

Should Benefit Usage Be Held Constant when Calculating the ECI?

A Theoretical Perspective

Mark A. Loewenstein
Bureau of Labor Statistics
2 Massachusetts Ave. N.E.
Suite 4130
Loewenstein_M@bls.gov

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Introduction

The Employment Cost Index or ECI seeks to hold benefit usage constant when possible.¹ There is little formal documentation of this procedure, and one suspects that users of the data are not fully aware of the practice and its implications. There is currently some confusion within OCWC as to whether it is appropriate to hold benefit usage constant. Sometimes the practice has been justified informally within OCWC for theoretical reasons and at other times it has been justified for data collection purposes. This paper examines the theoretical issues pertaining to the treatment of benefit usage. Naturally, in the final analysis, practical issues of data collection must trump theoretic distinctions. I therefore briefly touch on data collection issues in the conclusion, although this is not the focus of the paper.

The purpose of the paper is to highlight some of the conceptual issues involved in the decision to hold usage fixed or let it vary, and I do not attempt a systematic exhaustive analysis of all benefits. As a general rule, the theoretical arguments laid out below suggest that usage should be allowed to vary. However, as discussed in more detail below, different issues arise with respect to each of the various benefits. For some benefits, theory indicates quite clearly that usage should be allowed to vary. For other benefits, arguments can be made either way. For example, while it makes sense theoretically to allow health insurance benefits to vary, one can make a sound argument for either letting overtime usage vary or holding it fixed, depending upon what one wants the ECI to measure. Still a different set of considerations arises when considering hiring,

¹ Induced changes in usage are, however, supposed to be included in the ECI. This point will be discussed below.

retention, and referral bonuses and severance payments, which reflect the quasi-fixed nature of the labor input.

The Employment Cost Index or ECI measures changes in employers' cost of compensating workers, controlling for changes in the industrial-occupational composition of jobs. The ECI was modeled on the CPI, but the analogy needs to be applied with care. To help set ideas, let C_{it} denote the mean compensation paid to category i workers in period t and let E_{it} denote the number of category i workers employed in period t .

Letting 0 denote the base period, the ECI in period t is then calculated as

$$(1) \quad ECI_t = \frac{\sum_i E_{i0} C_{it}}{\sum_i E_{i0} C_{i0}} \cdot 100.$$

As can be seen from (1), employment in the various industry/occupation cells is held constant when calculating the ECI. Consequently, shifts in employment from, say, high paying to low paying sectors will not affect the ECI.

The compensation paid to labor consists partly of wages and partly of fringe benefits. Employers' expenditure on a given fringe benefit depends on both the benefit's usage – that is, the number of workers receiving the benefit – and on its rate – the cost per worker receiving the benefit. The cost of a benefit will increase if either its usage or its rate increases. Analogous to employment being held constant, one might be tempted to hold usage constant when calculating the ECI. However, this logic is incorrect. In the absence of other competing considerations, it is clearly inappropriate to hold usage constant. To see why, consider health insurance.

Health Insurance

Suppose that a firm offers two different health insurance plans. Suppose that the firm's health insurance contribution per participating worker in the first plan is \$1,800 per year and that its contribution per participant in the second plan is \$2,500 per year. Suppose 7 of the 20 workers in a particular job opt for plan 1, 9 workers sign up for plan 2, and the remaining 4 workers choose not to obtain health insurance through the employer. Assuming that that workers in the job work 2,000 hours in a year, the firm's hourly health insurance cost for the occupation in question is

$$\frac{\$1800 \cdot (7/20) + \$2500 \cdot (9/20)}{2000} = \$.877. \text{ This amount must be added to the employer's}$$

wage cost and the cost of the other fringe benefits to obtain the total compensation cost for the position.

