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Compensation Inequality

Brooks Pierce

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This paper uses Employment Cost Index (ECI) micro data to investigate inequality in compensation rates. The results help fill a gap in our knowledge on this issue, in that currently available data are not as comprehensive as those in the ECI. For example, most public use data lack benefit cost measures.

In the cross-section wage inequality understates compensation inequality. This is largely due to differences in the lower half of the wage distribution. The fraction of compensation taken in the form of wages is much higher at the 10^{th} percentile of the compensation distribution than at the median, implying larger compensation than wage differentials across different distributional points in the lower half of the wage distribution. On the other hand, the compensation and wage differentials between workers at the median and the 90^{th} percentile of the wage distribution are roughly equal to each other. The findings differ substantially depending on what benefits are included in the measure of compensation.

The data also allow one to investigate recent changes in wage and compensation inequality. Compensation inequality growth slightly exceeds wage inequality growth over the 1982-96 period. As with inequality at a point in time, some of the more interesting phenomena occur in jobs with below-median wages. The differences between compensation and wage inequality growth are largely due to declining health insurance coverage in the lower half of the compensation distribution.

The fact that compensation fell more than wages at points lower in the distribution suggests very large percentage drops in benefit costs in that range. For instance, the real costs associated with paid leave at the 10^{th} percentile of the compensation distribution fell by about 50 percent over the 1982-96 period. Costs associated with pensions and health insurance also fell dramatically for low-compensation jobs. The data suggest income effects as a potential contributory factor in the relative decline of fringe benefits at lower points in the compensation distribution.

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Brooks Pierce
pierce_b@bls.gov

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I. Introduction

Although there has been a great deal of recent empirical research on wage inequality, there has been relatively little empirical work on compensation inequality. Compensation is arguably a more relevant concept than wages if one is concerned about gauging incentives to work or incentives to hire, or if one is interested in broader aspects of well-being. Workers choose jobs partly on the basis of the job's wage-benefits mix, and higher productivity workers are likely to choose different mixes than lower productivity workers, for a number of reasons. Individuals' demands for pension coverage, health insurance coverage, etc., may vary with demographic characteristics such as age, gender, and family situation. Some forms of compensation are tax-advantaged so that incentives vary with individuals' marginal tax rates. Furthermore, the ability to take time off from work, health care, and so forth may be highly normal goods. Accordingly, it is natural to think of heterogeneous individuals choosing benefits packages in part through sorting across establishments. One might therefore expect compensation inequality to differ from wage inequality in systematic ways.

The lack of information about compensation inequality, despite intense interest in the provision of particular benefits such as health care and pension plans, can surely be traced to data availability. Currently available data often do not have sufficiently large and representative microdata samples, or they lack information on benefit costs and multiple benefits categories. In this paper I utilize the establishment survey microdata collected to produce the Employment Cost Index (ECI). These data cover a large part of the workforce and have cost information on many benefits components.

The main findings with respect to inequality at a point in time are as follows. Wage inequality tends to understate compensation inequality. This is largely due to differences in the lower half of the wage distribution. The fraction of compensation taken in the form of wages is much higher at the 10^{th} percentile of the compensation distribution than at the median, implying larger compensation than wage differentials across different distributional points in the lower half of the wage distribution. On the other hand, the compensation and wage differentials between workers at the median and the 90^{th} percentile of the wage distribution are roughly equal to each other. The findings differ substantially depending on what benefits are included in the measure of compensation. For example, wage inequality understates compensation inequality most when compensation is defined to exclude legally required costs such as unemployment and workers' compensation insurance, which often have fixed cost attributes. Among voluntary (non-legally required) benefits there are also qualitatively different results.

The data also allow one to investigate recent changes in wage and compensation inequality. Compensation inequality growth slightly exceeds wage inequality growth over the 1982-96 period. For example, estimated growth in the relative compensation at the 90^{th} and 10^{th} percentiles in the compensation distribution is about 2-3 percentage points (or about 15 percent) larger than the analogous figure for growth in relative wages. As with inequality at a point in time, some of the more interesting phenomena occur in jobs with below-median wages. Over this period compensation growth is larger than wage growth at the median, while the reverse is true at the 10^{th} or 25^{th} percentiles. The differences are primarily due to declining health insurance coverage in the lower half of the compensation distribution.

The fact that compensation fell more than wages at points lower in the distribution suggests very large percentage drops in benefit costs in that range. To take an example, the real costs associated with paid leave at the 10th percentile of the compensation distribution fell by about 50 percent over the 1982-96 period. Even larger percentage declines are observed for measured health insurance and pension costs. Leave and pension benefit costs decline less dramatically, and health insurance benefit costs increase, elsewhere in the distribution. This paper only speculates on the root causes of these observed patterns. It is quite likely that substitution effects are at work, especially in the case of health care costs. A further possibility involves income effects. The fringe benefits studied here are likely to be highly income elastic goods, perhaps especially at lower income levels. In that case wage declines would be associated with outsized benefit declines in the lower half of the wage distribution. The suppositions regarding income elasticities are at least consistent with the cross-sectional patterns of benefits described above. In fact, the observed patterns in fringe benefit cost changes parallel those one would predict based on the observed time series changes in compensation in conjunction with the cross-sectional relationship between compensation and fringe benefits. This suggests income effects as a potential contributory factor in the relative decline of fringe benefits at lower points in the compensation distribution.

II. The Employment Cost Index (ECI) Microdata

The ECI is a quarterly index measuring changes over time in the cost of wages and various nonwage compensation costs. This section is designed to give a broad overview of the survey design and data elements. With apologies to the reader, some important

details about the data collection and processing are left to an appendix. Two overall provisos are given here. The first is that cost data refer to employer costs, which may not always reflect employee valuations. The second is that data such as these are inevitably subject to some degree of measurement error. Nonetheless, I claim that these data are the best available for this particular application, as they span a substantial time period, include cost measures for several important fringe benefits, and are derived from employer and administrative records.

The survey scope of the ECI is the civilian workforce, excluding agricultural, federal government, self-employed, and private household workers. Establishments are the primary sampling units. Within a sampled establishment, 1 to 8 jobs are selected. The unit of observation in the microdata is therefore a "job", as defined by the sampled establishment.[1] Information is collected on the wages, other compensation costs, and work schedules of the individual incumbents in the sampled jobs. Various categories of non-wage compensation are collected, including health and life insurance, several forms of leave, pension and savings plans, bonuses, and legally required expenditures on Social Security, workers' compensation, and unemployment insurance. This data is converted to a cost per hour worked, and averaged over the incumbents within a job. Data elements describing job or establishment characteristics include the establishment's number of employees, detailed SIC code, and location; an occupational classification for the job; whether the job is covered by a union contract; and whether the employment is full-time or

[11] In typical practice individuals are sampled and data is collected for all workers with the same company job title as the sampled individual. The appendix discusses the interpretation of inequality statistics when the unit of observation is a job rather than an individual (essentially one misses variation across individuals in the same job).

part-time. Data are collected quarterly; samples in recent quarters have about 19,000 observations from 4500 establishments. The paper uses data from 1981 to 1997.

Table 1 gives sample statistics on non-wage compensation costs for the most recent quarter, December 1997. These statistics give an idea for magnitudes, and also provide a vehicle for discussing some interpretation and data collection issues. The table gives costs per hour worked, the benefits share of total compensation, and an incidence rate.[2] The various benefits are grouped roughly in order of average importance (although not in order of importance for distributional considerations). About nine percent of compensation costs come in the form of legally required compensation, the bulk of which is attributable to Social Security, Medicare and worker's compensation. The other major categories are leave, insurance, and retirement plans. For a basis of comparison, the average wage rate is $14.36 per hour in this quarter.[3]

Paid leave of various sorts, which is valued at the hourly wage, is the largest of the voluntary categories and accounts for costs of $1.32 an hour on average. On average, leave's compensation share is 5.6 percent and most sampled jobs, 86 percent, have some associated leave costs. Some discussion about the interpretation placed on leave benefits is warranted given that it has not been studied as extensively as some other benefits. Leave is an aggregate of paid vacation time, holidays, sick leave and an "other" category. Of these, the vacation and holidays components are the most important. Vacation and

[2] The incidence rates are calculated as the (worker-weighted) percent of jobs with positive costs. Because cost data are averaged over job incumbents the benefit coverage rates in table 1 can only proxy coverage rates which would be derived from individual data. For example, some individuals within a job may decline receipt of a particular benefit, or be excluded on the basis of length of service restrictions. Nonetheless, I present statistics using this incidence measure as it is likely to be informative for comparisons to other data, especially with respect to changes through time.

[3] The hourly wage rate is a straight-time hourly earnings figure adjusted to include overtime premium pay and shift differentials. Throughout the paper cost figures are deflated to 1997 dollars using the CPI.

holiday benefits are each typically collected in time units at some accrual rate (4 hours per pay period, 8 days per year, etc.), converted to an hours accrued per hour worked basis, and then valued at the job's hourly wage. The conceptual interpretation of leave is not entirely obvious. It may simply represent one margin of labor supply. Or leave plans may reflect firms' attempts to monitor and coordinate time off. I interpret leave to also represent some flexibility to the worker in scheduling hours or coordinating time for non-work purposes. Regardless, it is useful to present statistics on leave rather than subsume it into the wage measure as is sometimes done. These benefits are likely excluded from wage calculations using household survey data such as the Current Population Survey, as those calculations include earnings while on leave but probably do not adjust the hours worked to reflect leave time (see appendix). The best reason for analyzing leave separately, however, is that there are interesting facts that would otherwise be obscured.

Insurance consists primarily of health insurance, and accounts for 5.8 percent of compensation costs. The health insurance component itself accounts for $1.15 per hour in compensation costs, roughly comparable to average social security costs. The health insurance benefits coverage figure is 73.1 percent in these data. This figure is somewhat larger than similar statistics based on CPS data (see, e.g., Farber and Levy (1998) and Currie and Yelowitz (1998)).

Pension and savings plans tend to be less prevalent than leave or health insurance. Defined benefits plans are present 35.7 percent of the time while defined contribution plans (with positive employer payments) are present 40.9 percent of the time. Defined contribution plans include 401(k) plans as well as some other plans, such as deferred profit sharing. The ECI data reflect current pension costs, which in the case of defined benefit

plans can vary with pension asset returns and firms' chosen liability accounting methods. Presumably these costs can only approximate the long run actuarial obligation associated with a pension plan. The cost figure is fairly substantial at $0.78 per hour, and costs conditional on positive costs are quite large. Retirement compensation accounts for 2.8 percent of compensation, with defined benefit plans accounting for the majority of this category. There is some overlap in this category, with some jobs having both defined benefit and defined contribution plan contributions. The compensation share of this category conditional on receipt is about 4.5 percent.

III. Benefits' Effects on Inequality

The purpose of this section is to document benefits' effects on measured inequality at a point in time. In order to quantify compensation inequality and compare it to wage inequality, define total compensation per hour, c, as wages per hour, w, plus various benefits per hour, b_j, and rearrange terms,

$$\begin{aligned} c &= w + \sum_j b_j = w + \sum_j s_j c \\ &= w + sc \\ &= \frac{w}{1-s} \end{aligned}$$

where $s_j = b_j/c$ is benefit j's share in total compensation and s is the sum of these shares over j. Therefore compensation differentials in logarithms can be approximated as analogous wage differentials plus a term reflecting differences in benefit cost shares. For example, the log compensation differential between the 90th percentile and median can be written as

$$\begin{aligned} \ln(c^{90}) - \ln(c^{50}) &= \ln(w^{90}) - \ln(w^{50}) - \left\{\ln(1-s^{90}) - \ln(1-s^{50})\right\} \\ &\approx \ln(w^{90}) - \ln(w^{50}) + \frac{(s^{90} - s^{50})}{1-\bar{s}} \end{aligned} \tag{1}$$

where superscripts refer to location in the compensation distribution, and where $\bar{s}$ is the average of the 90th percentile and median benefits shares.[4] This representation argues for treating the benefit cost shares as a function of compensation in order to describe the effect of benefits on inequality. These effects can further be split into component (s_j) parts. Here the decomposition in equation (1) is applied to pooled 1995-97 cross-sectional data.

Figure 1 gives the flavor of many results that follow. It graphs the share of compensation costs taken in the form of benefits against the percentile of the compensation distribution.[5] Voluntary (not legally required) nonwage compensation is graphed, along with all nonwage compensation. Except for the distributional extremes, the benefit shares are relatively smooth increasing functions of the percentile. The immediate implication is that benefits tend to increase measured compensation dispersion. Most of the observed increases in both series occur in the lower half of the compensation

[4] One would like to compare compensation dispersion with data sorted on compensation to wage dispersion with data sorted on wages. Equation (1) does not do that because it uses the same data ordering for both the compensation and wage differentials. Therefore moving from wage dispersion to compensation dispersion requires an additional term that quantifies the effects of resorting when moving from a wage to a compensation distribution.

