

THE EMPLOYMENT COST INDEX AND RELATED SERIES ON WAGE AND COMPENSATION CHANGE
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This is the first of two papers on the Employment Cost Index (ECI). The ECI is the newest Bureau of Labor Statistics (BLS) series on wages and compensation (wages plus the employer's expenditures for employee benefits). The ECI is a fixed employment weighted Laspeyres index. This paper compares the ECI with related series, and explains why the series change relative to one another as they do. The purpose is to help users of the BLS data understand the relationships between, and the uses of, the limited data available on the change in wages and compensation. The second paper discusses the survey design and the estimation of the ECI.

The first comparisons are between the ECI and series that compute the change in the simple average. These are the Average Hourly Earnings (AHE) and the Average Hourly Compensation (AHC). The AHE is total wages and salaries paid to production workers in manufacturing, mining and construction and nonsupervisory workers in the rest of private nonfarm industry divided by hours paid. The AHC is total compensation of all persons in the private business sector divided by the hours of all persons. Comparisons are also made with the earnings data from the Current Population Survey (CPS), and the Hourly Earnings Index (HEI). The last two series use more complex measures of computing change than the simple average. 1/ The Change in the ECI and Simple Averages
The ECI, AHC and AHE differ in three respects:

1. The method used to compute change--the change in the simple average or the change in a fixed weight index.
2. The concept of pay used--wages or compensation.
3. The workers covered--all workers in the private nonfarm economy or only production and nonsupervisory workers.

The series are arranged in Table 1 so that adjacent series differ in only one of the three ways. The ECI (PROD) is an index from the ECI series specifically prepared for this paper. It includes the same group of workers as those included in the AHE. (Workers included in the AHE are called production workers and those excluded from the AHE, but included in the ECI are called nonproduction workers). The period is from December 1979, when the ECI compensation index begins, until December 1982.

Table 1: Comparisons of the Change in the ECI Wage and Compensation Indexes and the Change in the AHE and AHC.

(December 1979-December 1982)	
Series	Percent change
All private nonfarm workers	
AHC	28.2
ECI: Compensation	28.3
ECI: Wages	26.1
Production workers	
ECI (PROD): Wages	26.6
AHE	22.5

The method of computing change had little impact on the measures of change of compensation for all workers--the change in the AHC was within 0.1 percentage point of the change in the ECI compensation index. The concept of pay used made a difference of 2.2 percentage points--the change in the ECI compensation index for all workers increased 28.3 percent while the ECI wage index for all workers increased 26.1 percent. The group of workers covered made a difference of 0.5 percentage point--the change in the ECI wage index for production workers was 26.6 percent, as compared to the 26.1 percent change in the ECI wage index for all workers. The method of computing change had a large impact when only production workers are considered--the change in the AHE of 22.5 percent was 4.1 percentage points less than the change in the ECI wage index for production workers.

The differences between the ECI indexes in Table 1 are the result of different rates of change for different components of costs, or different worker groups. The compensation index increased more than the wage index because the index of benefit cost increased more than the index of wages. Similarly, the ECI wage index for all workers increased less than the ECI wage index for production workers because the wage index for nonproduction workers increased less than the index for production workers. These relationships are known, although estimates of the index of benefit cost and the wage index for nonproduction workers are not available, because the change in an aggregate index is a weighted average of the change in the component series.

The differences between the change in the ECI indexes and the corresponding average series in Table 1 are the result of compositional shifts within the workforce among industries and occupations with different levels of pay (wages or compensation). Average pay changes when the rate of pay for a specific job changes, or when there are compositional shifts in employment between occupations and industries with different pay levels. The ECI index holds the composition among jobs fixed and the ECI index changes only when the rates of pay for specific jobs change. Shifts from higher to lower pay jobs will cause the change in the average to increase less than the index because after the shift there are relatively fewer high pay jobs included in the average than before the shift.

Compositional shifts had little impact on the change in average pay when compositional shifts among all workers are included--the change in the AHC was equal to the change in the ECI compensation index. Compositional shifts had a large impact on the change in average pay when only compositional shifts among production workers are included--the change in the AHE was 4.1 percentage points less than the change in the ECI wage index for production workers. The different impact of compositional shifts of the workforce within all workers and within production workers is the result of cyclical shifts in employment that occurred from December 1979 to December 1982. December 1979 to December 1982 was a period of

economic contraction. ^{2/} During the contraction there were shifts in relative employment from high to low pay industries. An indication of the magnitude of the industrial shifts that occurred is given by examining the unemployment rate by industrial groups in December 1982. Unemployment rates in high pay industries such as construction, mining and durable manufacturing were 22.0, 18.1, and 17.1 percent. Unemployment in low pay industries such as finance, and services was 7.9 percent. The relative shifts in the employment of production workers from high wage to low wage industries caused the AHE to increase less than the ECI (PROD).

