Occupational Selection and Leveling in the National Compensation Survey

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To reduce respondent burden and save on collection resources, the National Compensation Survey does not collect data for every occupation found in the establishments it surveys. A random group of four, six, or eight company jobs is selected in each establishment on the basis of occupational employment. This selection process gives the NCS a broad unbiased sample of occupations that is representative of the labor force. After the jobs have been classified in an occupation, they are assigned a job level that ranks them by skill, knowledge, and other factors. This article provides an overview of the selection process, including a brief description of job leveling.

Method Of Occupational Selection

Occupations for the survey are identified by randomly selecting jobs within the establishment based on the establishments job description and classifying them in one of more than 800 unique occupations that are identified in the federal governments occupational classification system, ranging from accountants to zoologists. Surveys that report the characteristics of occupations, such as their level of compensation, use various approaches to identify a particular employers jobs in an establishment. A survey might use a fixed list of occupations and query each employer as to the existence of that job in their establishment (e.g., “Do you have any secretaries?”). To obtain a more representative array of jobs, some form of sampling may be used to randomly select a small number of jobs to study. Such sampling provides the basis for occupational selection for the BLS National Compensation Survey (NCS). This article discusses the details of the NCS occupation selection process.

All jobs included in the survey are randomly selected using generally accepted statistical techniques—in other words, judgmental job selection is not used. The random selection of occupations produces a representative sample of all occupations in the U.S. economy. Under the random selection method, all occupations have a chance of selection proportional to the share of employment in the job within the establishment. When the data from the occupations are aggregated, the final results represent the entire range of occupations in proportion to their presence in the economy. In contrast, using a preselected list does not provide a representative sample of the entire economy.

Mechanics Of Job Selection

The NCS field economists who collect the data from the establishments use the following procedure to select which jobs are to be included in the survey. First, the field economist must obtain a list of current employees. (Descriptions of how the selection process differs based on the type of list used are given later in this article.) The list provided must include all employees. The list is reviewed and certain types of jobs are excluded:

- Contractors—either self-employed or employees of outside firms (including temporary help employees)
- Individuals receiving long-term disability compensation
- Individuals currently not working, with no guarantee they will return to work
- Volunteers and unpaid workers
- Federal work-study students or students in positions set aside only for students
- Owners of unincorporated firms
- Family members with higher-than-market or token wages
- Owner managers of incorporated firms

Contractors that work for outside firms are excluded because they are employees of the contracting firm and could be selected if the contractor is selected for the NCS sample. The others are excluded either because they are self-employed,

are not currently working, are not paid employees, or do not represent “market pay” because they participate in the setting of their own pay.

The number of jobs to be selected for each establishment is based on the type of establishment and that establishments level of employment minus the excluded employees (“in-scope employment”). In private industry (except aircraft manufacturing) the number of jobs selected will be 4, 6, or 8; for government units it will be between 4 and 20 jobs; and for aircraft manufacturing establishments it will be between 4 and 32 jobs. The following table illustrates the selection process:

All industries except government and aircraft manufacturing units		Government units		Aircraft manufacturing units	
In-scope employment	**Number of jobs selected**	**In-scope employment**	**Number of jobs selected**	**In-scope employment**	**Number of jobs selected**
1 to 49	4*	1 to 49	4*	1 to 49	4*
50 to 249	6	50 to 249	6	50 to 249	6
250 or more	8	250 to 4,999	8	250 or more	8
—	—	5,000 to 9,999	10	5,000 to 9,999	16
—	—	10,000 to 14,999	12	10,000 or more	32
—	—	15,000 to 19,999	14	—	—
—	—	20,000 to 24,999	16	—	—
—	—	25,000 to 29,999	18	—	—
—	—	30,000 or more	20	—	—

* For establishments with fewer than 4 employees, the number of jobs selected will equal the in-scope employment.

Note: Dashes indicate not applicable.

The total in-scope employment for the establishment is divided by the number of jobs to be selected for the establishment; this is known as the sampling interval. For example, if the establishment had 300 in-scope employees and eight jobs were to be selected, the sampling interval would be 37.5; if there were 36 in-scope employees and four jobs were to be selected, the interval would be 9.