[5] For series graphed by percentile I adopt the convention of averaging the statistic within percentile. Percentiles are defined to be the one percent of the (weighted) data centered on the relevant number. In tables I smooth these series by taking averages over the five percent of the data nearest the indicated percentile; e.g., the 25-10 percentile differential is the difference between averages over percentiles 23-27 and percentiles 8-12.

distribution. The difference between the two series is attributable to legally required compensation costs. This difference is somewhat larger at lower percentiles, reflecting the fact that some of these costs have fixed cost attributes. For example, unemployment insurance costs are often a percentage of earnings up to some relatively low earnings cutoff. Notice also that the non-required benefits are virtually zero in the lowest decile. The series in the graph imply that the 50-10 wage differential understates the 50-10 voluntary compensation differential by about 15 percentage points, or about 20 percent of the 50-10 log wage differential.

The results in figure 1 obscure some interesting phenomena related to benefits components and extensive and intensive margins. Here I focus on compensation attributable to three main benefits subcomponents: leave, pensions and savings plans, and health insurance.[6] In the graphs that follow, series based on position in the compensation distribution are overlaid on series based on position in the wage distribution. If one believes that benefits are measured with little error, then one would prefer series based on position in the compensation distribution, as those series are likely to give a more accurate accounting of any benefits-wealth relationships. If benefits are noisy, however, one might prefer series based on position in the wage distribution, as those series are not contaminated with spurious positive benefits-compensation correlation. As any spurious correlation between benefit shares and wages would likely be negative, one can reasonably view the series based on wage percentile as lower bounds on true benefits-compensation relationships.

[6] Aggregating pensions and savings plans is necessary due to changes through time in how the ECI categorized defined contribution plans. One can disaggregate the leave component consistently through time, but such detail seems more appropriate for a separate study on leave.

Figure 2 graphs leave's benefit share against percentile in the wage and compensation distributions. As leave is valued at the wage rate, dividing leave costs by compensation returns it to units somewhat like accrual rates. The share of compensation taken as leave increases with compensation, and generically looks similar to the series in figure 1. It would be interesting to know how much of the cross-sectional covariation of benefits shares and compensation (or other explanatory variables) operates through coverage and how much operates through intensities among the covered. To give some idea about the extensive margin, figure 3 graphs the leave coverage rate against percentile. There is clearly increasing incidence with compensation, and by the 40th percentile nearly all the sampled jobs have some leave costs associated with them. Since the relationships shown in figure 2 combine the extensive and intensive margins, it must be the case that the increasing benefit share beyond the 40th percentile is attributable to an intensive margin.

Although retirement compensation represents on average only about 2-3 percent of compensation, it substantially affects inequality calculations. Figure 4 shows why: jobs in the bottom quartile of the compensation distribution have very little in the way of retirement benefits while jobs in the top decile have 5-6 percent of compensation in this form. Unlike the analogous graph for leave (and unlike, as shown below, the analogous graph for health insurance), the compensation share for retirement benefits continues to increase in the upper half of the distribution. This implies of course that retirement compensation tends to increase compensation inequality in the upper as well as the lower tail of the distribution.

Figure 5 shows the incidence of retirement benefits costs, where incidence is defined as employer contributions to either a defined benefit or a defined contribution

plan. Incidence increases with percentile throughout the distributions, but there is a somewhat greater increase in the lower half of the data. This in conjunction with figure 4 suggests some role for the intensive margin for this benefit. Figure 6 shows the incidence of pension benefits costs separately for defined benefit and defined contribution plans, graphed against percentile of the compensation distribution. Jobs with compensation near the median have about a 40 percent chance each of having defined benefit and defined contribution plan compensation. Both series increase with percentile, but the gradient is slightly steeper for defined benefit plans.

The patterns that hold for health insurance are somewhat different from those for leave and pensions. From figure 1 we know that benefits increase inequality in the lower half of the compensation distribution, but hardly do so in the upper half. The data for the leave and pension components suggested less of a dichotomy between the upper and lower halves of the distribution. It follows then that the distinction between the upper and lower halves of the distribution would likely be quite stark for the remaining major component, health insurance. Figure 7 makes this distinction plain by graphing the health insurance benefit share against percentile of the wage and compensation distributions. The share is quite low at the 10^{th} percentile, increases rapidly through about the 40^{th} percentile, doesn't change noticeably in the middle of the distribution, and tails off noticeably above the 60^{th} percentile. Health benefit costs per hour are rising over this range, but not proportionately with total compensation. Depending on where one makes comparisons, the share falls by 1-2 percentage points (on a base of 7-8 percentage points) in this range. Health insurance is the benefit component where sorting by compensation instead of wages seems to matter the most. The increase in the health insurance compensation share is less pronounced over

the first half of the distribution when the sorting is done by wages rather than compensation. The fact that the health cost share declines beyond the 60th percentile in both series indicates it is not a spurious phenomenon.

Figure 8 graphs the incidence of health care coverage. It is clear in comparing figures 7 and 8 that much of the observed differences in the bottom half of the compensation distribution is attributable to the extensive margin. The coverage rate in the bottom decile is on the order of 10 percent; by the 30th percentile it is about 60 percent. It is equally obvious that the equalizing influence of health insurance in the top half of the compensation distribution is attributable to an intensive margin, as coverage is roughly constant or slightly increasing over that range.

Table 2 brings together the results from these figures. The table gives wage and compensation dispersion across various points of the distribution, and indicates each group of benefits' contribution to compensation inequality using the approximation in equation (1). For example, the first row indicates that the log wage differential between the 25th and 10th percentile of the wage distribution is 0.299. The log compensation differential between these two points (again, in the wage distribution) is 0.375. Therefore about 0.076 log points in compensation dispersion can be attributed to various benefits. The number .026 for leave is derived from the different leave benefit shares at the 25th and 10th wage percentile as in equation (1). Since we are looking at various points in the wage distribution, we are in effect following the wage-sorted series in figure 2. The analogous calculations for pensions and health insurance follow the wage-sorted series in figures 4 and 7, respectively. Table 2 in addition gives "other voluntary" and "legally required" benefits categories. The wage dispersion column and the first four benefits columns add

up to the "voluntary dispersion" column; adding in the last benefit component ("legally required") gives the wage-sorted compensation dispersion. The final column of table 2 gives compensation dispersion based on the compensation-sorted distribution of the data. That is, reordering the data by compensation per hour rather than by the wage rate must increase overall compensation dispersion measures.

Consider first the broadest range, the 90^{th}-10^{th} differential. The leave and pensions components each add about 6 percent to measured compensation dispersion. Health insurance adds slightly less, 5.1 percent. At least over the whole distribution, leave and pension benefits are more important in determining compensation dispersion than are health insurance benefits. The "other voluntary" category adds 1.3 percent. The sum of these non-legally required benefits gives 0.187 in log points. Legally required compensation costs tend to equalize the compensation distribution, and in fact they reduce dispersion over this range almost as much as health insurance increases dispersion.

There are also interesting differences among benefits components across the various parts of the 90^{th}-10^{th} percentile range. These differences are apparent in previously referenced figures: leave effects occur mostly in the bottom half of the wage distribution, pension effects operate throughout the distribution, and health insurance is tremendously important in adding to dispersion in the lower half of the distribution but is equalizing in the upper half. The contrasting effects of health insurance in the 25^{th}-10^{th} and 90^{th}-75^{th} percentile ranges are especially stark. In the 25^{th}-10^{th} wage percentile range, voluntary compensation dispersion is about 30 percent larger than wage dispersion. Nearly half of this is attributable solely to the effects of health insurance benefits. And this, as we have seen, is largely an issue of coverage.

IV. Characteristics of Establishments and Jobs Affecting Fringe Benefits Choices

The analysis thus far has focused on deriving some factual relationships between wage and compensation distributions, and identifying which benefits are important in explaining these relationships. It has not identified explanations for why workers and firms arrange the compensation packages they do. There is no shortage of possibilities here. High ability workers may choose a relatively benefit-intensive compensation package because benefits are highly normal goods or because of tax issues. Larger establishments may offer compensation packages relatively skewed toward benefits like pensions in the hopes of reducing turnover, or because there are fixed costs of setting up plans. Firms may not offer health benefits to part-time workers because the costs of the plans have fixed cost attributes with respect to hours worked, and in fact part-time work may be a way for some firms and workers to transact so as to choose a relatively wage-skewed compensation package without being constrained by the plan coverage choices of other workers. Union bargaining may reflect median member preferences, which may be skewed toward benefits (see Freeman (1981)). Indeed, some observed effects of firm or job characteristics may simply reflect something about worker preferences: for example, workers in large establishments or public sector employment may be older or more risk averse than the typical person.

Table 3 presents (log) wage, compensation, and voluntary compensation regressions on controls for full-time status, union status, establishment size (employment), the presence of incentive pay, a set of public sector indicators, regional indicators, a metropolitan statistical area indicator and industry and occupation indicators. These

regressions are executed on a sample from the fourth quarter of 1994.[7] Given the unmeasured worker characteristics, it is not surprising that in these data there are fairly substantial wage and compensation premia associated with most of the covariates. Comparing the three regressions gives some feel for benefits choices. The effects of full-time status, union coverage, and establishment size are all larger in the compensation equation than in the wage equation, and larger still in the voluntary compensation equation. Furthermore, the coefficients in the compensation equation are all 30-35 percent larger than the analogous wage regression coefficients for these variables. The state and local government effects tend to be much more pronounced in the voluntary compensation equation than in the other two. One sees different patterns for the incentive pay indicator, with generally larger effects in the wage than the compensation equations.[8] Generally, though, compensation premia tend to be larger than wage premia here.

Tables 4 and 5 give regressions directly describing benefits components choices. The first table describes benefit incidence, and the second describes benefit levels conditional on positive costs for the relevant benefit. The extensive margins are estimated with probit models, and the intensive margins are regressions with log benefit costs for the fringe benefit in question as the dependent variables. So as to capture the possibility of income effects, controls for compensation are included, in the form of percentile indicators for the data sorted on compensation less the benefit costs for the benefit in question.

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[7] Some covariates are unavailable to me in more recent quarters.

[8] There are several possible explanations for the incentive pay wage premium, including selection on ability, higher induced effort, and compensating differentials to risk averse workers. The fact that the compensation premium is smaller than the wage premium is consistent with the view of incentive pay as a substitute for other incentive mechanisms such as deferred compensation. See, among others, Barkume (1999), Brown (1990), Goldin (1986), and Lazear (1986).

Sorting in this manner minimizes any spurious correlation between dependent and independent variables due to benefit cost measurement error.[9]

The first column of table 4 gives the extensive margin for leave benefits (the dependent variable is 1 if there are any positive costs associated with vacation, holidays, sick leave, or the "other" leave category). The second column gives analogous results for pensions, treated here as an aggregate category including both defined benefit and defined contribution plans. The final column in the table gives results for health insurance incidence. The coefficients (which have been transformed to show effects on the probability in question) generally accord with priors formed from the results in table 3. The consistently largest and most precisely estimated effects in these regressions are associated with the full-time and union status indicators, and the establishment size variable.[10] There are some contrasts across equations, in particular the very large effect of the full-time status indicator in the health insurance equation and the rather large establishment size effects for pensions and health insurance incidence. It seems quite likely that one way employees choose to take compensation in the form of wages rather than benefits is to opt into part-time positions (see Farber and Levy (1998)).

Table 5 repeats these exercises for intensive margins. The dependent variable in each regression is the natural logarithm of the benefit costs in question; the covariates are as in table 4. The pattern of results here looks somewhat like that in table 4, with some differences in emphasis. For example, the government employment and incentive pay indicators tend to have larger effects, relative to other variables, here than in the extensive

[9] Instrumenting compensation is not feasible given the desire to maintain a very flexible functional form; the treatment in the text is the lesser of two (minor) evils.

margin equations above. One interesting result involves the negative (though imprecisely estimated) sign on full-time status in the health insurance cost regression. This is consistent with health care benefits having fixed cost attributes with respect to hours worked – in comparing two jobs with the same compensation per hour and the same health care plan, the job with the shorter workweek will have higher health care benefit costs on a per-hour basis. The coefficient on full-time status indicates some incomplete prorating of benefits to offset this effect (see Cutler and Madrian (1996) and Lettau and Buchmueller (1998)). Since pensions and leave are benefits that are much less likely to have these fixed cost attributes, they do not exhibit this sort of negative partial correlation between benefits and full-time status.

