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6 The Size Distribution of Wage and Nonwage Compensation: Employer Cost versus Employee Value

Timothy M. Smeeding

6.1 Introduction

The issue of total employee compensation is important both to applied labor economists and to economists interested in the size distribution of labor income and workers' economic well-being. Unfortunately, neither group has been afforded the luxury of a nationally representative data set for individual workers which allowed them to measure and value all major components of wage and nonwage compensation.

In empirical studies of the return to labor effort, commonly utilized household surveys, such as the Current Population Survey (CPS), the National Longitudinal Survey (NLS), and the Panel Study of Income Dynamics (PSID), have only recently begun to record individual worker's benefit recipiency information for major types of nonwage compensation, such as pension rights and health insurance. But none of these data bases records the dollar amount which employers "contribute" on behalf of employees.[1] On the other hand, the Bureau of Labor Statistics (BLS) has conducted several establishment surveys, such as the 1977 Employer's Expenditure for Employee Compensation Survey (EEEC) and the 1977 Employment Cost Index Survey (ECI) which provide

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aggregate employer outlays for several detailed types of wage and nonwage compensation, such as vacation and holiday pay and pensions, but no information on their distribution across individual workers.

In this paper we present the initial results of assigning recipiency and dollar values for various types of wage and nonwage compensation from BLS establishment surveys to individuals in the March 1980 CPS, using microdata simulation techniques.[2] This new data base is used to answer three questions:

1. How do the employer cost and employee value of fringe benefits differ between themselves and between other measures of worker compensation for different types of workers?
2. How do fringe benefits affect the size distribution of total compensation as compared to the size distribution of wages and salaries?
3. How does the definition of employee compensation affect the results of a standard human capital model or "earnings function" of the type employed in much of the empirical labor economics literature?

Section 6.2 presents the definitions of compensation, fringe benefits, and other terms used in this paper, along with data on their aggregate value and growth, and the limitations of this study. Section 6.3 briefly outlines a heuristic model of the employer-employee compensation determination process which establishes the difference between employer cost and employee value. Empirical proxies for employer cost and employee value are presented in section 6.4. Section 6.5 presents the empirical results which suggest answers to the three questions listed above, while section 6.6 summarizes the results and discusses the application of this technique for future research in related areas. The appendix contains a detailed discussion of the simulation procedures used to match the BLS data to the CPS.

6.2 Definitions of Terms: Fringe Benefits and Their Growth and Importance

Fringe benefits will be defined as the amount of total employee hourly compensation not received as pay for time worked, but paid by employers to employees for time not worked, or paid by employers to intermediaries on behalf of employees.[3] Payments for time not worked include vacation and holiday pay and other payments for nonproduction bonuses, for paid sick leave, and for severance pay. These items are already included in the money wages, salaries, or earnings (we use these interchangeably below) usually recorded in household surveys, along with pay for time worked: straight time pay, overtime pay, and shift differential. Payments made to intermediaries, such as insurance companies, are termed nonwage compensation or supplements to wages and salaries. These supplements are of two types: First, legally required

payments, such as social security payroll taxes, unemployment insurance, and workers' compensation contributions, are included in supplements to wages and salaries. Second, supplements in the form of deferred compensation, such as employer pension and retirement contributions and employer contributions to thrift or savings plans are included here, as are insurance contributions for health, life, and sickness or accident insurance. Altogether wages and salaries (including both pay for time worked and pay for time not worked) plus supplements equals total compensation.

Table 6.1 presents estimates of the aggregate value of total employee compensation, as we have defined it, for the private nonfarm economy from 1966 to 1979. The 1966 and 1976 estimates are taken from the *Handbook of Labor Statistics 1978* (1979), while the 1979 estimates are taken from the 1977 EEEC, adjusted to 1979 using the ECI. These 1979 figures are the aggregate control values used in the microsimulation model. Both sets of data are normalized to indicate various components of compensation as a percent of aggregate wages and salaries in each year.

Several interesting patterns are suggested by table 6.1. The overall average difference between the most narrow measure of labor compensation (pay for time worked) and the broadest measure (total compensation) has grown from 18.9 percentage points as recently as 1966, to 29.5 percentage points by 1979. While pay for time worked has fallen slightly as a fraction of wages and salaries, mainly because of the increasing fraction of wages and salaries attributed to vacation and holiday pay, supplements have been growing at a more rapid rate. Legally required benefits have increased by 3.4 percentage points or nearly 60 percent from 1966 to 1979, largely due to the 2.2 percentage point increases in social security and railroad retirement payroll taxes (in parentheses in table 6.1), but also due to increases in unemployment insurance contributions. In terms of percentage change from 1966 to 1979, the two most rapidly rising elements of compensation are insurance contributions and deferred compensation which grew by 2.9 and 2.4 percentage points (or by 126.1 and 98.1 percent), respectively, over this period. As several researchers (Kennedy and Vogel 1979; Woodbury 1981; Clotfelter 1981) have noted, rising marginal tax rates, rising income, and other factors discussed more fully below have led employees to favor these nontaxable forms of compensation over wages and salaries.[4] Due to growth in these supplements, total compensation was almost 20 percent larger than wages in 1979.

While table 6.1 indicates a rapid rate of growth both in fringe benefits and, particularly, in supplements to wages and salaries, these figures only represent aggregate employer contributions as a percent of aggregate wages and salaries. Such estimates mask the variance in benefits, even

Table 6.1 **Change in Relative Components of Total Compensation in the Private Nonfarm Economy: 1966–1979**

Component of Total Compensation	Components of Total Compensation as Percentage of Wages and Salaries		
	1966	1976	1979
Pay for time worked[a]	92.0%	90.6%	90.1%
Vacations and holidays[b]	5.6	7.2	7.4
Other payments[c]	2.4	2.2	2.5
Total wages and salaries[d]	100.0	100.0	100.0
Supplements to wages and salaries:			
Legally required contributions[e]	5.7	8.1	9.1
(Social security/railroad retirement)	(3.4)	(5.1)	(5.6)
Insurance contributions[f]	2.3	4.8	5.2
Deferred compensation[g]	2.9	5.3	5.3
Total compensation[h]	110.9	118.2	119.6

Sources: 1966, 1976: *Handbook of Labor Statistics* (1979), table 113. 1979: 1977 EEEC adjusted to 1979 using the ECI; adjusted March 1980 CPS data tapes.

[a]Pay for time worked includes straight time wages and salaries, overtime, and shift differentials.

[b]Vacations and holidays include vacation and holiday pay and other paid leave, except for sick leave.

[c]Other payments include nonproduction bonuses, sick leave, and severance pay.

[d]Total wages and salaries includes all direct (before tax) payments to workers, i.e., the sum of pay for time worked, vacations and holidays, and other payments as recorded on household income surveys such as the CPS.

[e]Legally required contributions include employer contributions for social security and railroad retirement, unemployment insurance, workers' compensation, and other mandatory payments.

[f]Insurance contributions include employer payments for life, accident, private disability, and health insurance.

[g]Deferred compensation includes employer contributions for pension plans, retirement plans, and savings and thrift plans.

[h]Total compensation includes all listed components of total worker compensation: wages and salaries plus all supplements.

the benefit variance which can be observed on as simple a level as average increases in compensation for those actually receiving these benefits as compared to those who do not. For instance, pension and retirement plan contributions make up 95 percent of deferred compensation. Of all wage and salary workers in the private nonfarm economy, 44.6 percent were covered in 1979 by a pension plan to which their employer or union contributed.[5] For these covered workers, the average employer contribution was 11.4 percent of wages and salaries. Following a similar procedure for health insurance (which makes up roughly 80 percent of total insurance contributions) indicates an average employer contribution of

7.4 percent for those with subsidized health insurance coverage. Thus, while these two components of compensation average 9.2 percent of wages and salaries across all workers during 1979, they average more than twice as large an amount, or 18.8 percent, for the 37.8 percent of workers covered by both types of plans, even before taking account of intraindustry and intraoccupational differences in the level of pension and health insurance contributions. Other data sources suggest even wider differentials across specific groups of firms and workers (e.g., Chamber of Commerce of the United States 1980). To the extent that the microsimulation model used in this paper can capture these differentials, it appears that different measures of employee compensation will produce substantial differences between various types of workers as well as large dollar differences between various measures of compensation.

Before we begin our analysis it is important to keep the limitations of this effort in mind. First and most importantly, the measure of "total" compensation used in this paper does not include fringe benefits in-kind, such as free or employer subsidized meals, parking, personal use of cars, entertainment, travel, and so on; nor does it include other job amenities, such as office size or location and flexibility of work schedule. At this time there are limited data on even aggregate values of these forms of compensation, much less indicators of the types of workers who receive such "perks" or the distribution of their dollar value across various recipients.[6] Second, due to lack of appropriate data self-employed persons and all government workers are excluded from our analysis.

6.3 A Heuristic Model of Employer-Employee Benefit Determination

The decision to accept a job involves a worker who provides a given amount of labor services in exchange for an employer's compensation. In general this compensation can be broken into four components: wage goods, i.e., market purchased goods, W; fringe benefit goods, B; working conditions, i.e., job amenities not included in fringe benefits, A; and leisure, L.[7] The value of a job, or the utility derived from a job, to a worker can therefore be expressed as:

$$U = U(W, B, A, L). \tag{1}$$

In the model which follows we examine the trade-off between W and B, largely ignoring A and L.[8]

In accepting a job, a worker in effect makes a tied purchase of a given set of W, B, A, and L. In general, following the work of Rosen (1974), the choice is made according to a worker's subjective evaluation of the objectively measure characteristics of this package. This hedonic model of the labor market is characterized by a set of firms offering various compensation packages in hopes of attracting a worker whose productive

characteristics (training, appearance, physical and mental abilities, etc.) most closely match those sought by the firm. In the job bargaining process firms compete with one another for workers by offering different compensation packages or adjusting those which are already available. Adjustments in compensation packages are not costless and so, ceteris paribus, employers only provide more of a given compensation component, e.g., time off with pay or more generous pension plans, in lieu of lesser quantities of other components, e.g., shared offices or lower wages (e.g., see Rice 1966; Lester 1967; Steuerle 1979; Atrostic 1982). Employees evaluate the available packages and choose the package that maximizes equation (1). In a competitive economy, this interaction of workers and employers and the compensation package adjustment process results in a locus of job matches which trace out the rate at which the market trades off wage goods and benefits for various groups of workers at the margin. These marginal rates of exchange represent the implicit hedonic prices of various job and compensation package components.

Income tax advantages and two types of "scale" factors, economies of scale in pension funds and economies of scale and group rating for insurance, increase the value of untaxed benefits (or lower their implicit price) to employees, relative to their cost to employers. Employees can avoid personal income taxation for most employer provided supplements, particularly insurance and pensions—and also for such items as employer social security contributions. Scale economies allow the employer to either lower the cost of a given benefit or to offer a higher level of benefits for a given outlay. However, because employers do not, in general, avoid corporate or personal income taxation by rearranging their mix of benefits and wages, while employees do enjoy such advantages, we assume that the relative value of benefits to employees rises above the employers' cost of providing benefits.

Finally, we must admit the possibility of nonoptimal situations, at least for some workers. For instance, due to immobility, rigidities, customs, or habit, available wage-benefit packages may force some workers to accept some type(s) of fringe benefits whose characteristics they value below market prices. A good example might be duplicate fully employer funded family health insurance policies for two working spouses, whereby (ignoring the chance of layoff) one spouse's policy is virtually worthless. Such cases are not unlike the situation faced by many in-kind transfer recipients, e.g., low-income elderly who benefit from costly medicare and medicaid insurance. In both this latter situation and in the case of the doubly insured family, the beneficiary would accept a different wage-benefit package (or a lesser amount of cash transfers) and remain equally as well off, or better off, than at present. Thus we cannot ignore the possibility of a "cash equivalent" problem. While in-kind transfers valued by recipients below their market value may persist indefinitely, if,

for instance, donor (taxpayer) preferences insisted upon such transfers, labor market disequilibriums of this sort should soon disappear as employers realize that, by offering workers some choice between current types of health insurance policies and other less costly wage or benefit packages which do not include health insurance, they can lower their compensation costs while still making workers better off.

In summary, because of tax advantages for fringe benefits and the savings from scale economies and group rating economies, any given mix of compensation characteristics carries with it two distinct dollar value measures: employer cost and employee value. The next section presents empirical proxies for these and other measures of employer compensation.

6.4 Empirical Measures of Fringe Benefits and Other Forms of Compensation

Empirical measures of the value of total compensation and its components can be readily derived. For any employer, let:

$$C(\mathrm{TC}) = \sum_{i=1}^{n} P_{B_i} \cdot B_i + P_W \cdot W, \tag{2}$$

where the employer cost of total compensation for any given employee, $C(\mathrm{TC})$, is equal to the sum total of dollar amounts of benefits, $P_{B_i} \cdot B_i$, for any given benefit $i (i = 1, 2, \ldots, n)$, and wages, $P_W \cdot W$, where P_{B_i} and P_W are the prices of benefits (B_i) and wage goods (W).

