Earnings by Level of Work: Results from Pilot Studies of the National Compensation Survey Program

The Bureau's new National Compensation Survey makes use of a sophisticated point-factor system to classify jobs. The classification system allows researchers to compare jobs—and hence, hourly wages—between statistical metropolitan areas.

BY JASON FORD

One economic statistic that is frequently in demand is the average earnings for given occupations. Such data have a limitation, since a given occupation can encompass a wide range of tasks and abilities. Knowing the average salary for engineers, for example, would tell us little about the average salary of entry-level engineers or of senior-level engineers.

The Bureau of Labor Statistics has instituted a number of surveys over its history to study the relation of job duties to earnings. The most recent attempt is a national study of earnings known as the National Compensation Survey (NCS).[1] (This program was previously called COMP2000, and is referred to by that title in 1996 publications.)

The NCS collects data on earnings for about 500 occupations—from accountants to wood lathe operators.[2] The NCS is slated to publish earnings on overall averages in an occupation, and also by work level (defined as a range of skills, knowledge, and duties within an occupation).

To quantify work levels, BLS designed a point-factor system of job classification. BLS field economists ask questions concerning a number of factors related to a job. These factors cover a job's requirements, duties, and working conditions. They consist of the following:

- Knowledge
- Supervision received
- Guidelines
- Complexity
- Scope and effect
- Personal contacts
- Purpose of contacts
- Physical demands
- Work environment
- Supervisory duties

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(See appendix 1 for a description of the factors used to determine work levels.)

Each factor contains a set of descriptions. Jobs are assigned points for each factor, depending on the description that best fits the job. The points are tallied and then BLS classifies every job into a level from 1 to 15.[3] Examples of a level 1 job might be fast-food workers or ditch diggers. An example of a level 15 job might be senior researchers or high-level managers.

Different combinations of factors can generate the same level. Two jobs each may be ranked at level 12, for example, but one can have a higher *knowledge* level, and the other have higher *complexity and guidelines* level. Thus, it cannot explicitly be said that a job at level x has certain attributes (combination of factors). However, through the use of prototypes an approximation of the attributes can be made.

BLS defines prototypes for each level; the prototype shows the most common distribution of points assigned to each factor to produce the given level. The reason that prototypes are possible is that the 10 factors have a high level of correlation with each other. A job with a required level of knowledge would be expected to have a certain level of decision making, degree of contacts with others, and working conditions. If an employer required that a job be filled by someone with a doctorate, for example, it is likely that the employer would expect that employee to work independently. For specific discussion of prototypes for each of the jobs discussed in this article, please see appendix 2.

Early in 1996, BLS used this point-factor analysis to do pilot studies in three test cities: Albuquerque, New Mexico; Rochester, New York; and Allentown, Pennsylvania. The results of these tests suggest the wide number of possibilities for using this method as a tool for studying the Nation's earnings structure in the private sector and State and local governments.

BLS first took a random sample of establishments in these cities, then randomly sampled jobs within each establishment. The sampled jobs were classified into 1 of 501 possible occupations, such as "actuary" or "food service worker, not elsewhere classified".

Not all occupations provided publishable data in the three cities. An occupation had to be common enough to allow for generation of meaningful data.

This article focuses on the occupations where enough data were available in the three cities to compare earnings by level. For the occupation to be selected, at least three levels of data had to be available in at least two of the three cities.

The occupations meeting this standard are:

- Engineers;
- Secretaries;
- Bookkeepers and accounting and auditing clerks[4];
- General office clerks; and
- Janitors and cleaners.

A smaller volume of data on a number of other occupations also was developed. See tables 1, 3, and 5 for the complete breakdown.

In addition to making comparisons of the same occupation between cities, the leveling system allows comparison of an occupation's earnings with those of similar occupations. For example, secretaries' earnings can be compared to average earnings of all administrative support occupations, including clerical workers, which is the major group that includes secretaries.

To allow for comparison, BLS distributes the *economy's approximate 500 jobs* into 11 occupational groups containing related occupations. The National Compensation Survey collects and publishes data on the following nine groups[5]:

- Professional and technical;
- Executive, administrative, and managerial;
- Sales;
- Administrative support (clerical);
- Precision production, craft, and repair;
- Machine operators, assemblers, and inspectors;
- Transportation and material moving;
- Handlers, equipment cleaners, helpers, and laborers; and
- Services.