The fact that the intensive and extensive margin coefficients in tables 4 and 5 are in different units makes comparison more difficult. Table 6 recombines the extensive and intensive margin estimates above to give a total effect, in log points.[11] The table also gives the fraction of the estimated total attributed to the extensive margin. Most of the effects are fairly substantial, with a large fraction of the total effect attributed to the intensive margin for many of these covariates. This is a rather important point for this paper because it suggests that ECI based cost data is useful above and beyond the more typical incidence data.[12] Although not reported in the table, distributional effects are present after controlling for establishment and job attributes, with substantial variation along the intensive margin.

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[10] A one standard deviation change in the establishment size variable is roughly 2.2 and implies approximately a 7 percent wage differential and 9 percent compensation differentials.

[11] That is, $b = pb_c$ where b is the benefit cost, p is the probability of receiving benefits, and b_c is the benefit cost conditional on receipt, and therefore $d \ln b = (dp / p) + d \ln b_c$.

V. Changing Wage and Compensation Inequality

Over the past 30 years there have been large and well-documented changes in wage inequality. A substantial portion of this shift occurred during the 1980s and early- to mid-1990s, the period covered by the ECI. One consequence of this trend has been shifting patterns of labor force participation, with those groups experiencing relative wage declines also tending to reduce labor force participation the most (Juhn (1992), Welch (1997)); the interpretation is that of a substitution effect. Changing fringe benefits choices would be a natural example of changes driven by income effects (Hamermesh (1997), Hamermesh (1998), Bloom and Freeman (1992)). This gives rise to the question: are low compensation jobs, which have experienced the largest declines in real wages, also experiencing relative declines in the share of fringe benefits in compensation?

In order to answer questions like this I pool data for four subperiods, 1981-83, 1985-87, 1990-92, and 1995-97. These subperiods are chosen to be about 5 years apart so as to produce independent samples (establishments stay in sample approximately 4½ years), while still covering the bulk of the time that the ECI data are available. I focus on changes over the whole time period, but also present information on changes by subperiods.

Table 7 gives average wages, benefit costs, benefit shares, and incidence rates for these four subperiods. The table also presents these statistics calculated at the median of

[12] It is helpful to keep in mind that table 6 gives effects on log benefit costs, not on cost shares. Intensive margins are obviously less important when estimating the effect of compensation on cost shares.

the wage distribution.[13] One interesting fact is that cost levels for the different benefit components changed quite a lot, and in offsetting directions. Real leave compensation costs fell over the entire 1982-96 period, by approximately 15 percent.[14] Some of this decline was induced directly through real wage changes, as leave is valued at the wage rate to determine leave costs. However, some of the leave decline reflects changes in the amount of time earned for leave per hour worked, since leave as a share of total compensation fell over the period. Average real pension costs fell by about 30 percent over this 14 year time frame, with most of the decline occurring by the 1990-92 period; the share and incidence statistics mirror this pattern.[15] It is worth noting that average pension costs, conditional on positive costs, also fell quite a bit over the period. The ultimate causes of this trend are not entirely clear. The shift over this period toward defined contribution plans and away from defined benefit plans is well-known. Those changes may provide some basis for an accounting, but probably not a true explanation. Demographic changes in the labor market are likely to have had relatively small effects.[16] Changes in the tax treatment of various alternative savings vehicles, or changes in marginal tax rates could potentially induce substitution away from pensions for some workers. There is also some evidence that, within defined benefit plans, regulatory

[13] "At median" refers to statistics averaged over the five percent of the data centered on the median wage. Statistics are first calculated by quarter, and then pooled across quarters by taking simple averages.
[14] The paper references 3 year averages by middle year in referring to changes; e.g., the change from 1981-83 to 1995-97 is a "1982-96" change.
[15] Pension coverage trends reported elsewhere vary with the data source, sample, and time period analyzed (Gale (1994), PWBA (1994), Currie and Yelowitz (1998)). Bloom and Freeman (1992) report coverage declines using 1979 and 1988 May CPS data.
[16] Consider changes in the gender composition of the labor force. Currie and Yelowitz (1998) report gender differences in pension and health insurance coverage rates within schooling group of roughly 10-15 percentage points. The gender makeup of the non-agricultural civilian labor force, aged 20 or older, changed from 43.1 percent female in 1982 to 46.0 percent female in 1996.

changes during the mid- to late-1980s resulted in different pension funding levels (Gale (1994), Ippolito (1998)).

Average real health insurance costs rose quite rapidly over most of this period, before falling somewhat over the past few years. As is well known, health insurance coverage rates fell over this period. Note also that, in these data, health insurance costs conditional on positive costs rose much more rapidly in the 1980s than they have since the early- to mid-1990s (see Krueger and Levy (1997)). The observed trends may of course be due to falling coverage in response to rising prices for health care goods and services. For example, Gruber and Poterba (1994), using variation generated by changes in the tax code, find a fairly elastic response of coverage to insurance cost changes. Even if the rising prices reflect quality improvements (Cutler, McClellan, Newhouse, and Remler (1998)) there may still be an inducement to drop coverage absent some ability to restrict quality of care once injury or illness occurs. There is also evidence that changes in Medicaid eligibility acted to crowd out private health insurance over a relatively short period in the late 1980s and early 1990s (Cutler and Gruber (1996), Shore-Sheppard (1996)). Finally, it is worth noting the possibility of cross-price effects for any of these benefit categories, although there appears to be less evidence on this point. Of course, these factors might operate differentially at different points in the compensation distribution.

The differences in numbers between the average and "at median" costs in table 7 hint at distributional differences. For all three benefit categories, the incidence and share statistics tend to be larger at the median than at the mean. This follows from the patterns exhibited in the figures above: many of the distributional differences in incidence rates and

shares occur in the lower half of the distribution. In fact the difference in the incidence rates on average and at the median increase through time for all three benefit categories, suggesting some interesting changes in benefits dispersion.

Substantial changes in wage and compensation distributions took place coincident with these changes in average benefits levels. Figure 9 compares changes in compensation inequality to changes in wage inequality. Each panel overlays a plot of real compensation growth by compensation percentile with a plot of real wage growth by wage percentile. Panel A gives changes over the whole time period and the remaining panels each give changes over shorter subperiods. The generally upward sloping graphs indicate increasing compensation and wage inequality: growth rates are higher at higher percentiles. Panel A shows that wage inequality in these data increased mainly over the top half of the distribution. The series for compensation growth suggests a slightly more broad-based inequality increase. If anything, benefit differentials between the 90^{th} and 50^{th} percentiles changed in such a way that compensation inequality grew somewhat less than did wage inequality. If there is an area where there are substantial differences, it would be at the lower end. For example, comparing the median with the 25^{th} percentile, compensation inequality rose by .031 log points whereas wage inequality fell by .005 log points, meaning that adding in benefits increased inequality growth in that range by 3-4 percentage points.

The other panels in figure 9 show some interesting differences by subperiod. One distinguishing feature of the 1982-86 changes is that the wage and compensation declines at the very low end of the distribution were much larger than those at the median. That is, over that period the increased dispersion occurred throughout the entire distribution. The differences between the two series appear fairly small, however. Therefore many of the

main results of the paper hold when the earlier years of the survey are excluded. The changes since 1986 shown in panels C and D differ from those shown in panel B in that inequality decreased somewhat over the later periods at low percentiles. The figures in the last two panels also indicate that one's conclusions about dispersion in the lower half of the distribution are dependent on the measures of compensation used; dispersion increases are more apparent when including costs associated with leave, pensions, health insurance, and other benefits.

Table 8 gives wage and compensation differentials across various parts of the distribution, for each of the four periods. This table puts numbers to the series in figure 9. The final two columns are repeated from table 2, and the others give analogous statistics from earlier periods. At any point in time, including nonwage compensation increases measured inequality, especially in the lower half of the distribution. In terms of changes through time, including nonwage compensation tends to result in modestly larger inequality increases as measured by 90-10 dispersion, mostly accounted for by modestly smaller (in absolute value) inequality decreases over the bottom half of the distribution. For instance, the changes in the 90-10 log differentials over the 1982-96 period are .180 for wages and .202 for compensation; the relevant figures for the 50-10 differentials are .005 and .034. Thus if one measures inequality by a 90-10 differential, including benefits boosts measured inequality growth by 12 percent.

Table 9 shows the ultimate source of the differences between wage and compensation inequality changes, and gives a sense for whether the differences are statistically significant. The first column gives the change in wage dispersion over the 1982-96 period for the relevant percentile range, derived by differencing appropriately

from table 8. The next three columns give the contribution of individual benefits to compensation inequality, as operationalized by equation (1). The last two columns in the table give changing dispersion in voluntary compensation and in total compensation, where the distributional range continues to be defined based on points in the wage distribution. The difference between the voluntary compensation and wage dispersion columns gives the sum total of the effects on measured inequality growth of including voluntary benefits; the difference between the first and last columns also includes effects of legally required compensation costs.

Generally speaking, the point estimates for the benefit contributions columns are small and not statistically different from zero. The main exception is for health insurance in the bottom half of the distribution; health insurance costs as a share of compensation fall enough at the 10^{th} and 25^{th} percentiles relative to the median to induce higher measured changes in compensation inequality. For example, the change in 90-10 wage dispersion of .181 would be approximately 18 percent higher (.033/.181) were health insurance costs included. There is also some slight evidence for increased dispersion due to leave over the middle of the wage distribution, and decreased dispersion due to pensions over the lower half of the wage distribution.[17]

VI. Income Effects and Time Series Changes in Fringe Benefit Costs

Comparing wage and compensation inequality growth can partly obscure the magnitude of fringe benefit cost changes, as modest differences between wage and

[17] The reader should be aware, however, that this last result for pensions is one qualitative result that is not robust. Under reasonable alternative sample exclusions as outlined in the appendix, pensions increase dispersion growth slightly.

compensation changes can imply rather large percentage changes in benefits. If compensation per hour falls 2-3 percentage points more than wages at, say, the 25th percentile, it must be the case that benefits fall by quite a lot in percentage terms, simply because benefits are such a small fraction of total compensation for low compensation jobs. And absent any large declines in required nonwage compensation costs, this means that voluntary benefit costs must fall by an even greater amount in percentage terms. Similar reasoning leads to the conclusion that percentage changes in voluntary benefit costs are likely to be more moderate near the median and in the upper tail of the distribution.

This section details what happened to benefit costs and makes an admittedly speculative case for income effects as contributory to those changes. Benefit cost declines were quite large in percentage terms in those parts of the compensation distribution where compensation differences predict benefit differences well. This is at least consistent with the notion of important income effects, and leads one to a corollary question: do observed time series changes in fringe benefits at a particular point in the compensation distribution resemble what one would predict based on time series changes in compensation at that same point, in conjunction with a reasonable estimate of the behavioral relationship between compensation and fringes?

Answering this question requires an assessment of how fringe benefits vary with incomes. Lacking an accurate estimate of this behavioral relationship, I utilize the cross-sectional relationship observed between fringes and compensation. This proxy is most accurate when the underlying variation behind the cross-sectional relationship is roughly similar to the variation driving the observed time series changes. For example, the cross-

sectional patterns apparent in figures 4 through 8 may reflect substitution effects induced by progressive taxation and the tax treatment of pensions and health insurance. Applying those cross-sectional relationships to the time series changes in compensation is appropriate if the time series changes in compensation would also induce similar substitution patterns. This despite the fact that the cross-sectional relationship between fringes and compensation is not the same as that which would obtain if price and taste differences could be held fixed (a true income effect). On the other hand, suppose the cross-sectional relationship between, say, pension benefits and compensation was driven entirely by preferences (more forward looking people tend to be high earners). In that situation applying the cross-sectional relationship between pension choices and compensation to time series changes in compensation is inappropriate, as changing compensation in the time series is not likely to be due to changing preferences. The same comments are applicable to fringe benefits-compensation relationships due to e.g., age differences among workers in the cross-section.

Predicted values of percentage changes in benefit costs b_j, at different compensation percentiles θ, are defined as

$$\left\{ d\ln b_j(\theta) \right\}_{\text{predicted}} = \left\{ \frac{d\ln b_j(\theta)}{d\ln c(\theta)} \right\}_{\text{cross sectional}} \cdot \left\{ d\ln c(\theta) \right\}_{\text{time series}}$$

The time series changes for compensation (the last term above) are those graphed in figure 9. The cross-sectional relationships $dlnb_j$ and dlnc are constructed from the relationships observed in the pooled 1981-97 data, by differencing the relevant variable in the

neighborhood of the percentile.[18] Applying time series compensation changes to the constructed cross-sectional benefits expenditure elasticities gives the predicted percentage cost changes. The resultant series can be compared to actual percentage changes in benefits.