We define the employee value of the compensation package, $V(\mathrm{TC})$ for any employee as:

$$V(\mathrm{TC}) = \sum_{i=1}^{n} P_{B_i} \cdot B_i \cdot (t + S_i) + P_W \cdot W, \tag{3}$$

where t and S_i capture tax and scale advantages, respectively, by converting the value of benefits into equivalent pretax wages through their effect on relative prices. And $t = 1/(1 - t_m)$, where t_m is the marginal federal personal income tax rate on wages and other taxable money income for any given worker.[9]

Because $t_m \leq 1$, $t \geq 1$. The t factor estimates the additional amount of taxable wages necessary to leave the employee with after-tax income sufficient to purchase the same level of benefits which he now enjoys, at competitive market prices.[10] $S_i > 0$ also, indicating that, even in the absence of tax advantages, an employee could not purchase the same package of benefits at the same price as the employer, because group rating and scale economies lower prices to employers. Thus S_i represents the differentially higher prices that an employee would have to pay to purchase this same level of benefits. Together, the factor $(t + S_i) \geq 1$ then,

indicating that $V(\text{TC}) \geq C(\text{TC})$ because the ratio of employer prices (r subscript) for wage goods to benefits, P_{Wr}/P_{Bir}, differs from the employee price ratio (e subscript), P_{We}/P_{Bie}, due to the fact that $P_{We} = P_{Wr} \cdot (t + S_i)$.

Each of these measures of total compensation can be compared to wages and salaries (WSAL) alone for each worker:

$$\text{WSAL} = P_W \cdot W, \tag{4}$$

or to pay for time worked (PTW) where:

$$\text{PTW} = \text{WSAL} - \text{VHOL} - \text{OP}, \tag{5}$$

and VHOL is vacation and holiday pay, and OP is equal to other (severance, bonus, and sick) pay included in wages, as defined in section 6.2.

Wages and salaries are a relevant point of comparison for both $V(\text{TC})$ and $C(\text{TC})$ because it is often used as a proxy for either (or both) of these measures of compensation. Pay for time worked is, however, less appealing as a measure of the employee value of compensation. But in order to examine the size distribution of fringe benefits as we have defined them, pay for time worked must be subtracted from the employee value (or employer cost) of compensation. Further, in models of household work behavior where time and subsidized leisure become important variables, pay for time worked may be a more relevant measure of "earnings" than wages and salaries. To the extent that lesser amounts of vacations and holidays can be substituted for higher hourly rates of pay, hourly money wages for various workers may be quite different if measured on a pay for time worked basis as compared to a wage and salary basis. Workers whose wages and salaries differ least from pay for time worked, as measured in equations (4) and (5), respectively, receive less benefits in the form of time off with pay and other types of wage compensation than do those with the largest differences.

In equations (2) and (3) the value of benefits, $P_{B_i} \cdot B_i$, will be measured by the individual components of supplements: insurance, deferred, and legally required contributions. However, readers may prefer to differentiate between these types of compensation. Insurance and deferred compensation are bargained upon by workers and employers and differ widely across firms. On the other hand, legally required benefits are nonnegotiable components of compensation. Moreover, in calculating the employee value, $V(\text{TC})$, we will not be able to estimate the extent of nonoptimal situations at this time. The data needed to establish a worker's marginal rate of substitution between wage goods and benefits are not available. Assuming that hedonic prices or benefits levels adjust to competitive equilibrium, we would not find such situations to be widespread. For instance, the growth of "cafeteria" plans which allow workers to choose from various equal-cost bundles of benefits is a manifes-

tation of this hedonic adjustment process. But in the case of legally required contributions, no adjustments can be made. In particular, due to the vagaries and long-run prospects for social security, younger workers may value employer (and employee) contributions far below their cost. On the other hand, Burkhauser and Turner (1981) have recently demonstrated that older workers may value these contributions in excess of an equal amount of wages due to the current social security benefit formulas (e.g., rules for spouse's benefits). Similarly, workers in cyclical industries may place a high value on unemployment insurance contributions while those in more stable job situations may find them virtually worthless. Because experience rating does not fully compensate for these differences (see Feldstein 1978), employees in cyclical industries may put a value on unemployment insurance above the employer cost. Because we have no estimates of the marginal rate of substitution between wage goods and benefits, and because labor markets cannot easily adjust these forms of compensation to suit employee and employer preferences, we will compute a second measure of the employee value of total compensation:

$$V(\mathrm{TC})X = V(\mathrm{TC}) - \mathrm{LR} \cdot t, \tag{6}$$

and a second measure of the employer cost of total compensation:

$$C(\mathrm{TC})X = C(\mathrm{TC}) - \mathrm{LR}, \tag{7}$$

which simply measure the value of total compensation, $V(\mathrm{TC})X$, or the employer cost, $C(\mathrm{TC})X$, disregarding employers' legally required contributions (LR).

In total, we will analyze the six measures of worker compensation indicated in equations (2)–(7). In addition, we will examine two measures of the value of fringe benefits alone: either fringe benefits valued at employer cost, $[C(\mathrm{TC}) - \mathrm{PTW}]$, or at employee value, $[V(\mathrm{TC}) - \mathrm{PTW}]$. More benefit-specific definitions for these variables, including the schedule of scale effects for pension contributions, and scale and group rating effects for health, life, and sickness or accident insurance, and a detailed explanation of the simulation methodologies employed to estimate the various components of employee compensation can be found in the appendix.

6.5 Results

The measures of compensation described above were used to answer three different questions: What are the differences between employer cost and employee value of fringe benefits and other measures of compensation? What is the effect of fringe benefits on the size distribution of

earnings? What is the importance of different definitions of compensation in a standard human capital framework? We shall treat each in turn.

6.5.1 Comparing Employer Cost and Employee Value

Tables 6.2 through 6.5 present median levels of total compensation in the private nonfarm economy in 1979 for workers of different race, sex, and work status groups (tables 6.2 and 6.3); and for different occupational groups of workers (tables 6.4 and 6.5). In order to separate the effects of averaging measures of compensation for those with substantial levels of benefits and those without, tables 6.3 and 6.5 contain median compensation measures only for workers who receive both pension and health insurance benefits. In the private nonfarm economy, 37.8 percent of all workers, and 54.6 percent of all full-year full-time workers, receive both employer provided health insurance and pension benefits. In addition, workers with both types of benefits are more likely to receive other types of insurance coverage, sick pay, and other benefits than are other workers. Six measures of compensation are presented: wages and salaries (the standard measure of earnings); pay for time worked; the employer cost of total compensation (with and without legally required contributions); and the employee value of total compensation (with and without legally required benefits). In addition, we have calculated median levels of fringe benefits (total compensation minus pay for time worked) valued at employer cost and at employee value.

Median fringe benefits measured at employee value were $3099 (or 34.5 percent of wages) for all workers and $5208 (or 37.5 percent of wages) for full-year full-time workers in 1979 (table 6.2). Restricting the universe to employees with both health insurance and pension benefits in table 6.3 raises overall median benefits at employee value to $6866 (or 44.0 percent of wages and salaries) for all such workers and to $7239 (or 42.8 percent of wages and salaries) for all such full-year full-time workers. Workers with health insurance and pension benefits received more than twice as high a dollar amount in benefits ($6866 vs. $3099) and 9.5 more percentage points in total benefits relative to wages than did the overall average worker. Because workers with health insurance and pension benefits (table 6.3) are included among all workers (table 6.2) much wider differences would be found if we were to calculate median benefits for the 35.6 percent of workers with neither health insurance nor pension benefits.

Considering all workers in table 6.2, men received a higher dollar amount and a higher percent of salary in fringe benefits than did women. The ratio of female to male salary is 47.0 percent, while their ratio of fringe benefits at employee value is only 39.5 percent. However this substantial percent difference disappears totally when restricting the universe to all full-year full-time workers in table 6.2. Moreover, when

Table 6.2 **Different Measures of Median Compensation by Sex, Race, and Work Status in 1979**

Sex/Race	Wages and Salary	Pay for Time Worked	Total Compensation		Total Compensation without Legally Required		Total Fringe Benefits	
			Employer Cost	Employee Value	Employer Cost	Employee Value	Employee Value	Employer Cost
All workers:								
Both sexes	$ 8,974	$ 8,100	$10,667	$11,208	$ 9,690	$ 9,927	$3,099	$2,557
Males	13,047	11,883	15,789	16,594	14,472	14,909	4,711	3,906
Females	6,154	5,480	7,064	7,342	6,462	6,589	1,862	1,584
(female/male · 100)	(47.0)	(46.1)	(44.7)	(44.7)	(44.2)	(44.7)	(39.5)	(40.6)
Blacks	7,681	6,924	9,086	9,424	8,185	8,345	2,500	2,161
Whites	9,208	8,279	10,916	11,462	9,925	10,178	3,138	2,637
(black/white · 100)	(83.4)	(83.6)	(83.2)	(82.2)	(82.5)	(82.0)	(78.5)	(81.9)
Full-year full-time[a] workers only:								
Both sexes	13,884	12,327	16,596	17,535	15,248	15,842	5,208	4,269
Males	17,148	15,301	20,505	21,667	19,107	19,798	6,366	5,204
Females	9,784	8,561	11,598	12,229	10,649	10,990	3,668	3,037
(female/male · 100)	(57.1)	(56.0)	(56.5)	(56.4)	(55.7)	(55.5)	(56.6)	(58.4)

Source: Adjusted March 1980 CPS data tapes.

[a]Full-year full-time workers work thirty-five or more hours per week for fifty weeks or more per year.

Table 6.3 **Different Measures of Median Compensation by Sex, Race, and Work Status for Workers with Both Health Insurance and Pension Coverage in 1979**

Sex/Race	Wages and Salary	Pay for Time Worked	Total Compensation		Total Compensation without Legally Required		Total Fringe Benefits		Percent of All Workers with Health Insurance and Pension
			Employer Cost	Employee Value	Employer Cost	Employee Value	Employee Value	Employer Cost	
All workers:									
Both sexes	$15,577	$13,775	$19,180	$20,461	$17,637	$18,598	$6,866	$5,405	37.8%
Males	18,546	16,440	22,460	24,486	20,926	21,852	8,046	6,020	46.3
Females	10,352	9,044	12,791	13,709	11,744	12,325	4,665	3,747	27.0
(female/male · 100)	(55.8)	(55.0)	(57.0)	(56.0)	(56.1)	(56.4)	(58.0)	(62.2)	
Blacks	12,218	10,958	15,418	16,408	14,122	14,735	5,450	4,460	34.8
Whites	15,394	14,127	19,642	20,891	18,074	19,059	6,764	5,515	38.2
(black/white · 100)	(79.4)	(77.6)	(78.5)	(78.5)	(78.1)	(77.3)	(80.6)	(80.9)	
Full-year full-time[a] *workers only:*									
Both sexes	16,899	14,966	20,715	22,205	19,366	20,251	7,239	5,749	54.6
Males	19,761	17,236	23,856	25,821	21,973	23,173	8,585	6,620	59.8
Females	11,408	9,873	14,144	15,071	13,002	13,749	5,198	4,271	44.8
(female/male · 100)	(57.7)	(57.3)	(59.3)	(58.4)	(59.2)	(59.3)	(60.5)	(64.5)	

Source: Adjusted March 1980 CPS data tapes.

[a]Full-year full-time workers work thirty-five or more hours per week for fifty weeks or more per year.

looking only at workers with health insurance and pension benefits, the ratio of median female to median male fringe benefits, 58.0 percent, is now *higher* than their wages and salary ratio of 55.8 percent in table 6.3. This anomaly is explained by the fact that only 27.0 percent of all female workers received both health insurance and pension benefits as compared to 46.3 percent of males (table 6.3, final column). Thus female non-full-year non-full-time workers do less well than similar males, while fringe benefits reduce male-female compensation differentials for those females with both health insurance and pension benefits. Overall, blacks do not do quite as well as whites (table 6.2) when comparing median levels of benefits as a percentage of wages, but do slightly better than whites on this same basis for workers with both health insurance and pension benefits. It appears that much of the overall differences in benefits between males and females (and to a lesser extent blacks and whites) can be explained by the existence of benefits in a given job as compared to differences in benefit levels for those workers of each type with a given benefit package.

Across all workers (table 6.2), employers spend $1693 on supplements to wages and salaries (the difference between the employer cost of compensation and wages and salaries, not separately shown in tables 6.2 and 6.3) which employees then valued at $2234 (employee value of compensation minus wages and salaries). Excluding legally required benefits, these supplements were $725 and $953, respectively. Thus tax and scale advantages result in a difference in medians of $541 between employee value and employer cost of supplements including legally required benefits and $228 excluding these benefits. Both differences were approximately 32.0 percent of employer cost.