Three occupational groups—professional and technical; executive, administrative, and managerial; and administrative support—are grouped to form a category called "white-collar workers, excluding sales" which is used as a basis for comparison for this article. For example, earnings of level 4 secretaries were compared with level 4 administrative support workers. In addition, comparisons were made of workers in a specific occupation and all workers in an occupational group. For example, average earnings of secretaries were compared to those of administrative support workers, the group to which secretaries belong.

Engineers

There were a sufficient number of engineers in Albuquerque and Rochester to generate publishable data for levels 9 and above. Engineers, not surprisingly, tended to be classified at relatively high levels in the two cities, where the most

Table 1. Earnings ratios of engineers to professional and white-collar workers in private industry by city and level, 1996

Level	Albuquerque		Rochester	
	Professional workers[1]	White-collar workers (excluding sales)	Professional workers[1]	White-collar workers (excluding sales)
9	1.14	1.20	1.15	1.19
11	1.03	1.12	1.09	1.12
12	1.03	1.05	0.94	1.02
13	0.73	0.90	n.a.	n.a.
All levels[2]	1.12	1.63	1.16	1.46

[1]For engineers, only private industry was used, because the job is found almost entirely in private industry in both cities.

[2]All levels" includes engineers who are slotted at levels other than the four found on this table. For example, the survey did not turn up enough level 10 engineers to publish statistically significant data on that work level. Nevertheless, those that were found were averaged into the "all levels" data.

n.a. = data not available.

common level was 12.

In Albuquerque, average hourly earnings for engineers ranged from $20.47 at level 9 to $33.38 at level 13. Level 9 refers to a journey-level engineer, and level 13 refers to an engineer doing work requiring an advanced degree or the equivalent.

In Rochester, average hourly earnings for engineers ranged from $22.08 at level 9 to $28.54 at level 12. (See table 1 for earnings ratio of engineering occupation by level.)

How do the earnings of engineers compare to other professional and white collar jobs, holding level constant?

Ratios are used to compare wages among occupations, levels, and areas. Comparison ratios were computed to determine the relationship between engineers and various published categories. To compute them, the mean wage for an occupation, such as engineer level 9, was divided by the mean wage for all professional level 9 occupations. A ratio larger than 1 indicates that the mean wage for the occupation(s) is greater than the mean wage for the comparison group; a ratio of less than 1 indicates a lower wage. Ratios were calculated in the following manner:

1. Determine the basis for comparison:

   The mean wage for level 9 engineers in Albuquerque
   The mean wage for level 9 professionals in Albuquerque

2. Calculate the ratio:

   x/y where x = mean wage for level 9 engineers in Albuquerque
   y = mean wage for level 9 professionals in Albuquerque
   $20.47 / $17.90 = 1.14

In this instance, the level 9 engineers were paid approximately 14 percent more than the average pay for level 9 professionals in Albuquerque. The tables show the ratios.

The two cities in table 1 show similarities in the data. In Albuquerque, level 9 engineers are paid more than professional and white-collar workers. At level 13, engineers were paid less than other professional workers. In Rochester, level 9 engineers were paid more than white-collar workers at the same level whereas, at level 12, the estimated wage does not differ significantly for engineers and white-collar workers.

The ratio of engineers' pay to that of all white-collar workers was almost identical in the two cities when compared by level except for the "all levels" category. At level 11, for example, the ratio was 1.12 in both cities.

The data do not indicate why engineers are paid more relative to other professional and white-collar workers at the lower levels. Some possibilities, however, include:

- Jobs that require a great deal of training, such as doctors and research scientists, are found predominantly at the higher levels. These jobs receive high pay because workers have to forego several years of earnings to receive training. Their earnings raise the overall average of all white-collar and executive-level jobs.

- At levels 12 and 13, the overall averages for professional and white-collar pay are driven partly by high pay for supervisory positions. An engineering job can be classified as level 13 without having supervisory duties. Other jobs classified at that level are more likely to have supervisory duties.

Table 2. Earnings ratios of secretaries to administrative support and white-collar jobs in private industry by city and level, 1996

Levels	Albuquerque		Allentown		Rochester	
	Administrative support	White collar	Administrative support	White collar	Administrative support	White collar
3	1.03	1.04	0.99	0.99	n.a.	n.a.
4	1.05	1.05	.99	.96	0.99	0.98
5	1.13	1.04	1.12	1.07	.98	.96
6	n.a.	n.a.	.94	.82	1.17	.97
All levels	1.08	0.61	1.06	.66	1.08	.62

n.a. = data not available.

