraprofessionals. The O*NET can help structure and clarify the recruiting process by helping to build descriptions of required knowledge, ability and skills (e.g., [Dorman 2009](#)) and in structuring job interviews around required competencies (e.g., [DeLuca and Hirsh 2009](#)).
3. *Designing compensation and performance evaluation systems.* O*NET data can contribute to designing compensation and performance evaluation systems by defining the required knowledge, skill, and abilities required for accounting positions, and in determining appropriate compensation for positions. Example applications of the O*NET to the design of compensation systems include [DeLuca and Hirsh \(2009\)](#) and National Center for O*NET Development (2011); example applications of the O*NET to the design of performance evaluation systems include [Jeanneret \(2009\)](#) and [Anderson \(2009\)](#).

4. *Benchmarking of existing or proposed positions.* Existing or proposed accounting positions can be assessed, i.e., benchmarked, against the standardized O*NET occupational categories of accounting work, as a means of determining their minimal requirements, organizational rank, or compensation.
5. *Designing training and development systems.* The O*NET includes data on expected on-the-job and preparatory training by occupation. Example applications of the O*NET to development and training programs (e.g., [Dorman 2009](#); [Ryan and Pearlman 2009](#)) suggest that O*NET data could potentially help structure training and development programs for accounting professionals and paraprofessionals.
6. *Compliance with governmental requirements.* The increasingly global labor market demands means of assessing non-U.S. accountants' skills and abilities in relation to job demands. O*NET data can potentially contribute to this need by helping to identify and meet U.S. visa requirements for admitting foreign workers, and in aligning job descriptions with the database of occupational categories that are specified by the U.S. Customs and Immigration Service ([Ryan and Pearlman 2009](#)). In addition, Section 404 of the Sarbanes-Oxley Act requires evaluations of the adequacy of corporate systems of internal control. The O*NET could assist these evaluations by mapping the levels of accounting knowledge and skills that are required by the organizational control system to the standardized levels of accounting knowledge and skill that are found, listed by occupation, in the O*NET data.
7. *Job clustering.* The standardized descriptions and comprehensive taxonomy of O*NET occupations can facilitate job clustering, i.e., identifying the relations and similarities among accounting positions. Such clustering could help in identifying career and training progressions and advancements within and between positions.
8. *Person-job matching.* The O*NET has been used extensively to create systems for matching individuals to positions, most often by state employment agencies, but also by individual employers (e.g., [Dorman 2009](#); [Ryan and Pearlman 2009](#)). Hence, assessing the fit of potential entrants to accounting positions is a potentially useful accounting application of the O*NET.
9. *Strategic HR planning.* The O*NET can be useful in identifying and filling knowledge and skill gaps within organizations. For example, the O*NET could help identify the skills, knowledge, and other attributes that are needed to successfully start a forensic accounting division in a public accounting practice (see O*NET Occupation #13-2099.04—Fraud Examiners, Investigators, and Analysts). Alternatively, existing O*NET applications include use as an aid to determine how to best relocate and reassign workers in a corporate downsizing ([National Center for O*NET Development 2009](#)) and in determining which jobs were candidates for “greening,” i.e., targeted for reducing waste and energy consumption ([Anderson 2009](#)).
10. *Linking to, and building upon, the O*NET in competency models of accounting work.* Several recent efforts attempt to identify the needed skills and attributes of professional accounting work, including the 1960s' AICPA-sponsored analysis of accounting work ([Roy and MacNeill 1963, 1966](#)), and the AICPA-sponsored 1999 core accounting competencies (CACs; [AICPA 1999](#)). But no evidence exists that these efforts build upon, or relate to, the characteristics of accounting work that are identified in the O*NET, or identify the unique and common attributes of accounting versus nonaccounting occupations. Future efforts to identify the skills and knowledge needed for accounting work can build upon the considerable existing resources and specifications that are found in the O*NET. To illustrate such possibilities, [Jeanneret \(2009\)](#) illustrates the use of the O*NET for developing competency models for jobs in the refining and insurance industries.

O*NET Applications in Accounting Research

How has the O*NET informed accounting scholarship? How might it be applied to issues in accounting and auditing employment and HR management? This section reviews the small corpus of accounting research that uses the O*NET, links O*NET data and variables to the [Almer et al. \(2005\)](#) framework for considering the relationship between accounting firms and their auditor-employees, and considers four additional O*NET applications in accounting research.

Existing Studies

A search of published literature and working papers identified five accounting-relevant O*NET papers. These five papers utilize data from O*NET (V12) to describe or compare characteristics of accounting work with other professions. Chen et al. (forthcoming) assessed the accounting-relevant validity of the O*NET by comparing O*NET job descriptions with one outside-professional accounting source, i.e., the Holland model of occupations ([Hogan and Blake 1999](#); [Holland 1959, 1985](#)), and two within-professional accounting sources: the 1967 ([Roy et al. 1967](#)) and 1999 ([AICPA 1999](#)) AICPA core competency analyses. Results indicated high commonality and convergence between the O*NET accounting job descriptions and the within-professional accounting sources. In contrast, Holland model descriptions of accounting work evidenced low validity and convergence, i.e., poor agreement to within-accountancy sources.

[Chen et al. \(2010\)](#) used O*NET data to investigate hypotheses derived from the “Discover” career counseling model and software, which asserts that accounting is an “outlier” profession relative to engineering, health care, and law. Results indicated that accounting shares many attributes with professional law and engineering and that, among the studied professions, healthcare best approximates an “outlier” profession. The first study reported in [Bryant et al. \(2011\)](#) used the O*NET to compare the creativity demands of accounting work: (1) with three other professions, (2) with the population of U.S. occupations represented in the O*NET, and (3) within sub-areas of accounting work. Results indicated that accounting work requires no less creativity than do three competing professions and the data set of U.S. occupations listed in the O*NET. Comparisons within sub-areas of accounting indicated that financial accounting work requires more creativity than does auditing, taxation, and managerial accounting work.

[Madsen \(2011a\)](#) investigated the extent of standardization of accounting work in three occupations: (1) bookkeepers, (2) accountants, and (3) auditors. Surprisingly, results indicated that accountants’ and auditors’ work was highly standardized while bookkeeping work was not. [Wier et al. \(2010\)](#) used O*NET data to test the hypothesis that accounting, and particularly auditing, work afforded lower levels of autonomy than do other professions and occupations. Results indicated that accounting work afforded no less work autonomy than three competing professions and more work autonomy than the population of U.S. occupations that are listed in the O*NET.

Potential Applications

One approach to considering potential applications of the O*NET in accounting scholarship is to consider its usefulness in relation to an existing framework for investigating relations between accounting employers and employees. [Almer et al. \(2005, Figure 1\)](#) propose a framework for considering the relationship between accounting firms and their auditor-employees. Table 2 links the [Almer et al. \(2005\)](#) framework variables with counterparts in the O*NET to the related O*NET content model domains, categories, and related variables. Table 2, Panels A–E link O*NET domains, categories, and variables to [Almer et al. \(2005\)](#) variables related to the value received by firms from their auditor employees, i.e., to [Almer et al. \(2005, Figure 1, column 1\)](#). Table 2, Panels

TABLE 2

O*NET Variables Related to Framework of Relations between Public Accounting Firms and Their Auditors

Panel A: Variables Related to Value Received by Firm, Framework Variable: Professional Contributions to Firm and Degree of Expertise

O*NET Domain: Worker Characteristics

O*NET Category: Abilities—Cognitive

O*NET Variables:

<p>Verbal Abilities</p> <ul style="list-style-type: none"> 1.A.1.a.1 Oral Comprehension 1.A.1.a.2 Written Comprehension 1.A.1.a.3 Oral Expression 1.A.1.a.4 Written Expression <p>Idea Generation/Reasoning Abilities</p> <ul style="list-style-type: none"> 1.A.1.b.1 Fluency of Ideas 1.A.1.b.3 Problem Sensitivity 1.A.1.b.4 Deductive Reasoning 1.A.1.b.5 Inductive Reasoning 1.A.1.b.6 Information Ordering 1.A.1.b.7 Category Flexibility <p>Quantitative Abilities</p> <ul style="list-style-type: none"> 1.A.1.c.1 Mathematical Reasoning 1.A.1.c.2 Number Facility 	<p>Memory</p> <ul style="list-style-type: none"> 1.A.1.d.1 Memorization <p>Perceptual Abilities</p> <ul style="list-style-type: none"> 1.A.1.e.1 Speed of Closure 1.A.1.e.2 Flexibility of Closure 1.A.1.e.3 Perceptual Speed <p>Spatial Abilities</p> <ul style="list-style-type: none"> 1.A.1.f.1 Spatial Orientation 1.A.1.f.2 Visualization <p>Attentiveness</p> <ul style="list-style-type: none"> 1.A.1.g.1 Selective Attention 1.A.1.g.2 Time Sharing
--	--