For workers with both health and pension benefits in table 6.3, the median level of supplements to salary including legally required benefits was $3603 in terms of employer cost and $4884 at employee value, producing a difference of $1281 or 35.6 percent of employer cost for these workers alone. Excluding legally required benefits, median insurance and deferred contributions alone were $2060 measured at employer cost and $3021 in employee value terms, leaving a difference of $961 or 46.5 percent of employer cost. Clearly the differences between employer cost and employee value of compensation are not insignificant at this time, particularly for workers who receive both health insurance and pension benefits.

The aggregate difference between employer cost and employee value of compensation was $67.43 billion or 7.71 percent of total wages and salaries with almost 95 percent of this difference due to the tax advantages of nonwage compensation alone. The aggregate gain in employee value due to tax advantages of $63.9 billion was 37.0 percent, as large as total supplements. Excluding legally required contributions, these differ-

ences fall to $43.25 billion or 4.94 percent of aggregate salaries. Thus the employee advantages of excluding employer provided benefits from income taxation are quite large. In this day and age of social security funding crises, it is interesting to note that if deferred contributions and insurance benefits were subject to payroll taxation by the employer, an additional $4.5 to $5.0 billion of social security payroll tax revenue would have been collected in 1979; double this amount if these benefits were also subject to employee payroll taxation.

While relative median compensation levels and measures of benefits vary by only a small amount for a given measure of compensation when comparing the groupings shown in tables 6.2 and 6.3, these estimates mask considerable differences across occupation groups, as seen in tables 6.4 and 6.5. In table 6.4, median fringe benefits vary from $5345 for craft and kindred workers to $709 for service workers, measured at employee value. As a percentage of wages the differences ranged from 36.9 percent for nontransport operatives to 20.8 percent for service workers at employee value and from 31.0 to 18.9 percent at employer cost. The most highly unionized occupations (e.g., craft and kindred workers and operatives) enjoyed the largest amount of fringe benefits as a percentage of wages and salaries (confirming the results of Freeman and Medoff [1980] and Antos [1981]) along with professional, technical, and kindred workers. Restricting the universe to employees with both health insurance and pension benefits (table 6.5) considerably reduces this variance. Now fringe benefits vary only from about 40 percent of wages for sales or service workers to roughly 46 percent for managers and the highly unionized groups when benefits are counted at employee value and from about 32 to 37 percent of wages when valued at employer cost. Major differences across occupations in table 6.4 are therefore explained largely by the fraction of each occupational group who receive both health insurance and pension benefits. The percent of all workers with both types of benefits is only 21.0 percent for service workers as compared to 51.4 percent for managers and administrators. This explains why overall service workers' fringe benefits of $642 at employer cost rise to $2970 for those with both types of benefits.

In summary, tables 6.2 through 6.5 indicate a series of interesting differences between the dollar level of different measures of compensation and benefits for any given set of workers. As expected, both full-year full-time workers and workers with health insurance and pension coverage benefit more than other groups in dollar terms and as a percentage of wages and salaries. Both male-female and interoccupational differences between wages and salaries and other measures of compensation are fairly substantial when measured across all workers. Tables 6.3 and 6.5 show that these differences are more a matter of benefit recipiency status than of benefit levels per se. For instance females (or service workers)

Table 6.4 **Different Measures of Median Compensation by Occupation in 1979**

Occupation	Wages and Salary	Pay for Time Worked	Total Compensation		Total Compensation without Legally Required		Total Fringe Benefits	
			Employer Cost	Employee Value	Employer Cost	Employee Value	Employee Value	Employer Cost
Prof./tech. & kind.	$14,327	$12,645	$16,895	$17,724	$15,523	$16,079	$5,079	$4,160
Mgr. & admin.	16,853	15,020	19,844	20,828	18,308	18,993	3,975	4,824
Sales	6,393	5,826	7,278	7,545	6,639	6,718	1,719	1,452
Clerical & kindred	7,539	6,753	8,945	9,496	8,152	8,354	2,653	2,192
Craft & kindred	14,981	13,351	17,666	18,693	16,219	16,743	5,345	4,315
Operating (ex. trans.)	8,846	8,012	10,754	11,277	9,690	9,945	3,265	2,742
Trans/equip. oper.	12,188	11,212	14,774	15,581	13,486	13,845	4,367	3,562
Laborers	5,570	5,003	6,391	6,621	5,784	5,859	1,618	1,388
Service	3,401	3,063	3,705	3,772	3,458	3,465	709	642
Total	8,974	8,110	10,677	11,208	9,699	9,927	3,099	2,557

Source: Adjusted March 1980 CPS data tapes.

Table 6.5 **Different Measures of Median Compensation by Occupation for Workers with Both Health Insurance and Pension Coverage in 1979**

Occupation	Wages and Salary	Pay for Time Worked	Total Compensation		Total Compensation without Legally Required		Total Fringe Benefits		Percent of All Workers with Health Insurance and Pension
			Employer Cost	Employee Value	Employer Cost	Employee Value	Employee Value	Employer Cost	
Prof./tech. & kind.	$18,900	$16,348	$22,544	$24,996	$21,080	$22,110	$8,646	$6,196	50.9%
Mgr. & admin.	21,693	18,962	25,832	28,162	24,150	25,321	9,200	6,870	51.4
Sales	15,976	14,249	19,355	20,616	17,796	18,817	6,367	5,106	22.5
Clerical & kindred	11,188	9,681	13,976	14,844	12,784	13,587	5,163	4,295	35.5
Craft & kindred	19,074	16,919	23,029	25,209	21,246	22,355	8,290	6,110	50.7
Operating (ex. trans.)	13,050	11,718	16,504	17,676	15,176	15,922	5,958	4,786	44.4
Trans/equip. oper.	16,786	15,166	20,588	21,979	19,113	20,010	6,813	5,422	45.4
Laborers	13,352	12,122	17,010	18,129	15,428	16,054	6,007	4,888	27.8
Service	9,298	8,356	11,326	12,115	10,469	10,848	3,759	2,970	12.0
Total	15,577	13,775	19,180	20,461	17,637	18,598	6,866	5,405	37.8

Source: Adjusted March 1980 CPS data tapes.

who are in jobs with both pension and health benefits receive levels of those benefits which are not dissimilar to males (or to those of other occupations). The inequality problem is largely explained by the relatively low fractions of females and service workers who are in jobs with both types of benefits. Additional tabulations not presented here indicate that the various measures of total compensation examined above have little effect on age-earnings profiles or on regional differences in measures of total compensation.

6.5.2 Fringe Benefits and Compensation Inequality

The second question we pose concerns itself with the impact of fringe benefits and supplements on the size distribution of total earnings. To begin with, table 6.6 investigates the way in which the various measures of total compensation are spread across wage and salary classes. All workers are ranked by wage level, and the percentage of workers in each bracket is shown. Mean levels of each additional measure of compensation and mean levels of benefits are then calculated, maintaining this same wage or salary ranking. These measures of mean compensation are recorded in part A of table 6.6, and as a percentage of wages and salaries by income bracket in part B. Additional information is provided for full-year full-time workers and part-year part-time workers as well. Because of their disequalizing effect, benefits which are distributed in a largely prorich pattern will be termed regressive, while those which provide a larger fraction of wages and salaries at low wage and salary levels will be referred to as progressive benefit structures.

In table 6.6, pay for time worked declines as a percentage of earnings as wages rise, indicating that paid leisure (vacations and holidays) and other benefits included in salary increase with earnings. These percentages range from 97.0 percent of salary in the lowest income class to 87.7 percent for those with salary levels in excess of $50,000 a year. Part-year part-time workers receive very little in the way of these benefits as compared to full-year full-time workers. The employer cost of total compensation, excluding legally required benefits, increases as a percentage of salaries as earnings levels increase from 104.2 percent in the lowest bracket to 112.8 percent at the $20,000 level, declining above this point, while the employer cost of total compensation including legally required benefits follows the same pattern but rises by a much lesser amount, from 116.0 to 121.6 percent of salaries, peaking at roughly the same point. It appears that legally required benefits exert an equalizing influence on compensation, so much so that the employer cost of compensation is actually a lesser percentage of salaries at levels of $50,001 or more than at earnings levels of $2000 or less.

Moving to employee value of compensation, we find that tax and scale advantages, which generally increase with earnings due to increasing

Table 6.6 **Mean Levels of Compensation and Fringe Benefits by Wage or Salary Level in 1979**

Annual Wage or Salary Level	(Percent of All Workers)	Wages and Salary	Pay for Time Worked	Total Compensation		Total Compensation without Legally Required		Total Fringe Benefits	
				Employer Cost	Employee Value	Employer Cost	Employee Value	Employee Value	Employer Cost
				A. Mean Compensation					
$2,000 or less	(15.2)	$ 875	$ 849	$ 1,014	$ 1,030	$ 912	$ 917	$ 181	$ 165
2,001–5,000	(15.3)	3,308	3,149	3,870	3,968	3,478	3,512	919	721
5,001–7,500	(12.6)	6,149	5,710	7,365	7,678	6,636	6,772	1,968	1,655
7,501–10,000	(11.0)	8,538	7,840	10,340	10,856	9,357	9,597	3,016	2,500
10,001–15,000	(18.1)	11,998	10,857	14,529	15,377	13,301	13,766	4,520	3,672
15,001–20,000	(12.6)	16,986	15,300	20,621	22,034	19,025	19,852	6,734	5,321
20,001–25,000	(7.8)	21,769	19,407	26,471	28,543	24,558	25,839	9,136	7,064
25,001–30,000	(3.8)	26,597	23,631	31,810	34,442	29,821	31,501	10,811	8,179
30,001–50,000	(3.4)	35,318	31,114	41,138	45,074	39,157	41,845	13,960	10,024
50,001 or more	(.8)	64,864	56,894	71,694	81,209	69,833	77,204	24,325	14,810
All workers	(100.0)	10,983	9,907	13,238	14,053	12,151	12,696	4,146	3,331
All full-year full-time workers	(56.2)	15,854	14,122	19,117	20,433	17,660	18,529	6,308	4,995
Part-year part-time workers	(14.0)	4,844	4,789	5,623	5,934	5,159	5,278	1,145	834

B. Mean Compensation as a Percentage of Wages and Salary

$2,000 or less	(15.2)	100.0%	97.0%	116.0%	117.7%	104.2%	104.8%	20.7%	18.0%
2,001–5,000	(15.3)	100.0	95.2	117.6	120.0	105.1	106.2	24.8	21.8
5,001–7,500	(12.6)	100.0	92.9	119.8	124.9	107.9	110.1	32.0	26.9
7,501–10,000	(11.0)	100.0	91.8	121.1	127.1	109.6	112.4	35.3	29.3
10,001–15,000	(18.1)	100.0	90.5	121.1	128.2	110.9	114.7	37.7	30.6
15,001–20,000	(12.6)	100.0	89.1	121.6	129.7	112.8	116.9	39.6	31.3
20,001–25,000	(7.8)	100.0	89.1	119.6	131.1	112.1	118.7	42.0	32.5
25,001–30,000	(3.8)	100.0	88.8	119.6	129.5	112.1	118.4	40.7	30.8
30,001–50,000	(3.4)	100.0	88.1	116.5	127.6	110.9	118.5	39.5	28.4
50,001 or more	(.8)	100.0	87.7	111.5	123.0	108.7	119.0	35.3	23.8
All workers	(100.0)	100.0	90.1	120.3	128.0	110.7	115.7	38.1	30.6
Full-year full-time workers	(56.2)	100.0	89.1	120.6	128.8	111.4	116.9	39.7	31.5
Part-year part-time workers	(14.0)	100.0	98.9	116.4	122.5	106.5	109.0	23.6	17.2

Source: Adjusted March 1980 CPS data tapes.

marginal tax rates, magnify these differentials below the $25,000 level. At higher levels of earnings, tax and scale advantages increase the employee value of supplements greatly, offsetting a large part of the decline in employer cost of compensation due to the earnings ceilings on most forms of legally required benefits. These advantages are large enough that, excluding legally required benefits, the employee value of compensation generally increases as a percentage of earnings throughout the earnings range. In comparison, employer cost excluding required benefits declines as a percent of wages above the $20,000 level. As expected, full-year full-time workers receive larger benefits, as a percentage of salaries, than do part-year part-time employees.

The final two columns of table 6.6 summarize these trends by presenting fringe benefits measured at employer cost and at employee value. These figures clearly indicate a regressive distribution of fringe benefits. In general, the 43.1 percent of workers at salary levels below $7500 receive lesser amounts of benefits as a percentage of salary than do higher salary workers. Employer cost of fringe benefits peaks at 32.5 percent of wages in the $20,000–$25,000 range, falling by a substantial amount above that level. In terms of employee value, we find a similar pattern with the 42.0 percent peak in this same earnings bracket. However, tax advantages again help maintain employee value at higher levels of wages and salaries.