Table 3. Earnings ratios of bookkeepers to administrative support occupations in private industry by city and level, 1996

Levels	Albuquerque		Allentown		Rochester	
	Administrative support	White collar	Administrative support	White collar	Administrative support	White collar
3	0.97	0.80	0.88	0.88	n.a.	n.a.
4	.87	.82	1.06	1.00	1.04	1.03
5	n.a.	n.a.	.76	.82	0.93	0.91
6	n.a.	n.a.	n.a.	n.a.	1.00	.84
All levels	.97	.49	1.03	.59	1.04	.65

n.a. = data not available.

- Local supply and demand for engineers may be similar in the two cities.

Secretaries

Secretaries are considered administrative support workers. Data on secretaries were available from levels 3 to 6.

The process of classifying by level for administrative support workers is somewhat different than for professional workers such as engineers. For example, the "knowledge" factor relates to skill for clerical workers, rather than formal education.

The NCS was able to develop data for secretaries in the levels 4 and 5 in the three cities. At level 4, their average hourly earnings were $11.14 in Allentown, $9.92 in Albuquerque, and $9.79 in Rochester. At level 5, the average hourly earnings were $12.28 for Allentown, $11.54 for Rochester, and $11.24 for Albuquerque.

The overall ratio of secretarial earnings to those of all administrative support workers was almost the same in the three cities. (See table 2.)

Bookkeepers and accounting and auditing clerks

Workers in this occupation classify, record, and summarize numerical and financial records. They are considered administrative support workers.

The data for this group show fewer patterns than other occupations. On average, hourly earnings were $11.01 in Allentown, $10.77 in Rochester, and $8.99 in Albuquerque. Workers at level 5 averaged $10.98 per hour in Rochester and $9.42 per hour in Allentown.

When looking at ratios by levels, the only pattern to emerge was that the overall average earnings for this occupation are similar to the overall average earnings for all administrative support (clerical) workers. (See table 3.)

General office clerks

Like secretaries and bookkeepers and accounting and auditing clerks, general office clerks are considered administrative support workers. General office clerks were usually graded at a lower level than secretaries and bookkeepers, however. Data were available from levels 1 to 4 in Albuquerque and levels 2 to 4 in the two other cities.

Their earnings are comparable to other administrative support staff and white-collar workers at the same level. (See table 4.)

Janitors and cleaners

BLS was able to compile data on janitors and cleaners from level 1 to level 3 in all three cities. These workers are classified as blue collar and as such their levels are defined differently than those of clerical or professional workers. Level 1 basically characterizes an unskilled laborer, requiring little or no previous experience. Level 2 and 3

Table 4. Earnings ratios of general office clerks to administrative support and white-collar jobs in private industry by city and level, 1996

Levels	Albuquerque		Allentown		Rochester	
	Administrative support	White collar	Administrative support	White collar	Administrative support	White collar
1	1.01	1.01	n.a.	n.a.	n.a.	n.a.
2	1.03	1.01	1.03	1.03	0.92	0.923
3	1.03	1.03	1.11	1.11	.96	.97
4	0.93	0.93	1.04	1.02	.98	.98
All levels	.89	.50	.95	.59	.92	.53

n.a. = data not available.

Table 5. Earnings ratios of janitors and cleaners to service workers in private industry by city and level, 1996

Level	Albuquerque	Allentown	Rochester
	Service workers	Service workers	Service workers
1	1.27	1.26	1.27
2	1.12	1.08	1.00
3	1.21	1.51	1.40
All levels	1.09	1.12	0.99

workers are considered semiskilled. In the janitorial trades, a level 3 job often equates to one in which the incumbent is able to do routine maintenance tasks.

Level 2 and level 3 workers had sizable differences in earnings from city to city. In Albuquerque, level 2 janitors and cleaners averaged $6.14 per hour and at level 3, $7.73. In Allentown, the averages were $8.23 at level 2 and $12.22 at level 3. In Rochester, the averages were $7.73 at level 2 and $10.37 at level 3.

The average pay of janitors and cleaners was always at least 10 percent greater than that of service workers overall, although the ratio varied, as shown above.

Future studies

In October 1996, BLS began collecting data on earnings by level in 154 localities across the United States, including the 34 largest metropolitan areas. When the data are gathered and analyzed, BLS can determine whether the findings from these initial three cities are representative of the Nation as a whole.

Appendix 1. Factors Used for Determining Work Levels

The National Compensation Survey uses 10 factors to determine the work level of an occupation. The factor with the greatest weight is *knowledge required.* A job that requires no knowledge other than the ability to do simple repetitive tasks would be given the lowest number of points. On the high end, a job that required mastery of a professional field to generate and develop new hypotheses and theories—a theoretical mathematician, for example— would be assigned the maximum number of points for this factor.