Panel B: Variables Related to Value Received by Firm, Framework Variable: Professional Contributions to Firm and Degree of Expertise

O*NET Domain: Worker Requirements

O*NET Categories: Basic Skills, Cross-Functional Skills, and Technical Skills

O*NET Category

O*NET Variables

O*NET Category	O*NET Variables	
Basic Skills	Content	Process
	2.A.1.a Reading Comprehension	2.A.2.a Critical Thinking
	2.A.1.b Active Listening	2.A.2.b Active Learning
	2.A.1.c Writing	2.A.2.c Learning Strategies
	2.A.1.d Speaking	2.A.2.d Monitoring
	2.A.1.e Mathematics	
	2.A.1.f Science	
Cross-Functional Skills	Social Skills	Complex Problem-Solving Skills
	2.B.1.a Social Perceptiveness	2.B.2.i Complex Problem Solving
	2.B.1.b Coordination	
	2.B.1.c Persuasion	
	2.B.1.d Negotiation	
	2.B.1.e Instructing	

(continued on next page)

TABLE 2 (continued)

O*NET Category	O*NET Variables	
Technical Skills	Technical Skills	Resource Management Skills
	2.B.3.m Quality Control Analysis	2.B.5.a Time Management
		2.B.5.b Management of Financial Resources
	Systems Skills	2.B.5.c Management of Material Resources
	2.B.4.e Judgment and Decision Making	2.B.5.d Management of Personnel Resources
	2.B.4.g Systems Analysis	
	2.B.4.h Systems Evaluation	

Panel C: Variables Related to Value Received by Firm, Framework Variable: Professional Contributions to Firm and Degree of Expertise

O*NET Domain: Worker Requirements

O*NET Categories: Knowledge, Education

O*NET Category	O*NET Variables	
Knowledge	Business and Management	Mathematics and Science
	2.C.1.a Administration and Management	2.C.4.a Mathematics
	2.C.1.b Clerical	Arts and Humanities
	2.C.1.c Economics and Accounting	2.C.7.a English Language
	2.C.1.d Sales and Marketing	2.C.7.b Foreign Language
	2.C.1.e Customer and Personal Service	Law and Public Safety
	2.C.1.f Personnel and Human Resources	2.C.8.b Law and Government
	Manufacturing and Production	Communications
	2.C.2.a Production and Processing	2.C.9.a Telecommunications
Education	Education Level in Specific Subjects	
	2.D.3.b Business Vocational	
	2.D.3.c English/Language Arts	
	2.D.3.d Oral Communication	
	2.D.3.e Languages	
	2.D.3.f Basic Math	
	2.D.3.g Advanced Math	

Panel D: Variables Related to Value Received by Firm, Framework Variable: Professional Contributions to Firm and Degree of Expertise

O*NET Domain: Experience Requirements

O*NET Category: Licensing

O*NET Variables: Specific License or Certificate Required

- 3.D.2.a Post-Secondary Degree
- 3.D.2.b Graduate Degree
- 3.D.2.c On-the-Job Training
- 3.D.2.d Examination
- 3.D.2.e Character References
- 3.D.4 Additional Education and Training
- 3.D.5 Organization and Agency Requirements

(continued on next page)

TABLE 2 (continued)

Panel E: Variables Related to Value Received by Firm, Framework Variable: Agent (Employee) Effort and Shirking

O*NET Domain: Worker Characteristics

O*NET Category: Work Style

O*NET Variables

Achievement Orientation

- 1.C.1.a Achievement/Effort
- 1.C.5.a Dependability
- 1.C.1.b Persistence

Conscientiousness

- 1.C.1.c Initiative

Panel F: Variables Related to Value Received by Auditors, Framework Variables: Salary, Benefits and Deferred Compensation, Development, Flexibility

O*NET Category: Work Values

Framework Variable	O*NET Domain	O*NET Variables	
Salary	Workforce Characteristics	Salary (from Bureau of Labor Statistics (BLS) Data) (See Appendix B)	
Benefits & Deferred Compensation	Worker Characteristics	Support 1.B.2.e.1 Company Policies and Practices	Working Conditions 1.B.2.b.4 Compensation
Development	Worker Characteristics	Recognition 1.B.2.c.1 Advancement 1.B.2.c.2 Recognition 1.B.2.c.3 Authority 1.B.2.c.4 Social Status	
Flexibility	Worker Characteristics	Working Conditions 1.B.2.b.1 Activity 1.B.2.b.2 Independence 1.B.2.b.3 Variety 1.B.2.b.4 Compensation 1.B.2.b.5 Security 1.B.2.b.6 Working Conditions	Support 1.B.2.e.1 Company Policies and Practices 1.B.2.e.2 Supervision, Human Relations 1.B.2.e.3 Supervision, Technical
		Relationships 1.B.2.d.1 Co-workers 1.B.2.d.2 Social Service 1.B.2.d.3 Moral Values	

(continued on next page)

TABLE 2 (continued)

Panel G: Variables Related to Value Received by Auditors, Framework Variable: Personal Preferences

O*NET Domain: Worker Characteristics

O*NET Category	O*NET Variables	
Work Values	Achievement	Support
	1.B.2.a.1 Ability Utilization	1.B.2.e.1 Company Policies and Practices
	1.B.2.a.2 Achievement	1.B.2.e.2 Supervision, Human Relations
	Working Conditions	1.B.2.e.3 Supervision, Technical
	1.B.2.b.1 Activity	Independence
	1.B.2.b.3 Variety	1.B.2.f.1 Creativity
	1.B.2.b.5 Security	1.B.2.f.2 Responsibility
	1.B.2.b.6 Working Conditions	1.B.2.f.3 Autonomy
	Relationships	
	1.B.2.d.1 Co-workers	
	1.B.2.d.2 Social Service	
	1.B.2.d.3 Moral Values	
	Work Style	Social Influence
1.C.2.b Leadership		1.C.5.b Attention to Detail
		1.C.5.c Integrity
Interpersonal Orientation		Practical Intelligence
1.C.3.a Cooperation		1.C.7.a Innovation
1.C.3.b Concern for Others		1.C.7.b Analytical Thinking
1.C.3.c Social Orientation		
Adjustment		
1.C.4.a Self Control		
1.C.4.b Stress Tolerance		
1.C.4.c Adaptability/Flexibility		

Source of framework: [Almer et al. \(2005, Figure 1\)](#).Source for O*NET variables: O*NET Resource Center (undated #1), except for salaries, which are from [U.S. Bureau of Labor Statistics \(2009b\)](#).

F and G link O*NET constructs and variables to [Almer et al. \(2005\)](#) variables related to the value received by auditor employees from their work, i.e., to [Almer et al. \(2005, Figure 1, column 2\)](#).

Table 2 maps relevant [Almer et al. \(2005\)](#) variables to three levels of description in the O*NET content model: domains, categories, and variables. O*NET *domains* reference the O*NET content model domains shown in Figure 1. O*NET *categories*, the second level of description, group-related variables within the six domains. Finally, O*NET *variables*, organized within categories, reference data elements that are available in the database. Table 2 also includes the reference identifier codes for each variable, for example, 1.A.1.a.1 = oral comprehension, to ease variable identification within the O*NET database. Table 2 illustrates both the large number of relevant O*NET variables for accounting and auditing work, and also the sometimes daunting complexity of working with the O*NET data set.