Table 10 gives benefit cost elasticities with respect to compensation, based on pooled 1981-97 data, to quantify the cross-sectional relationships. Elasticities at any given percentile are noisy measures, so the table gives averages over ranges of the distribution; the ranges are centered on the 25th, 50th and 75th percentiles. The elasticities for pensions tend to be higher than those for leave and health insurance. The elasticities are much larger in the lower parts of the distribution for all three benefits components. If one were looking for the effects of changing inequality on fringe benefit choices, one would look first to the bottom third of the compensation distribution.

Figures 10 through 12 plot actual and predicted changes, in percentage terms, for the 3 main voluntary benefit components. (Table 11 gives precise numbers at various points in the compensation distribution, and is presented without additional comment). Although no single story explains all the patterns for these figures, one commonality is the tendency for benefit costs to fall more in percentage terms in the lower part of the distribution. This is roughly what one would expect based on the distributional differences in changing compensation, and in fact the predicted series do tend to track the actual changes.

[18] The cross-sectional $dlnb_j$ terms are constructed as $(b_j(\theta+2)-b_j(\theta-2))/4*b_j(\theta)$ and the actual time series changes from date t to date tau are constructed as, suppressing the θ notation, $(b_{j\tau}-b_{jt})/b_{jt}$.

Figure 10 shows the patterns for leave changes; the time periods in the various panels mirror those in figure 9. Over the whole 1982-96 period, actual leave costs fall throughout the entire distribution. The declines are 25-30 percent near the median, and as much as 50 percent near the 25th percentile. Throughout the entire range, actual costs fall by more than would be predicted by compensation changes alone. However, the distributional aspects of the changes are captured quite well by the counterfactual. The correlation between the two series in panel A is 0.91. Unlike the case with pensions and health insurance, there are relatively few stories to tell regarding changes in tax policy, regulations, and other public policies affecting leave choices that might provide alternative explanations to these patterns.[19] And, although the series are inevitably more noisy, a similar story emerges when looking at changes in the subperiods of the data. In the early- to mid-1980s (panel B) there was a relatively small gradient with respect to percentile. The trends in the late 1980s and early 1990s are more apparent. In both cases (although especially in the last subperiod) the actual tends to lie below the predicted and there are clear gradients with respect to percentile.

Figure 11 shows the patterns for pensions. This figure looks more noisy than that for leave, but there are some similarities. Pension costs fell on average by more than the compensation changes would have predicted. The distributional differences in the predicted series roughly mirror those in the actual series, with pension costs falling most in percentage terms in the area between the 10th and 30th percentiles. Figure 11 also shows

[19] Leave-compensation relationships reflect hours worked choices as well as income-elastic demands for amenities like "flexibility". There is some ambiguity about the hours worked – wage relationship in cross-sectional microdata because of various measurement issues. Welch (1997), using CPS data, finds a positive covariance even for samples of workers, once wage measures are instrumented. Although beyond the scope of this paper, leave considerations might affect such calculations.

the series over different subperiods. The pension declines occurred in all three subperiods, although the declines were more modest in the last period. If anything, the most recent change (1991-96) shows a slightly smaller pension decline than would have been predicted based on the observed compensation changes. The actual and counterfactual series tend to exhibit roughly the same pattern with respect to percentile. The two series in panel A have a correlation coefficient of 0.80; furthermore, the series tend to track each other in each of the individual subperiods.

Some of the policy changes affecting pensions alluded to above – changing marginal tax rates, regulatory changes, etc. – might be expected to lower employer contributions to pension plans. These policy changes therefore might help to explain why the actual series in figure 11 lie so far below the counterfactuals. It is likely that these factors differentially affected pension contributions at different percentiles, but the extent or even direction of these differential effects is not obvious. For example, one might expect marginal tax rate changes to have a smaller effect in the lower than upper half of the compensation distribution. Or consider the hypothesis advanced by Ippolito (1999), that regulatory changes made it profitable to reduce contributions in overfunded defined benefit plans: it is not obvious that low compensation per hour workers are disproportionately in overfunded defined benefit plans (intuition and figure 6 might suggest otherwise to the reader). A very real possibility is that changes in individual retirement account deductibility with the Tax Reform Act of 1986 induced substitution away from IRAs and toward close substitutes such as pensions, and that this disproportionately affected high compensation individuals. This probably wouldn't go very far toward explaining the patterns for the first and last subperiods of the data. Given

the uncertainty surrounding these issues, the most reasonable statement is necessarily weak: the observed changes are consistent with income effects, but there are likely to be other factors at work as well.

Figure 12 shows the same graphs for health insurance cost changes, and represents a cautionary tale. Over the 1982-96 period jobs with above-median wages experienced large increases in health insurance costs, while the experience below the median and especially in the range of the 10^{th}-30^{th} percentiles, was somewhat different. One might be tempted to declare that the actual and counterfactual series in these figures track each other, except for the fact that one expects some price effects in this market. The different time periods in figure 12 are interesting in this regard. For the 1982-86 changes health insurance costs rose everywhere except at the very low end of the distribution. The actual series lies about 30 percentage points above the predicted series at all percentiles; if there is any substitution at work here it is apparently at work only at very low compensation levels (income effects would predict the same pattern). The 1986-91 changes look quite different. Here one sees high benefit cost growth rates in the upper half of the distribution and much lower growth rates elsewhere. The differential responses at, say, the 10^{th} and 40^{th} percentiles are much larger than would be predicted solely from the income effects counterfactual series. The final period, 1991-96, is one where health insurance premium increases moderated substantially (see Krueger and Levy (1997)). The changes over that period look much more like the pension and leave pictures in that costs are generally falling, with some distributional detail explainable by the fact that compensation is falling most in the lower half of the distribution. Nonetheless, it seems clear that benefit cost

declines at the very low end of the compensation distribution exceeded what an income effects counterfactual would predict.

In the case of health insurance, at least, a very likely explanation is that higher health insurance costs resulted in a substitution away from coverage in low compensation jobs and cost increases for those jobs that kept coverage.[20] It is easy to imagine models where it is difficult to buy "a little" health insurance. With such indivisibilities a price increase causes higher expenditures for those that continue coverage (assuming price inelastic demand), and lower coverage rates as some who were once just indifferent to obtaining health insurance find it advantageous to drop coverage. Presumably these will tend to be lower wealth people in the subset initially with coverage. Another cause for more elastic demand at lower incomes is the presence of publicly provided insurance as a substitute. If these interpretations are accurate, then one would want to model health insurance price elasticities as a function of income. It is a truism that if demand is more elastic at lower incomes, then income elasticities are larger at higher prices. Therefore if one believes the trends shown in figure 12 are primarily due to rising costs of private health insurance, then one might also want to entertain the possibility of larger income elasticities for health insurance coverage when anticipating future trends. This may be especially relevant if compensation growth continues to increase for those with low compensation levels.

VII. Summary

[20] Also, the public insurance crowdout argument would apply for the 1986-91 period. Cutler and Gruber estimate that 17 percent of the 1987-92 decline in private health insurance coverage was due to Medicaid expansions during that period. This would be a substantial minority of below-median changes.

The intent of this paper is to present facts on the level and distribution of fringe benefits, on the relationship between wages and fringe benefits, and on how these relationships have changed through time. Research into this issue has been to some extent limited by the absence of microdata on fringe benefits receipt and the costs associated with benefits when present. The data utilized here have the advantage of giving wage and fringe benefits costs for large samples of jobs, over a period of time with relatively substantial changes in wage distributions.

As a general proposition, voluntary fringe benefits like leave, pensions, and health insurance increase compensation dispersion in the lower half of the distribution. Of these benefits, only the pensions component substantially increases dispersion in the upper half of the distribution; health insurance in fact reduces dispersion in that range. Legally required compensation costs such as worker's compensation insurance and social security tend to reduce dispersion throughout the entire distribution. The equalizing effects of required compensation over the entire range of the distribution (as measured by a 90-10 differential) roughly offset the effects of health insurance, and are slightly smaller in absolute magnitude than are the effects of leave or pensions.

One may also use these data to look at changes in inequality through time. Compensation inequality rose over the past 10-15 years by a greater amount than did wage inequality. The differences are apparent mainly in the bottom half of the respective distributions, and are largely due to declines in health insurance coverage rates.

On average, employers' real leave and pension costs per hour worked fell over this period, while health insurance costs per hour worked rose. The fact that compensation inequality rose relative to wage inequality implies that benefit costs declined more in

percentage terms in the lower half of the compensation distribution. These trends are consistent with many different possible explanations, including changes in health insurance premium rates and changes in public policies affecting savings behavior. The distributional changes are also consistent with income effects, where low wage workers, facing declining real wages, choose to take a disproportionately large fraction of the compensation decreases in the form of lower fringe benefits. Distinguishing this last possibility from alternatives would be especially useful if inequality continues to change substantially.

References

Barkume, Anthony, "The Structure of Compensation for 'Payment by Results' Jobs in the U.S. Labor Market," unpublished manuscript, March 1999.

Bloom, David E. and Richard B. Freeman, "The Fall in Private Pension Coverage in the United States, **American Economic Review** 82(2), May 1992, pp. 539-545.

Brown, Charles, "Firms' Choice Of Method of Pay," **Industrial and Labor Relations Review**, 43, February 1990, pp. 165S-182S.

Currie, Janet and Aaron Yelowitz, "Health Insurance and Less Skilled Workers," unpublished manuscript, October 1998.

Cutler, David M. and Jonathan Gruber, "Does Public Insurance Crowd Out Private Insurance?" **Quarterly Journal of Economics**, 111(2), May 1996, pp. 391-430.

Cutler, David M. and Brigette C. Madrian, "Labor Market Responses to Rising Health Insurance Costs: Evidence on Hours Worked," **Rand Journal of Economics**, 29(3), Autumn 1998, pp. 509-530..

Cutler, David M., Mark McClellan, Joseph P. Newhouse, and Dahlia Remler, "Are Medical Prices Declining? Evidence from Heart Attack Treatments," **Quarterly Journal of Economics**, 113(4), November 1998, pp. 991-1024.

Farber, Henry S. and Helen Levy, "Recent Trends in Employer-Sponsored Health Insurance Coverage: Are Bad Jobs Getting Worse?" Working Paper 402, Industrial Relations Section, Princeton University, July 1998.

Freeman, Richard B., "The Effect of Unionism on Fringe Benefits," **Industrial and Labor Relations Review** 34(4), July 1981, pp.489-509.

Gale, William G., "Public Policies and Private Pension Contributions," **Journal of Money, Credit, and Banking**, 26(3), August 1994, part 2, pp. 710-732.

Goldin, Claudia, "Monitoring Costs and Occupational Segregation by Sex: An Historical Analysis," **Journal of Labor Economics**, 4(1), January 1986, pp. 1-27.

Groshen, Erica, "Sources of Intra-Industry Wage Dispersion: How Much Do Employers Matter?" **Quarterly Journal of Economics**, 106(3), August 1991, pp. 869-884.

Gruber, Jonathan and James Poterba, "Tax Incentives and the Decision to Purchase Health Insurance: Evidence from the Self-Employed," **Quarterly Journal of Economics**, 109(3), August 1994, pp. 701-734.

Hamermesh, Daniel S., "The Timing of Work Time Over Time," **Economic Journal**, 109, January 1999.

Hamermesh, Daniel S., "Changing Inequality in Markets for Workplace Amenities," NBER Working Paper 6515, October 1997.

Ippolito, Richard A., "Reversion Taxes, Contingent Benefits and the Decline in Pension Funding," unpublished manuscript, February 1999.

Juhn, Chinhui, "Declining Male Labor Market Participation: The Role of Declining Labor Market Opportunities," **Quarterly Journal of Economics**, 115(1), February 1992, pp. 79-121.

Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce, "Wage Inequality and the Rise In Returns to Skill," **Journal of Political Economy**, 101(3), June 1993, pp. 410-442.

Katz, Lawrence F. and Kevin M. Murphy, "Changes in Relative Wages, 1963-1987: Supply and Demand Factors," **Quarterly Journal of Economics**, 107(1), February 1992, pp. 35-78.

Krueger, Alan B. And Helen Levy, "Accounting for the Slowdown in Employer Health Care Costs," **Proceedings of the National Tax Association**, 1997, pp. 61-75.

Lazear, Edward P., "Salaries and Piece Rates," **Journal of Business**, 59(3), July 1986, pp.405-431.

Lettau, Michael and Thomas C. Buchmueller, "Are Nonwage Benefits Quasi-Fixed Costs? Evidence on the Cost of Providing Benefits to Full-Time and Part-Time Workers," unpublished manuscript, November 1998.

Murphy, Kevin M. and Finis Welch, "The Structure of Wages," **Quarterly Journal of Economics**, 107(1), February 1992, pp. 285-326.

Shore-Sheppard, Lara, "Stemming the Tide? The Effect of Expanding Medicaid Eligibility on Health Insurance Coverage," Working Paper 361, Industrial Relations Section, Princeton University, April 1996.

