EMPLOYMENT COST INDEX: QUANTIFYING CONCEPTS

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The Employment Cost Index statistics are computed from data on compensation by occupation collected from a sample of occupations and establishments weighted to represent the universe of occupations and establishments in the private nonfarm economy, The basic steps in the quantification process are:

1. Initial collection of hourly wage or salary levels, and fringe benefit practice data for survey occupations.
2. Computation of a cents-per-hour-worked cost of fringe benefits for each benefit provided to workers in the occupation.
3. Summation of all the cents-per-hour-worked cost for all benefits.
4. Addition of the average hourly wage or salary level and the benefit cost to obtain a total compensation per-hour-worked cost for every occupation.
5. Quarterly collection of information on benefit practice changes and average wage or salary levels for the same occupations.
6. Repricing of benefit practices, on a quarterly cycle to obtain current cents-per-hour benefit costs based on new practices, and the effect of changes in wage or salary levels on wage-related benefits.
7. Addition of current earnings and benefit cost to obtain current quarter compensation cost for the same survey occupations.
8. Weighting up current and prior quarter occupational compensation to obtain aggregate compensation and wage bills.
9. Comparison of bills in the current quarter to the prior quarter to obtain change statistics.

The wage and salary component of the ECI is represented by straight-time average hourly earnings for the occupation. This concept as applied to the Employment Cost Index is relatively clear-cut when employees are compensated at an hourly rate. For example, an establishment employing four hourly rated carpenters, one at $10.00 per hour, and three at $9.00 per hour, would report earnings for the occupation of $9.25 ($10.00 + 3 x $9.00 = $37.00 ÷ 4 = $9.25).

The measurement of pay for salaried workers, and those paid on a piece-work or commission basis requires reduction of earnings to an hourly average before the occupational average is calculated. This is accomplished by dividing the straight-time earnings payment by the straight-time hours associated with the payment. For example, a $200.00 salary paid for a 40 hour week is converted to an hourly average of $5.00.

Although salaries and commissions are available from payroll recores, fixed work schedules are often not documented for employees paid on these bases. It is therefore necessary to impute a schedule for such workers. For instance, executives may not have fixed work schedules; in such cases, the workweek of the majority of the office staff is used as a proxy in the denominator of the average hourly earnings' calculation. For those employees who work outside of an office setting, e.g., school teachers, the employer is asked to provide a reasonable estimate of work time.

The benefit component of compensation (compensation is defined as wages plus the cost of fringe benefits) is measured in cents per hour or data convertible to a cents-per-hour figure. The fringe benefits included in ECI measurement can be categorized as follows:

Hours Related
- Premium Pay for Overtime, Holidays, and Weekends
- Vacations
- Holidays
- Sick Leave
- Other Paid Leave

Supplemental Pay
- Shift Differentials
- Nonproduction Bonuses
- Severance Pay
- Supplementary Unemployment Benefit Funds

Insurance
- Life Insurance
- Health Benefits
- Sickness and Accident

Pensions and Savings
- Pension and Retirement
- Savings and Thrift

Legally Required
- Social Security
- Railroad Retirement
- Railroad Supplemental Retirement
- Railroad Unemployment
- Federal Unemployment Tax Act
- State Unemployment Insurance
- Workers' Compensation
- Other Legally Required Benefit (example: State required temporary disability insurance)

Merchandise Discounts
- Merchandise Discounts in department stores

Occupational hourly earnings plus the employer's cost per hour worked for those employee benefits listed above constitute the price of labor in the ECI.

Since pay rates generally pertain to the job rather than to the incumbent workers, the basic unit of data collection is an occupation in an establishment. The occupation is comprised of all those workers employed in jobs classified under an ECI occupation in the establishment. Thus the ECI measures changes in rates of pay for specific jobs, not changes in the earnings of individual workers.

While shifts in the types of workers within the occupation in a given establishment may affect wage movements, shifts in employment among occupations and establishments are controlled by measuring wage change for the same occupations in the same establishments between survey periods and applying fixed employment weights to the results. The unit of observation is standardized to a certain extent below the occupational level by measuring only certain types of labor within the occupation, e.g., full or part-time, incentive or time-rated, depending on the predominant type.