It is likely that the relative shifts in employment from high to low wage industries also cause the change in average earnings for nonproduction workers to increase less than the wage index for nonproduction workers. This cannot be verified since neither the change in average earnings nor the wage index for nonproduction workers is available.

During periods of economic contraction, individual establishments attempt to maintain their skilled, high pay, workforce. This results in a shift in relative employment from production workers, which are typically low pay occupations, to nonproduction workers, which are typically high pay occupations. ^{3/} An indication of the magnitude of the occupational shifts that occurred is given by examining the unemployment rate by occupational groups in December 1982. Unemployment rates are for the Major Occupational Groups as defined by the 1970 Census. These groups do not closely correspond to the occupations included in production workers. Blue-collar and service workers who are entirely included in production workers had unemployment rates of 16.3 and 12.2 percent. Managers and administrators who are entirely excluded from production workers had an unemployment rate of 4 percent. The unemployment rates for other white-collar workers, that are included or excluded from production workers depend-

ing on the industry, ranged from 3.7 to 8.0 percent.

When all compositional shifts are included, the shifts from low compensation production workers to high compensation nonproduction workers offset the industrial shifts from high to low compensation industries. The change in the AHC is equal to the change in the ECI compensation index.

Note that the change in the average wage of all workers depends on relative shifts in employment from low wage production to high wage nonproduction workers, as well as on the change in the average wage for each group. The change in average wage of all workers is not a weighted average of the change in the average wage of the component series. It is possible that over the period December 1979 to December 1982 the change in the average wage for all workers was larger than the change in the average wage of either production or nonproduction workers.

Additional comparisons between the change in the ECI wage index and the change in earnings for occupational groups are made when data from the CPS are examined. Both the ECI and CPS give estimates for the Major Occupational Groups.

Earnings from the Current Population Survey

The CPS measures the median rather than the mean. It uses weekly wage and salary earnings rather than hourly earnings. It covers all civilian workers rather than only workers in the private nonfarm economy. These differences certainly influence the change in the CPS, but it is clear from the data in Table 2 that the differences between the CPS and the ECI wage indexes are dominated by shifts in composition of the workforce among jobs with different wage and salary levels.

For every occupational group, with the exception of sales workers, the change in the CPS was less than the change in the ECI. The differences for blue-collar and service worker occupations ranged from -10.0 to -6.1 percentage points.

Table 2. Comparison of the Change in the ECI Wage and Compensation Index and the Change in the CPS. (December 1979 - December 1982)

Series	Change in CPS	Change in ECI	Difference
All occupational groups			
Wages	25.4	26.1	-0.7
Wages by occupational group			
Service workers	20.5	30.5	-10.0
Blue-collar			
Laborers	14.6	23.4	-8.8
Craft and kindred	20.0	26.7	-6.7
Operatives exc. transport	20.0	26.2	-6.2
Transport operatives	15.2	21.3	-6.1
White-collar			
Managers and administrators	18.6	23.8	-5.2
Clerical workers	25.6	27.2	-1.6
Professional and technical	29.4	30.9	-1.5
Sales	24.4	19.4	5.0

The differences for white-collar workers, excluding sales workers, ranged from -5.2 to -1.5 percentage points. The -4.1 percentage point difference for production workers found by comparing the AHE and ECI (PROD).

falls above the differences for the blue-collar workers and in the low range of the white-collar workers. Production workers include all of the blue-collar and service occupations, exclude managers and administrators and include some of the workers in the remaining three white-collar groups.

The differences between the CPS and the ECI wage index for occupational groups are large compared to the -0.7 percentage point difference between the aggregate CPS and ECI wage index. Shifts in relative employment from high to lower wage industries cause the change in the CPS to be less than the change in the ECI for the individual occupational groups. Shifts in relative employment from lower to higher wage occupational groups offset most of the industrial shifts within occupational groups, and the change in the aggregate CPS is relatively close to the change in the aggregate ECI wage index.

The 0.7 percentage point difference between the change in the aggregate CPS and the change in the aggregate ECI wage index is large when compared to the 0.1 percentage point difference between the AHC and the ECI compensation index. High wage jobs are usually high compensation jobs. Shifts in the composition of the workforce would be expected to cause the difference between the AHC and the ECI compensation index to be roughly the same as the difference between the change in the CPS and the ECI wage index. It is possible that employment shifts could cause the change in average wages to differ from the ECI wage index by 0.7 percentage points and cause the change in the AHC to differ from the compensation index by 0.1 percentage point. It is likely that other differences in the CPS series, such as the use of the median rather than the mean, and weekly rather than hourly earnings, account for some of the 0.7 percentage point difference between the change in the CPS and ECI wage index.