We next consider four additional potential applications of the O*NET to accounting scholarship:

1. *Changing knowledge and skill requirements of accounting work.* Periodically, writers assert that the nature of professional accounting practice has fundamentally changed. For example, [Elliott \(1992, 1994, 1995\)](#) so asserts for the period beginning around 1990, while [Roy and MacNeill \(1963, 1966\)](#) make this assertion for the period beginning around 1960. But periodic claims as to the changing nature of accounting knowledge and skill are largely uninvestigated, leading to several fundamental questions: specifically what about accounting work has (and has not) changed? And specifically when did these changes occur? O*NET data on accounting work begins in 1998 (O*NET 98) and extends through ~ 2010 (V15, released in June 2010). This 12-year O*NET data set offers the possibility of quantitatively testing the validity of claims as to the changing nature of accounting practice, using a data set whose rigorous sampling methods promise higher levels of external validity than are present in alternative samples. This data set could also provide a basis for investigating whether the nature of auditing and accounting work changed following passage of the Sarbanes-Oxley Act (cf. [Murthy and Ragland 2009](#)).
2. *Changing uses of technology in accounting work.* Following from the previous suggestion, the technologies that underlie accounting work have evolved from paper-and-pencil bound journals and ledgers to highly sophisticated enterprise-wide systems ([Elliott 1992](#)). But have these changes in technology changed the set of relevant skills and knowledge required of professional accountants (e.g., [Bryant and Hunton 2000](#); [Hunton 2002](#); [Vera-Muñoz et al. 2006](#))? The O*NET T2 Tool and Technology Database (T2DB) identifies the technology demands, i.e., machines, equipment (i.e., tools) and IT hardware and software (i.e., technologies) of occupations ([O*NET Online 2011](#)). Data on the technology requirements of occupations is based on job analysts' evaluations of occupational task demands, which include reviewing task descriptions of O*NET Internet searches, including visiting professional associations—websites and analyzing university curricula syllabi. Currently, T2DB identifies over 43,000 tools and technologies that are used in 629 occupations. While only two versions (2006, 2009) of the T2DB exist, the T2DB provides a rich, comprehensive cross-sectional description of technology demands of occupations. Although unused in accounting research, the T2DB holds promise for investigations of the technology demands of accounting work, which might be combined with earlier data regarding accounting technologies (e.g., [Roy and MacNeill 1963, 1966](#)), to support a longitudinal investigation of technological evolution within professional accountancy work.
3. *Tracking the life cycles of accounting occupations.* The birth, growth, and decline of sub-areas of accounting work (e.g., taxation versus managerial accounting) are largely uninvestigated in accounting research. To the extent such issues are investigated, it is largely within a context of the qualitative changes in moral and ethical values within the profession (e.g., [Boland 1981, 1982](#); [Richardson 1988](#); [Zeff 1970, 1971](#)), rather than quantitative investigation of the nature and evolution of accounting work. The O*NET allows for the tracking, and quantitative investigation, of the evolving nature of employment in professional accounting. Hence, this aspect of the O*NET directly responds to [ACAP's \(2008\)](#) call for recurring data on the demand for professional accountants and creates the possibility for investigating the life cycles of sub-disciplines of accounting work.

For example, demand for some accounting occupations, e.g., forensics and fraud investigation ([AICPA 2010](#); [Curtis 2008](#); [Singleton and Singleton 2010](#)), is rapidly growing, while other accounting occupations, e.g., payroll and timekeeping clerks ([O*NET Online 2010](#)), are declining in demand. What accounting-relevant skill and knowledge sets are in ascendancy; which are in decline? What predicts the areas of skill and knowledge growth and decline in accounting work? Within which industries is the demand for accounting work growing versus declining? In addition, although the O*NET does not

directly include information on occupational outsourcing, it may be combined with other sources, to investigate, for example, how outsourcing has changed the U.S. demand for differing accounting, e.g., professional versus paraprofessional, services (Ellram et al. 2008; Nicholson et al. 2006)?

4. *Within-profession variation.* This paper largely assumes that accounting is a unitary, homogeneous profession. But the work of corporate managerial accountants differs in important ways from that of tax auditors, which also differs from the work of accountants who prepare and analyze financial statements. How can accounting curriculums best reach a compromise in educating future professionals for the diverse demands of sub-areas of accounting work? Which areas of accounting work receive the highest and lowest average compensation, and why? O*NET data can be useful in exploring the similarities and differences across accounting-relevant occupations. As one example of such an application, Bryant et al. (2011) provide evidence from O*NET data indicating that, surprisingly, financial accounting work requires more creativity than does auditing, taxation, and managerial accounting work.

LIMITATIONS OF THE O*NET

In 2005, a labor economist recommended that we investigate the O*NET in response to our persistent (and likely annoying) questions regarding how to best empirically explore the nature of professional accountancy and auditing work. Our resulting experiences suggest that the O*NET is a useful, but demanding, and often-frustrating, resource. The accounting-relevant limitations of the O*NET include the following:

1. *Overly Broad Categories.* Some of the O*NET categories of accounting work are broad and nebulous. For example, SOC Code 13-2011.01, i.e., the occupation of “accountant,” includes CPAs, staff accountants, accounting managers, cost accountants, business analysts, and accounting supervisors. Because there are no separate classifications for public versus private accountants, or managerial and governmental accountants, most job-holders in these diverse accounting occupations are subsumed in the general “accountant” classification. Overly broad occupational categories make the analyses of some within-occupation differences (e.g., taxation versus managerial accounting) in accounting work problematic.
2. *Complexity and “User Hostility.”* The O*NET is large and complex. The most recent version includes 22 files (see Appendix A, Table 3, Panel C) that, in text form, demand 7.4MB of storage space. And some important data, e.g., on salaries and wages, are included in a *supplemental*, i.e., additional, data set (see Appendix B). Identifying, restructuring, organizing, isolating, and where needed linking to, the data that is relevant to a particular accounting research question can require months of sustained effort. Researcher start-up costs are substantial. One experienced O*NET user describes it as a “user hostile” database (cf. Tippins and Hilton 2009).
3. *Data Lags and Sampling Errors.* Although the O*NET annually lists new and emerging occupations (National Center for O*NET Development 2009) and new and emerging tasks within existing occupations (O*NET Resource Center undated #4), there are lag periods between the establishment and growth of an occupation and its availability in O*NET data. For example, only a reduced data set is available on fraud investigators, because of the relatively recent emergence of this occupation. Possibly as a partial result of these lags, the database is missing at least some data on most “emerging economy” occupations, e.g., knowledge and service occupations are under-represented, while declining occupations,

e.g., agriculture, mining, and manufacturing, are over-represented. This limitation restricts the usefulness of the O*NET for analyzing trends in accounting work.

4. *Entry-Level Occupational Focus.* The O*NET emphasizes entry-level jobs, meaning that there is higher representation (i.e., larger sampling) among lower- than higher-level jobs in all occupations. Hence, the O*NET is an excellent source of information about entry- and lower-level accountants and auditors; it is less useful and informative with respect to public accounting and auditing firm partners and managers. A notable, and surprising, exception is SOC Code 11-3031.01, treasurers and controllers—an executive-level accounting position.
5. *Omitted Individual-Level Data.* To protect the anonymity of individual respondents, the O*NET intentionally excludes micro-level, i.e., individual, data (Tippins and Hilton 2009), and attempts to ensure that these data are undiscoverable using data-mining methods. This limitation means that it is infeasible to include individual-level control variables, e.g., salary, personality, motivation, age, in O*NET analyses. Hence, many control variables, that are common in behavioral accounting research, are unavailable in O*NET data.
6. *Omitted Firm-Level Data.* Similarly, to protect the anonymity of responding organizations, the O*NET intentionally excludes organization-level data. Because of this limitation, it is usually infeasible to include firm-level and even industry-level control variables, e.g., salary by position, organizational rank or position, in O*NET analyses.
7. *Annual Updating Burden.* The O*NET's annual updating ensures data currency, but imposes a maintenance burden, since retaining a current data set requires that all files must be annually downloaded and organized. Not all researchers are willing to invest in a data set that requires an annual maintenance commitment.
8. *Missing Professional Certification.* The O*NET contains minimal data related to professional accounting certifications. For example, the O*NET provides data on the extent of education required by accountants but no specific data on required certifications (which is probably at least a partial function of limitation #1). Given the increasing importance and diversity of accounting-relevant professional certifications (e.g., CPA, CMA, CGA, CIA, CISA, CISSP), this is an important data omission, which limits the usefulness of O*NET to investigations of the implications of changes in professional accountancy licensure (cf. Jacob and Murray 2006).
9. *Potential Rating Biases.* Although no existing validation efforts suggest the existence of the following biases in O*NET data, assessments of the O*NET's validity propose two potential sources of ratings bias (Tippins and Hilton 2009). First, a social desirability bias (e.g., see Nederhof 1985) may lead job-holders to overstate the importance and value of socially desirable job-related attributes, such as technology knowledge and interpersonal skills, and to understate the importance of socially undesirable job-related attributes, such as jobs with low levels of autonomy, or dangerous or socially devalued (e.g., cleaning toilets) working conditions. Second, job analysts' lack of direct, on-the-job experience may lead them to inaccurately perceive job characteristics. The presence of either bias could lessen the validity of inferences resulting from the analysis of O*NET data.
10. *Variability in Construct Validity.* Considerable variability exists in the validity of the constructs that underlie the O*NET (Handel 2009; Tippins and Hilton 2009). For example, constructs within the abilities O*NET domain are well-grounded in research; in contrast, many skill constructs, e.g., "trunk strength," lack a supporting research base that would establish their validity. Hence, accounting professionals and scholars should consider the O*NET validation literature (much of it cited herein) in assessing whether the constructs that they deem of interest have sufficient validity to justify their use and application.