The ECI currently covers all private nonfarm establishments classified in major industry divisions B through H defined in the 1967 edition of the Standard Industrial Classification Manual (SIC), with the exception of private households. Published data are limited to the five major divisions of contract construction, manufacturing, wholesale and retail trade; transportation, communication, electric, gas and sanitary services; and services, except private household.

The ECI occupational classification system is based on the classification system used to collect data for the 1970 Census of Population. The Census system classifies all jobs into 441 occupations (Accountant, Stockhandler, etc.) which are then combined into 12 occupational groups:

Professional, technical, and kindred workers
Managers and administrators, except farm
Sales workers
Clerical and kindred workers
Craft and kindred workers
Operatives, except transport
Transport equipment operatives
Laborers, except farm
Farmers and farm managers
Farm laborers and farm supervisors
Service workers, except private household
Private household workers

Only 9 of the 12 occupational groups listed above are covered in the current survey. Farmers and farm managers, farm laborers and farm supervisors, and private household workers are excluded. For later stages of development of the index, all occupational groups will be included.

The occupations surveyed differ from industry to industry, although in sum they represent the broad spectrum of occupations in the private nonfarm economy.

The compensation data from which the ECI is computed are obtained quarterly from a sample of about 2,000 establishments and from a sample of occupations within these establishments. Approximately 9,600 observations of occupational compensation data are currently reported quarterly.

Data collection is initiated by a BLS field representative with a visit to the survey reporting unit. Quarterly data submissions thereafter are usually collected by mail or telephone, but personal visits to the establishment are often necessary to update benefit data.

A major task in the initial contact is job matching, that is determining the jobs in the establishment that match the occupation as defined for the survey. This set of jobs becomes the basic unit of observation. In some segments of the sample, the unit is further specified by sampling a specific job. Eventually this will become a survey-wide procedure.

Other determinations which are made at the time of initial collection are whether the majority of incumbents are full or part-time, time or incentive workers, or are covered by collective bargaining agreements. This information is used to classify data for later tabulation and/or to insure that compensation for comparable groups of workers are measured from quarter-to-quarter.

In the initial quarter, the respondent reports straight-time hourly earnings for the occupation as defined above.

Essentially, initial collection with regard to fringe benefits requires two tasks--first, identifying existing benefit practices, and second, obtaining data from the respondent to calculate a cents-per-hour worked cost for those benefits.

In addition to the benefits listed above, information is also collected on scheduled daily hours, weekly hours, and annual weeks worked over a time span of normal business activity. Each occupation's benefits are categorized as wage or nonwage related according to whether the employer's cost of the benefit is affected or unaffected by a change in pay levels. Every effort is made to collect the benefit data applicable to the ECI occupation for which wage and salary data are collected. If data can only be obtained for an occupational grouping larger than the ECI occupation, the cost data are prorated (if the benefit is wage related) or allocated (if the benefit is non wage related) to the ECI occupation.

To illustrate allocation and proration, suppose a survey occupation is "Secretary", earning $10,000 per year, and a life insurance premium is $7.00 per $1,000 coverage per employee for all office employees in the establishment. Assume average earnings for all office employees is $15,000 annually, and coverage is $30,000 per employee. Then the benefit is nonwage-related, and the cost--$7.70 x 30 or $231--is allocated to the occupation, "Secretary." If the coverage is twice annual salary, then the benefit would be wage-related and the premiums would be prorated--(10,000/15,000) x $7.70 per thousand x 30 = $154 per employee for the occupation of "Secretary."

The benefit data, as supplied by the respondents, will normally consist of data elements which were used to calculate a cents-per-hour-worked cost of the benefit. These data elements may include rates, expenditures, benefit usage and eligibility information. Examples of data elements expressed as rates are--a $7.70 per thousand premium for a life insurance, $150 per employee for a health insurance premium, 7 paid holidays per year, or a 10¢ per hour shift differential. An employer's aggregate contribution to a pension fund is an illustration of expenditure-type data. Usage data may be the number of employees ordinarily on each work shift, length-of-service distributions of employees, or the normal amount of overtime paid for. Eligibility pertains to such items as age and service requirements for the benefit.

Cost or pricing of a benefit involves the computation of the employer's cents-per-hour-worked cost for every individual benefit, followed by the summation of all cents-per-hour-worked costs for all benefits provided by the employer.

Some examples are provided below to illustrate the methods by which data on benefit practices are used in the calculation of cents-per-hour-worked cost. Suppose workers in an occupation receive vacation, life and health insurance benefits.