Finally, levels of fringe benefits among part-year part-time workers are substantially below those for full-year full-time workers, and for all workers combined. Whereas the employer cost of benefits for a full-year full-time worker averages 31.5 percent of wages and salaries, a part-year part-time employee receives benefits which average only 17.2 percent.

The reasons for these patterns in benefits by earnings level are more apparent in table 6.7. Here we have disaggregated fringes as a percentage of wages and salaries by component. The percentages are formed by summing the component of benefits over all workers and dividing by aggregate wages in each income bracket. In part A the components of benefits are measured for all workers at employer cost and in part B at employee value. Parts C and D present similar decompositions for full-year full-time workers and part-year part-time workers, respectively.

In general, overall levels of benefits and their pattern by income class mask significantly different patterns in the individual components of compensation. As expected, those components of benefits already included in wages, i.e., vacations, holidays, and other payments (or pay for time not worked), in columns (1) and (2) are quite regressively distributed, each of them increasing consistently and substantially with earnings. These differences mirror the treatment of part-time vs. full-time workers at the very bottom of table 6.7.[11] These estimates are the same in

parts A and B of table 6.7 because tax and scale advantages do not apply in this case.

The decomposition of nonwage compensation in the form of supplements to wages and salaries in columns (4) through (7) reveal several interesting patterns. Deferred compensation which consists almost wholly of pension contributions, increases greatly with earnings. Because pensions are calculated as a constant percentage of earnings for all workers within each industry, this pattern is mainly due to the pattern of pension plan coverage reported on the CPS. Tax advantages and economies of scale in pension fund management increase employee value (part B of table 6.7) by 45 percent relative to employer cost, further magnifying this pattern. In column (5) insurance contributions, of which health insurance premiums are roughly 80 percent, are fairly proportionate to salaries running from 3.7 percent at the lowest earnings level to a peak of 6.2 percent and then declining to 2.9 percent in the highest earnings group when measured at employer cost. Tax and scale advantages (part B) make these contributions slightly more regressive when counted at employee value. Taken together, insurance and deferred contributions (column [6]) generally rise with wages when measured at employer cost, and are quite regressive when counted at employee value, mirroring the patterns evident in table 6.6

In sharp contrast to other elements of compensation, legally required benefits (column [7] in table 6.7) are progressively distributed for two reasons: First, because they benefit virtually all workers. Second, because employer contributions are a constant percentage of wages up to a ceiling earnings level. For instance, the maximum employer social security contribution in 1979 was $1405 at $22,900. Above this level the fixed contribution declines as a fraction of wages. A similar but even more sharply progressive employer contribution schedule affects other legally required social insurance programs. Contribution ceilings for unemployment insurance and workers' compensation peak below $10,000. Because of this pattern, legally required benefits have a leveling effect on total nonwage compensation, tending to cancel out the regressive distribution of nonlegally required supplements. At the very bottom of table 6.7 we find that legally required benefits are the only form of compensation which provides a larger percent of wages for part-year part-time workers than for full-year full-time workers. The net effect (column [8]) reveals a slightly peaked distribution of total additions to wages when measured at employer cost. At employee value, tax and scale advantages reduce the decline in these estimates after their peak at the $25,000 level.

Finally, column (9) combines supplements and pay for time not worked to arrive at a measure of total fringe benefits. Because of the steeply regressive distribution of pay for time not worked, overall fringe benefits

Table 6.7 **Components of Fringe Benefits as a Percentage of Wages and Salaries by Wage and Salary Level in 1979**

Annual Wage and Salary	Fringe Benefits Included in Wages and Salaries: Other Payments[a] (1)	Vacation and Holiday Pay (2)	Total (3) = (1) + (2)	Supplement to Wages and Salaries: Deferred Compensation (4)	Insurance Compensation (5)	Subtotal (6) = (4) + (5)	Required Contributions (7)	Total Supplements (8) = (6) + (7)	Total Fringe Benefits (9) = (3) + (8)
A. Benefits Measured at Employer Cost, All Workers									
$2,000 or less	1.2%	1.7%	2.9%	.4%	3.7%	4.1%	11.8%	15.9%	18.8%
2,001–5,000	1.4	3.2	4.6	1.1	4.0	5.1	11.9	17.0	21.6
5,001–7,500	1.9	5.1	7.0	2.3	5.6	7.9	11.9	19.8	26.8
7,501–10,000	2.2	6.3	8.5	3.2	5.7	8.9	11.5	20.4	28.9
10,001–15,000	2.3	7.0	9.3	4.8	6.2	11.0	10.2	21.2	30.5
15,001–20,000	2.2	7.4	9.6	6.1	5.9	12.0	9.4	21.4	31.0
20,001–25,000	2.2	8.3	10.5	7.1	5.6	12.7	8.8	21.5	32.0
25,001–30,000	2.4	8.5	10.9	7.3	4.9	12.2	7.5	19.7	30.6
30,001–50,000	2.5	9.1	11.6	7.0	3.9	10.9	5.6	16.5	28.1
50,001 or more	2.7	10.8	13.7	7.2	2.9	10.1	2.3	12.4	26.1
Overall mean	2.2	7.4	9.6	5.4	5.3	10.7	9.1	19.8	29.4

B. Benefits Measured at Employee Value, All Workers									
$2,000 or less	1.2	1.7	2.9	.5	4.2	4.7	12.9	17.6	20.5
2,001–5,000	1.4	3.2	4.6	1.3	4.8	6.1	13.8	19.9	24.5
5,001–7,500	1.9	5.1	7.0	2.9	7.2	10.1	14.7	24.8	31.8
7,501–10,000	2.2	6.3	8.5	4.2	7.4	11.6	14.6	26.2	34.7
10,001–15,000	2.3	7.0	9.3	6.5	8.3	14.8	13.4	28.2	37.5
15,001–20,000	2.2	7.4	9.6	8.5	8.3	16.8	12.9	29.7	39.3
20,001–25,000	2.2	8.3	10.5	10.3	8.4	18.7	12.4	31.1	41.6
25,001–30,000	2.4	8.5	10.9	11.0	7.5	18.5	11.0	29.5	40.4
30,001–50,000	2.5	9.1	11.6	11.8	6.7	18.5	9.2	27.7	39.2
50,001 or more	2.7	10.8	13.7	14.0	5.1	19.1	4.6	23.7	37.4
Overall mean	2.2	7.4	9.6	7.9	7.6	15.6	12.4	28.0	37.6
C. Full-Year Full-Time Only									
Employer cost	2.3	7.8	10.1	5.6	5.4	11.0	9.0	20.0	30.1
Employee value	2.7	7.8	10.0	8.4	7.7	16.1	12.3	28.4	38.5
D. Part-Year Part-Time Only									
Employer cost	.9	0.0	.9	1.9	3.5	5.4	11.0	16.4	17.3
Employee value	.9	0.0	.9	2.7	4.7	7.4	13.6	21.0	21.9

Source: Adjusted March 1980 CPS data tapes.

[a]Includes severance pay, sick pay, and bonuses.

are decidedly prorich, even in terms of employer cost. Tax and scale advantages only strengthen this pattern in part B. For instance, benefit levels for the 30.5 percent of workers in the lowest two brackets are only slightly more than half as large, in percentage terms, as are benefit levels for the 15.8 percent of workers in the highest four brackets once tax and scale advantages are taken into account.

Based on the results presented in tables 6.6 and 6.7, one might suspect that conventional summary measures of the size distribution of employee compensation would tend toward greater inequality once fringe benefits were included. Table 6.8 confirms these suspicions. First, in part A of table 6.8 we find that the income share of the bottom quintile falls from 2.4 to 2.1 percent while the top quintile share increases from 47.3 to 48.4 percent when moving from left to right. These movements are confirmed by a 3.1 percent increase in the Gini coefficient, from .4529 to .4667, between these measures of compensation. In contrast, the size distribution pay for time worked is more equal than the size distribution of wages and salaries because of the fact that a much larger proportion of wages takes the form of vacation and holiday pay for higher income groups. Thus vacation and holiday pay exacerbates earned income inequality, as we would expect based on tables 6.6 and 6.7. Altogether the Gini rises by 4.5 percent or from .4466 to .4667, moving from pay for time worked—the most equally distributed measure of compensation—to the employee value of total compensation, excluding required benefits—the least equally distributed measure. Including legally required benefits only slightly tempers this conclusion. Similar patterns can be found for males and females. In part B of table 6.8 a similar pattern is evident for full-year full-time workers. Though size distributions of compensation for full-year full-time workers are considerably more equal than for all workers, even larger differences between the size distributions of total compensation can be noted. For males, the employee value Gini (excluding required benefits) exceeds the pay for time worked Gini by 6.1 percent, and for females by 9.5 percent (i.e., .2584 vs. .2359). In both parts of this table the distributional summary measures of the employer cost of compensation differ little from wages. Thus it is mainly the tax and scale advantages captured in the employee value measures which produce these differences.

Based on these tabulations it is fair to conclude that more full measures of compensation, such as those presented in this paper, indicate a more unequal size distribution of total employee compensation than the distribution of wages and salaries alone. Moreover, if we could include measures of other job perks and noncash compensation normally enjoyed by high-wage professionals, managers, and administrators in our estimates (see note 6), we strongly suspect that an even more unequal distribution of compensation would result. The major equalizing compo-

Table 6.8 **The Size Distribution and Degree of Inequality of Various Measures of Total Compensation in 1979 (measures of annual compensation)**

	Wages and Salaries	Pay for Time Worked	Total Compensation		Total Compensation Excluding Legally Required Contributions	
			Employer Cost	Employee Value	Employer Cost	Employee Value
			A. All Workers			
Quintile shares of compensation:						
(Lowest) First quintile	2.4%	2.5%	2.2%	2.1%	2.2%	2.1%
Middle quintiles	50.3	50.8	50.8	50.0	50.1	49.5
(Highest) Fifth quintile	47.3	46.7	47.0	47.9	47.7	48.4
Gini coefficients:						
All workers	.4529	.4466	.4535	.4626	.4594	.4667
Males	.4027	.3944	.3984	.4081	.4068	.4144
Females	.4239	.4189	.4336	.4430	.4347	.4431
			B. Full-Year Full-Time Workers			
Quintile shares:						
(Lowest) First quintile	8.0%	8.1%	7.9%	7.6%	7.8%	7.4%
Middle quintiles	53.2	53.7	54.0	53.5	53.4	53.1
(Highest) Fifth quintile	38.0	38.2	38.1	38.9	38.8	39.5
Gini coefficients:						
All workers	.3099	.3036	.3043	.3134	.3128	.3202
Males	.2852	.2679	.2760	.2858	.2860	.2939
Females	.2415	.2359	.2455	.2554	.2490	.2584

Source: Adjusted March 1980 CPS data tapes.

[a]Full-year, full-time workers work thirty-five or more hours per week for fifty weeks per year or more.

nents of fringe benefits in the private nonfarm labor market are legally required benefits which, some may argue, may have a fairly low value for persons on whose behalf such contributions are made. Finally, both the relatively low incidence of benefits and the low levels of benefits among part-year part-time workers appears to reduce the relative cost of this type of employee. If employers tend to favor these types of employees for cost reasons, hiring and laying off part-time workers on a regular basis, some portion of the recent pattern of labor market instability in the United States may be attributable to the relatively low employer compensation cost for these workers.

6.5.3 Measures of Compensation and Regression Models

The final issue to be investigated involves the question of the biases involved in empirical labor market research which relies only on wages and salaries as a proxy for total compensation. If regressors have widely different values for different measures of total compensation, biases in the effect of, for instance, education on compensation levels will likely be present. In this section we present a basic human capital model of the type suggested by Mincer (1974) and Blinder (1973). The dependent variable is the log hourly compensation measure, that is, the given measure of compensation divided by total hours worked. The log-linear format allows for straightforward comparison across the categories of total compensation with each coefficient capturing the approximate percentage change in the measure of hourly compensation, given a unit change in the independent variable. In the case of dummy variables (all variables but experience and experience squared) the coefficients can be interpreted as the percentage change in the dependent variable due to a change in the variable in question.[12] Regression results are shown for all workers (table 6.9) and the 47.9 percent of workers with both pension and health insurance benefits (table 6.10); standard errors are shown in parentheses. Also included in the final column is the hourly fringe benefit rate at employee value (i.e., fringe benefits divided by hours worked). These final figures can thus be compared to the other measures of compensation.