11. *Missing Gender Data.* The role of gender in professional accounting matters to both accounting research and practice (Hooks and Higgs 2002). The primary O*NET data set does not include gender data. However, gender data can be obtained, by specific request, from the U.S. Department of Labor. Unfortunately, missing data make the available gender data of little practical or scholarly use in accounting investigations.
12. *Focus and Level of Analysis.* While potentially valuable, O*NET-based research is no substitute for well-executed field research. The O*NET offers the possibility of “thin,” i.e., multiple-occupation investigations that provide insight into professional accounting by comparison with other occupations. In contrast, well-executed case and field work promises “thick,” contextually rich investigations of the nature and evolution of professional accounting practices (e.g., see Ahrens and Chapman 2006, 2007). Hence, O*NET research will provide larger sample, multi-occupation, quantitative investigations; in contrast, well-executed field work provides small sample, focused, qualitative, contextually rich investigations. One method and data set does not substitute for the other.

SUMMARY

The O*NET is an important resource for accounting practice and research because it is under-used, is supported by unsurpassed financial resources, employs a rigorous sampling method that results in representative samples, and is among the only employment data set that contains both long-term longitudinal and cross-sectional data about professional accounting and auditing work. Its across-occupation breadth, frequent updates, and large number of descriptive variables, i.e., depth, is unrivaled as a data source about U.S. occupations.

But the O*NET’s accounting-relevant limitations include overwhelming complexity, user “unfriendliness” bordering on hostility, missing data, idiosyncratic groupings of accounting occupations, no individual- or firm-level data, and absence of data on most high-level accounting occupations. Ultimately, the usefulness of the O*NET depends on the research questions posed. But scholars investigating the (changing?) nature of professional accounting work will find, after several months of digging and frustration, that the O*NET is a valuable, under-utilized resource gem.

REFERENCES

- Advisory Committee on the Auditing Profession (ACAP). 2008. *Final Report on the Auditing Profession to the U.S. Department of the Treasury*. New York, NY: Department of the Treasury.
- Advisory Panel for the Dictionary of Occupational Titles. 1993. *The New Dot: A Database of Occupational Titles for the Twenty-First Century (Final Report)*. Washington, D.C.: U.S. Department of Labor, Employment, and Training Administration.
- Ahrens, T., and C. S. Chapman. 2006. Doing qualitative field research in management accounting: Positioning data to contribute to theory. *Accounting, Organizations and Society* 31 (8): 819–841.
- Ahrens, T., and C. S. Chapman. 2007. Management accounting as practice. *Accounting, Organizations and Society* 32 (1-2): 1–27.
- Almer, E. D., J. L. Higgs, and K. L. Hooks. 2005. A theoretical framework of the relationship between public accounting firms and their auditors. *Behavioral Research in Accounting* 17 (1): 1–22.
- American Institute of Certified Public Accountants (AICPA). 2008. *The Supply of Accounting Graduates and the Demand for Public Accounting Recruits*. Accessed February 9, 2010. Available at: http://ceae.aicpa.org/NR/rdonlyres/F043134-7E2B-45C9-8D71-A0D3FB68483C/0/2009_TrendsReport.pdf
- American Institute of Certified Public Accountants (AICPA). 2010. *Overview of Certified in Financial Forensics (CFF) Credential*. Accessed April 25, 2011. Available at: <http://www.aicpa.org/InterestAreas/ForensicAndValuation/Membership/Pages/Overview%20Certified%20in%20Financial%20Forensics%20Credential.aspx>

- American Institute of Certified Public Accountants, Board of Examiners. 2008. *Practice Analysis*. Accessed March 16, 2011. Available at: http://www.aicpa.org/BecomeACPA/CPAExam/ExaminationContent/ContentDevelopment/DownloadableDocuments/2008_Practice_Analysis_Technical_Report.pdf
- American Institute of Certified Public Accountants (AICPA). 1999. *The AICPA Core Competency Framework for Entry into the Accounting Profession*. Accessed February 18, 2008. Available at: <http://vwww.aicpa.org/edu/corecomp.htm>
- Anderson, L. 2009. Uses of O*NET in human resource management. Presentation to the Panel to Review the Occupational Information Network (O*NET). Accessed July 2009. Available at: <http://www7.nationalacademies.org/cfe/Anderson%20Power%20point.pdf>
- Andreassi, J. K., and C. A. Thompson. 2007. Dispositional and situational sources of control: Relative impact on work-family conflict and positive spillover. *Journal of Managerial Psychology* 22: 722–740.
- Boland, R. J. 1981. The accounting professional—Ethics, responsibility and liability. *Accounting Review* 56 (1): 246–248.
- Boland, R. J. 1982. Myth and technology in the American accounting profession. *Journal of Management Studies* 19 (1): 109–127.
- Bryant, S. M., and J. E. Hunton. 2000. The use of technology in the delivery of instruction: Implications for accounting educators and education researchers. *Issues in Accounting Education* 15 (1): 129–162.
- Bryant, S., D. Stone, and B. Wier. 2011. Accountants, accounting work and creativity. *Behavioral Research in Accounting* 23 (1): 45–64.
- Chen, C., K. Jones, A. Scarlata, and D. Stone. Forthcoming. Does the Holland Model of Occupational Choice (HMOC) Perpetuate the Beancounter-Bookkeeper (BB) Stereotype of Accountants? *Critical Perspectives on Accounting*.
- Chen, C., K. Jones, A. Scarlata, and D. Stone. 2010. *Is Accounting an “Outlier” Profession? A Comparison of Accounting, Engineering, Healthcare, and Law*. Working paper, Lexington, KY, Von Allmen School of Accountancy.
- Curtis, G. E. 2008. The model curriculum in fraud and forensic accounting and economic crime programs at Utica College. *Issues in Accounting Education* 23 (4): 581–592.
- Davila, T. 2005. An exploratory study on the emergence of management control systems: Formalizing human resources in small growing firms. *Accounting, Organizations and Society* 30 (3): 223–248.
- DeLuca, D., and W. Hirsh. 2009. Comments on the occupational information network (O*NET). *Letter from the Workforce Sciences Group at Mercer to the Panel to Review the Occupational Information Network (O*NET)*. Accessed July 2009. Available at: <http://www7.nationalacademies.org/cfe/Mercer%20Associates%20Comments%20on%20ONET.pdf>
- Dierdorff, E. C., and J. K. Ellington. 2008. It’s the nature of the work: Examining behavior-based sources of work-family conflict across occupations. *Journal of Applied Psychology* 93: 883–892.
- Dierdorff, E. C., and F. P. Morgeson. 2007. Consensus in work role requirements: The influence of discrete occupational context on role expectations. *Journal of Applied Psychology* 92: 1228–1241.
- Dorman, R. 2009. Manpower’s use of O*NET. *Presentation to the Panel to Review the Occupational Information Network (O*NET)*. Accessed July 2009. Available at: <http://www7.nationalacademies.org/cfe/Dorman%20Power%20point.pdf>
- Drake, A. R., J. Wong, and S. B. Salter. 2007. Empowerment, motivation, and performance: Examining the impact of feedback and incentives on nonmanagement employees. *Behavioral Research in Accounting* 19: 71–89.
- Elliott, R. K. 1992. The third wave breaks on the shores of accounting. *Accounting Horizons* 6 (2): 61–85.
- Elliott, R. K. 1994. Confronting the future: Choices for the attest function. *Accounting Horizons* 8 (3): 106–124.
- Elliott, R. K. 1995. The future of assurance services: Implications for academia. *Accounting Horizons* 9 (4): 118–127.
- Ellram, L. M., W. L. Tate, and C. Billington. 2008. Offshore outsourcing of professional services: A transaction cost economics perspective. *Journal of Operations Management* 26 (2): 148–163.
- Gul, F. A., B. H. Andrew, S. C. Leong, and Z. Ismail. 1989. Factors influencing choice of discipline of study—Accountancy, engineering, law and medicine. *Accounting and Finance* (November): 93–101.