The vacation cost calculation data are:

Length of Service	Vacation Weeks	Workers	Vacation Weeks x Workers
0 to 1 year	0	2	0
1 to 2 years	2	5	10
2 to 5 years	3	11	33
5 to 12 years	4	18	72
12 to 17 years	5	6	30
17 + years	6	2	12
Total		44	157

Scheduled weekly hours....38
Straight-time average hourly earnings....$7.50
Annual hours worked (annual scheduled hours (52 x 38) + overtime - paid leave)....1,871
Computation:

Average vacation weeks = 157 ÷ 44 = 3.6

$$\text{¢/hour worked} = \frac{\text{(weeks/year x hours/week x \$/hour)}}{\text{hours worked/year}}$$

$$= \frac{3.6 \times 38 \times \$7.50}{1871} =$$

$$= \$0.5484$$

For life insurance, the cost calculation data are:

Insurance coverage of 3 times annual hourly straight-time earnings; employer pays premium of $6.86 per $1000 of annual straight-time earnings.computation:

$$\text{¢/hour worked} = \frac{3 \times 38 \times 52 \times \$7.50 \times \$6.86/\$1000}{1871}$$

$$= \$0.163$$

For health benefits, the cost calculation data are:

Insurance premium is $14.70 per biweekly pay period.
computation:

$$\text{¢ hour worked} = \frac{\$14.70 \times 26}{1871}$$

$$= \$0.204$$

The employer's cost of social security benefits is estimated centrally using an equation whose coefficients were specified based on a sample of data from survey occupations. The dependent vauables are the employer's legally required contribution rate and taxable ceiling, and average earnings for the occupation.

In the example used to explain the pricing calculation, assume the cents-per-hour costs cost of social security to be $0.507; that other benefit costs are premium pay for overtime ($.060), paid holidays ($0.417), pensions ($0.956), federal unemployment tax ($0.022), state unemployment tax ($0.040), and workers' compensation ($0.338).

The cost of each benefit per occupation is then summed up across all benefits provided by the employer for workers in that occupation--

Benefit	¢ hour cost
Overtime	$0.060
Vacations	0.548
Holidays	0.417
Life Insurance	0.163
Health Benefits	0.204
Pension	0.956
Social Security	0.507
Federal Unemployment Tax	0.022
State Unemployment Tax	0.040
Workers' Compensation	0.338
All benefits	3.255

Straight-time average hourly earnings and cents-per-hour-worked benefits costs are added to obtain the compensation cost for each ECI occupation in the initial survey period, as shown below:

Straight-time average hourly earnings	$7.500
Benefit cost/hour worked	3.255
Compensation-per-hour-worked	$10.755

In succeeding quarters, survey establishments are asked to report straight-time hourly earnings for the same occupations specified in the initiation quarter, and information on benefit practice changes which modify an employer's hourly payment obligation. Such changes may include liberalization of holiday or vacation plans, introduction of a pension plan, changes in insurance premiums, social security taxable ceilings, changes in acturial assumption in pension funding. Not all cost changes qualify as changes in the ECI; changes resulting from shifts in employment, fluctuations in the usage of benefits such as overtime, retroactive payments, etc., are instances where cost changes occur but are not measured for ECI purposes.

When a benefit change is reported, information is obtained to reprice the benefit. Changes will generally be in the form of new rates or expenditures. Changes are recorded when the new obligation is incurred, not necessarily when payments resulting from the change are made by the employer. For example, if health insurance practices are liberalized starting January 1, but the new premium is not paid until April, the change is still recorded as occurring in January.

It should also be noted that ECI measurement does not rely solely on accounting-type data, i.e., data may not be available at the time when a benefit practice changes, or may not be appropriate for measurement in accordance with ECI concepts. Assume, for example, a situation where pension benefits rise from $200 to $2.50 per month and the employer's cents-per-hour cost is 20¢. The employer's obligation to provide for these benefits has obviously changed, but the financial records will not reflect this at the time of the change (and may never pick up this change in isolation from other factors affecting expenditures). In this situation, the data collector would apply a factor of 250/200 or 25% increase to the old cents-per-hour cost to reprice the benefit, i.e., 1.25 x .20 = 25¢.