An increase in the rate the firm must pay for the health plans it offers will cause its health care cost to increase. The firm's health care cost will also increase if there is an increase in the proportion of workers in the job who choose to participate in the employer's health insurance or if there is an increase in the proportion of participating workers who choose the higher cost plan. For example, if the number of workers who choose plan 1 falls to 5 while the number who choose plan 2 increases to 11, the employer's health insurance cost rises to

$$\frac{\$1800 \cdot (5/20) + \$2500 \cdot (11/20)}{2000} = \$.912.$$

A CPI-like index for health insurance would hold health plan usage constant and therefore not be affected by economywide changes in plan participation. In contrast,

the ECI measures how the cost of a given labor input changes over time; it does not attempt to hold the structure of the compensation package fixed. Changes in plan participation affect the values of C_{it} in equation (1). As far as the ECI is concerned, it should make no difference whether health insurance costs change because the costs of the various health insurance plans change or because of shifts in participation from one type of health insurance to another. Either change implies a change in the employer cost of employee compensation.

As a practical matter, the ECI's treatment of health insurance may not differ that much from the theoretical ideal enunciated here because the ECI includes induced changes in usage. According to the collection manual, an induced change in usage is "A change in usage caused by a change in employees' decisions due to changes to a benefit.... For example, if the employer started requiring the employee to pay for a part of health insurance, employees may be induced to drop out of the plan." In practice, changes in employers' health insurance plans typically justify re-estimating the cost using the new plan participation rates. The discussion above suggests that it is not necessary to determine whether or not a change in health insurance is "induced." Whether or not it is induced, a change in health insurance usage directly affects the employer's cost of employee compensation and should not be held constant when estimating the ECI.

The appropriate treatment of other benefits turns out not to be as clear-cut as health insurance. For example, the proper treatment of overtime depends on precisely what the ECI is intended to measure.

Overtime

As noted above, the ECI is a measure of the price of labor to employers, defined in terms of compensation per employee hour. However, there is ambiguity as to what is meant by the “price of labor.” Specifically, does the price of labor refer to the “transactions price of labor” or the “effective price of labor?” The two are not identical. The distinction between them is crucial when determining how to treat variations in overtime.

Overtime hours are, by definition, different from regular hours. Workers presumably dislike working overtime and consequently require higher compensation to work overtime hours. In addition, the Fair Labor Standards Act requires that covered workers be paid at least time and a half for each hour they work per week in excess of 40 hours. A change in a firm’s use of overtime implies a different mix of regular and overtime hours. Allowing overtime hours to vary would thus conflate the effect of a change in the mix of services the firm obtains from its workers with the effect of a change in base compensation. If, as argued by Sheifer, one wants changes in the ECI to reflect only changes in the *transactions price* of labor, overtime usage should clearly be held constant.

But one might well want the ECI to measure the *effective price*, or equivalently, current cost, of labor. If a firm obtains more overtime hours from its employees, then it will effectively have to pay its workers more per hour. If not passed on in the form of higher prices, this higher cost means lower profits. If the ECI is to reflect the current cost of labor, overtime hours should be allowed to vary.

It is not obvious whether policy makers concerned with the cyclical behavior of wages, price, and unemployment are more interested in the effective price of labor or the transactions price of labor. Treating overtime hours as fixed smooths the ECI in part by dampening cyclical fluctuations that may be of interest to policy makers. But policy makers can obtain information on overtime from other sources, and may therefore may prefer to have the effect of changes in overtime stripped from the ECI.