United States Department of Labor, Pension and Welfare Benefits Administration, "Pension and Health Benefits of American Workers," May 1994.

Welch, Finis, "Wages and Participation," **Journal of Labor Economics**, 15(1) part 2, January 1997, pp.S77-S103.

Woodbury, Stephen A., "Substitution Between Wage and Nonwage Benefits," **American Economic Review**, 73(1), March 1983, pp.166-182.

Appendix: ECI Microdata

A. Panel Aspects

The ECI measures changing wages and compensation costs over a sample of fixed jobs. To do so it follows sampled establishments and jobs over multiple quarters. Sample replenishment takes the form of drawing a new establishment sample for a given industry (as defined by 2 digit SIC code) and dropping the old sample from that industry. The new industry sample, except for subsequent attriters, remains in the ECI sample for approximately 4½ years. Each quarter different industries are replenished. Sample weights are constructed at the time of initiation into the sample, and reflect aggregate employment in the industry.

The panel aspect of the data raises some issues relevant to treating the data as annual cross-sections. To correct for attrition within an industry sample and changing industrial distributions in the economy, sample weights are adjusted quarter by quarter so that the cross section maintains a proper industry distribution. This reweighting does not correct for nonrandom attrition within industry or the fact that the within-industry distribution of sampled jobs (say, with respect to occupations) is static until the industry is resampled. This treatment is very similar to what the BLS undertakes in producing its annual Employer Costs for Employee Compensation release.

The paper looks at periods approximately five years apart in an attempt to maintain comparable industry samples, by capturing a given industry's panels at similar points in each panel's lifetime. Also, cross sections are not independent at high frequencies, but are at the frequency corresponding to the length of a panel's life.

B. Leave Costs and Scheduled Hours versus Hours Worked

An example demonstrates how leave is treated in the ECI. Consider a job where incumbents are paid $400 per week for a 40 hour scheduled workweek. Assume workers receive 2 hours per week in paid vacation, and that there are no other benefits. The wage rate is calculated as $10 per hour. Leave costs are calculated as the hourly wage times the ratio of leave hours to hours worked (which is scheduled hours minus leave hours). Here the computation is $10 times 2/(40-2) = $0.53 per hour worked. Note that the figure is on a per hour worked (versus per scheduled hour) basis. Total compensation is $10.53 per hour, also on an hours worked basis. One could arrive at the same $10.53 figure by dividing weekly earnings by weekly hours worked ($400/38). Had there been other benefits in this example, they would have been converted to a cost per hour worked and added to the $10.53 figure to arrive at total compensation.

As this example should make clear, whether leave is incorporated into wage measures in CPS and similar data depends on how "hours worked" is defined, and how respondents answer in practice. March CPS retrospective data has response heaping at 52 weeks and 40 hours per week, suggesting that annual hours worked do not typically net out leave. Analyses using CPS Outgoing Rotation Group data that generate hourly wages as the ratio of usual weekly earnings to usual hours worked per week would not net out leave if usual hours per week is interpreted as scheduled hours or modal hours.

C. Benefits Data Quality

Benefits data in the ECI microdata are often imputed or estimated. Cases where establishments do not provide information on work schedules or a benefit are termed "refusals". The BLS imputes benefit cost data for refusals, as follows. If there are valid past benefits data for the job in question, those figures are brought forward using average growth rates observed for other jobs in the same industry/occupation group (2 digit SIC by major occupational group). If the imputation must be done at the initiation quarter, which would for instance be the case where work schedule information cannot be obtained, benefit levels are imputed based on the average benefit levels observed for other jobs in the industry/occupation group. Imputations take into account whether the respondent indicates there are positive costs associated with the particular benefit and job.

A more frequent outcome than outright refusals is the estimation, by the respondent, of benefit costs for workers in a particular sampled job using data relevant for a broader set of workers. The BLS has preferred and fallback data collection methods for benefits. The preferred method for the main voluntary benefits highlighted in the paper is to identify distinct plans at initiation into the sample and categorize the job's incumbent workers at that point in time into the distinct plans. Costs are calculated at initiation by applying the different plan premiums or cost rates to the incumbent distribution across plans. Costs are updated by applying changing plan cost rates to the fixed incumbent distribution across plans. A common fallback collection method is to use expenditure data. Typically costs collected using the preferred method refer to job incumbents while expenditure data refer to a larger group of workers than the job incumbents. For example, an establishment self-insuring health care costs would report expenditure data for broad sets of workers. The use of expenditure data is the most important measurement issue for this paper, because it leads to within-establishment smearing of benefits costs across jobs. That is, high wage workers tend to chose higher benefits than lower wage workers in the same establishment, and those differences may not be well measured for many establishments.

Appendix table 1 gives fractions of the data satisfying varying levels of quality. These statistics are for the last quarter of 1997. Results are given separately for above- and below- median compensation jobs, as well as for the whole distribution. For the benefits listed, imputations tend to be for 10-15 percent of the data. Of the imputed data, most indicate positive costs. There are differences by place in distribution, with a greater fraction of data imputed in higher deciles. Observations with "No Plan" obviously have zero costs (establishments with plans do report zero costs for some jobs). Among the non-imputed positive cost data for leave, most of the data refers to job incumbents. For the pensions and health insurance components, the non-imputed data is more evenly split between referring to job incumbents only and referring to broader groups of workers.

Clearly the "No Plan" observations and the observations with non-imputed data for job incumbents have more accurate cost data than the non-imputed data based on the broader group, and the imputed data (which have very little benefit cost information). Over time, the fraction of the sample with the most accurate data – zero costs or non-imputed positive cost data for job incumbents – has changed relatively little. Within the subsample of positive cost data there has been a slow shift over time toward observations with imputed data or data based on broader groups of workers than the job incumbents.

There is of course a tension between excluding data that might be less accurate and including that data so as to produce more precise estimates and maintain sample representation. In these data there is also an issue of when to exclude observations with actual data for some benefit costs and imputed data for others. Here are my general rules for handling the various contingencies. For the purpose of computing compensation and wage percentiles, all data are used, including the imputed benefits for refusals. The idea here is that the wage data contain a lot of information about overall compensation, and that information is useful in assigning distributional places to all the observations. For tables that report average statistics, like table 1, all data are used in the calculations. For graphs and tables dealing with distributional differences in a particular benefit's costs, imputed data for that benefit are excluded (or more precisely, as indicated above, imputed data are used in assigning percentiles, but only nonimputed data within an assigned percentile are used in the calculations). For tables dealing with the distribution of compensation more generally, such as table 2, observations with imputed data for any of the voluntary benefits listed in appendix table 1 are excluded. The idea here is to compute statistics relevant to different benefits using the same data sample.

D. Robustness of Results to Sample Exclusions

For the most part, the qualitative results presented in the paper are insensitive to the chosen exclusions. Excluding the imputed benefits data matters little. The main question involves the treatment of expenditure data that refer to broader groups of workers. As discussed above, those data can be expected to obscure within-establishment differences in benefit costs, and there has been a slight increase through time in the prevalence of those data.

For a robustness check I recalculate parts of table 2 using different samples. I focus on cross-sectional statistics in the last period because that is where the differences are likely to be (and actually are) greatest. As before, all data are used in defining percentiles. Within any percentile, average costs equal the fraction of the data with positive costs times average benefit costs conditional on positive costs. For the fraction with positive costs I use incidence data from the subsample where plan existence is known. For average costs conditional on positive costs I use the subsample of observations where the data refer to the jobs' incumbent workers only. The presumption is that reported zero cost data are accurate, and that the most accurate data where costs are positive come from observations reporting cost figures for the job incumbents only.

The results are given in appendix table 2. The first column under each benefit category is reprinted from table 2, the second gives the statistics as calculated using the alternative samples. The results accord with priors in that the dispersion statistics are generally larger using the more restricted sample. This is most true for pensions, a benefit that is more directly related to wages and tends to have a substantial fraction of data reported for broader groups of workers than the job. It is least true for leave costs, which are also directly related to wages, but are based mainly on more accurate data.

It is a simple matter to reproduce appendix table 2 for different subperiods, and I will summarize those results briefly here (calculations available on request). If results differ greatly in earlier periods, then the sample exclusions will have some effect on inequality change calculations (recall equation (1)). The differences between calculations

for columns (1) and (2) for leave in the 1981-83 period are roughly similar to what is shown in appendix table 2. However for pensions and health insurance there are relatively small differences between columns (1) and (2) in the 1981-83 period. This suggests that compensation inequality may have grown slightly more than indicated in table 9, especially as relates to the contribution of pensions. The one qualitative result of the paper that is not robust to the sample exclusions is the result in table 9 of decreased inequality due to pensions. Therefore the sample restrictions as used in the paper should be viewed as producing conservative estimates of the effects of health insurance and pension benefits on compensation inequality and on changes in compensation inequality.

E. Within-job Compensation Variation

One way in which ECI-based inequality statistics differ from those based on household survey data is that the ECI microdata unit of observation is the job rather than the individual. The inequality statistics presented in the paper are therefore interpretable as what one would observe using individual microdata, except that individuals' wages and benefit costs are proxied by their job averages. That is, one misses within-job wage and benefit cost dispersion. From a firm's perspective this may not be very relevant – the within-job dispersion in, say, health insurance takeup rates may reflect ex post outcomes rather than ex ante expected costs – but it would be relevant from the perspective of the individual workers.

For wage rates, evidence from other establishment survey data suggests that relatively little of the total log wage variation is within-job (Groshen (1991)). More recent evidence from another establishment survey, the National Compensation Survey, indicates that within-job log wage variance is on the order of 3 to 4 percent of total log wage variance (calculations by author). The sampling design and data collection for these surveys are similar, suggesting that wage dispersion measures as presented in the paper are quite like what would obtain were individual wage rates observed.

Unfortunately, there is little evidence on within-job differences in benefit costs. Within-job dispersion in legally required benefit costs should approximately equal the within-job wage dispersion, since those costs tend to be direct functions of earnings. And obviously there is no within-job variance where costs are zero, which is a substantial portion of the data for some benefits. For observations with positive voluntary benefits costs, one can conceptually attribute within-job cost differences to differences in employer offers or in employees' take-up. One would expect within-job differences in employer benefit offers to be small because of non-discrimination rules and the desire to be perceived as treating similar workers in a similar fashion. Note in this regard that ECI sampling treats full-time and part-time workers as occupying different jobs, even if they have the same job title (the same treatment holds for differences in union status and incentive pay status). Therefore any dispersion due to full-time/part-time differentials in health insurance (etc.) offers will be reflected in the ECI data as dispersion across jobs, and so will be incorporated in the paper's inequality calculations. The main offer rate differences within-job probably relate to tenure or age service requirements, which are relevant mainly for retirement plans and vacation leave. Within-job differences in individuals' take-up of benefit offers are most likely to occur for benefits where there is

some copayment or immediate cost to the worker, e.g., health insurance or matching contributions to defined contribution plans.

Therefore most of the within-job compensation variation is likely to be due to health insurance and pension plan costs. I have no choice but to presume this dispersion is small relative to the across-job dispersion, and that it largely differences out over time, so that the dispersion estimates presented in the paper can be viewed as being fairly good proxies for what would obtain in individual microdata.

Table 1: Nonwage Compensation Costs, Fourth Quarter 1997

	Average Compensation Costs ($/hour)	Average Compensation Share	Percent of Jobs With Positive Costs
Legally Required			
Social Security/Medicare	1.13	.062	99.7
Worker's Compensation	0.38	.022	97.8
State UI	0.10	.007	88.5
Federal UI	0.03	.002	78.8
All Legally Required	1.64	.094	100.0
Leave			
Vacation	0.61	.026	74.3
Holidays	0.45	.020	75.2
Sick Leave	0.19	.008	54.5
Other Leave	0.06	.003	49.9
All Leave	1.32	.056	86.0
Insurance			
Health Insurance	1.15	.054	73.1
Life Insurance	0.05	.002	61.3
Sickness/Accident Insurance	0.03	.002	33.4
All Insurance	1.23	.058	77.4
Retirement and Savings			
Defined Benefit Plans	0.51	.017	35.7
Defined Contribution Plans	0.27	.011	40.9
All Retirement and Savings	0.78	.028	62.6
Other			
Nonproduction Bonuses	0.25	.008	35.2
Severance Pay	0.02	.001	10.2
Supplemental UI	0.01	.000	1.1
Voluntary Nonwage Compensation	3.61	.152	91.9
Nonwage Compensation	5.26	.246	100.0

Notes: The source is microdata from the fourth quarter 1997 Employment Cost Index. The average wage rate in this quarter's sample is $14.36. All cost figures are expressed in real (CPI-deflated) 1997 dollars.