The series discussed, the AHE, AHC, CPS and the ECI index, are highly complementary. A more comprehensive picture of the change in labor markets is obtained by examining the series jointly, than can be obtained from any single series considered separately. The final series compared, the HEI, does not contribute much additional information.

The Hourly Earnings Index

The HEI forms an index by weighting simple average wages for detailed industries from the AHE by hours paid in the base year. The HEI removes some of the impact of between establishment shifts. Over the period shifts were from high to low wage establishments and the HEI increased 25.4 percent; 1.9 percentage points more than the AHE. Shifts between establishments still had a greater impact on the HEI than employment shifts within establishments, and the HEI increased 1.2 percentage points less than the ECI (PROD).

The Time Period Compared

The direction and magnitude of the differences between the series depend on the time period. Had another time period been used, the relationships would be quite different. The importance

of the time period selected is shown in Chart 1, that plots the change in the ECI (PROD) and the AHE for the year ended in the quarter shown.

During the period of falling unemployment the change in the AHE is greater than the change in the ECI (PROD), while the reverse is true during the contraction. It would be easy to select a period where the change in the AHE was equal to the ECI (PROD). Whatever period studied, however, the difference would be the result of the shifts in the composition of the workforce that occurred over the period.

The Use of Various Series 4/

The reasons why the series change differently are also the reasons why different series must be estimated. Wages and compensation are costs to the employers of labor, and income to the employees. The change in labor costs of production are not necessarily the change in average labor income. For a given group of workers, the change in the labor cost of production differs from the change in labor income when there are shifts between jobs with different wage or compensation levels.

An increase in the wage paid for a particular job (e.g., higher wages for laborers) increases the average wage earnings or income of employed workers. It also increases the labor cost of producing a given amount of output, changes the relative cost of employing different kinds of labor, and changes the cost of employing labor relative to other factors of production. A relative shift in employment from low wage to high wage jobs (e.g., an increase in unemployment of low wage laborers) also increases the average wage income of workers. Such a shift does not, however, change the cost of producing a given amount of output or the cost of employing different kinds of labor for any producer. Each employer of labor pays each kind of labor the same amount after the shift as before.

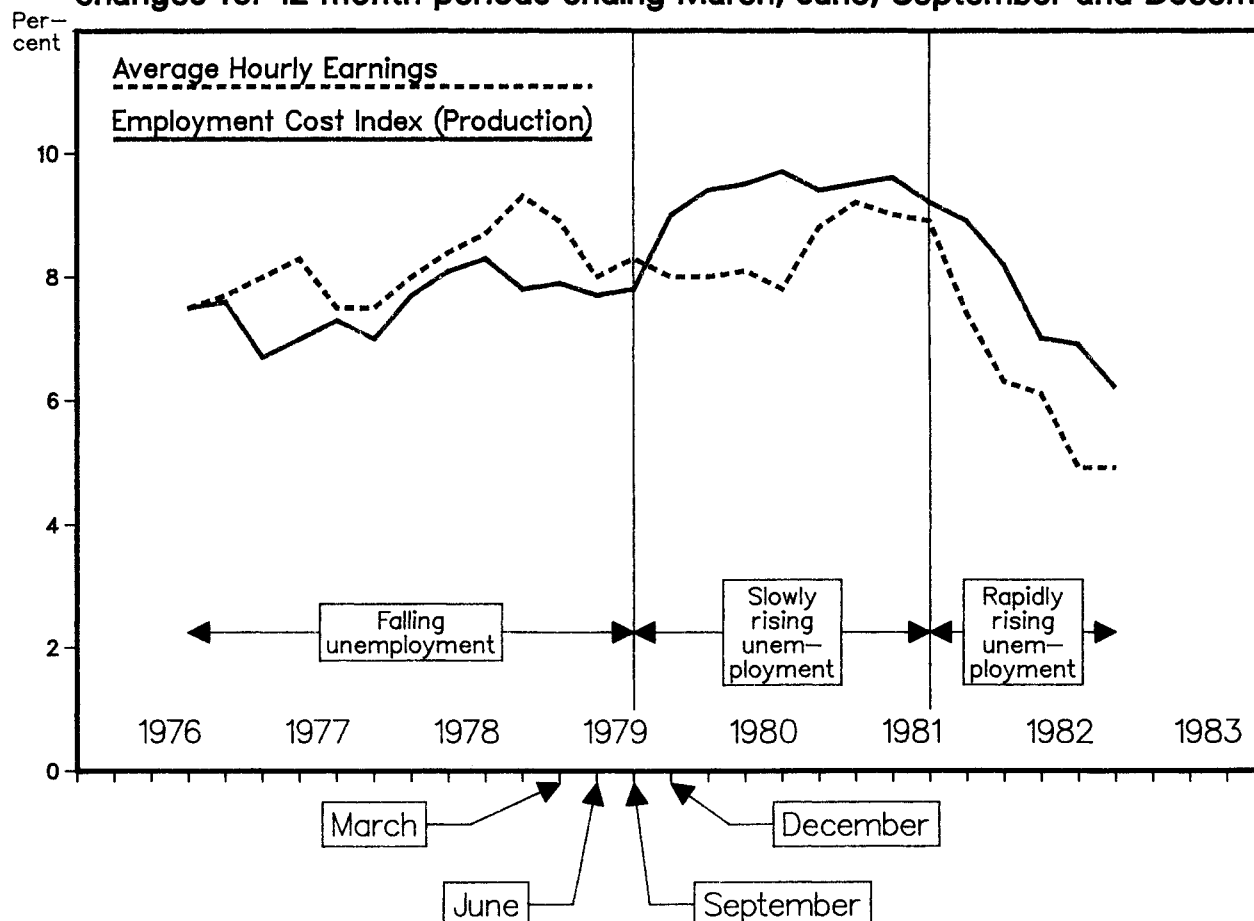
The ECI should be used when the change in wages or compensation as a cost of employing labor is wanted. The ECI should be used in analyzing the change in wages or compensation on output prices, the allocation of labor between industries and occupations, or the distribution of income between factors of production.