A good discussion of overtime can be found in the section of the “Final Report of the Concepts Analysis Team ”entitled “Overtime Hours: Hold Constant or Update?”. Comparing ECI and Current Employment Statistics data, this paper finds that the ECI practice of holding overtime constant tends to lead to overtime hours being underestimated.² The paper also points out that a change in overtime hours has conflicting effects on total compensation cost per hour. The direct effect of higher overtime hours is offset by the fact that the costs of fixed benefits (i.e., benefits that are tied to the number of employees and not hours) are spread out over a larger number of hours. Specifically, let w denote the wage rate, H_S denote regularly scheduled hours net of leave time, H_o denote overtime hours, p be the overtime wage premium (for example, p is typically .5), r be the ratio of wage related benefits (primarily social security) to wages, and let B denote (fixed) benefit costs (such as health insurance). Then total compensation cost in a job is given by

$$C = w(H_S + H_o)(1+r) + pw H_o(1+r) + B$$

² The paper also notes that overtime is most common in manufacturing industries and blue collar occupations – that is, in industries and occupations whose employment shares have been falling over time.

and total compensation per hour worked is

$$(2) \quad c = w(1+r) + (pwH_o(1+r) + B)/(H_s + H_o).$$

Differentiating (2) with respect H_o yields $\partial c / \partial H_o = \frac{pwH_s(1+r) - B}{(H_s + H_o)^2}$, which is positive if

$pwH_s(1+r) > B$. If wages are below the social security ceiling, then $r = .0765$. And p is usually $.5$. Making these substitutions, we see that an increase in overtime leads to an increase in total compensation cost per hour if $.5385 wH_s > B$. So as a rough rule, total compensation per hour increases if wage earnings (wH_s) are more than twice as large as benefit costs B . For the ECI sample as a whole, wages are about 70% of total cost, so on average the effect of a change in overtime on total cost is positive, but relatively small. Of course, even if total compensation cost is not very sensitive to changes in overtime, changes in overtime will affect the relative costs of the various benefits.

Hiring, Referral, and Retention Bonuses

Economists sometimes refer to labor as a quasi-fixed input to reflect the fact that, like capital, the labor input cannot be adjusted costlessly. The change in a firm's workforce during a period is given by

$$(3) \quad \Delta E = H - L - Q,$$

where H is the number of new hires during the period, L is the number of (temporary and permanent) layoffs, and Q is the number of quits. That is, a firm can actively add to its labor force by hiring new workers and it can reduce its labor force through temporary or permanent layoffs. Quits also reduce the size of the firm's workforce.

Hiring workers can be costly. Indeed, it is precisely because changing their labor force is costly that firms often resort to overtime to achieve temporary increases in output. Two components of hiring costs are included in the ECI, namely, hiring bonuses to newly hired workers and referral bonuses to existing employees who refer new workers to the firm. Retention bonuses can also be put into the same category since these prevent quits and thus mitigate the number of costly hires that firms need to make. Other hiring cost components, particularly, training costs, are undoubtedly more important than hiring, referral, and retention bonuses, but these are excluded from the ECI, which only includes employers' direct compensation costs.³

Hiring costs are “lumpy” in that they occur infrequently. By way of illustration, consider a firm that employs only one worker. This firm will incur a hiring cost at the time it hires a new worker. The firm will not have to incur this cost again until the worker leaves and has to be replaced. The firm's hiring cost in the period it made the hire is an overstatement of its expected hiring cost in a given period, while the firm's hiring cost in subsequent periods when it is not hiring are an understatement of its expected hiring cost.

More generally, consider a firm with more than one, and possibly many, employees. As in the example above, suppose for the moment that this firm is keeping its total number of employees constant over time. From equation (3), one sees that $\Delta E = 0$ when $H = L + Q$: to keep employment constant, the firm must hire enough replacements to just

³ For example, analyzing a 1982 survey of some 2,000 employers, Barron, Black, and Loewenstein (1989) find that during a new worker's first three months of employment, more than 150 hours of the new worker's time, co-workers' time, supervisors' time, and training specialists' time are devoted to the providing the new worker with formal and informal on-the-job training. A later study by Barron, Berger, and Black (1999) obtains a similar result.

offset the number of leavers. While a firm attempting to keep its employment constant will not generally be laying off workers at any point in time, there will typically be some workers who leave their firm to either work somewhere else or to retire from the workplace. The firm will have to hire replacements for these quitters. Because the number of workers who leave in any period is random, the number of workers the firm must hire – and thus its hiring and referral bonuses - will vary over time. For positions with large numbers of workers, this is not much of an issue. In the absence of cyclical considerations, the law of large numbers tells us that variations in H/E, the proportion of employees who are new hires, will be small for positions in which there are lots of workers. However, for positions with fewer workers, these variations may be considerable and a good case can be made for estimating hiring, referral, and retention bonus costs as a moving average of past costs.