Table 2: Benefits' Contribution to Compensation Dispersion, 1995-97

Distributional Range	Wage Dispersion	Benefit's Contribution					Compensation Dispersion		
		Leave	Pensions	Health Insurance	Other Voluntary	Legally Required	Voluntary Compensation	Compensation (wage sort)	Compensation
25-10	.299	.026	.014	.039	.007	-.013	.385	.375	.368
	(.008)	(.004)	(.001)	(.005)	(.003)	(.004)	(.014)	(.014)	(.011)
50-25	.406	.030	.014	.022	.001	-.016	.473	.456	.471
	(.008)	(.003)	(.003)	(.006)	(.003)	(.003)	(.012)	(.013)	(.008)
75-50	.460	.016	.017	-.003	.002	-.006	.492	.486	.482
	(.007)	(.003)	(.004)	(.004)	(.002)	(.003)	(.012)	(.011)	(.008)
90-75	.385	-.011	.017	-.007	.003	-.014	.387	.373	.391
	(.007)	(.003)	(.004)	(.003)	(.002)	(.003)	(.011)	(.010)	(.007)
50-10	.705	.056	.028	.061	.008	-.029	.858	.831	.839
	(.011)	(.003)	(.002)	(.004)	(.002)	(.003)	(.013)	(.012)	(.012)
90-50	.845	.005	.034	-.010	.005	-.020	.879	.859	.873
	(.010)	(.003)	(.004)	(.005)	(.002)	(.003)	(.014)	(.014)	(.011)
75-25	.866	.046	.031	.019	.003	-.022	.965	.942	.953
	(.010)	(.003)	(.003)	(.005)	(.003)	(.003)	(.013)	(.013)	(.010)
90-10	1.550	.061	.062	.051	.013	-.049	1.737	1.690	1.712
	(.012)	(.003)	(.003)	(.004)	(.002)	(.004)	(.016)	(.016)	(.014)

Notes: ECI quarterly data from the first quarter 1995 to the fourth quarter 1997 are pooled and equally weighted to obtain these statistics. The "Distributional Range" column indicates the percentile range over which comparisons are made. Statistics are based on averages over the five percentiles of the data centered on the relevant point; for example, the row "25-10" refers to differences between the 23^{rd}-27^{th} and the 8^{th}-12^{th} percentile ranges. In all columns except the last the percentiles reference place in the wage distribution; for the last column percentiles reference place in the compensation distribution. Wage and compensation dispersion columns are log wage and log compensation differentials. Standard errors are in parentheses and take into account the clustering of observations within establishments as well as the non-independence of observations due to pooling.

Table 3: Wage and Compensation Determinants

	log hourly wage	log hourly compensation	log hourly voluntary compensation
Full Time	.233	.311	.329
	(16.3)	(20.5)	(20.9)
Union Coverage	.185	.243	.251
	(13.0)	(15.9)	(15.9)
ln(establishment size)	.032	.040	.042
	(11.6)	(13.8)	(14.3)
Incentive Pay Indicator	.180	.152	.154
	(6.8)	(6.1)	(5.9)
Ownership (Private Omitted)			
State Government	-.026	.040	.058
	(1.1)	(1.7)	(2.6)
Local Government	.044	.024	.095
	(2.5)	(4.2)	(5.2)
R-Squared	.711	.737	.740
N	22128	22128	22128

Notes: Data are from the fourth quarter 1994. Regressions include controls for region, presence in a metropolitan statistical area (MSA), and detailed industry and occupation. T-statistics are in parentheses; standard errors are robust and account for the clustering of observations within establishments.

Table 4: Benefit Incidence

	Leave	Pensions	Health Insurance
Full Time	.259	.179	.526
	(18.4)	(7.2)	(23.6)
Union Coverage	.028	.138	.137
	(4.6)	(4.7)	(9.3)
ln(establishment size)	.005	.098	.051
	(3.7)	(16.0)	(14.0)
Incentive Pay Indicator	-.126	-.113	-.036
	(8.3)	(3.1)	(1.3)
Ownership (Private Omitted)			
State Government	.033	.084	.069
	(4.3)	(1.6)	(3.0)
Local Government	.028	.123	.008
	(4.7)	(2.7)	(0.4)
Percentile Indicators (sorted on)	(non-leave compensation)	(non-pension compensation)	(non-health insurance compensation)
R-Squared	.436	.355	.547
N	20750	20612	20751

Notes: Data are from the fourth quarter 1994. The dependent variables are indicators for presence of positive compensation costs for the benefit in question. Estimates are from maximum-likelihood probit models; coefficients are transformed to give changes in probability. All equations include region, MSA, and major industry and major occupation controls. T-statistics are in parentheses; standard errors are robust and account for the clustering of observations within establishments.

Table 5: Benefit Intensive Margin

	Leave	Pensions	Health Insurance
Full Time	.288	.191	-.157
	(6.5)	(2.2)	(1.9)
Union Coverage	.076	.220	.390
	(2.9)	(4.5)	(10.1)
ln(establishment size)	.055	.009	.007
	(10.3)	(0.7)	(0.9)
Incentive Pay Indicator	-.296	-.308	-.329
	(6.9)	(2.2)	(5.3)
Ownership (Private Omitted)			
State Government	.328	.387	.124
	(6.2)	(6.1)	(2.0)
Local Government	.117	.305	.129
	(2.9)	(4.7)	(2.9)
Percentile Indicators (sorted on)	(non-leave compensation)	(non-pension compensation)	(non-health insurance compensation)
R-Squared	.721	.605	.467
N	15237	6538	7398

Notes: Data are from the fourth quarter 1994. The dependent variables are the natural logarithms of the benefits in question. All regressions include region, MSA, and major industry and major occupation controls. T-statistics are in parentheses; standard errors are robust and account for the clustering of observations within establishments.

Table 6: Combined Extensive and Intensive Margins

	Leave		Pensions		Health Insurance	
	Combined Effect	Fraction Extensive	Combined Effect	Fraction Extensive	Combined Effect	Fraction Extensive
Full Time	.582	.504	.482	.604	.537	1.293
Union Coverage	.108	.295	.445	.506	.573	.319
ln(establishment size)	.062	.099	.169	.946	.074	.903
Incentive Pay Indicator	-.440	.327	-.492	.375	-.377	.127
State Government	.365	.103	.524	.262	.216	.427
Local Government	.149	.214	.504	.396	.139	.072

Notes: Columns labelled "Combined Effect" give the marginal effect in percentage terms of the given covariate on benefit costs. These statistics are constructed by combining estimates from tables 4 and 5 (see text for description). Columns labelled "Fraction Extensive" show what fraction of the combined effect is attributable to the extensive margin.

Table 7: Wages, Benefit Costs, and Compensation Costs, 1981-97

	1981-83		1985-87		1990-92		1995-97	
	Average	At Median	Average	At Median	Average	At Median	Average	At Median
Hourly Wage	15.18	12.86	15.20	12.69	14.43	11.78	14.15	11.20
Leave								
Costs	1.53	1.35	1.50	1.25	1.41	1.15	1.31	1.03
Share	.066	.075	.064	.070	.061	.068	.056	.065
Incidence (%)	92.2	96.2	90.3	95.2	89.9	96.6	86.1	94.4
Pensions								
Costs	1.12	0.84	0.98	0.70	0.79	0.52	0.78	0.48
Share	.042	.045	.036	.038	.029	.030	.029	.029
Incidence (%)	70.5	76.5	65.7	72.0	61.4	69.0	62.0	69.5
Health Insurance								
Costs	0.82	0.82	0.99	0.97	1.25	1.25	1.19	1.15
Share	.039	.045	.047	.054	.059	.073	.056	.070
Incidence (%)	84.7	93.5	82.2	90.9	77.7	88.1	73.5	83.7
Voluntary Benefits	3.85	3.23	3.76	3.13	3.76	3.13	3.64	2.86
Total Benefits	5.38	4.64	5.35	4.59	5.43	4.64	5.29	4.25
All Compensation	20.56	17.50	20.55	17.29	19.86	16.42	19.44	15.43

Notes: Columns labeled "Average" refer to averages of the given statistics over the entire distribution, for the relevant pooled subperiod. Columns labeled "At Median" refer to averages of the given statistics over the 48^{th}-52^{nd} percentiles in the wage distribution. All cost figures are deflated to 1997 dollars using the Consumer Price Index.

Table 8: Wage and Compensation Dispersion, 1981-97

	1981-83		1985-87		1990-92		1995-97	
Distributional Range	dlnw	dlnc	dlnw	dlnc	dlnw	dlnc	dlnw	dlnc
25-10	.288	.364	.339	.420	.322	.398	.299	.368
50-25	.411	.440	.432	.458	.420	.471	.406	.471
75-50	.407	.422	.427	.438	.435	.444	.460	.482
90-75	.263	.284	.322	.327	.350	.364	.385	.391
50-10	.699	.804	.771	.878	.742	.869	.705	.838
90-50	.670	.706	.749	.765	.785	.808	.845	.873
90-10	1.369	1.510	1.521	1.643	1.526	1.677	1.550	1.712
Quarterly Average:								
Observations	11710		16711		24839		19504	
Establishments	2431		3188		5318		4606	

Notes: ECI quarterly data for the relevant periods are pooled and equally weighted to obtain these statistics. The "Distributional Range" column indicates the percentile range over which comparisons are made. Statistics are based on averages over the five percentiles of the data centered on the relevant point; for example, the row "25-10" refers to differences between the 23rd-27th and the 8th-12th percentile ranges. Columns labeled "dlnw" are log wage differentials across the stated percentiles of the wage distribution. Columns labeled "dlnc" are log compensation differentials across stated percentiles in the compensation distribution.

Table 9: Changing Wage and Compensation Dispersion, 1982-96

	Change In:					
		Benefit's Contribution			Compensation Dispersion	
Distributional Range	Wage Dispersion	Leave	Pensions	Health Insurance	Voluntary Compensation	All Compensation
25-10	.011	-.005	-.011	.016	.010	.025
	(.015)	(.007)	(.005)	(.008)	(.024)	(.023)
50-25	-.005	.004	-.005	.017	.013	.003
	(.013)	(.007)	(.007)	(.008)	(.022)	(.022)
75-50	.053	.008	.001	.005	.064	.066
	(.013)	(.007)	(.009)	(.006)	(.024)	(.023)
90-75	.122	.002	.002	-.004	.122	.114
	(.014)	(.008)	(.010)	(.005)	(.024)	(.023)
50-10	.006	-.001	-.016	.032	.023	.027
	(.019)	(.006)	(.006)	(.006)	(.024)	(.024)
90-50	.175	.010	.003	.001	.186	.179
	(.018)	(.007)	(.009)	(.006)	(.028)	(.027)
75-25	.049	.012	-.004	.021	.077	.068
	(.015)	(.006)	(.008)	(.007)	(.024)	(.023)
90-10	.181	.009	-.013	.033	.210	.207
	(.020)	(.006)	(.007)	(.006)	(.027)	(.028)

Notes: ECI quarterly data from the first quarter 1982 to the fourth quarter 1996 are pooled and equally weighted to obtain these statistics. The "Distributional Range" column indicates the percentile range over which comparisons are made. Statistics are based on averages over the five percentiles of the data centered on the relevant point; for example, the row "25-10" refers to differences between the 23^{rd}-27^{th} and the 8^{th}-12^{th} percentile ranges. In all columns percentiles reference place in the wage distribution. Wage and compensation dispersion columns are log wage and log compensation differentials. Standard errors, in parentheses, take into account the clustering of observations within establishments as well as the non-independence of observations due to pooling.

Table 10: Benefit Cost Elasticities with Respect to Compensation, By Compensation Percentile

Compensation Percentiles	Leave	Pensions	Health Insurance
Percentiles 10-40	2.29	3.42	2.83
Percentiles 40-60	1.47	1.83	1.09
Percentiles 60-90	1.16	1.93	0.97

Notes: Elasticities are based on pooled 1981-97 cross-sectional data, and are simple averages of compensation percentile-specific estimates over the ranges indicated.