In general, the coefficients for virtually all independent variables (except for education) do not vary a great deal in either table 6.9 or 6.10. An extra year of "potential" experience (age minus years of education minus 6) has about a 2 percent greater impact on fringe benefits than on wages or pay for time worked in table 6.9, but not in table 6.10. Similarly, female fringe benefits are about 40.5 percent less than male fringe benefits compared to a 35.4 percent difference in wages in table 6.9. But restricting the universe to workers with both pension and health insurance benefits (table 6.10) reverses this finding. Here fringe benefits are

about 36.4 percent less for females while wages are 41.4 percent less. Thus, if workers with both pension and health insurance benefits are considered, fringe benefits reduce female labor market disadvantages. As noted earlier, labor market disadvantages in table 6.9 then reflect the fact that females are more likely to be in jobs which do not offer both types of benefits.

The most significant differences in these models deal with the impact of education and work status. In the case of education there are only small (2–3 percent) differences between the measures of total compensation in terms of return to higher education levels. But comparing these to benefits reveals large differences for all workers. For instance, in table 6.9 some college (13–15 years of education) increases wages by 19.7 percent, but increases the employee value of benefits by roughly 32.4 percent. Similarly college graduates earn about 45.0 percent more than high school graduates in wage and salary terms, but receive approximately 59.6 percent more in fringe benefits in table 6.9. These effects are not, however, apparent in table 6.10. For workers with health insurance and pension benefits, the impact of fringe benefits is almost identical to the impact of education on the various measures of compensation. Thus again it appears that major differences in fringe benefits are due to the type of job which a worker has, i.e., their occupation and industry, which in turn affects their probability of having health insurance or pension benefits.

The coefficient for non-full-year full-time workers is interesting. For instance, in table 6.9, all else constant, on a pay-for-time-worked basis it appears that non-full-year full-time workers receive a higher rate of hourly compensation for actual hours worked than do full-year full-time workers. In table 6.9, for all workers, this difference averages 12.1 percent with a small standard error. In table 6.10, for workers with health and pension benefits, the differences are only 2.0 percent with a high standard error.[13] The final column in table 6.9 indicates that non-full-year full-time workers receive 51.6 percent less fringe benefits per hour, compared to full-year full-time workers. Based on these results, it appears highly probable that hourly rates of pay for non-full-year full-time workers compensate, to some extent, for their dearth of benefits. For instance, on the March 1980 CPS, only 5.1 percent of all part-year part-time workers received both health insurance and pension benefits as compared to 55.6 percent of all full-year full-time workers. This compensation-wage effect for non-full-year full-time workers who receive some vacation and holiday pay may at least partially offset the conclusion that part-year part-time workers are relatively cheap labor, as suggested earlier.[14] As expected, these differences are reduced to insignificance (table 6.10) once those workers with only health insurance and pension

Table 6.9 **Comparative Human Capital Regression Results for All Private Economy Nonfarm Workers in 1979 (standard errors in parentheses)**

	Dependent Variable, Log of Hourly						
			Total Compensation		Total Compensation Excluding Legally Required		
Variable	Wages and Salary	Pay for Time Worked	Employer Cost	Employee Value	Employee Value	Employer Cost	Fringe Benefits at Employee Value
Constant	1.423	1.232	1.574	1.575	1.466	1.457	1.061
	(.015)	(.015)	(.015)	(.015)	(.015)	(.015)	(.019)
Experience	.031	.029	.032	.034	.035	.033	.051
	(.001)	(.001)	(.001)	(.005)	(.006)	(.005)	(.001)
Experience^2	−.001	−.001	−.001	−.001	−.001	−.001	−.001
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Race	−.086	−.089	−.082	.086	−.084	−.082	−.082
	(.008)	(.008)	(.008)	(.008)	(.008)	(.007)	(.001)
Sex	−.354	−.358	−.364	−.367	−.368	−.364	−.405
	(.006)	(.005)	(.005)	(.005)	(.005)	(.005)	(.001)
Region	−.084	−.082	−.085	.087	−.089	−.087	−.096
	(.006)	(.005)	(.005)	(.005)	(.005)	(.005)	(.007)
Residence	−.098	−.093	−.092	−.096	−.102	−.099	−.101
	(.005)	(.005)	(.004)	(.005)	(.005)	(.005)	(.006)

Education (years)							
Less than 7	−.140	−.147	−.139	−.142	−.150	−.143	−.112
	(.016)	(.016)	(.016)	(.017)	(.017)	(.017)	(.021)
8–11	−.044	−.045	−.042	−.041	−.043	−.042	−.025
	(.011)	(.010)	(.010)	(.011)	(.011)	(.011)	(.014)
13–15	.197	.178	.198	.211	.211	.206	.324
	(.010)	(.009)	(.009)	(.010)	(.010)	(.010)	(.012)
16 or more	.450	.421	.429	.458	.470	.458	.596
	(.011)	(.011)	(.011)	(.011)	(.011)	(.011)	(.014)
Veteran status	.113	.107	.116	.119	.126	.121	.145
	(.007)	(.007)	(.007)	(.007)	(.007)	(.001)	(.009)
Non-full-year							
non-full-time	−.189	.121	−.201	−.213	−.225	−.212	−.516
	(.007)	(.006)	(.006)	(.007)	(.007)	(.007)	(.009)
R^2	.300	.283	.315	.325	.330	.323	.415

Definitions of Variables:
Experience = age minus years of education minus six.
Race = 1 if black; 0 otherwise.
Sex = 1 if female; 0 otherwise.
Region = 1 is South; 0 otherwise.
Residence = 1 is nonmetropolitan; 0 otherwise.
Veteran status = 1 if veteran; 0 otherwise.
Non-full-year non-full-time = 1 for all workers who did not work thirty-five or more hours per week and who also did not work fifty or more weeks per year.

Table 6.10 **Regression Results for All Private Economy Nonfarm Workers with Both Pension and Health Benefits (standard errors in parentheses)**

	Dependent Variable, Log of Hourly					
			Total Compensation		Total Compensation Excluding Legally Required	
Variable	Wages and Salary	Pay for Time Worked	Employer Cost	Employee Value	Employee Value	Employer Cost
Constant	1.775	1.558	2.036	2.054	1.931	1.063
	(.031)	(.031)	(.030)	(.030)	(.031)	(.033)
Experience	.030	.029	.028	.030	.031	.032
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Experience^2	−.001	−.001	−.001	−.001	−.001	−.001
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Race	.106	−.103	−.097	−.103	−.103	−.102
	(.007)	(.007)	(.007)	(.007)	(.007)	(.008)
Region	−.072	−.070	−.066	−.068	−.069	−.064
	(.007)	(.007)	(.006)	(.007)	(.007)	(.007)
Residence	−.089	−.084	−.081	−.084	−.091	−.083
	(.006)	(.006)	(.006)	(.006)	(.006)	(.007)
Education (years)						
Less than 7	−.096	−.093	−.091	−.099	−.105	−.100
	(.025)	(.025)	(.023)	(.024)	(.024)	(.026)
8–11	−.023	−.021	−.025	−.028	−.029	−.031
	(.015)	(.015)	(.014)	(.014)	(.015)	(.016)
13–15	.155	.147	.139	.147	.151	.157
	(.015)	(.015)	(.014)	(.014)	(.015)	(.016)
16 or more	.395	.374	.352	.369	.384	.370
	(.016)	(.016)	(.015)	(.016)	(.016)	(.017)
Veteran status	.055	.051	.057	.058	.060	.072
	(.008)	(.007)	(.007)	(.007)	(.008)	(.008)
Non-full-year full-time	−.054	−.020	−.037	−.036	−.021	−.148
	(.001)	(.010)	(.010)	(.010)	(.010)	(.011)
R^2	.300	.298	.304	.300	.306	.269

Definition of Variables: Same as table 6.9.

benefits are included in the analysis. For this group, non-full-year full-time status only reduced fringe benefits by 14.8 percent as compared to full-year full-time employees.

In conclusion, based on tables 6.9 and 6.10, it does not appear that the wage and salary measure of total compensation, chosen for the most part by necessity in human capital studies, creates any significant bias in the results of those studies. However, two notes of caution must be added. First of all, the nondifferences in the coefficients in these tables may be a reflection of the simulation methodology used to allocate fringe benefits to CPS workers. As with all simulations, our methodology compresses

the variance in benefit levels below that which would be obtained if individuals had reported actual benefit levels. But the Leibowitz paper in this volume, which is based on actual employer provided data for individual workers and not on imputed benefit amounts, supports these results based on Leibowitz's interpretation of her coefficients. Still, while the impact of education, experience, sex, etc., on chosen measures of compensation do not vary by a great deal, the same coefficients for fringe benefits themselves do exhibit some substantial differences, for example, those with some college and for college graduates. Further, there does appear to be some substantial difference between full-year full-time workers and other workers which is partially compensated for by higher nominal market wage rates for hours actually worked for non-full-year full-time workers.

Second, more complete specification of such models, for example, a model which includes occupation- or industry-specific differences in fringe benefits (the major differences which our simulation procedures directly controlled for), may produce differences in the effect of the independent variables on hourly compensation rates. Moreover, it appears that studies of sexual differences in rates of compensation may produce different coefficients, and possibly then different measures of the degree of labor market compensation differences between the sexes, than would studies based on wages and salaries alone. In both table 6.9 and 6.10, 5 percent differentials between fringe benefits and salaries for men and women were noted with the differences running in opposite directions in the two tables. However, until formal studies of this nature are actually completed, the extent of such biases—if there really are such biases—remain to be seen.

6.6 Summary and Conclusions

This paper has presented several measures of employee compensation, including measures of the employer cost and employee value of such benefits. A substantial differential between employer cost and full employee value was noted for various groups of workers. We were not able to estimate employee preferences for various types of benefits and thus could not adjust for nonoptimal situations. To the extent that an employee is forced to accept a benefit package with some components of that package valued below employer cost, the employee value measure used here may overstate the true employee value of compensation. Research on the determination of these preferences, for instance using studies of employer benefit package adjustments when employees are presented with a "cafeteria" plan, should be undertaken.

In many ways, the results of this endeavor seem promising, while in other ways they are disappointing. The regression results do not suggest

that the different measures of compensation used in these regressions would substantially affect the previously determined impact of various explanatory variables on hourly wages and salaries. To the extent that more detailed outside data on the distribution of various types of benefits across different groups of workers become available, more sophisticated and accurate benefit simulation models may produce different results. While at this time we are not optimistic, we are working on new data sources which will improve the quality of these estimates.

On the other hand, several interesting patterns of benefit distribution across different demographic groups (male-female) and different income classes were noted. It appears that, as we have measured them, fringe benefits increase earned income inequality with this difference mainly due to the substantial tax and scale economy advantages of employer provided fringe benefits.

Appendix
Construction of March 1980 CPS Data Base

The March 1980 CPS contains wage and salary income data for a large group of U.S. workers. For the first time, the March CPS also asked workers about employer or union pension plan coverage and health insurance coverage. Respondents indicated whether the employer had a pension or health insurance plan, whether or not they were covered by their employer's plan, whether the employer subsidized the health insurance plan if they were covered, and whether they had individual or family coverage. No other information concerning nonwage compensation was obtained. The BLS 1977 EEEC survey and 1977 ECI survey both collected establishment data on employer outlays for various types of fringe benefits according to industry (EEEC) and occupation (ECI). The 1977 EEEC data tapes were combined into fifty-three industry groups, and aggregate outlays for various types of benefits as a percentage of WSAL were tabulated (see table 6.1). These tabulations provide the basic value of benefit data which was assigned to CPS workers. The ECI data were used in two ways: first, to update fringe benefit values to 1979, and second, after the EEEC based imputation, as a check against the occupation-specific consistency of the imputed CPS benefit value data.

In assigning benefit values to each individual worker, several different microsimulation techniques were employed. This appendix contains an explanation of the simulation methodology used to estimate the various components of the six measures of total compensation developed for this paper. We begin with definitions of each measure and then proceed to explain how each variable was created. The numbers in parentheses

preceding each definition correspond to the equations which described these variables in the paper. Each mnemonic variable is explained below.

(4): WSAL = WSAL.

(5): PTW = WSAL − OP − VHOL.

OP = SKSAL + BOSAL + SEV PAY.

VHOL = VAC + HOL.

(2): $C(\text{TC}) = \text{WSAL} + \text{DC} + \text{IC} + \text{LR}$.

DC = PERT + SVTHR.

IC = LI + S/AI + HI.

LR = SSRR + OR.

(3): $V(\text{TC}) = \text{WSAL} + \text{DC}(t + S_1) + \text{IC}(t + S_2) + \text{LR}(t)$.

(6): $V(\text{TC})X = V(\text{TC}) - \text{LR}(t)$.

(7): $C(\text{TC})X = C(\text{TC}) - \text{LR}$.

WSAL = CPS wages and salaries, all private nonfarm workers. WSAL was \$874.066 billion in 1979.