So far we have focused attention on a firm that it is maintaining constant employment. A firm that is increasing its employment must hire more workers than leave. Conversely, firms can contract through attrition and layoffs. A firm that is growing today will have relatively high hiring, referral, and retention bonus payments today and lower payments in the future. Conversely, a firm that is contracting can expect to have higher bonus payments in the future than at the present.⁴ This again suggests that expected bonus payments be estimated as an average of past bonus payments. Of course, the question remains: Over how long a time period should one average?

⁴ Strictly speaking, the principle that the ECI measures the cost of a fixed labor input would require that bonuses for new hires who replace leavers be included in the ECI, while hiring bonuses for new workers who constitute a net addition to the firm's workforce be excluded. Implementing this in practice would likely prove to be quite difficult. Furthermore, excluding new workers who constitute a net addition to the firm's workforce would have the effect of understating adjustment costs for the economy as a whole – since at any moment in time, some sectors will be expanding and others will be declining.

Note that averaging essentially constitutes an intermediate course between holding usage constant and updating usage to its current value. In practice, it will likely turn out to be exceedingly difficult or even impossible to obtain the historical values necessary to calculate an average, in which case one is again forced to choose between holding usage constant or updating usage to its current value.⁵ In the absence of a secular change in usage over time, both approaches will be correct on average. Updating infrequently offered benefits has the disadvantage of potentially introducing volatility into the ECI, but it has the advantage of not missing cyclical changes in usage. Furthermore, if one holds usage constant, the ECI will not capture secular changes in usage that may be occurring over time.⁶ While updated costs may not correspond perfectly to employers' "expected costs", a policy of updating at least allows the ECI to capture historical costs.

It may well prove to be prohibitively difficult and costly to update quarterly usage information. A reasonable compromise is to update annually. It should also be noted that when benefit information is collected in the form of expenditures, usage is of necessity allowed to vary. In the December 2001 sample, the source codes indicate that 25% of all nonproduction bonus data are in the form of expenditures, but one suspects that this is an understatement.⁷ Common sense and anecdotal evidence suggest that field

⁵ Quotes typically remain in the ECI sample for four to five years. Obtaining the required historical values will only be a problem for quotes that have recently been introduced into the sample, but this problem is likely to be quite severe.

⁶ Secular changes in usage will be partially captured in the ECEC. Suppose, by way of example, that bonus usage is rising over time. Then new quotes in the ECI-ECEC sample will tend to have higher usage than old quotes, which will cause ECEC bonus costs to increase. (the ECI design intentionally chains out this composition effect). Since only about one fifth of the sample turns over in a year, secular changes in usage will affect the ECEC with a very substantial lag.

⁷ Hiring, retention, and recall bonuses likely make up a relatively small part of total nonproduction bonuses. An example of another nonproduction bonus would be year end bonus payments that an employer

economists usually collect bonus information as expenditures, the question being whether they obtain this information for the past quarter or the past year. Instead of the current somewhat haphazard assortment of practices, a more consistent approach would be to instruct the field economist to attempt to obtain expenditure information for the preceding year at initiation and to subsequently update bonuses annually.⁸

Unemployment Insurance Contributions and Severance Payments

Layoffs can be permanent or temporary. Temporary downturns in the demand for a firm's output or temporary disruptions in its input supplies often lead to temporary layoffs. Firms' current contributions to federal and state unemployment insurance funds are partially based on their workers' past unemployment insurance claims. A firm's current contribution to the fund is supposed to approximate the expected value of claims by the firm's workers in the future and changes slowly over time. Unemployment insurance contributions thus pose no problem as far as the ECI is concerned.