- Handel, M. J. 2009. *The O*NET Content Model: Strengths and Limitations, Report Prepared for Review Panel of the Occupational Information Network (O*NET)*. Washington D.C.: National Academy of Science. Available at: <http://www7.nationalacademies.org/cfe/mhandel%20onet%20issues.pdf>.
- Hogan, R., and R. Blake. 1999. John Holland's vocational typology and personality theory. *Journal of Vocational Behavior* 55 (1): 41–56.
- Holland, J. L. 1959. A theory of vocational choice. *Journal of Counseling Psychology* 6 (1): 35–45.
- Holland, J. L. 1985. *Making Vocational Choices: A Theory of Vocational Personalities and Work Environments*. 2nd ed. Englewood Cliffs, NJ: Prentice Hall.
- Hooks, K. L., and J. L. Higgs. 2002. Workplace environment in a professional services firm. *Behavioral Research in Accounting* 14 (1): 105–127.
- Hunton, J. E. 2002. Blending information and communication technology with accounting research. *Accounting Horizons* 16 (1): 55–67.
- Jacob, J., and D. Murray. 2006. Supply-side effects of the 150-hour educational requirement for CPA licensure. *Journal of Regulatory Economics* 30 (2): 159–178.
- Jarvenpaa, M. 2007. Making business partners: A case study on how management accounting culture was changed. *European Accounting Review* 16 (1): 99–142.
- Jeanneret, P. R. 2009. Use of O*NET in job analysis. *Presentation to the Panel to Review the Occupational Information Network (O*NET)*. Accessed July 2009. Available at: <http://www7.nationalacademies.org/cfe/Jeanneret%20PP.pdf>
- Krishnan, J., and J. S. Yang. 2009. Recent trends in audit report and earnings announcement lags. *Accounting Horizons* 23 (3): 265–288. DOI: [10.2308/acch.2009.23.3.265](https://doi.org/10.2308/acch.2009.23.3.265)
- Lindsay, R. M. 1993. Incorporating statistical power into the test of significance procedure: A methodological and empirical inquiry. *Behavioral Research in Accounting* 5: 211–236.
- Lindsay, R. M. 1994. Publication system biases associated with the statistical testing paradigm. *Contemporary Accounting Research* 11 (1): 33–57. DOI: [10.1111/j.1911-3846.1994.tb00435.x](https://doi.org/10.1111/j.1911-3846.1994.tb00435.x)
- Lindsay, R. M. 1995. Reconsidering the status of tests of significance: An alternative criterion of adequacy. *Accounting, Organizations, and Society* 20 (1): 35–53.
- Liu, C., P. E. Spector, and S. M. Jex. 2005. The relation of job control with job strains: A comparison of multiple data sources. *Journal of Occupational and Organizational Psychology* 78: 325–337.
- Madsen, P. E. 2011a. How standardized is accounting? *The Accounting Review* (forthcoming).
- Madsen, P. E. 2011b. Personal communication with authors. Email, May 16, 2011.
- Minnesota Population Center. 2010. IPUMS. Accessed May 2011. Available at: <http://cps.ipums.org/cps/index.shtml>
- Murthy, U. S., and L. Ragland. 2009. Towards an understanding of accounting information systems as a discipline: A comparative analysis of topical coverage in AIS and MIS courses. *AIS Educators' Journal* 4: 1–15.
- National Center for O*NET Development. 2009. *New and Emerging Occupations of the 21st Century: Updating the O*NET®-SOC Taxonomy: Summary and Implementation*. Accessed August 2010. Available at: http://www.onetcenter.org/dl_files/UpdatingTaxonomy2009_Summary.pdf
- National Center for O*NET Development. 2010. *O*NET® Research and Technical Reports*. Accessed July 21, 2010. Available at: <http://www.onetcenter.org/research.html>
- National Center for O*NET Development. 2011. *O*NET Products at Work*. Accessed April, 2011. Available at: http://www.onetcenter.org/dl_files/paw/Products_at_Work.pdf.
- National Science Foundation. undated. *National Survey of College Graduates*. Accessed May 2011. Available at: http://www.nsf.gov/statistics/showsvy.cfm?svy_CatID=3&svy_Seri=7
- Nederhof, A. J. 1985. Methods of coping with social desirability bias: A review. *European Journal of Social Psychology* 15 (3).
- Nicholson, B., J. Jones, and S. Espenlaub. 2006. Transaction costs and control of outsourced accounting: Case evidence from India. *Management Accounting Research* 17 (3): 238–258.
- O*NET Online. 2010. *Summary Report for: 43-3051.00—Payroll and Timekeeping Clerks*. Accessed March 2011. Available at: <http://www.onetonline.org/link/summary/43-3051.00>.
- O*NET Online. 2011. *What's New?* Accessed March 2011. Available at: <http://www.onetonline.org/help/new/>

- O*NET Resource Center. undated #1. *The O*NET® Content Model*. Available at: <http://www.onetcenter.org/content.html>, Accessed September, 2010.
- O*NET Resource Center. undated #2. *O*NET Association Support*. Available at: <http://www.onetcenter.org/endorsements.html>. Accessed August, 2010.
- O*NET Resource Center. undated #4. *Supplemental Database Files*. Available at: <http://www.onetcenter.org/supplemental.html#emerge>, Accessed: August, 2010.
- O*NET Resource Center. undated #5. *Tools and Technology Database*. Available at: http://www.onetcenter.org/supplemental.html#tools_tech, Accessed: April, 2011.
- O*NET Resource Center. undated #6. *Production Database—O*NET® 15.0*. Available at: <http://www.onetcenter.org/database.html?p=3> Accessed September 13, 2011.
- O*NET Resource Center. undated #7. *About O*NET*. Available at: <http://www.onetcenter.org/overview.html> Accessed September 13, 2011.
- O*NET Resource Center. undated #8. *O*NET Resources*. Available at: <http://www.onetcenter.org/> Accessed September 13, 2011.
- O*NET Resource Center. undated #9. *O*NET Developer's Corner*. Available at: <http://www.onetcenter.org/developers.html> Accessed September 13, 2011.
- O*NET Resource Center. undated #10. *O*NET Research and Technical Reports*. Available at: <http://www.onetcenter.org/research.html> Accessed September 13, 2011.
- O*NET Resource Center. undated #11. *O*NET Questionnaires*. Available at: <http://www.onetcenter.org/questionnaires.html> Accessed September 13, 2011.
- O*NET Resource Center. undated #12. *O*NET Crosswalk Search*. Accessed September 13, 2011. Available at: <http://www.onetonline.org/crosswalk>
- Paolillo, G. P., and R. W. Estes. 1982. An empirical analysis of career choice factors among accountants, attorneys, engineers, and physicians. *The Accounting Review* 52 4: 785–793.
- Peterson, N., and American Psychological Association. 1999. *An Occupational Information System for the 21st Century: The Development of O*NET*. Washington, D.C.: American Psychological Association.
- Peterson, N., M. Mumford, W. Borman, P. Jeanneret, and E. Fleishman. 2001. Understanding work using the occupational information network (O*NET): Implications for practice and research. *Personnel Psychology* 54 (2): 451–492.
- Richardson, A. J. 1988. Accounting knowledge and professional privilege. *Accounting, Organizations and Society* 13 (4): 381–396.
- Rowe, C. 2004. The effect of accounting report structure and team structure on performance in cross-functional teams. *The Accounting Review* 79 (4): 1153–1180.
- Roy, R. H., and J. H. MacNeill. 1963. Study of the common body of knowledge for CPAs. *Journal of Accountancy* 116 (6): 55–58.
- Roy, R. H., and J. H. MacNeill. 1966. Horizons for a profession: The common body of knowledge for CPAs. *Journal of Accountancy* 122 (3): 38–50.
- Roy, R. H., and J. H. MacNeill, Carnegie Corporation of New York, and AICPA. 1967. *Horizons for a Profession: The Common Body of Knowledge for Certified Public Accountants*. New York, NY: AICPA.
- Ryan, A. M., and K. Pearlman. 2009. *Summary of Responses to Survey on Use of O*NET in Human Resource Management and Job Analysis*. Paper prepared for the Panel to Review the Occupational Information Network (O*NET). Accessed July 2009. Available at: <http://nrc51/xpedio/groups/dbasse/documents/websupport/051750.pdf>
- Schroeder, D. L., L. Schiffel, and K. A. Smith. 2010. Institute of Management Accountants' annual career issue and salary survey. *Strategic Finance* 61 (12): 20–39.
- Siegel, G., and J. E. Sorensen. 1994. *What Corporate America Wants in Entry-Level Accountants*. New York, NY: Institute of Management Accountants and The Financial Executives Institute.
- Siegel, G., and J. E. Sorensen. 1999. *Counting More, Counting Less: Transformations in the Management Accounting Profession*. Montvale, NJ: Institute of Management Accountants.
- Singleton, T., and A. J. Singleton. 2010. *Fraud Auditing and Forensic Accounting, 4th ed.* Hoboken, N.J.: Wiley.