PTW = pay for time worked, derived by subtracting VHOL and OP from WSAL. It includes straight time, wages, overtime pay, and shift differentials. PTW was \$790.370 billion in 1979.

OP = other nonPTW and non VHOL payments included in WSAL. These include:

SKSAL = sick pay. Workers were randomly assigned sick pay recipiency based on industry-specific probabilities of being covered as derived from the Battelle Employment Related Health Benefits (ERHB) Survey (Malhotra et al. 1980). Sick pay was then treated as an insurance policy, with an equal proportion of earnings assigned to each participant within each of the fifty-three EEEC industry groupings for which separate dollar amounts were available. Altogether SKSAL was .95 percent of WSAL or \$8.628 billion in 1979.

BOSAL = nonproduction bonus. Distributed across all non-part-year part-time workers by industry group in proportion to their wage and salary level.

SEV PAY = severance pay and contributions to severance pay funds not realized in 1979. These were distributed across all full-time workers in proportion to their wage and salary level within each of the fifty-three EEEC industry groups. The decision to exclude part-time workers was based on the AWS and LOB surveys and discussions with the BLS officials who take these surveys.

Together BOSAL and SEV PAY totaled \$10.740 billion in 1979, which when combined with SKSAL produces a total value of \$19.368 billion for OP in 1979.

VHOL = vacation and holiday pay. VHOL was estimated by assigning numbers of weeks of vacation (and numbers of holidays) to workers based on their industry, occupation, and firm-specific experience level. While firm-specific tenure data were not available in the March 1980

CPS, they were available on an earlier May 1979 CPS special supplement. Months of experience were assigned March 1980 CPS workers with a given level of tenure based on a regression model for estimating experience similar to that employed by Corcoran and Duncan (1979) and van der Gaag, Haveman, and Smeeding (1980). Separate estimates were obtained from the May 1979 CPS for males and females further separated by full-time or part-time work status. Having assigned a level of experience to March 1980 CPS workers, we next employed two BLS surveys: the 1977 Area Wage Survey (AWS) and the 1979 Level of Benefits (LOB) survey to determine how vacations and holidays were divided among specific types of workers according to experience, industry, and occupation. Using these data, a certain number of vacation days and a certain number of holidays were assigned to CPS workers with a given level of tenure. Using information on hours and weeks worked, all full-year workers, and all full-time but part-year workers were given a value for vacation and holiday pay based on their average hourly wages and salaries as reported on the CPS and prorated for employees working less than full year (fifty weeks) or working less than full time (thirty-five hours per week). Part-year part-time workers were not assigned these benefits. Once these values were determined, employees were aggregated into the fifty-three industry groupings consistent with EEEC, and the percentage of aggregate wages and salaries assigned to CPS workers was checked against industrywide totals (adjusted from 1977 to 1979 using the ECI), and scaled up or down by the same fraction for each worker in an industry grouping to reach the correct level of aggregate vacation and holiday benefits in each industry grouping. Altogether the March 1980 CPS includes $64.329 billion in VHOL for 1979.

C(TC) = employer cost of compensation, and includes DC, IC, and LR:

DC = deferred compensation which includes pensions and retirement pay (PERT) and employer savings or thrift plan contributions (SVTHR). PERT makes up in excess of 96 percent of DC. Equal percentage amounts of DC were assigned to workers reporting (or assigned) pension coverage on the March 1980 CPS. Dollar aggregates for determining these pensions were taken from the fifty-three industry-specific EEEC groupings for 1977, scaled up to 1979 by the change in PERT noted in the ECI. No acceptable alternative to this admittedly crude pension benefit assignment technique is currently available. For this reason it is not possible to use this data set and regression technique to estimate wage-pension trade-offs (as in Schiller and Weiss 1980). Other data which provide a more detailed breakdown of pension benefit information (e.g., data from the President's Commission on Pension Policy) are not available at this time. Altogether DC totaled $47.259 billion in 1979.

IC = insurance compensation which includes life insurance (LI), sickness or accident insurance (S/AI), and health insurance (HI). Each type of payment was imputed by a complicated procedure which can only be outlined here. First, the EEEC data do not separate the components of IC, recording all insurance payments in one lump sum amount. Fortunately the 1977 ECI survey does separate these amounts by industry. These percentage breakdowns were used to divide the fifty-three EEEC industry groupings' estimates of IC into LI, S/AI, and HI. On average, 77 percent of IC is HI, 12 percent is LI, and 11 percent S/AI. But there are wide variances across industry groups.

In the case of HI, average weekly premiums were assigned to workers reporting employer subsidized HI on the March 1980 CPS, according to family or individual coverage status. Premium amounts were obtained from the ERHB. These benefit amounts varied by industry and occupation grouping, by family/individual coverage, by employer percentage of premium paid, and by total premium cost of the policy. Using this data, average premiums per employee for each type of plan (family or individual) were obtained along with the variance in employer-employee contributions and benefit levels within industry groups. These premium values were updated to 1979 using Health Insurance Association of America data and were distributed to preserve the intraindustry and intraoccupation benefit level differences noted in the ERHB. Next, workers whose employer paid all or part of the HI premium were estimated by occupation and industry. The employer percentage of premium paid was then either 100 percent or something less—depending on the type of coverage and industry as determined by the ERHB and the March 1980 CPS. Workers were then assigned a net employer contribution based on coverage status and number of weeks worked. Dollar amounts were again aggregated and scaled on an equal dollar per worker basis and again prorated for weeks worked, to meet EEEC industry-specific total dollar amounts, adjusted to 1979 using the ECI.

The Battelle ERHB Survey also contained information on the percentage of employees in various industries who benefited from life and sickness/accident insurance, paid sick leave, or none of these, divided into establishments with group health insurance plans and establishments without them. LI and S/AI were calculated by assigning coverage according to industry group specific probabilities estimated for those workers with and without health insurance according to the ERHB Survey. Once a worker was selected, LI was estimated by giving each covered worker the same percentage of salary in insurance protection, the percent determined by the ECI-adjusted EEEC total value of contribution divided by covered workers' total wages within an industry. S/AI was also estimated by assigning ERHB-based probabili-

ties to determine coverage. However, equal weekly amounts of S/AI were calculated for workers in each EEEC industry group according to weeks worked, and average S/AI expenditures per week worked. Altogether IC totaled $46.355 billion in 1981.

LR = legally required contributions which consist of social security and railroad retirement contributions (SSRR) and other required contributions (OR) for workers' compensation, unemployment insurance, and other minor legally required payments. SSRR was calculated simply as .0613 percent of wages up to a maximum of $1405 at $22,900. Other payments were calculated by dividing EEEC industry-specific OR total amounts (adjusted to 1979) by total wages and salaries of all workers up to $10,000 per year per worker (the most common unemployment insurance payroll tax base) within that group. This same percent was applied to wages (up to $10,000) and assigned to OR for all workers within an industry. In total, $79.347 billion of LR was estimated for 1979.

Once all benefits were assigned, CPS amounts were aggregated according to occupation, region, or location and tabulated as a percentage of wages and salaries so that they were comparable to the ECI data. In all cases the resulting percentages either were identical to the ECI to three places after the decimal, or were within the range of error which separates the EEEC and ECI survey results to three places after the decimal.

In summary then, DC, IC, and LR added $172.961 billion to WSAL ($874.066 billion) producing an aggregate $C(\text{TC})$ of $1047.027 billion including LR, and $967.680 billion for $C(\text{TC})X$ excluding LR. $V(\text{TC})$ and $V(\text{TC})X$ involve the same compensation components at $C(\text{TC})$ and $C(\text{TC})X$, but also involve t, S_1 (for DC), and S_2 (for IC):

t = one over one minus the marginal federal personal income tax rate. The CPS does not contain income tax information. However, following the income tax simulation model used by Mathematica (Doyle et al. 1980) and by Smeeding (1975), the Census Bureau has designed a tax simulation model by which CPS workers were grouped into tax filing units, assigned standard or itemized deduction status, and placed in a marginal federal personal income tax bracket.

S_1 = scale factor for pension plans. Pension plans enjoy economies of scale based on the size of the pension fund. While custodial (administrative overhead) fees decline by a small amount when comparing an Individual Retirement Account (IRA) or a Keough plan (for self-employed persons) to larger pension funds, the major economies are due to lower securities commissions for portfolio adjustments. As shown in table 6.A.1, custodial fees and securities commissions fall from 5.90 percent for an IRA (Keough) plan to 3.54 percent for large pension funds, yielding a maximum value of 2.36 percentage points for S_1 (Mahler and Hanson 1981). Pension fund size was estimated by total annual pension fund

Table 6.A.1 Scale Factor for Pension and Retirement Plans: S_1

Category of Aggregate Pension Plan Size[a]	Total Custodial and Securities Fees as a Percent of Aggregate Pension Value	S_1^b
IRA/Keough	5.90%	NA%
Small	4.43	1.47
Medium	4.13	1.77
Large	3.54	2.36

Source: Paul Mahler and William Hanson; Merrill, Lynch, Pierce, Fenner, and Smith Pension Fund Managers.

[a]Exact dollar values for determining small, medium, and large pension plans are not disclosed, as requested by Merrill, Lynch, Pierce, Fenner, and Smith, Inc.

[b]S_1 factors are calculated by subtracting the fee for given size pension plan from the IRA/Keough figure of 5.90 percent.

outlays divided by the total number of firms for each of nine industry groupings. Covered employees in each industry grouping received the S_1 factor for that grouping.

S_2 = scale and group rating factor for insurance contributions. Commercial employer group health insurance is significantly less expensive than individual coverage due to lower sales costs (economies of scale) and group rating advantages. The difference in total expenses as a percentage of total premium for commercial health insurance companies varies from 38.7 to 61.6 percent of premium for groups of one to three employees, to levels of 6.0 to 7.0 percent for employee groups of one thousand or more workers (Thexton 1978; Schuttinga 1981). However, these differences are much smaller for Blue Cross/Blue Shield (BC/BS) health plans where expenses run only from 12.0 percent for groups of one to three workers to 7.1 percent for groups of one thousand or more workers (Schuttinga 1981). Various factors account for these differences, including the nonprofit status of BC/BS and the fact that BC/BS cross-subsidizes small group plans at the expense of larger group plans. In any case, because individual BC/BS plans are available at lower rates than commercial policies, the lower BC/BS expense margins were assumed to capture the current differential savings between individual and group policies. These factors are shown in table 6.A.2 and were used to adjust medical, sickness or accident, and life insurance for economies of scale and group rating. Group size was estimated by the average number of covered workers per firm within a given industry group.

While these simulation methods have most certainly compressed the true variance in employer contributions, particularly for pension plans, we expect that the benefit imputation procedures were of a sufficiently sophisticated nature to capture a large fraction of the true variance in

Table 6.A.2 **Scale Factors for Insurance Plans: S_2**

Group Size	Total Expenses[a] as a Percent of BC/BS Premium	S_2^b
1–3	12.0%	NA%
4–9	11.0	1.0
10–19	10.3	1.7
20–49	9.2	2.8
50–100	8.5	3.5
100–249	8.0	4.0
250–499	7.6	4.4
500–999	7.4	4.6
1,000–4,999	7.1	4.9
5,000 or more	7.0	5.0

Source: James Schuttinga, U.S. Department of Health and Human Services. Estimates are for August 1, 1978.

[a]Total expenses include premium taxes, sales costs, claims processing costs, and other costs.

[b]S_2 is calculated by taking the difference between expenses for groups of 1–3, i.e., 12.0 percent, and the expense level in each group size bracket.

employer contributions for fringe benefits. More refined estimates of the value and distribution of benefits and greater variance in imputed benefits await the availability of new and more detailed data sources.

Notes

1. There are, however, recent surveys which provide at least some of the necessary information for a limited group of workers, e.g., the 1977 National Medical Care Expenditure Survey which will soon be available for public use.

2. Others (e.g., Antos 1981; Alpert 1980) have followed the opposite approach, aggregating CPS variables and using these aggregates in conjunction with BLS data to analyze components of total compensation on an establishment basis.

3. While fringe benefits are defined and were simulated in hourly wage terms, they can also be aggregated across all workers (as in table 6.1) or expressed in terms of annual earnings (as in section 6.5). One problem with breaking fringe benefits into hourly rates is the definition of hours—either hours actually worked, or hours worked plus vacation, holiday, and other hours paid for but not worked, could be used. In this paper we use the latter (Census) definition of hours.

4. With deferred compensation, an employee only postpones taxation. However, in most cases (pensions, for instance) taxes are lowered as well as deferred by postponing taxation of benefits until retirement. In addition to deferral of taxation, a nonaccretion based income tax also allows deferred taxes to add to the aggregate value of pension funds, producing a higher compound return to such investments as well.