Three factors deal with the level of decision making on a job. These are *complexity, guidelines,* and *scope and effect*. Complexity deals with the level of difficulty and originality in performing the work. A street sweeper would likely be assigned the least number of points in this category, because the job is routine. A rocket scientist who works with abstract issues and must independently figure out which tasks need to be done and which approach to take would be assigned the most points.

Guidelines refer to whether a job has clear instructions on the work to be performed. A job where deviations are not allowed would get the lowest number of points. Jobs where guidelines are scarce or of limited use would get the highest number of points. Scope and effect refers to the importance of the decision making when the job is performed correctly. A janitor who collects trash will not have as high a scope and effect on the company as the plant manager who could decide to introduce a more efficient manufacturing system.

The next group of factors deal with relations with other employees and the public. They are supervision received, personal contacts, and purpose of contacts.

Supervision received refers to the amount of monitoring and review a person receives. Jobs which entail tasks having detailed instructions are assigned the least number of points; jobs which call for only general policy direction receive the highest number of points.

Personal contacts and purpose of contacts refer to relations with those outside the immediate hierarchy. Jobs calling for personal contacts—where the incumbent deals with other employees, customers, or suppliers on a very structured basis—would receive few points on this factor. A ticket taker, for example, probably would get low points in this category. Jobs requiring a worker to deal with high-ranking officials at national or international levels would get a high level of points.

Purpose of contacts gives points for the nature of relations with the contacts. Those who exchange routine information would get fewer points than those who engage in negotiations.

In the factors discussed thus far, white-collar employees tend to get matched at higher levels than blue-collar employees. For the next two factors, however, the pattern is reversed. These are *physical demands and work environment.* Physical demands refers to the physical strength and agility required to do the job. Work environment refers to the level of risk and discomforts involved in the job.

The final factor is *supervisory duties*. This factor describes the employee's position in the chain of command. A nonsupervisory position gets no points, and jobs that are third-line supervisors or higher get the maximum number of points. This factor is experimental, and may be deleted or changed for future studies.

Appendix 2. Work Levels for Each of the Five Jobs Studied

Engineers

For a level 9 professional job, the prototype for the knowledge factor is: Knowledge of the principles, concepts, and methodology of a professional or administrative occupation which has been either (a) supplemented by skill gained through job experiences to permit independent performance or recurring assignments; or (b) supplemented by expanded professional or administrative knowledge gained through relevant graduate school or experience. This level generally describes a professional job where some graduate school or equivalent experience is required. These jobs often are referred to as journey-level jobs.

In fact, all the levels from 6 to 9 have the same prototype for the knowledge factor for professional work. A level 9 job tends to be distinguished by high scores on the factors related to decision making and contacts with others. (For a complete discussion of the 10 factors, see Appendix 1 and *Comp2000-Pilot Survey, Albuquerque New Mexico Statistical Metropolitan Area, February-March 1996*, BLS Bulletin 3082-1).

The prototype for knowledge for levels 10-12 is: knowledge of a wide range of concepts, principles, and practices in a professional or administrative occupation, such as would be gained through extended graduate study or experience, and skill in applying this knowledge to difficult and complex work assignments. This level of knowledge describes a professional worker with advanced expertise. The difference between levels 10 to 12 is generally caused by the factors relating to decision making and contacts with others.

The prototype for levels 13-14 is a knowledge level described as: Mastery of a professional or administrative field to apply experimental theories and new developments to problems not susceptible to treatment by accepted methods.[6] This level of knowledge generally describes a job requiring a doctorate or many years of experience.

The above description presumes that the occupations have no supervisory duties. Team leader status may raise an occupation by 1 level, depending on the totals of the other points. First line supervisory status will usually raise the occupation 1-2 levels. Second line supervisory status will raise the occupation 2-4 levels. Third-line supervisory status will raise the occupation 4-5 levels.[7]

Secretaries

The prototype for a level 2 or level 3 secretary is a knowledge level described as: Knowledge of basic or commonly-used rules, procedures, or operations which typically require some previous training or experience. An entry-level secretary who had enough training to type and handle phone calls level 2. The prototype for a level 3 secretary is a job where the secretaries are trusted to do basic clerical tasks on their own, and contacts with other employees or the public may involve a variety of issues.