- Smith, T. J., and C. Campbell. 2006. *The structure of O*NET occupational values*. *Journal of Career Assessment* 14 (4): 437–448.
- Tippins, N., and H. L. Hilton. 2009. A Database for a Changing Economy: Review of the Occupational Information Network. (O*NET, ISBN: 0-309-14770-0). Uncorrected draft release, accessed April 2011. Available at: http://www.nap.edu/catalog.php?record_id=12814
- Tracey, J. B., M. C. Sturman, and M. J. Tews. 2007. Ability versus personality: Factors that predict employee job performance. *Cornell Hotel and Restaurant Administration Quarterly* 48 (3): 313–322.
- U.S. Bureau of Labor Statistics. 2004. *Standard Occupational Classification (SOC) User Guide Home Page*. Accessed September 13, 2011. Available at: <http://www.bls.gov/soc/socguide.htm>
- U.S. Bureau of Labor Statistics. 2008. *Professional and Related Occupations*. Accessed April 13, 2011. Available at: <http://www.bls.gov/oco/oco1002.htm>
- U.S. Bureau of Labor Statistics. 2009a. *Employment Projections by Occupation*. Accessed September 13, 2011. Available at: http://www.bls.gov/emp/ep_table_102.htm
- U.S. Bureau of Labor Statistics. 2009b. *Occupational Employment Statistics, May 2009, National Occupational Employment and Wage Estimates United States*. Available at: http://www.bls.gov/oes/current/oes_nat.htm
- U.S. Bureau of Labor Statistics. 2010. *2010 SOC User Guide: What's New in the 2010 SOC*. Available at: http://www.bls.gov/soc/soc_2010_whats_new.pdf
- U.S. Department of Labor, Employment, and Training Administration. 2008. *O*NET Data Collection Program, Office of Management and Budget Clearance Package Supporting Statement, Volumes I and II*. Raleigh, NC: USDLETA. Accessed July 21, 2010. Available at: http://www.onetcenter.org/dl_files/om3008/Supporting_Statement2.pdf
- Vera-Muñoz, S. C., J. L. Ho, and C. W. Chow. 2006. Enhancing knowledge sharing in public accounting firms. *Accounting Horizons* 20 (2): 133–155.
- Wier, B., S. Bryant, and D. Stone. 2010. *Do Public Accounting Firm Partners Underestimate the Value of Work Autonomy to Top-Performing Staff?* Working paper, Lexington, KY, Von Allmen School of Accountancy.
- Wiita, N. E., and H. T. Palmer. 2009. O*NET in-demand occupations: Estimating skill levels for success. Presentation at 23rd Annual Conference of the Society for Industrial and Organizational Psychology.
- Zeff, S. A. 1970. Rise of accounting profession—From technician to profession, 1896–1936, Carey, J. L. *Business History Review* 44 (3): 416–417.
- Zeff, S. A. 1971. Rise of accounting profession—To responsibility and authority, 1937–1969, Carey, J. L. *Business History Review* 45 (3): 380–381.

APPENDIX A

O*NET DEVELOPMENT, STRUCTURE, AND USE

This appendix provides additional information about the updating, data sources, structure, and potential uses of the O*NET.

STRUCTURE: UPDATING, DATA SOURCES, AND OCCUPATIONAL CODES

Updating and Data Sources

Approximately 100 occupations are updated annually in the O*NET; the selection of occupations for updating is based upon joint consideration of the demand for occupational entrants, i.e., job growth, and the requirement that each occupation be updated quinquennially, i.e., at least twice a decade. Updating an occupation requires obtaining data from seven questionnaires

(questionnaires available at: <http://www.onetcenter.org/questionnaires.html>; O*NET Resource Center undated #11). If the occupation is updated using the “establishment” method, job-holders complete five questionnaires: (1) demographics, education training, and experience, (2) knowledge, (3) work activities, (4) work context, and (5) work style (see Table 3, Panel A). If the occupation is updated using the “occupational expert” method, then occupational experts complete these questionnaires. Regardless of method, occupational analysts complete two questionnaires, based on an analysis of job-holders’ responses regarding abilities and skills.

Except for the work context questionnaire, respondents rate both the level (LV) of a needed attribute and its importance (IM). Table 3, Panel B, from the knowledge questionnaire, presents the O*NET questions that ask respondents to rate the level and importance of “economics and accounting knowledge” to their job.

The current production version of the O*NET includes 22 files (see Table 3, Panel C). In addition to the seven files identified in Panel C, 15 additional files are categorized as “lookup” (for reference), “domain” (a main data source), or “other” (miscellaneous).

Occupational Codes

Development of the 2000 standard occupational classification (SOC) was intended to maximize the usefulness of occupational information collected by the U.S. government. Four levels of aggregation exist in the original 2000 SOC system: 23 major groups, 96 minor groups, 449 broad occupations, and 821 detailed occupations (U.S. Bureau of Labor Statistics 2004). The current O*NET database (15.0) uses the 2010 SOC, although the 2010 SOC implements only minor changes compared to the 2000 version.⁷ The 2010 SOC has 23 major groups, 97 minor groups, 461 broad groups, and 840 detailed occupations.

SOC occupations in both versions consist of six-digit codes (in the format ##-####.). The first two digits represent the major group; the third digit represents the minor group; the fourth and fifth digits represent the broad occupation, while the sixth digit represents the detailed occupation. The O*NET database uses an additional two digits as an extension to the SOC code to account for data collected on more detailed “sub-occupations” (in the format ##-####.##). Only .00 occupations exist in both the O*NET database and the SOC system. To illustrate, 13-2011.00 in the O*NET (and the SOC) is the occupation “Accountants and Auditors.” Occupations 13-2011.01 (Accountants) and 13-2011.02 (Auditors) provide additional detailed data on these sub-occupations only in the O*NET database.

Matching O*NET data to other sources of data, including across O*NET files, is often challenging because of differing available data levels within this (obviously) complex classification system. “Cross-walk” files, i.e., a file that links O*NET data to other data sources, exist at <http://online.onetcenter.org/crosswalk/> (O*NET Resource Center undated #12), but since the .00, .01, and .02 in the O*NET map to the .00 in the SOC and others, there is sometimes duplicate or omitted data that requires time-consuming, manual data manipulation when moving between O*NET data files. Hence, while cross-walks can be useful, they are also time-consuming and demanding (Madsen 2011b).

USING THE O*NET: NEGOTIATING THE O*NET WEBSITE

The current production version of the database can be downloaded from <http://www.onetcenter.org/developers.html> (O*NET Resource Center undated #9), in a single zipped file, or in

⁷ From the 2000 to the 2010 SOC, 359 of the 840 detailed occupations had no change, 453 occupations had small editorial changes, 21 had only a title change, and 7 had a code change without a change in definition (U.S. Bureau of Labor Statistics 2010).