Table 11: Actual and Predicted Benefit Cost Changes

	Change In:					
	Leave Costs		Pension Costs		Health Insurance Costs	
Compensation Percentile	Actual	Predicted	Actual	Predicted	Actual	Predicted
A. 1982 to 1996						
10th	-.541	-.557	-.675	-.871	-.755	-.935
25th	-.489	-.317	-.710	-.571	-.090	-.344
50th	-.276	-.185	-.413	-.246	.397	-.153
75th	-.189	-.061	-.233	-.085	.766	-.033
90th	-.135	.045	-.149	.081	.452	.005
B. 1982-1986						
10th	-.115	-.298	-.328	-.467	-.172	-.489
25th	-.117	-.053	-.369	-.095	.192	-.058
50th	-.056	-.010	-.163	-.014	.214	-.009
75th	-.038	.009	-.010	.016	.381	.006
90th	-.087	.051	-.053	.090	.111	.012
C. 1986-1991						
10th	-.293	-.150	.180	-.236	-.395	-.266
25th	-.242	-.137	-.406	-.248	.075	-.149
50th	-.101	-.080	-.278	-.107	.217	-.067
75th	-.044	-.047	-.245	-.068	.294	-.026
90th	.032	-.009	-.074	-.016	.355	-.004
D. 1991-1996						
10th	-.252	-.109	-.453	-.169	-.508	-.179
25th	-.235	-.127	-.222	-.229	-.286	-.138
50th	-.145	-.094	-.025	-.125	-.050	-.078
75th	-.117	-.023	.031	-.033	-.010	-.013
90th	-.083	.004	-.030	.006	-.037	-.002

Appendix Table 1: Imputed Data, Fourth Quarter 1997

	Whole Distribution	Below Median	Above Median
Vacation Leave			
Imputed Data – No Information	.042	.036	.049
Imputed Data – Known Positive Costs	.082	.063	.101
No Plan	.196	.257	.137
Non-Imputed Cost Data – Job Incumbents	.596	.571	.619
Non-Imputed Cost Data – Broader Group	.084	.074	.095
Holiday Leave			
Imputed Data – No Information	.042	.036	.049
Imputed Data – Known Positive Costs	.026	.025	.027
No Plan	.162	.220	.105
Non-Imputed Cost Data – Job Incumbents	.714	.656	.769
Non-Imputed Cost Data – Broader Group	.056	.064	.050
Defined Benefit Plans			
Imputed Data – No Information	.045	.038	.051
Imputed Data – Known Positive Costs	.053	.030	.075
No Plan	.596	.778	.414
Non-Imputed Cost Data – Job Incumbents	.173	.085	.261
Non-Imputed Cost Data – Broader Group	.134	.070	.199
Defined Contribution Plans			
Imputed Data – No Information	.043	.036	.050
Imputed Data – Known Positive Costs	.074	.054	.095
No Plan	.553	.649	.458
Non-Imputed Cost Data – Job Incumbents	.136	.107	.164
Non-Imputed Cost Data – Broader Group	.194	.154	.232
Health Insurance			
Imputed Data – No Information	.045	.039	.051
Imputed Data – Known Positive Costs	.100	.069	.131
No Plan	.237	.418	.058
Non-Imputed Cost Data – Job Incumbents	.327	.228	.375
Non-Imputed Cost Data – Broader Group	.291	.196	.385

Notes: Statistics presented are the fraction of the sample with benefit status flags as indicated. Numbers sum to one within benefit and column.

Appendix Table 2: Benefits Contribution to Compensation Dispersion, 1995-97, Under Alternative Sample Restrictions

	Leave		Pensions		Health Insurance	
Distributional Range	(1)	(2)	(1)	(2)	(1)	(2)
25-10	.026	.027	.014	.020	.039	.047
50-25	.030	.027	.014	.026	.022	.022
75-50	.016	.014	.017	.027	-.003	-.002
90-75	-.011	.001	.017	.015	-.007	-.004
50-10	.056	.054	.028	.046	.061	.069
90-50	.005	.015	.034	.042	-.010	-.006
90-10	.061	.069	.062	.088	.051	.063

Notes: Constructs are as in table 2, except for the samples used in the calculations. Columns labeled (1) exclude imputed data, and are from table 2. Columns labeled (2) are constructed as follows. Incidence of the benefit in question is calculated from the subsample of the data with non-imputed incidence. Benefit shares conditional on receiving the benefit are calculated from the subsample of the data where all major benefits data refer to the sampled job (meaning the data are not imputed and refer to the job's incumbents only). Within percentile, a benefit's share of compensation is estimated as the incidence times the benefit share conditional on receipt. Statistics in columns labeled (2) are obtained by applying equation (1) to these estimated series.