Furthermore, quantification in other situations amounts to the employer's judgment of the impact of a practice change. The employer may estimate the impact of a practice change as a "6% jump in cost" or an increase of "2¢ per hour." If the employer can substantiate this estimate, it is a valid method of quantification for measuring change.

Insofar as possible, and with certain logical exceptions, benefit usage is fixed in measuring changes in cost. For example, normal overtime may be two hours per week at a time-and-half rate. This is fixed-based usage for ECI measurement.

Quarterly fluctuations in overtime worked do not have any cost impact. If the overtime premium rate practice is changed, the the change is applied to the fixed base usage to quantify the change. Similarly, length of service distributions determining vacation benefits are fixed in computing changes in average vacation cost.

One more element has to be considered in the measurement process--the effect of wage change on the cost of wage-related benefits. This effect, usually referred to as "creep", means, for example, that the employer's cost of

two weeks of employee vacation will rise along with pay increases even if the amount of vacation time remains fixed. The ECI data processing system automatically calculates the "creep" effect each quarter when a change in wages or salaries is reported for those benefits which are wage-related.

The tabular example below illustrates the procedure for computing cents-per-hour occupational cost from quarter-to-quarter.

In the base quarter (T1), average hourly earnings, hourly cost of all benefits, and hourly compensation of $7.500, $3.255, and $10.755 respectively are calculated for occupation A. An hours worked figure of 1871 is calculated from the product of scheduled hours reported and scheduled annual weeks, plus overtime less paid leave. Wage-related benefits are designated by an asterisk.

In the interval from the base (T1) to the first update quarter (T2), workers in occupation A, receive a 6 percent wage increase, and have their vacation plan changed to provide for more paid leave. The effect of the wage increase is to boost average hourly earnings from $7.50 to $7.95, and to increase all wage-related benefit costs by 6 percent. In addition, the liberalized vacation plan, not only increases vacation costs, but raises all benefit costs, both wage and nonwage-related, by decreasing hours worked, the denominator in the cents-per-hour worked calculation by 3 hours. The net effect in T2 is to increase hourly compensation to $11.383.

The sole change from T2 to T3 is an improvement in pension benefits resulting in an increase in costs for that benefit, and a commensurate rise in total compensation to $11.460.

From T3 to T4, workers in occupation A get a cost-of-living increase of 1.3 percent, and an increase in the premium rate for overtime. The wage increase boosts the cost for wage-related benefits, leaving other benefit costs unchanges, and the higher premium rates push up benefit costs for overtime. The net effect is an increase in hourly compensation to $11.625.

Changes in Average Hourly Compensation, Over Four Time Periods

Occupation A		T 1 = Base Quarter	T 2 = 1st Update Quarter	T 3 = 2nd Update Quarter	T 4 = Update Quarter
Straight-time, average hourly earnings		$ 7.500	$ 7.950	$ 7.950	$ 8.050
Hourly Benefit cost					
*a. Premium Pay for Overtime	.060		.064	.064	.099
*b. Vacations	.548		.630	.630	.638
*c. Holidays	.417		.443	.443	.449
*d. Life Insurance	.163		.173	.173	.175
e. Health Benefits	.204		.205	.205	.205
f. Pensions	.956		.958	1.035	1.035
*g. Social Security	.507		.538	.538	.546
h. Federal Unemployment Tax	.022		.023	.023	.023
i. State Unemployment Tax	.040		.040	.040	.040
*j. Workers' Compensation	.338		.359	.359	.365
Total Hourly Benefit Expenditure Rate		$ 3.255	$ 3.433	$ 3.510	$ 3.575
Average Hourly Compensation		$ 10.755	$ 11.383	$ 11.460	$ 11.625
Annual Hours Worked		1,871	1,868	1,868	1,868

* = Wage-related benefit

Using a matched set of establishment occupation cents-per-hour cost observations, the data processing system then computes the ECI statistics. Stripped down to its essentials, this is a sequential weighting and averaging process. Establishment occupational sample weights are applied to the hourly cost occupational observations to obtain occupational cost averages for each of the cell cost averages to get aggregate wage or compensation bills for major occupational groups; and the bills are summed across industries. The aggregates for the current quarter are compared to the aggregates in the prior quarter to get the measure of change shown in the published statistics. An illustration of this process, with a 2-occupation, 3-establishment sample, in a prior (or base) and current quarter is shown in the example below:

Calculation of the wage and salary bills only would be accomplished by following the same steps omitting the benefit cost data.