The HEI measures neither the change in wages as income nor as costs. The use of the HEI, and the justification for publishing it, requires a historical digression. The HEI was issued in 1971 as an attempt to approximate the change in labor cost until the ECI could be developed. When it was issued the BLS stated: "Even this measure [HEI] is defective in not adjusting for employment shifts among establishments within an industry or shifts in the occupational composition of employment within an establishment. Until a general wage index [ECI] is developed---adjusted average hourly earnings [HEI] is the best comprehensive measure." 5/ The HEI meets the needs of those who require a measure of the trend in wages that includes the years before 1975 (when the ECI was released), but do not require that the measure relate to any particular economic concept.

Summary

There are many uses for wage and compensation data. The uses require measures that differ in the concept of pay---wages or compensation---the

Employment Cost Index (Production) and Average Hourly Earnings changes for 12 month periods ending March, June, September and December



Source: Bureau of Labor Statistics

workers included, and the method used to compute change. The method of computing change determines if the measure is one of changing labor cost, or changing labor earnings. The change in labor cost relative to the change in average earnings depends on employment shifts within a group of workers.

The actual differences depend on the period covered. Had a different period been selected the relationships would be different. The change in the AHE could be greater than or equal to the change in the ECI (PROD). The AHC could differ substantially from the ECI compensation index. But whatever the magnitude or the direction of the differences, they would be determined by the shifts in employment that occurred over the period.

FOOTNOTES

- 1/ Additional information on all series used, except the CPS data, can be found in: BLS Handbook of Methods, Vol. I., U.S. Department of Labor, Bureau of Labor Statistics, December 1982, Bulletin 2134-1. Information on the CPS data can be found in: Technical Description of the Quarterly Data on Weekly Earnings from the Current Population Survey, U.S. Department of Labor, Bureau of Labor Statistics, January 1982, Bulletin 2113.
- 2/ M. A. Urquhart and M. A. Hewson, "Unemploy-

ment Continued to Rise in 1982 as Recession Deepened," Monthly Labor Review, February 1983.

- 3/ For a discussion of pay levels by industry and occupation, see: Profile of Occupational Pay: A Chartbook, U.S. Department of Labor, 2037.
- 4/ For additional discussion of the uses of the series, see: N. J. Samuels, "Developing a General Wage Index," Monthly Labor Review, March 1971; T. W. Gavett, "Measures of Change in Real Wages and Earnings," Monthly Labor Review, February 1972; V. J. Sheifer, "Employment Cost Index: A measure of change in the price of labor," Monthly Labor Review, July 1975; J. E. Triplett, "Concepts of Quality in Input and Output Measures: A Commentary on An Old Debate," The U.S. National Income and Product Accounts: Selected Topics (Murray Foss, ed.); J. E. Triplett, "A Conceptual Model for Labor Market Data," prepared for the Session on Model Structure, Data Bases, and Policy Issues, 95th Annual Meeting of American Economic Association (1981); J. E. Triplett, "An Essay on Labor Cost," BLS Working Paper 130, June 1981.
- 5/ T. W. Gavett, "Measures of Change in Real Wages and Earnings," Monthly Labor Review, February 1972.