The sampling interval is then multiplied by the *random-start decimal* to determine the first employee selected from the list. The random-start decimal is an automatically generated number between 0.0001 and 0.9999. Subsequent employees are selected by adding the sampling interval to the previous selection value. For example, if the sampling interval was 37.5 and the random decimal was 0.2275, the first employee selected would be the ninth employee on the list (0.2275 × 37.5 = 8.53, which rounds to 9). The NCS policy is to always round up the selection to the next whole number if the result is not a whole number when selecting an individual on a list. The second employee selected would be the 47th employee on the list (8.53 plus 37.5 = 46.03, which rounds to 47). This process would continue until the proper number of the jobs was selected.

The NCS uses the employers definition of the “most narrowly defined” company job. For example, if a bakery classifies bakers by their specialty, such as bread baker, pastry finisher, etc., these would be the most narrowly defined company jobs. If, however, all bakers are classified as “baker,” then that would be the most narrowly defined company job. If a job has grade levels, such as Engineer I, Engineer II, etc., each level would be considered the most narrowly defined job. The NCS does make additional distinctions beyond the most narrowly defined company job for three types of job attributes: (1) whether the job is full time or part time, (2) whether the job is covered by a union contract, and (3) whether the employees pay is based on time or an incentive. If the most narrowly defined company job includes workers in both categories for any of these attributes—for example, if the selected job was “waitress” and both part-time and full-time employees were present—they would be considered as two separate jobs. Data from both groups could not be included in the same job. It is possible that both full-time and part-time waitresses could be selected from the same establishment, but data for them would have to be collected separately, and they would not be considered as the same job.

If one job were randomly selected more than once, the total number of jobs selected for the survey would be reduced. This is because that job would be counted as only one job, but its sample weight would be adjusted to reflect that it was selected twice.

Selecting jobs from a list of employees. The selection of jobs within sampled establishments is often accomplished by selecting individuals from a readily available list of employees. The preferred employee list is one that is sorted by occupation; however, if this type of ordered list is unavailable, then other listings of active employees are used. When individuals are selected, their jobs become the selected jobs for the establishment. The characteristics of the position for each selected individual become the characteristics of the selected jobs. The job selection process when using an employee list is illustrated in example 1.

Example 1. Job Selection Using An Employee List

A sampled establishment has 10 employees. The NCS acquires a list of the names of all the employees in the establishment and their job titles and confirms that all 10 employees are in scope.

Name	Job
1 Bill Walker	Accountant
2 Jerry Singer	General Manager
3 Mary Johnson	Secretary
4 Jack Wilson	Sales Manager
5 Bob Smith	Salesperson, full-time
6 Joe Jones	Salesperson, full-time
7 Andy Anderson	Salesperson, full-time
8 Judy Jackson	Salesperson, full-time
9 Amy Watson	Salesperson, full-time
10 Jane Crane	Salesperson, part-time

Assume a random start decimal of 0.6151in this example. The sampling interval would be 2.5 (10 employees divided by 4 jobs to be selected). The first selected job would be the job held by employee number 2 (2.5 × 0.6151 equals 1.54, which rounds up to 2). The second selected job would be the job held by employee number 5 (1.54 plus 2.5 equals 4.04, which rounds up to 5). The third selected job would be the job held by employee number 7 (4.04 plus 2.5 equals 6.54, which rounds up to 7). The fourth selected job would be the job held by employee number 10 (6.54 plus 2.5 equals 9.04, which rounds up to 10). The selected individuals and jobs are shown in bold below.

Name	Job
1 Bill Walker	Accountant
2 Jerry Singer	**General Manager**
3 Mary Johnson	Secretary
4 Jack Wilson	Sales Manager
5 Bob Smith	**Salesperson, full-time**
6 Joe Jones	Salesperson, full-time
7 Andy Anderson	**Salesperson, full-tim**
8 Andy Jackson	Salesperson, full-time
9 Amy Watson	Salesperson, full-time

10 Jane Crane	**Salesperson, part-time**

The selected jobs would be general manager, salesperson, full time (selected twice), and salesperson, part time. Data would be collected for all employees in the establishment that are in each of the selected jobs, including the employees in the selected jobs that were not selected during this process. For example, data for Joe Jones, Judy Jackson, and Amy Watson would be collected because they are in one of the occupations selected—salesperson, full time—even though they were not selected during the random selection. For the NCS selection process, salesperson, full time, and salesperson, part time are considered separate jobs.

Selecting jobs from a list of jobs. When an employee list is not available, a list of company jobs with employment totals for each job attached is an acceptable alternative. The job selection process when using an occupational list is illustrated in example 2.