Computation of ECI change statistics for total compensation and wages and salaries

Compensation bill for the current survey period is deivided by the total for the base (or prior) period to obtain a ratio:

Current period-Prior period or $289,500 - 285,125 = 1.0153

The ratio is converted to a quarterly percentage change statistic; in this case 1.53.

If the prior period is the index base period, then

Base Index = 100.0

2nd quarter Index = 100.0 x 1.0153 = 101.53

Statistics are now published for the percent changes in wages and salaries for the 3 months ending in March, June, September, and December (Appendix 1). They are available in a press release two months following the survey reference month; quarterly change statistics extend back to September 1975.

The ECI is now in the process of expansion to a measure of total compensation with the addition of fringe benefits; governments will be included in the survey. When this is accomplished, the Employment Cost Index will measure changes in compensation for the nonfarm economy, excluding households.

Calculation of occupational compensation bill for an industry

Occupation	Weighted Hourly Compensation		Occupational Weight--1970 Census Employment	Aggregate Compensation	
	Base (1)	Current (2)	(3)	Base (1x3)	Current (2x3)
A	$9.260	$9.644	3,000	$27,780	$29,933
B	6.367	6.474	2,000	12,734	12,948
Total Compensation bill, Major occupational group ---------- Industry 1				40,514	41,880

Calculation of compensation bill, all occupations, all industries

Industry	Compensation Base	Aggregate Bills Current
1 ----------	$40,514	$41,880
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62 ----------	9,502	10,707
Compensation Aggregate (62 industries)	$285,125	$289,500

Appendix 1. Rate of wage and salary changes in Employment Cost-Index

(Percent changes)

Series	3 months ended				
	June 1977	September 1977	December 1977	March 1978	June 1978
All private nonfarm workers	1.9	1.8	1.7	1.9	2.1
Workers, by occupational group					
White-collar workers	1.6	1.7	1.8	1.8	2.1
Professional and technical workers	1.5	1.8	1.7	1.6	1.3
Managers and administrators	2.0	1.3	0.7	2.4	1.8
Sales Workers	1.7	1.7	4.0	0.3	5.4
Clerical workers	1.2	2.0	1.7	2.4	1.4
Blue-collar workers	2.2	1.8	1.8	1.8	2.2
Craft and kindred workers	1.9	2.2	1.7	1.3	2.3
Operatives, except transport	1.7	1.6	2.2	2.5	1.4
Transport equipment operatives	4.2	1.6	1.0	1.3	4.5
Nonfarm laborers	2.9	1.3	1.5	2.4	2.1
Service workers	2.2	1.7	1.0	3.6	1.9
Workers, by industry division					
Manufacturing	1.8	2.2	1.8	2.0	1.6
Durables	1.5	2.2	2.0	1.8	1.7
Nondurables	2.2	2.0	1.5	2.3	1.5
Nonmanufacturing	1.9	1.5	1.7	1.9	2.4
Construction	2.3	1.8	1.4	1.2	2.9
Transportation and public utilities	2.9	2.0	2.1	1.4	2.1
Wholesale and retail trade	1.7	0.9	1.5	3.1	2.7
Wholesale trade	*	-0.2	2.6	2.5	1.8
Retail trade	1.9	1.4	1.1	3.3	3.1
Services	1.8	1.8	0.7	1.7	1.7
Workers, by region					
Northeast	2.0	1.7	1.5	1.8	1.6
South	2.2	1.9	1.2	3.0	2.2
North Central	1.5	2.0	2.4	1.3	2.3
West	1.7	1.5	1.8	1.9	2.2
Workers, by bargaining status					
Union	2.2	1.9	2.0	1.6	2.0
Manufacturing	2.0	2.3	2.2	1.7	1.7
Nonmanufacturing	2.4	1.5	1.8	1.5	2.3
Nonunion	1.7	1.7	1.6	2.2	2.2
Manufacturing	1.6	2.0	1.5	2.2	1.6
Nonmanufacturing	1.7	1.6	1.6	2.1	2.5
Workers, by area					
Metropolitan areas	1.8	1.7	1.9	1.7	2.1
Other areas	2.1	1.8	1.1	3.4	2.3

* Not available