At levels 4 and 5, the prototype for knowledge is: Knowledge of a body of standardized rules, procedures, operations, goods and services, tools or equipment requiring considerable training and experience to perform the full range of standard clerical assignments and resolve recurring problems. This knowledge level corresponds to an experienced secretary who could handle a variety of assignments on his or her own. The difference in prototypes between level 4 and 5 is based on the complexity of the tasks and the amount of work that involves coordination with others.

The knowledge level of a level 6 secretary is: Knowledge of an extensive body of rules, procedures, operations, products or services requiring extended training and experience to perform a wide variety of interrelated or nonstandard procedural assignments and resolve a wide range of problems. This level of knowledge is generally the maximum one assigned to clerical workers. Thus, a position assigned this knowledge level would be a senior clerical worker, such as an executive secretary.

Bookkeepers and accounting and auditing clerks

This occupation has the same prototype for each level as secretaries, since both are clerical workers. Because the job duties are different, however, the prototypes represent different things. The prototype for a level 3 bookkeeper is: Knowledge of basic or commonly-used rules, procedures, or operations which typically require some previous training or experience. A bookkeeper who handles routine clerical tasks, such as identifying discrepancies and verifying mathematical accuracy, would probably fall into this category.

At level 4 and 5, the prototype is: Knowledge of a body of standardized rules, procedures, operations, goods and services, tools or equipment requiring considerable training and experience to perform the full range of standard clerical assignments and resolve recurring problems. At these levels, the clerk should be able to perform more difficult clerical functions than at level 3. An employee would need a knowledge of accounting procedures and be able to follow them without close supervision.

The knowledge level for a level 6 in this occupation is: Knowledge of an extensive body of rules, procedures, operations, products or services requiring extended training and experience to perform a wide variety of interrelated or nonstandard procedural assignments and resolve a wide range of problems. This level of knowledge is generally the maximum one assigned to clerical workers. This rating is assigned to the most experienced clerks who may maintain journals of an accounting system. They would be expected to be able to resolve problem accounts on their own.

General office clerks

The prototype for knowledge for a level 1 clerical worker is: Knowledge of simple, routine, or repetitive tasks or operations which typically includes following step-by-step instructions and requires little or no previous training or experience. In the prototype, all the other factors are at their minimum, so a level 1 job generally consists of routine clerical tasks where little training is required.

Levels 2 and 3 have the same knowledge requirement as secretaries. Employees are expected to know: Basic or commonly-used rules, procedures, or operations which typically require some previous training or experience. A clerk who was expected to help locate records for the public, for example, would probably be at least at level 2. The level 4 prototype describes a clerk with training on a variety of functions who could work independently.

Janitors and cleaners

Level 1characterizes an unskilled laborer, requiring little or no previous experience. Levels 2 and 3 are semiskilled workers. In the janitorial trade, a level 3 job often equates to jobs where workers are able to handle routine maintenance tasks without supervision.

—ENDNOTES—

[1] For an overview of the new program, see John E. Buckley, "BLS Redesigns its Compensation Surveys," *Compensation and Working Conditions*, September 1996, pp. 19-21. See also Kenneth Hoffmann, "New Approach to Measuring Occupational Wages," *Compensation and Working Conditions*, December 1996, pp. 4-8, and Beth Levin Crimmel, "COMP2000: Designing a New Wage Survey," *Compensation and Working Conditions*, December 1996, pp. 9-11.

[2] NCS will probably never publish data on all 500 jobs. The more common the occupation, the greater the chance of publication.

[3] Few, if any, occupations would have classifiable jobs at all levels, however. A job requiring a college degree can never score less than a level 5; thus, it is very unlikely that a professional job would be classified at less than this level.

Similarly, blue-collar jobs are unlikely to go higher than level 9 for a nonsupervisory position, or level 11 for a supervisory position. Blue-collar workers tend not to have high knowledge requirements, and are constrained by the nature of the work to have relatively strict guidelines and supervisory controls. Furthermore, blue-collar workers tend to have a maximum of one level of supervisory authority.

The choice to use 15 work levels is arbitrary. Since each job is given a set number of points, any number of breakouts are possible.

[4] These three titles are considered part of one job.

[5] BLS excludes agricultural and household occupations.

[6] One factor not discussed here, because not enough data were available at the occupational level, is level 15. To achieve this factor, the knowledge description is as follows: Mastery of a professional field to generate and develop new hypotheses and theories. Jobs of this type tend to be classified at the highest possible level for most of the factors.

[7] Supervisory duties is an experimental factor. In more recent surveys, data have been collected on supervisory duties, but points have not been added.