Example 2. Job Selection Using An Occupational List

This example uses the same establishment as in example 1, but with an occupational list.

Job title	Employees	Cumulative total number of employees
Accountant	1	1
General Manager	1	2
Salesperson	6	8
Sales Manager	1	9
Secretary	1	10

For this example, assume the random start number would be 0.6151. The sampling interval would be 2.5 (10 employees divided by 4 jobs to be selected). The first selected job would be general manager (2.5 × 0.6151 equals 1.54, which rounds up to 2). The second selected job would be salesperson (1.54 plus 2.5 equals 4.04, which rounds up to 5). The third selected job would also be salesperson (4.04 plus 2.5 equals 6.54, which rounds up to 7). The fourth selected job would be secretary (6.54 plus 2.5 equals 9.04, which rounds up to 10). The selected jobs are shown in bold below.

Job title	Employees	Cumulative total number of employees	Number of times selected
Accountant	1	1	
General Manager	**1**	**2**	**1**
Salesperson	**6**	**8**	**2**
Sales Manager	1	9	
Secretary	**1**	**10**	**1**

The job salesperson was selected twice. In example 2, the establishment did not distinguish between full-time and part-time sales workers, which are considered separate jobs in the NCS. Therefore, NCS would have to subsample the salesperson job to select between part time and full time. The probability-proportionate-to-size selection would be completed as shown below:

Job title	Employees	Cumulative total of employees
Salesperson, full-time	5	5
Salesperson, part-time	1	6

In this part of the example, assume the random start number would be 0.7826. The sampling interval would be 3 (6 employees divided by 2 jobs to be selected). The first selected job would be salesperson, full time (3 × 0.7826 equals 2.35, which rounds up to 3). The second selected job would be salesperson, part time (2.35 plus 3 equals 5.35, which rounds up to 6). The jobs selected in example 2 would be general manager; salesperson, full time; salesperson, part time; and secretary.

Note that in examples 1 and 2, the same set of employees was sampled and the same random start was used, but the jobs selected were not identical. As long as the jobs are selected randomly and each job has a chance of being selected, it does not matter which jobs are selected to represent the establishment.

Matching Selected Jobs To The Standard Occupational Classification System

Once the establishment jobs are selected, they are matched to an occupation from the Standard Occupational Classification (SOC) system.[1] The occupational matching allows for the comparison of jobs across establishments. The matching is based on the duties listed in the establishment job description (or given by the respondent if there is no job description) and the occupational definitions given in the SOC system. Matches are not based on job title. The establishment job descriptions are designed to meet the needs of that establishment, so they might not always conform exactly to the SOC system. In other words, the duties of the company jobs do not necessarily match the duties in the occupational definitions—they could be narrower or much broader.

Jobs that are more narrowly defined. The NCS collects data only for the “most narrowly defined company job” that was selected. Data are collected for only the selected establishment job, which is then classified into a SOC occupation. It is possible that there could be other narrowly defined establishment jobs that might match the same SOC occupation. The NCS would not collect data for those establishment jobs unless they were also selected during job selection. Even when more than one selected job is classified into one occupation, the data are collected separately for each of the selected jobs. For example, if a hospital was a sampled unit and the job-selection procedure chose “operating room nurse” and “emergency room nurse,” which the hospital considered to be separate jobs because of the specialized training required, both jobs would be classified as registered nurses (SOC code 29-1141), but data for each type of nurse would be collected and processed separately. Establishment descriptions that are narrower than the occupational definition are easier to classify into an occupational group than are more broadly defined jobs.

Jobs that are more broadly defined. Employers write their job descriptions to meet their particular needs; such descriptions might not match the standard definitions of occupations. In many cases the duties assigned to a particular job may fall under more than one SOC occupation. For example, an employee might be designated as a sales clerk but perform janitorial and delivery duties as needed. This could happen in any establishment, but it is more likely to occur in smaller establishments, because of the limited number of people available to perform the necessary tasks. In other cases employers may choose to define jobs broadly, covering many tasks and skills of different levels. This is known as “broad banding” of jobs, and it is used to give the employer greater flexibility in assigning work.

The following guidelines are used to match the broadly defined job to one SOC occupation:

1. The job is matched to the occupation with the highest skill level performed if the employee is paid based on that skill. For example, a person in a sampled job “maintenance worker” is required to be a qualified electrician. The job would

be classified as “electrician” if the wage rate reflected that of an electrician, even if the worker spent very little time actually doing electrical work.
2. If the skill levels of the multiple tasks performed are similar, the job would be matched according to the majority of the work performed (or the most work performed if no occupation represented a majority of the time).