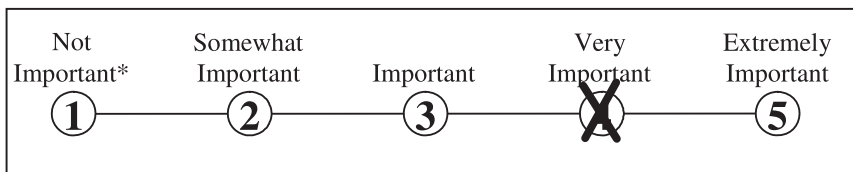
TABLE 3
O*NET Data Sources

Panel A: Seven O*NET Questionnaires, Questions, and Respondents

<u>Questionnaire (File)</u>	<u>Questions</u>	<u>Variables</u>	<u>Respondent</u>
Abilities	52	104	Occupational analyst
Education, Training, and Experience (Demographics)	4	8	Job-holder
Knowledge	33	66	Job-holder
Skills	35	70	Occupational analyst
Work Activities	41	82	Job-holder
Work Context	57	57	Job-holder
Work Styles	16	32	Job-holder
Total	238	419	

Panel B: Example O*NET Questions Regarding the Level and Importance of Economics and Accounting Knowledge

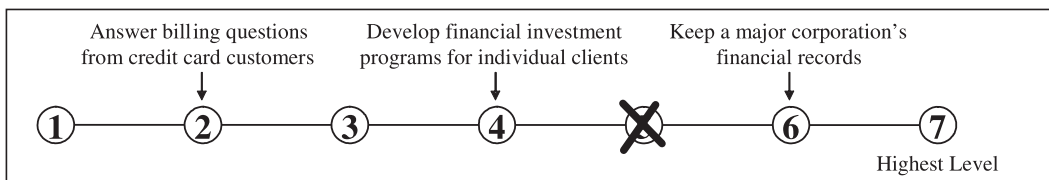
How important is ECONOMICS AND ACCOUNTING knowledge to the performance of your current job?



Mark your answer by putting an X through the number that represents your answer.
Do not mark on the line between the numbers.

* If you rate the knowledge area as Not Important to the performance of your job, mark the one with an X, then skip over question B and proceed to the next knowledge area.

What level of ECONOMICS AND ACCOUNTING knowledge is needed to perform your current job?



Mark your answer by putting an X through the number that represents your answer.
Do not mark on the line between the numbers. Source: O*NET Resource Center (undated #11).

Panel C: O*NET Data Files

- Lookup Files
1. Content Model Reference
 2. Job Zone Reference
 3. Occupation Data
 4. Scales Reference

(continued on next page)

TABLE 3 (continued)

Domain Files

1. Abilities
2. Education, Training, and Experience
3. Knowledge
4. Skills
5. Work Activities
6. Work Context
7. Work Styles
8. Interests
9. Job Zones
10. Task Ratings
11. Task Statements
12. Work Values

Other Files

1. Education, Training, and Experience Categories
2. Level Scale Anchors
3. Occupation Level Metadata
4. Survey Booklet Locations
5. Task Categories
6. Work Context Categories

22 MSAccess, text, or SPSS files (see Table 3, Panel C). We import these text files into an Access database to confirm file integrity before converting to a PASW (formerly SPSS) data set. Each file has a variable that contains the sample size and source (analyst, incumbent, etc.) of the data. The data dictionary provides an in-depth discussion of all data files and variables: <http://www.onetcenter.org/database.html?p=3> (O*NET Resource Center undated #6).

More information about O*NET data collection and content is available: <http://www.onetcenter.org/overview.html> (O*NET Resource Center undated #7) and at <http://www.onetcenter.org/dataCollection.html> (O*NET Resource Center undated #3).

USING THE O*NET: USEFUL LINKS

Useful O*NET Resources and related URLs include:

1. The O*NET Resource Center: <http://www.onetcenter.org/> (O*NET Resource Center undated #8).
2. Download the 14.0 production database, 15.0 development database, or 4.0 analyst databases: <http://www.onetcenter.org/developers.html> (O*NET Resource Center undated #9).
3. Research and technical reports on data collection: <http://www.onetcenter.org/research.html> (O*NET Resource Center undated #10).
4. ContentModel and list of variables included in the six informational domains: <http://www.onetcenter.org/content.html> (O*NET Resource Center undated #1).
5. Data requests and O*NET data questions: onet@ncmail.net
6. Questionnaires: <http://www.onetcenter.org/questionnaires.html> (O*NET Resource Center undated #11).

7. Current Data Dictionary: <http://www.onetcenter.org/database.html?p=3> (O*NET Resource Center undated #6).

APPENDIX B

USING THE O*NET: A DESCRIPTIVE, BETWEEN-PROFESSION ANALYSIS OF WAGES AND EMPLOYMENT

Purpose and Comparison Set

The O*NET domain “Workforce Characteristics” includes data on both labor market information (wages) and occupational outlook (employment projections). To illustrate the confusing, and sometimes frustrating, nature of the O*NET, the “Workforce Characteristics” data, despite being part of the O*NET conceptual model, is not part of the downloadable O*NET database but is instead provided by other U.S. government agencies. Employment and wage data are produced and provided by the Department of Labor, U.S. Bureau of Labor Statistics (BLS), and by state and local employment agencies. Occupational earnings data are obtained by the Occupational Employment Statistics (OES) Survey, which publishes median hourly and annual earnings of workers by occupation (U.S. Bureau of Labor Statistics 2009b). National labor market information is developed by The Office of Occupational Statistics and Employment Projections. Data on wages and long-term employment projections are produced and provided by the U.S. Bureau of Labor Statistics (U.S. Bureau of Labor Statistics 2009a).

The O*NET database is well suited to between-occupation comparisons. Accordingly, we present an illustrative, descriptive comparison regarding how accounting compares with other professions that compete with professional accountancy for entrants (Gul et al. 1989; Paolillo and Estes 1982). Specifically, we compare accounting and finance occupations with two other professions: law and engineering.⁸

Method

The O*NET V14 database contains information about 1,102 detailed occupations. We used a statistical procedure called cluster analysis, coupled with judgmental examination of occupational entry requirements, to include only professional (not clerical) occupations in our study. In identifying professional-only occupations, we included occupations that, according to the O*NET database, require at least a bachelor’s degree.⁹ Of the 1,102 O*NET occupations, 39 are professions in one of three areas: accounting and finance, law, and engineering. In the areas of accounting, law, and engineering, 39 require at least a bachelor’s degree: 10 accounting and finance occupations, 4 law occupations, and 25 engineering occupations. A list of these occupations, by O*NET occupational code, appears in Table 4.

DOL employment and wage data exist for many of the occupations that are included in the O*NET. An impediment to joining O*NET with DOL data lies in their differing occupational codes. As discussed in Appendix A, SOC occupations consist of eight-digit codes (in the format ###-####.##). The DOL data are reported in six-digit codes (in the format ##-#####). The O*NET

⁸ A U.S. Bureau of Labor Statistics (2008) webpage lists “professional and related occupations.” Surprisingly, all of the professions included in our sample *except* accounting and auditing are listed at this site. Hence, one potential impediment to recruiting high-quality entrants to professional accounting, that is implicit at this webpage, is the (common?) perception that accounting is not a profession.

⁹ For example, billing clerks were eliminated from “other” accounting jobs; surveyors, although classified within engineering, were also omitted as nonprofessionals.