Severance payments are made to workers who are permanently laid off, so they occur when a firm is reducing the size of its workforce. By their very nature, severance payments are made infrequently. As with some bonus payments, this suggests estimating a firm's expected severance payments as an average of past payments. Once again, a reasonable alternative is to obtain expenditure information for the preceding year at initiation and to subsequently update severance payments annually.⁹

distributes among his workers when profits are high; it seems hard to make a case for holding usage of this type of bonus payment constant over time.

⁸ The Concepts Analysis Team makes this same recommendation in their 1996 report.

⁹ Updated severance payments are likely to be volatile, but this should not matter much for the ECI since severance payments are such a small part of total compensation.

Vacations and Other Paid Leave

The data collection construct “job” is somewhat of a black box. Ideally, one hopes that the workers in a job are similar in terms of their productivity, or more precisely, that the average productivity of workers in the same job is not changing over time as the quote ages in the sample. The major concern here pertains to tenure. Seniority is likely correlated with worker quality, but is not held constant when calculating the ECI. Consequently, a case can be made for not including in the ECI variations in compensation that are caused by changes in the tenure distribution of workers. This consideration is especially important for vacations and other paid leave since the leave time that workers are awarded is often directly tied to their tenure.

On the other hand, one can argue that the ECI should simply try to estimate changes in firms’ cost of labor and not concern itself with productivity changes due to factors such as a change in the tenure distribution of their workers. Indeed, it should be noted that besides affecting paid leave, a change in the seniority distribution of workers will also generally affect the average wage compensation in a position. No attempt is made to purge the effect of seniority on ECI wages -- in the absence of tenure information, this is simply not possible.¹⁰ One can therefore question whether concern about a changing seniority distribution is a sufficiently compelling reason to hold paid leave usage constant.

¹⁰ The ECI does consider full time and part time workers to be in different jobs even if they are doing the same kind of work. This is motivated at least in part by the presumption that full time workers are inherently different from part-time workers. Similarly, straight time workers are placed into distinct jobs from workers who receive incentive pay. The case for purging the effect of seniority on compensation if tenure were available seems less compelling.

Defined Contributions

Like other benefits, defined contribution plans can be defined in terms of rate and usage. In the case of defined contributions, the rate is the amount of matching contributions the firm makes and the usage is the number of workers who participate in the plan. A change in rate and in usage will both cause a firm's defined contribution cost to change. Since there frequently are tenure eligibility rules for pensions, changes in the tenure distribution of workers will lead to variations in the usage of defined contributions. Of course, a change in the tenure distribution of workers may also affect defined contribution rates. As with paid leave, one can thus question whether concern about a changing seniority distribution is a sufficiently compelling reason to hold defined contribution usage constant.

Seniority is generally not directly linked to the usage of other benefits.¹¹ Thus, the failure to hold the tenure distribution constant does not appear to be a very good reason to keep the usage of other benefits constant.

Data Collection Issues

The preceding discussion has focused on theoretical considerations. Of course, practical issues of data collection must also be considered. OCWC's historical preference for holding usage constant appears to be motivated in large part by operational concerns. Still, the current practice is somewhat of a hodgepodge. Benefits data are

¹¹There are some relatively minor exceptions to this statement. For example, new workers may sometimes have to wait a month before they can enroll in an employer's health insurance plan.

currently collected in one of two forms – either as rate and usage or as expenditures.¹² Overall, benefit information in the form of rate and usage is clearly more prevalent than benefit information in the form of expenditures. Indeed, some benefits are collected almost entirely in the form of rate and usage. However, for some benefits there are a substantial number of observations where information is collected as expenditures. For example, in the December 2001 sample, the source codes indicate that 38% of all health insurance data and 41% of all defined contribution data are in the form of expenditures. (There is some question as to how reliable the source codes are. As noted above, the codes indicate that 25% of all nonproduction bonus data are in the form of expenditures, which seems lower than one would intuitively expect.) When benefit information is collected in the form of expenditures, it is impossible to hold usage constant.