5. These figures on pension coverage and the health insurance coverage questions which follow were taken directly from the March 1980 CPS. The 44.6 percent of all private nonfarm workers with pension coverage in 1979 exceeds the 43.7 percent of private nonfarm workers covered by pensions as reported in the May 1979 CPS (Beller 1981).

6. Clotfelter (1979) cited a recent survey which indicated that 53 percent of sample companies paid for country club memberships for some executives, 83 percent for physical examinations, and 25 percent for personal use of company planes. The survey showed that an executive earning $100,000 averaged $30,000 in these and other types of in-kind compensation. While it is often difficult to separate true "business" expenses (real costs of doing business) from pure "pleasure" (pure consumption and thus income or compensation) when dealing with travel and entertainment expenses and other perks, a strong argument can be made to include large proportions of these outlays in a more full measure of total employee compensation (Clotfelter 1981).

7. Leisure refers to hours not worked and not paid for by the employer. Paid time off from work for vacations and holidays is included in fringe benefits, while time used for home production is either ignored or, equivalently for our purposes, lumped with L.

8. In a similar fashion, Thaler and Rosen (1975), Antos and Rosen (1975), Quinn (1979), and Smith (1979) have examined the trade-off between W and A, ignoring B and L. Antos (1981) and Alpert (1980) examine the trade-off between W and B, ignoring L and A. Brown (1980) has added A, but not L, to B and W in his analysis of equalizing differences in the labor market. Atrostic (1982) has included all four elements in an analysis of labor supply behavior, though A and B are combined into one subjective measure.

9. Others (e.g., Leibowitz in this volume; Woodbury 1981) have chosen to express this relationship in terms of after-tax wages. Such a transformation can be accomplished by multiplying both sides of equation (3) by $(1 - t_m)$. However, for the purposes of this paper, i.e., for comparing employee value to employer cost, we chose to cast the analysis in terms of pretax wages to capture the fact that employees value nontaxed benefits in excess of their employer cost. In either case, the dollar value of fringe benefits is the same regardless of whether the analysis is presented in terms of pretax or after-tax wages.

10. Clearly, state specific marginal income tax rates should be included where applicable. Thus our t is really a lower bound estimate of the tax advantages afforded by nontaxable fringe benefits. Note that federal OASDHI payroll taxes do not apply in this case. Essentially, adding legally required employer contributions to employee wages and salaries indicates that we are treating social security as a form of deferred compensation, albeit possibly indirect and uncertain compensation, not as a "tax" per se.

11. In some ways these estimates of zero vacation and holiday pay in part D of table 6.7 are only a direct consequence of our decision not to allocate vacation and holiday pay to part-year part-time workers. But, according to the best available information, the vast majority of such workers do not benefit from paid holidays or paid vacations.

12. The coefficients of a log-linear regression are only rough approximations of percentage increases for coefficients larger than .10. However, in order to provide easy translation from the regression results to the text, we refer to these coefficients as being roughly equal to percentage changes.

13. This coefficient was statistically insignificant at the 95 percent level.

14. However non-full-year full-time workers in the regression model would include full-year part-time and part-year full-time workers who were allocated some vacation and holiday pay, as well as part-year part-time workers, who were not assigned these benefits. Pay for time worked differs from nominal wages for part-year part-time workers by only .9 percent (table 6.7). The other two groups of non-full-year full-time employees were allocated these benefits. Of the 41.8 million non-full-year full-time employees in 1979, only 31.7 percent (13.3 million) were part-year part-time workers. On the other hand, only part-year part-time workers were singled out in tables 6.6, 6.7, and 6.8.

References

Alpert, William. 1980. An economic analysis of private wage supplements. Washington University, St. Louis. Mimeo.

Antos, Joseph R. 1981. Wages and compensation of white-collar workers. U.S. Bureau of Labor Statistics. Mimeo.

Antos, Joseph R., and Sherwin Rosen. 1975. Discrimination in the market for public school teachers. *Journal of Econometrics* 3: 123–50.

Atrostic, B. K. 1982. The demand for leisure and nonpecuniary job characteristics. *American Economic Review* 72: 428–440.

Beller, Daniel J. 1981. Coverage patterns of full-time employees under private retirement plans. *Social Security Bulletin* 44: 3–11.

Blinder, Alan. 1973. Wage discrimination: Reduced form and structural estimates. *Journal of Human Resources* 8: 426–54.

Brown, Charles. 1980. Equalizing differences in the labor market. *Quarterly Journal of Economics* 97: 113–34.

Burkhauser, Richard, and John Turner. 1981. Is the social security payroll tax a tax? Vanderbilt University. Mimeo. April.

Chamber of Commerce of the United States. 1980. *Employee benefits 1979*. Washington, D.C.: Chamber of Commerce.

Clotfelter, Charles. 1979. Equity, efficiency, and the tax treatment of in-kind compensation. *National Tax Journal* 32: 51–61.

———. 1981. Business perks and tax-induced distortions: The case of travel and entertainment. Working paper. Duke University, Institute of Policy Sciences and Public Affairs.

Corcoran, Mary, and Greg Duncan. 1979. Work history, labor force attachment, and earnings differences between the races. *Journal of Human Resources* 14: 3–20.

Doyle, Mary P., David Edson, Norma Pappas, and William Boulding. 1980. *Creation of 1980 and 1984 data bases from the March 1978 CPS, volume 1, final report*. Washington, D.C.: Mathematica Policy Research.

Feldstein, Martin S. 1978. The effects of unemployment insurance on temporary layoff unemployment. *American Economic Review* 68: 834–46.

Freeman, Richard, and James Medoff. 1980. *What do unions do?* Cambridge: Harvard University Press.

Gagg, Jacques van der, Robert Haveman, and Timothy Smeeding. 1980. Determinants of wage inequality: The impact of model specification on the estimated contribution to wage variation. Paper presented to the World Congress of the Econometric Society, 1 September 1980, Aix-en-Provence, France. Mimeo.

Handbook of labor statistics 1978. 1979. U.S. Department of Labor, Bureau of Labor Statistics. Bulletin 2000. Washington, D.C.: U.S. Government Printing Office.

Kennedy, Peter E., and Ronald J. Vogel. 1979. A theory of the determinants of fringe benefits. U.S. Department of Health and Human Services, Health Care Finance Administration. Mimeo.

Lester, Richard A. 1967. Benefits as a preferred form of compensation. *Southern Economic Journal* 33: 488–95.

Mahler, Paul, and William Hanson. 1981. Telephone conversation, June 10.

Malhotra, Suresh, Kenneth M. McCaffree, John M. Wills, and Jean Baker. 1980. *Employment related health benefits in private nonfarm business establishments in the United States, volume 2, description of selected data*. Seattle, Wash.: Battelle Human Affairs Research Center.

Mincer, Jacob. 1974. *Schooling, experience, and earnings*. National Bureau of Economic Research. New York: Columbia University Press.

Quinn, Joseph F. 1979. Wage differentials among older workers in the public and private sectors. *Journal of Human Resources* 14: 41–62.

Rice, Robert G. 1966. Skill, earnings, and the growth of wage supplements. *American Economic Review* 56: 583–93.

Rosen, Sherwin. 1974. Hedonic prices and implicit markets: Product differentiation in pure competition. *Journal of Political Economy* 82: 34–55.

Schiller, Bradley, and Randall Weiss. 1980. Pensions and wages—A test for equalizing differences. *Review of Economics and Statistics* 62: 529–38.

Schuttinga, James. 1981. Telephone conversation, June 9.

Smeeding, Timothy M. 1975. Measuring the economic welfare of low-income households and the antipoverty effectiveness of cash and noncash transfers. Ph.D. diss., University of Wisconsin-Madison.

Smith, Robert S. 1979. Compensating wage differentials and public policy: A review. *Industrial and Labor Relations Review* 32: 339–51.

Steuerle, Eugene. 1979. Efficiency and the valuation of fringe benefits. U.S. Department of the Treasury. Mimeo.

Thaler, Richard, and Sherwin Rosen. 1975. The value of saving a life: Evidence from the labor market. In *Household production and consumption*, ed. N. E. Terleckyj. Conference on Research in Income and Wealth: Studies in Income and Wealth, vol. 40. New York: National Bureau of Economic Research.

Thexton, Peter M. 1978. Letter to Morton B. Hess, Office of the Actuary, Social Security Administration.

Woodbury, Stephen A. 1981. Estimating preferences for wage and nonwage benefits. Conference Paper no. 102. Cambridge, Mass.: National Bureau of Economic Research.

Comment

Martin David

I will focus my comments on four areas: the conceptual underpinnings for the measurement of total compensation, the simulation methodology, the value of the statistics presented, and the possibilities for improved data in future studies.

Conceptual Underpinnings

Smeeding's estimates recognize that measures of cash wages are no longer sufficient as a description of the compensation package received by employees (if they ever were). The estimates attempt to draw a distinction between employer cost and employee valuation. In criticizing Smeeding's efforts, I will argue that several conceptual gaps mar the distinction drawn and imply that superior estimates can be drawn from the data base at hand.

In presenting a utility function, Smeeding rightly points out that amenities and leisure serve as important arguments. Indeed, it is probably more accurate to think of equation (1) as an indirect utility function and observe that there is a maximum achievable utility for any given vector of wage rates, fringe benefits, and amenities offered by the employers to whom an individual worker has access. Focusing on this indirect utility function, one can observe that there are two measures of interest:

A. What is the utility gain associated with acceptance of employment on the terms offered?

B. What are the characteristics of the compensation vector (WG, FB, A) that are operative at the several margins affecting work effort? That is, the decision on work intensity (hours/per week), the decision on work experience (hours/year), and the decision as to length of working lifetime depend on current and expected future compensation vectors.

To answer question A, it is clear that amenities of the job cannot be ignored. The disutility of work depends heavily on a number of factors that contribute substantially to the well-being of the worker. In addition to the in-kind consumption benefits that Smeeding alludes to, workers benefit from employer investments in job safety, from control over working conditions and job planning, and employer investments in general training. The theory of compensating differentials makes clear that variation in amenities will induce corresponding inverse variations in cash wage payments. Sider (1980) offers an excellent analysis that demonstrates the existence of a frontier relating wages to job safety levels. Stafford and Duncan (1980) point to substantial consumptive uses of time during working hours that again lead to amenity values. To provide a meaningful measure of the utility gain (question A) one must either demonstrate that there is no correlation between amenities and other

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forms of compensation or one must control on the level of amenity provided.

Thus it appears that the employee valuation of total compensation presented by Smeeding is at best a partial measure whose meaning is rendered ambiguous by the possibilities of compensating variations for some amenities and complementarities between cash and other forms of compensation in other cases.

The second question has been almost completely ignored in Smeeding's presentation. Table 6.10 gives a partial insight; the last row relates the effect of full-year, full-time status to the compensation package. This contrast should be elaborated to show the effect of weeks worked during the year and the effect of employees with hours of work in excess of normal working weeks, as opposed to those with temporary reductions in workhours or layoffs. If the fringe benefits prove to be a largely inframarginal form of compensation, we would have some important evidence on how the change in total compensation packages affects work incentives.

A third question that can be asked about employment is a question that is asked by the employer:

C. What is the resource cost of an additional employee? or additional employee hours? A question corresponding to the utility gain question for the individual is the social question:

D. What is the total resource cost of employment?

Clearly, both of these questions entail the resource costs that are encumbered by employers in creating amenities as well as cash compensation. I see no way of excluding such costs from consideration. Indeed, one might divide all resource costs of employment into four categories:

Provider	Costs Generating Consumption Goods for the Employee	Costs Complementary to Labor Services Provided in the Work Setting
Employer	1	3
3rd Party	2	4

It is clear that the employer provided goods in category 1 can be either cash or in-kind; the distinction of who is the provider may have little economic meaning. Some employers may choose to absorb the costs of a sick leave policy directly; others may prefer to negotiate and purchase a temporary disability insurance policy; mixtures of these extremes are common.

The point to be made is that the exclusion of costs under category 3 (provision of uniforms, safety devices, or subsidizing meals taken during working hours) excludes a significant and amenity-producing use of resources. As a result it is not possible to relate the total compensation estimates in this paper to meaningful measures of costs of employment.

Conceptually, Smeeding appears to have presented us with half a loaf. While half may be better than none, it seems that we should be extremely cautious about inferring either welfare or resource cost implications from the data at hand.

The tax rate margin. The principal source of difference between the employee and employer valuation of fringe benefits is the margin created by the assignment of a marginal tax rate to the wages and salaries reported (WSAL). The rate is used to inflate the imputed fringe benefits, according to $1/(1 - t_m)$. This procedure is wrong for at least two reasons. The increase in utility associated with total compensation is the value of goods and services that both cash and in-kind compensation provide for consumption. If the tax rate rises, the utility value of fringe benefits does not necessarily rise—the health insurance benefit continues to provide the same increment in health. Rather, what has happened is that the after-tax value of cash compensation falls as the tax rate rises. Thus the appropriate measure of V(TC) would include WAGSAL net of income and payroll taxes *plus* the full outlay for fringe benefits without adjustment (see figs. C6.1 and C6.2).