TABLE 4

Accounting, Law, and Engineering Occupations Included in Appendix B Analysis

Panel A: Accounting and Legal Occupations

Accounting and Finance (n = 10)

11-3031.01 Treasurers and Controllers
 11-3041.00 Compensation and Benefits Managers
 13-1051.00 Cost Estimators
 13-1111.00 Management Analysts
 13-2011.01 Accountants*
 13-2011.02 Auditors*
 13-2031.00 Budget Analysts
 13-2051.00 Financial Analysts
 13-2052.00 Personal Financial Advisors
 13-2061.00 Financial Examiners

Law (n = 4)

23-1011.00 Lawyers
 23-1021.00 Administrative Law Judges,
 Adjudicators, and Hearing Officers
 23-1022.00 Arbitrators, Mediators, and Conciliators
 23-1023.00 Judges, Magistrate Judges, and
 Magistrates

Panel B: Engineering Occupations (n = 25)

11-9041.00 Engineering Managers
 17-1011.00 Architects, Except Landscape and
 Naval
 17-1012.00 Landscape Architects
 17-2011.00 Aerospace Engineers
 17-2021.00 Agricultural Engineers
 17-2041.00 Chemical Engineers
 17-2051.00 Civil Engineers
 17-2061.00 Computer Hardware Engineers
 17-2071.00 Electrical Engineers
 17-2072.00 Electronics Engineers, Except
 Computer
 17-2081.00 Environmental Engineers
 17-2111.01 Industrial Safety and Health Engineers*
 17-2111.02 Fire-Prevention and Protection
 Engineers*

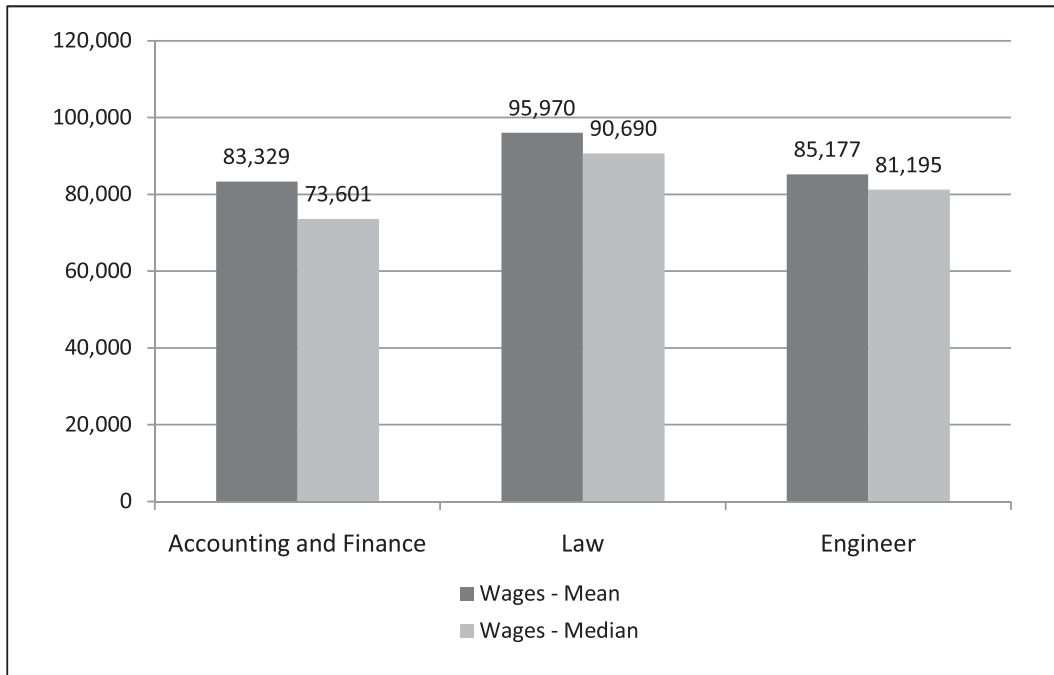
17-2111.03 Product Safety Engineers*
 17-2112.00 Industrial Engineers
 17-2121.01 Marine Engineers*
 17-2121.02 Marine Architects*
 17-2131.00 Materials Engineers
 17-2141.00 Mechanical Engineers
 17-2151.00 Mining and Geological Engineers,
 Including Mining Safety Engineers
 17-2161.00 Nuclear Engineers
 17-2171.00 Petroleum Engineers
 17-3021.00 Aerospace Engineering and Operations
 Technicians
 17-3026.00 Industrial Engineering Technicians
 25-1032.00 Engineering Teachers, Postsecondary

database reports on the most detailed occupations, for example, 13-2011.01 (Accountants) and 13-2011.02 (Auditors), whereas the DOL data report on the summary (.00), higher-level occupations, for example, on 13-2011.00 (Accountants and Auditors). As a result, data redundancy exists that must be hand-reconciled by occupations. Because of this data-matching problem, three sets of detailed O*NET occupations can be aggregated, i.e., rolled up, into a higher-level DOL occupation code. These occupations are marked with an asterisk in Table 4.

Salaries

Figure 2 compares 2009 average accounting and finance occupations with those in the benchmark professions, for the 39 professional occupations. Compared with the benchmark

FIGURE 2
2009 Average Mean and Median Wages by Occupational Group



professions, accounting and finance professionals are paid, on average, 95.96 percent of the average salary of other professionals. Using median values, accounting and finance professionals are paid 89.05 percent of the average salary of other professionals.

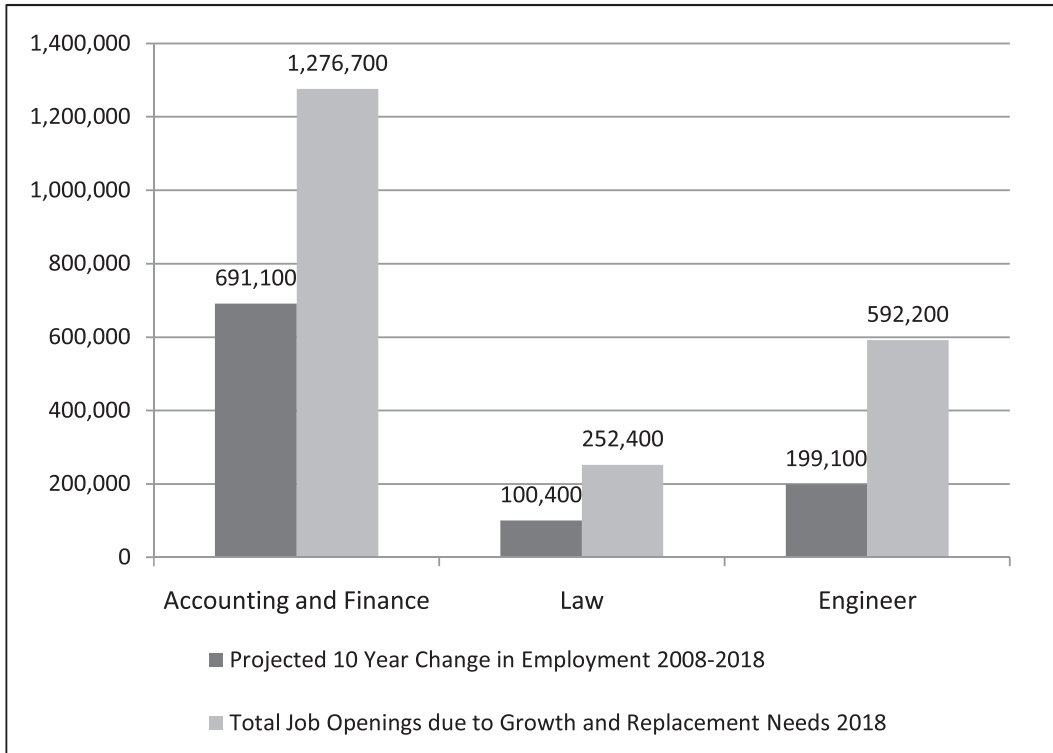
Expected Growth

Figure 3 presents data on the expected growth of accounting and finance jobs compared with the benchmark professions for the time period 2008 to 2018. Employment in accounting and finance “professional” occupations is expected to increase 20.4 percent (an increase of 691,000 from 2008 to 2018), while law and engineering are expected to increase by 12.38 percent and 11.02 percent, respectively. The number of new accounting and finance jobs expected to be open due to growth and replacement needs in the next eight years (i.e., 1,276,700) exceeds the number of openings within each benchmark profession by almost double, i.e., 252,400 for law and 592,200 for engineering.

Summary

This brief, descriptive example compares O*NET data on wage and employment prospect for three professions: (1) accounting and finance, (2) law, and (3) engineering. The results suggest that professional accountants are paid less than are professionals in other occupations, but that the expected demand for professional accountants, near term, exceeds that of the benchmarked professions.

FIGURE 3
Projected Employment Growth (2008–2018) and Projected Job Openings (Total) by Profession



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.