Conclusion

This paper has attempted to elucidate the theoretical issues pertaining to the treatment of benefit usage. In the end, practical issues of data collection must trump theoretic distinctions. In determining whether to update usage directly or indirectly through expenditure data, one needs to be concerned with potential effects on response rates and the quality of the data that are collected. Moreover, it is worth noting that updating usage for a benefit will have a substantial effect on the ECI only if actual usage varies from quarter to quarter for a given quote. The overall ECI will be affected only if the change in usage is common across a significant number of quotes.

¹²By way of example, the field economist ideally obtains information on the number of employees in a particular job participating in each of the health insurance plans an employer offers and the cost the employer incurs per worker employed in each plan (rate and usage). If this information is not available the

The question as to whether usage should be held constant clearly deserves more careful study, but several points are worth keeping in mind. First, while there is currently a preference for holding benefit usage constant, this practice is not followed consistently. When rate and usage information is collected, benefits are held constant. However, when expenditure information is collected, usage is by necessity allowed to vary.

Second, allowing usage to change should have little effect on the ECI and ECEC in any quarter, but will allow them to more fully capture cyclical and secular changes in usage over time. Since the ECI allows for induced usage, it does not entirely miss these changes now. Specifically, the ECI will eventually identify trends as employer initiated changes in benefit plans lead to induced changes in usage; the ECI is more likely to miss a one-time shift in usage.

Third, of all the benefits, the strongest case can perhaps be made for holding vacation usage constant because variations in vacation usage will largely correspond to variations in seniority. But holding vacation usage constant would be inconsistent with the treatment of wages, which constitute about 70 percent of total compensation and are affected by seniority.

The potential difficulty in updating quarterly usage information must not be minimized. Indeed, it may well prove to be prohibitively difficult and costly to update quarterly usage information. However, one can adopt the reasonable compromise of updating usage information annually rather than quarterly. This approach seems even more reasonable in light of the fact that some benefit costs pretty much only change once a year.

field economist can simply obtain information on the employer's total health insurance expenditures for all workers in the job.

Not only has there been some confusion within OCWC as to whether it is appropriate to hold benefit usage constant, but one suspects that field economists may not be acting consistently. For example, it is not clear whether at initiation field economists are attempting to collect bonus expenditure information for the prior quarter or the prior year. Theoretical considerations appear to indicate that benefit usage should generally be updated when calculating the ECI. However, even if the decision is made to hold usage constant, it would seem desirable to provide clearer guidelines to the field economists who collect the data.

References

- Barron, John M., Mark C. Berger, and Dan A. Black. 1999. "Do Workers Pay for On-the-Job Training?" *Journal of Human Resources*, pp. 235-252.
- Barron, John M., Dan A. Black, and Mark A. Loewenstein. 1989. "Job Matching and On-the-Job Training." *Journal of Labor Economics* 7:1, pp. 1-19.
- "Final Report of the Concepts Analysis Team," Office of Compensation and Working Conditions mimeo, 1996.
- Sheifer, Victor J. 1978. "How Benefits Will Be Incorporated Into the Employment Cost Index." *Monthly Labor Review*. pp. 18-23.

Questions for the Committee

Does the committee agree with the paper's general conclusion that theoretically it is desirable to allow benefit usage to vary? Are some benefits an exception to this general rule?

Should the ECI measure the "transactions price of labor" or the "effective price of labor?"

Should the ECI be attempting to measure expected hiring costs or historical hiring costs?

Should the ECI attempt to exclude variations in compensation that are caused by changes in the tenure distribution of workers?

In light of the potential difficulty in updating quarterly usage information, does the committee agree that updating usage information annually is a reasonable compromise?