Occupational Leveling

After the jobs have been classified in an occupation, a *job level* is assigned to the job. The “job leveling” process allows for the comparison of selected jobs across all establishments by ranking them using a common set of job factors.

The NCS measures the duties and responsibilities of the position at the full performance level of the job, not the qualifications of the incumbent who presently holds the position. The assigned duties that control the qualifications of the job and constitute the primary reason for the occupation are usually the leveling determinations; these are known as *pay factors*.

The four-factor leveling system. The jobs are leveled using four factors drawn from the Office of Personnel Managements Factor Evaluation System,[2] which is the underlying structure for evaluation of Federal General Schedule occupations.

Selected occupations first need to be matched to a specific SOC to ensure that the specific knowledge guide needed for factor leveling is used. There are four factors that must be measured for each job: (1) knowledge, (2) job controls and complexity, (3) contacts, and (4) physical environment. Each factor is subdivided into levels, which are assigned point values —the higher the level of responsibility or difficulty, the higher the number of points assigned. This process is known as “point factor evaluation” because it categorizes certain aspects of an occupation to specific levels of work with an assigned number of points. The leveling technique consists of discussion with the respondent and review of job descriptions, if available, for each job selected, to determine the most appropriate level of each factor.

The four factors cover the following:

1. Knowledge:
    - Kind or nature of knowledge and skill needed
    - How the knowledge and skill are used in doing the work
2. Job controls and complexity:
    - Amount and type of work directions received
    - Variations and difficulty of work
    - Nature of the work within the organization
3. Contacts (their nature and purpose):
    - Personal contact with persons not in the supervisory chain
    - Purpose of contacts in dealing with individuals not in the supervisory chain
4. Physical Environment:
    - Amount of physical demands
    - Risk associated with the job

Job controls and complexity, contacts, and physical environment each use the same set of criteria (and points) for evaluating every job; knowledge is the one factor that has specialized criteria for various groups of occupations. The occupational groups are as follows:

- Professional accountants and auditors
- Professional engineering and architecture
- Information technology
- Professional mathematics and statistics
- Professional economics, sociology, geography, psychology, and similar jobs
- Social, welfare, and health administration
- Professional medical (limited coverage)

- Medical, hospital, dental, public health, and veterinary technical
- Professional education
- Business administration
- Professional library, museum, and archival
- Professional biological and physical science
- Engineering and scientific technical
- Professional legal
- Administrative legal
- Communications and the arts
- Protective service
- Investigation, inspection, and compliance
- Service
- Sales
- Office and administrative support
- Miscellaneous technical
- Blue collar (some blue-collar jobs may be classified under other groups)
- Pilots and air transportation

These specialized criteria are listed in a guide that describes the leveling process in greater detail.[3]

For each job, the factors are recorded and their points are totaled. The total falls into a range that defines an occupational level. The ultimate purpose of job leveling is to classify every job in a level that matches a pay level in the General Schedule pay system for Federal employees.

Supervisory leveling. Supervisors are classified according to their level of supervisory responsibility, regardless of job title. Supervisors are classified as first-, second-, or third-line supervisors, depending on their level of authority and the complexity of the organization. Most supervisory occupations are evaluated based on their duties and responsibilities. A modified approach is used for professional and administrative supervisors when they direct professional work and are paid primarily to supervise. Such supervisory occupations are leveled based on the duties and responsibilities of the highest reporting position.

As discussed in this article, the National Compensation Survey puts a great amount of effort into selecting an unbiased sample of occupations, reducing respondent burden, and using as few resources as possible. In addition, the leveling of the data and occupational coding make comparisons of occupational wage data across occupations possible.

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Notes

1 For information on the 2010 Standard Occupational Classification system, see http://www.bls.gov/soc/.

2 See *Introduction to the Position Classification Standards* (U.S. Office of Personnel Management, 1991; revised 2009), available at http://www.opm.gov/fedclass/gsintro.pdf.

3 *National Compensation Survey: Guide for Evaluating Your Firms Jobs and Pay* (U.S. Bureau of Labor Statistics, October 2003), available at www.bls.gov/ncs/ocs/sp/ncbr0004.pdf.