The implications are twofold. First, for any wage earner $V(\text{TC}) \gtreqless C(\text{TC})$, depending on the excess of scale economies in the purchase of fringe benefits over the employee tax liabilities. Second, it is the cumulative effect of all tax brackets that determines the difference between disposable wage goods and wage goods paid by the employer. Thus the *average* tax rate determines the position of the employee's budget constraint relative to the employer's isocost level. This latter observation implies that the margin between V(TC) and C(TC) augmented by the scale economies will be considerably less than Smeeding has estimated.

A third aspect of the adjustment for taxes paid is fundamental to the meaning of the V(TC). If a fixed revenue requirement for government is assumed, it is not possible for all employers to increase fringe benefits relative to wages without an increase in the tax rates; the converse holds if all employers reduce fringe benefits relative to wages. This observation suggests that the budget constraint on which Smeeding bases his valuations can not hold in the aggregate. In the long run, it is likely that Smeeding's representative employee faces a budget constraint in which the difference between gross wages and purchasing power disposable for the purchase of goods and services remains constant, no matter what arrangements employers make for the provision of in-kind fringe benefits.

If this latter argument has validity, it suggests that tax considerations do not increase the consumption attainable by "typical" workers who trade wages for fringe benefits. For the typical worker the sole value of fringe benefits lies in the economies of scale attainable. At the same time,

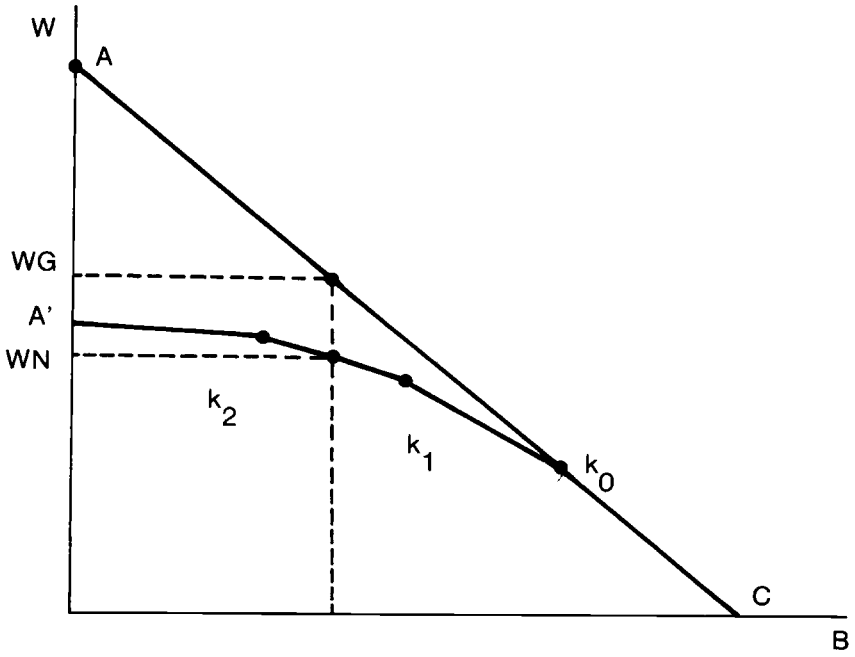

Fig. C6.1 AC = employer cost in the absence of scale advantages; $A'C$ = after-tax budget constraint; W = cash income tradable to all commodities; B = in-kind income; k_0, k_1, k_2 = bracket steps in federal income and payroll taxes including earned income tax credit.

of course, the existence of tax-exempt status for some fringe benefit payments may alter the progressiveness of the tax structure; increased use of fringe benefits by high-wage workers may cause tax rate changes for low-wage workers that leave them worse off.

Fortunately use of WSAL net of taxes plus employer costs provides the correct index of changes in worker utility over time as changes in tax rates will automatically be accounted for in the relevant way.

Simulation Methodology

The procedures used by Smeeding are similar to what many others have done to create synthetic data sets. The assumptions are neither more unreasonable nor is the execution less questionable than the work of others in creating CPS-IRS data sets or data sets that are used to estimate the scope of the welfare-eligible population. As a scientific profession, we must be extremely critical of all of these efforts on three grounds: (1) No measures of the variance associated with the imputation procedures are created; (2) the use of expectations reduces variance in

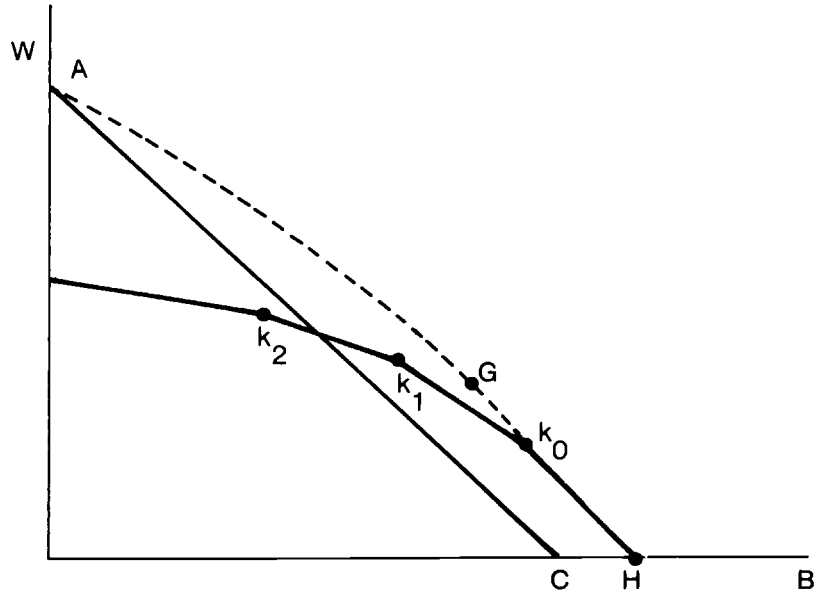

Fig. C6.2 AG = range of economies of scale in fringe benefit provision; Hk_0 = "zero" tax bracket; k_0k_1 = first tax bracket; k_1k_2 = second tax bracket.

the synthetic data set; and (3) the results are presented without information on the consequences of alternative imputation rules. Rubin (1980) gives us guidance on how each of these three objectives can be achieved by multiple imputation. How would this apply to the statistics at hand?

Smeeding's imputations are imputations at two levels. In some cases, a personal characteristic that is related to the payment of fringe benefits is missing from the CPS data base. In other cases, the value of a fringe benefit paid to an individual is not available, though information on some conditioning characteristics, including receipt of the benefit and occupation and industry, are known. In the latter case the imputation may be described as the creation of an index based on personal characteristics which is normalized to unity and then used to allocate the industrywide control on the aggregate of fringe benefits paid in that industry. (I hope this characterization is not too gross). The important element of variance that is suppressed by this procedure is the variance in the ratio of fringe benefits to wage and salary payments that exists among firms within an industry. This variance is estimable from the EEEC. To preserve variance, a value of the ratio would need to be drawn from the EEEC distribution and assigned to an appropriate number of employees; this would imply different levels of fringe benefits for persons with the same conditioning characteristics within an industry.

Let me elaborate. Health insurance varies substantially across employers with regard to types of services and costs that are reimbursable. Aside from the difference in proportion of premiums that are paid for by the employer, the amount of that premium will vary across firms. While Smeeding maintains variance in employer proportion contributed within an industry, as I understand the procedure, the same expected premium is used for all employers. This eliminated an important source of variance.

Failure to preserve the variance of the fringe benefit payments that exists in the universe renders Smeeding's conclusions on the Gini coefficient highly questionable. It also does violence to the regression findings since we can be sure that the covariance of personal characteristics with levels of fringe benefit payments is incorrect. This might not be so bad if we were sure that we understood the direction of bias in the covariance. However, as we have already suggested, one group of workers chooses among compensating differential cash payments; for them we expect an inverse relationship between cash and fringe benefits. For others in the population, as Smeeding strongly suggests, tax considerations imply a positive correlation between compensation in cash and fringe benefits. No prior grounds exist for asserting the population value of the covariance, and systematic understatement of the random variation in fringe benefits produces a meaningless result.

This same argument applies to the assignment of personal characteristics from other data sets to give the conditioning information that is required for the imputation.

Both preservation of variance and a measure of the variance associated with the imputation procedure can be obtained by the multiple imputation procedure advocated by Rubin. What is required is that two or more values be assigned to each data point, using a distribution of values conditional on individual (firm) characteristics. The variance of the stochastic component for like individuals then gives a measure of the variation due to the imputation procedure. In addition, the machinery for generating multiple imputations makes it easy to do sensitivity analysis of alternative imputation rules and their impact on the population statistics.

Value of the Imputations

Of the numbers presented, C(TC) appears the most useful. It adds to information that can be easily collected from household surveys. The accounting for employer costs other than WSAL appears well grounded in good measurements. The estimates related to V(TC) appear flawed, and if recomputed could tell us something about the relationship between employer costs of compensation and the movement of household budget constraints in different groups of workers.

The value of PTW is particularly obscure. PTW differs from WSAL

largely because of VHOL; those imputations are particularly weak since appropriate information on employees was not available in the CPS to perform an allocation.

Tenure in the job had to be imputed before employer data could be used to assign expected number of paid holidays by occupation-industry class. (Loss of variance would appear to be particularly important as small and large firms in the same industry are unlikely to have the same vacation accruals.)

In addition, VHOL is primarily a technique for income averaging within the year and not subject to either the scale or tax questions nor to the in-kind consumption that dominate Smeeding's discussion.

The fringe benefits that are added to WSAL are valued as premiums paid to provide contingent income or benefits. The worker whose cancer treatment is paid by an employer contribution to health insurance does not receive a greater income than his healthy coworker. However, the amount of WSAL reported to CPS is *cash* realized from employment activities *including* sick pay. Thus the worker who receives cancer treatment *will* report a payment for time not worked while his healthy coworker does not. Smeeding estimates PTW by subtracting the same insurance premium for both workers from reported WSAL. This procedure preserves an appropriate expectation but gives extremely misleading estimates of the variance of PTW. The role of sick pay in maintaining WSAL for part-year workers is obscured, while for a majority of workers who draw no sick pay PTW is understated. It is extremely difficult to anticipate how this may bias computation of the change in Gini from PTW to WSAL—among covered workers those with smaller PTW will benefit because of the inverse correlation of PTW and sick pay. However, sick leave benefits may well be concentrated among those with higher PTW, offsetting the former effect. One would clearly prefer to use WSAL rather than PTW. Precisely because fringe benefits are highly variable across workers, the presentation of measures of variance should be added to the measures' central tendency in tables 6.2–6.7. Smeeding should provide tabulations where the value of CPS household and family characteristics is fully exploited.

Need for Additional Data

Smeeding comments that if imputation does not produce useful results, a large-scale survey involving both employers and employees would be required to produce information on total compensation. Smeeding has shown that some additional knowledge can be produced by imputation. However, the value of that knowledge would be much more secure if some small-sample data collections were undertaken from an appropriately structured sample of employers and employees. To validate the present results, one could start with a representative sample of employers

and collect personal characteristics from a sample of their employees. This would be a validating procedure much like that of Ferber and his collaborators (1969) in testing the validity of household reports of savings and share holdings. Any information of this kind, and some is included in the Leibowitz paper in this volume, should be used in validating the simulation results.

I conclude:

1. This is a path-breaking effort. Census, BLS, and Smeeding are to be commended.

2. Correction of the tax factor will give us an enormously useful measure of employee valuation. Further work might well be undertaken to attach discounts (Z_{ij}) to health insurance benefits received by spouses who have overlapping coverage.

3. In any replication of this effort greater attention needs to be paid to preserving variance among employers and imparting that to the household data. The technique of multiple imputations appears ready to assist in that task, and its the task of assessing changes in variance that would be associated with alternative imputation procedures.

References

Ferber, R. et al. 1969. Validation of consumer financial characteristics: Common stock. *Journal of the American Statistical Association* 64: 415–32.

Rubin, D. B. 1980. Discussion. Section on survey methods. *Proceedings of the American Statistical Association*, 426–28.

Sider, H. 1980. Work-related accidents and the production process: An empirical analysis. Ph.D. diss. University of Wisconsin-Madison. Circulated as Work-related accidents and the production process. BLS Working Paper 117, April 1981. Washington, D.C.: U.S. Bureau of Labor Statistics.

Stafford, F., and G. J. Duncan. 1980. The use of time and technology by households in the United States. In *Research in labor economics*, vol. 3, ed. R. G. Ehrenberg, 335–75. Greenwich, Conn.: JAI Press.

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