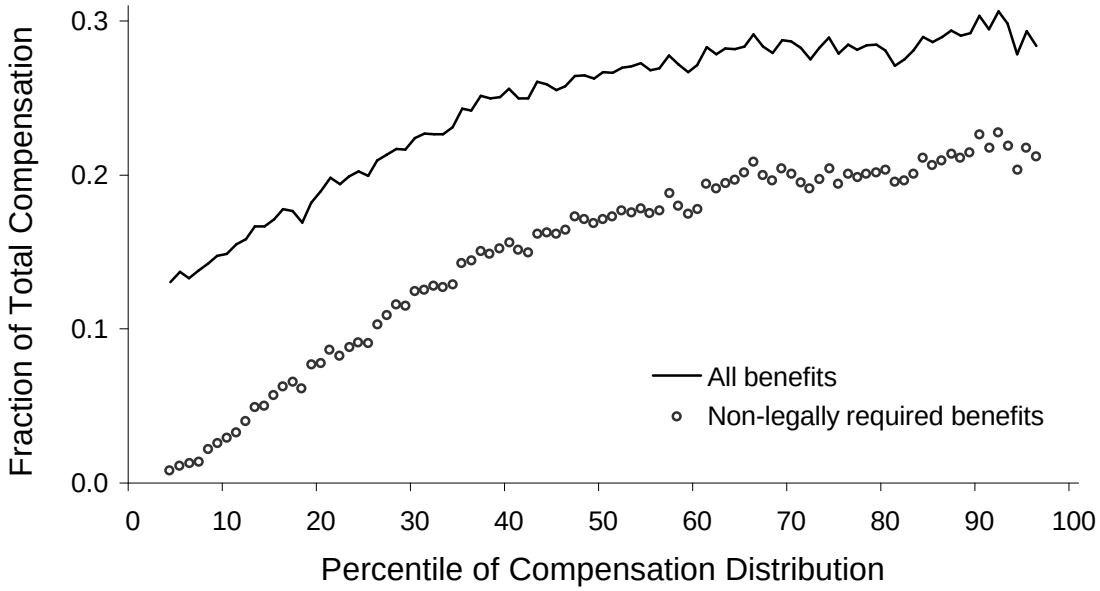

Figure 1. Benefits' Share of Compensation, 1995-1997

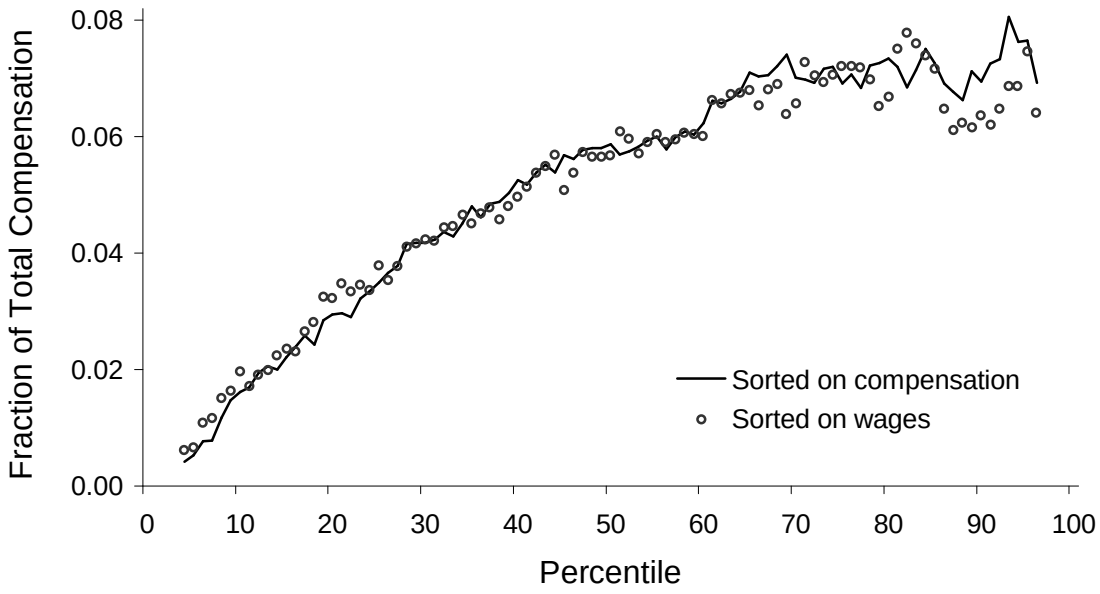

Figure 2. Leave's Share of Compensation, 1995-1997

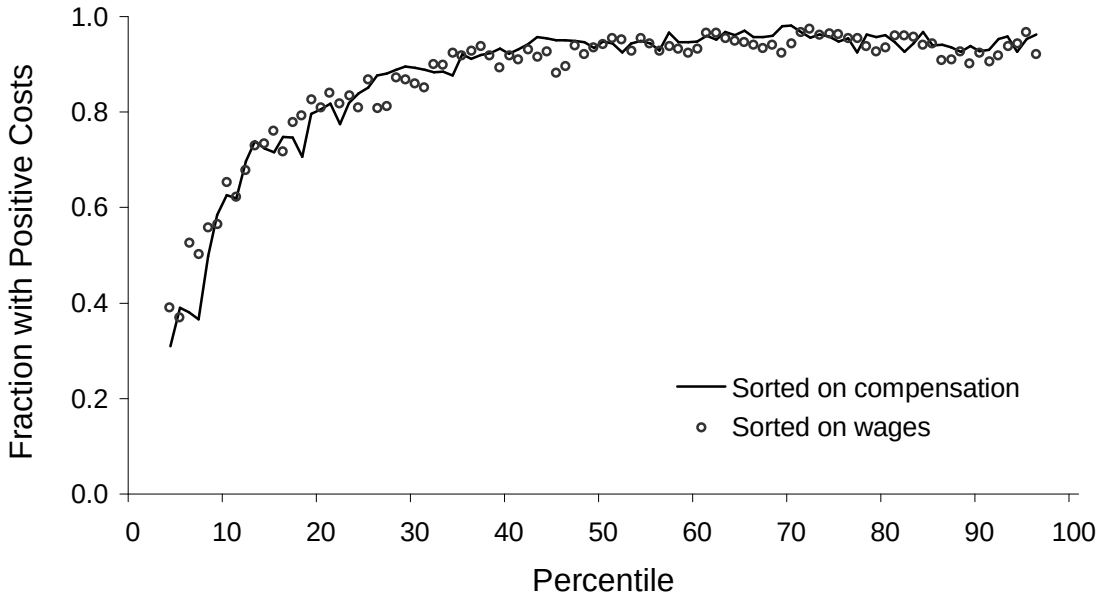

Figure 3. Leave Cost Incidence, 1995-1997

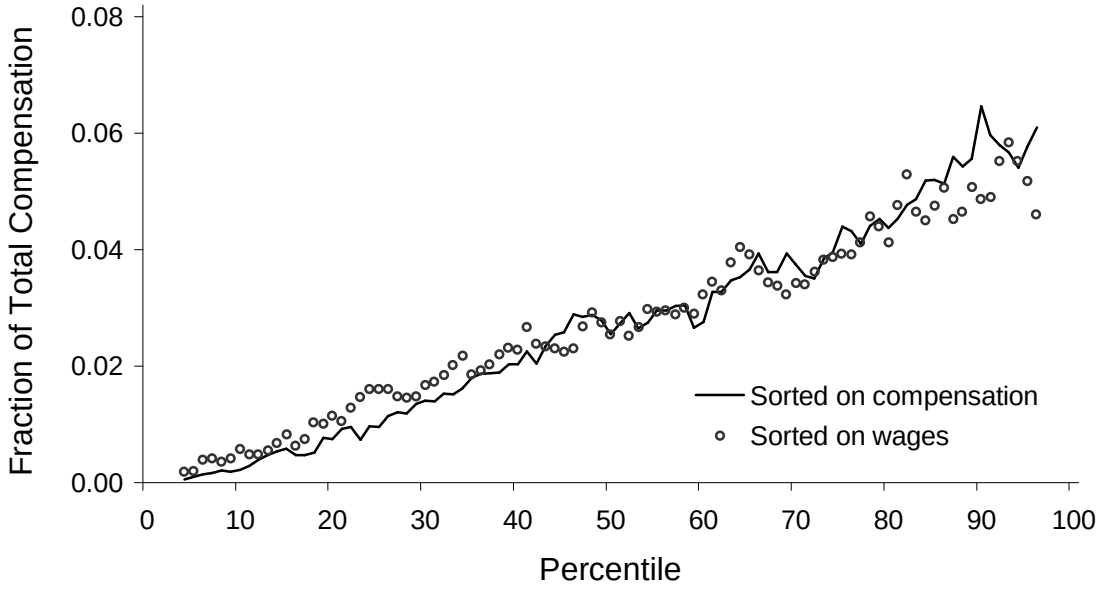

Figure 4. Pensions' Share of Compensation, 1995-1997

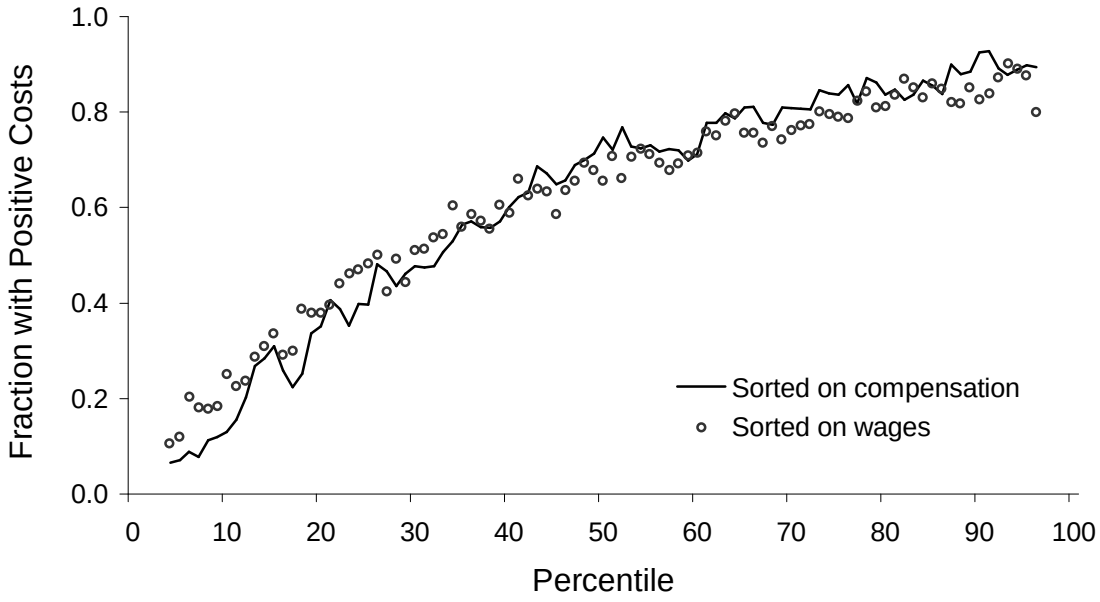

Figure 5. Pension Cost Incidence, 1995-1997

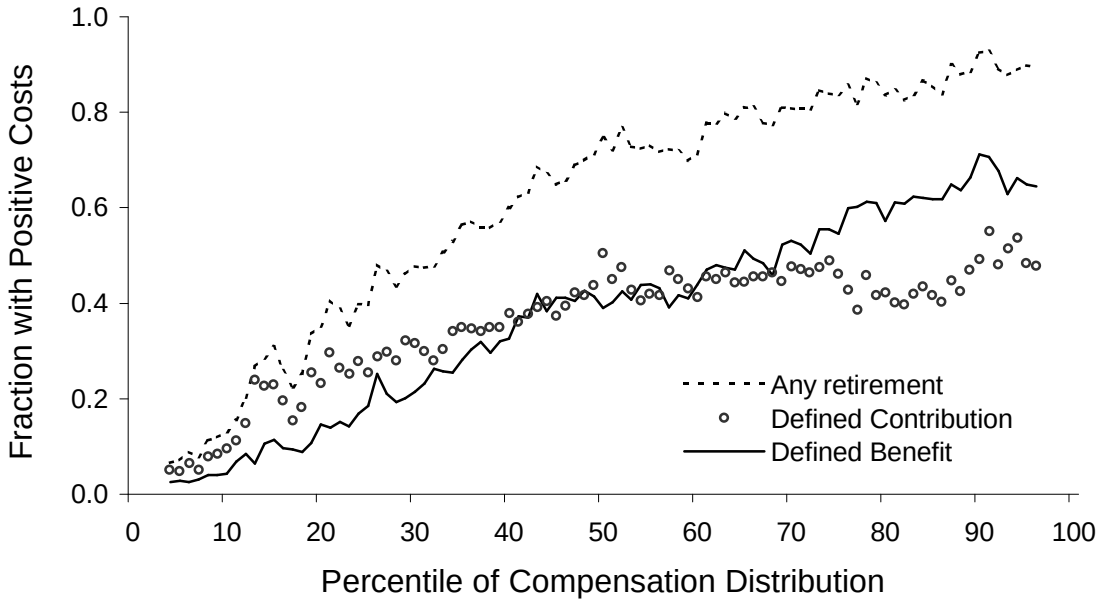

Figure 6. Pension Incidence by Type, 1995-1997

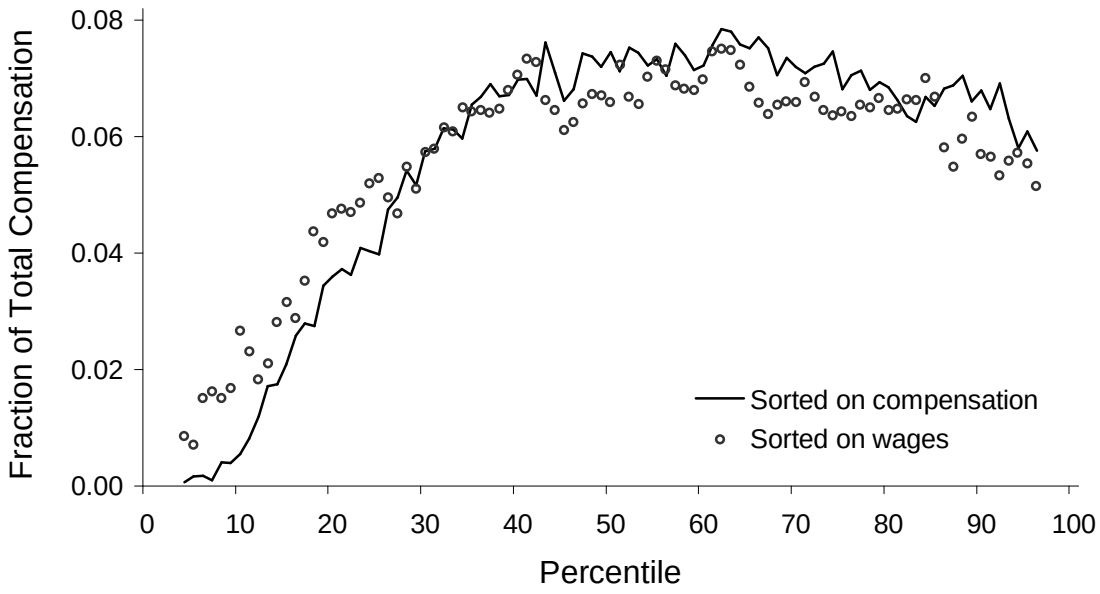

Figure 7. Health Insurance's Share of Compensation, 1995-1997

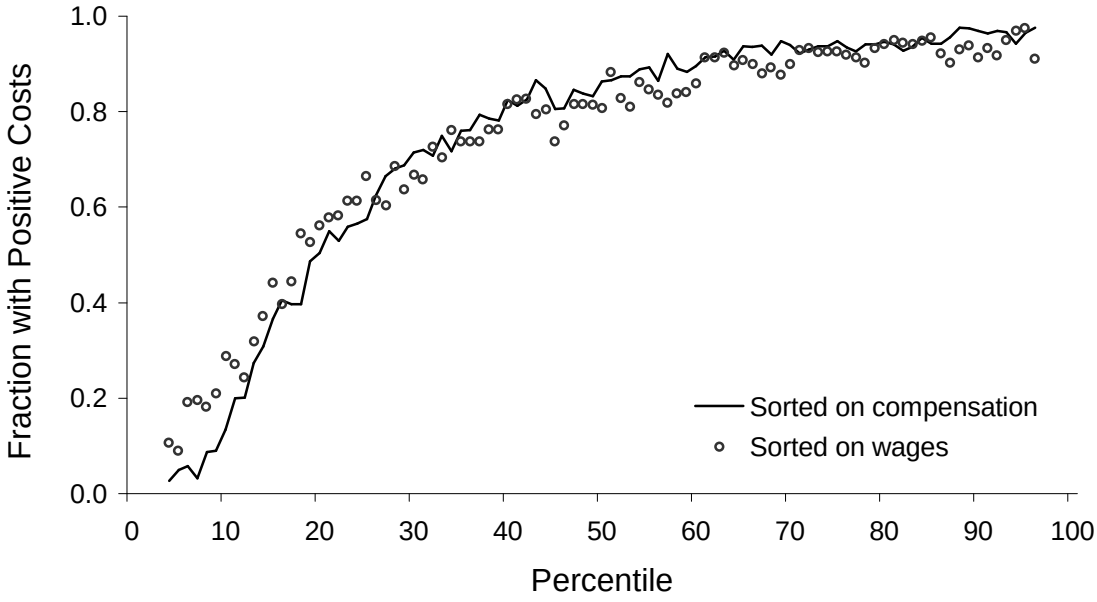

Figure 8. Health Insurance Cost Incidence, 1995-1997

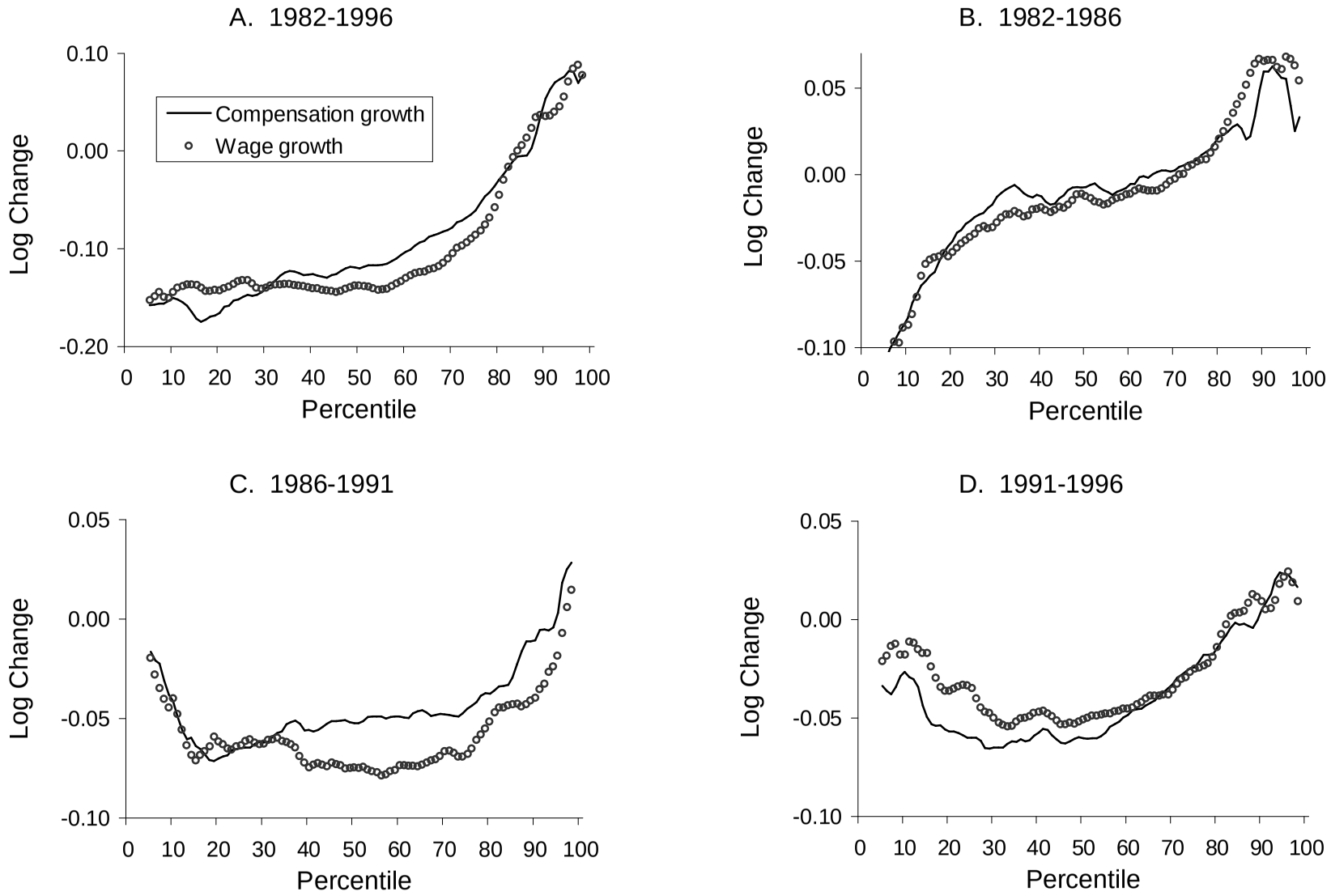

Figure 9. Wage and Compensation Growth by Percentile

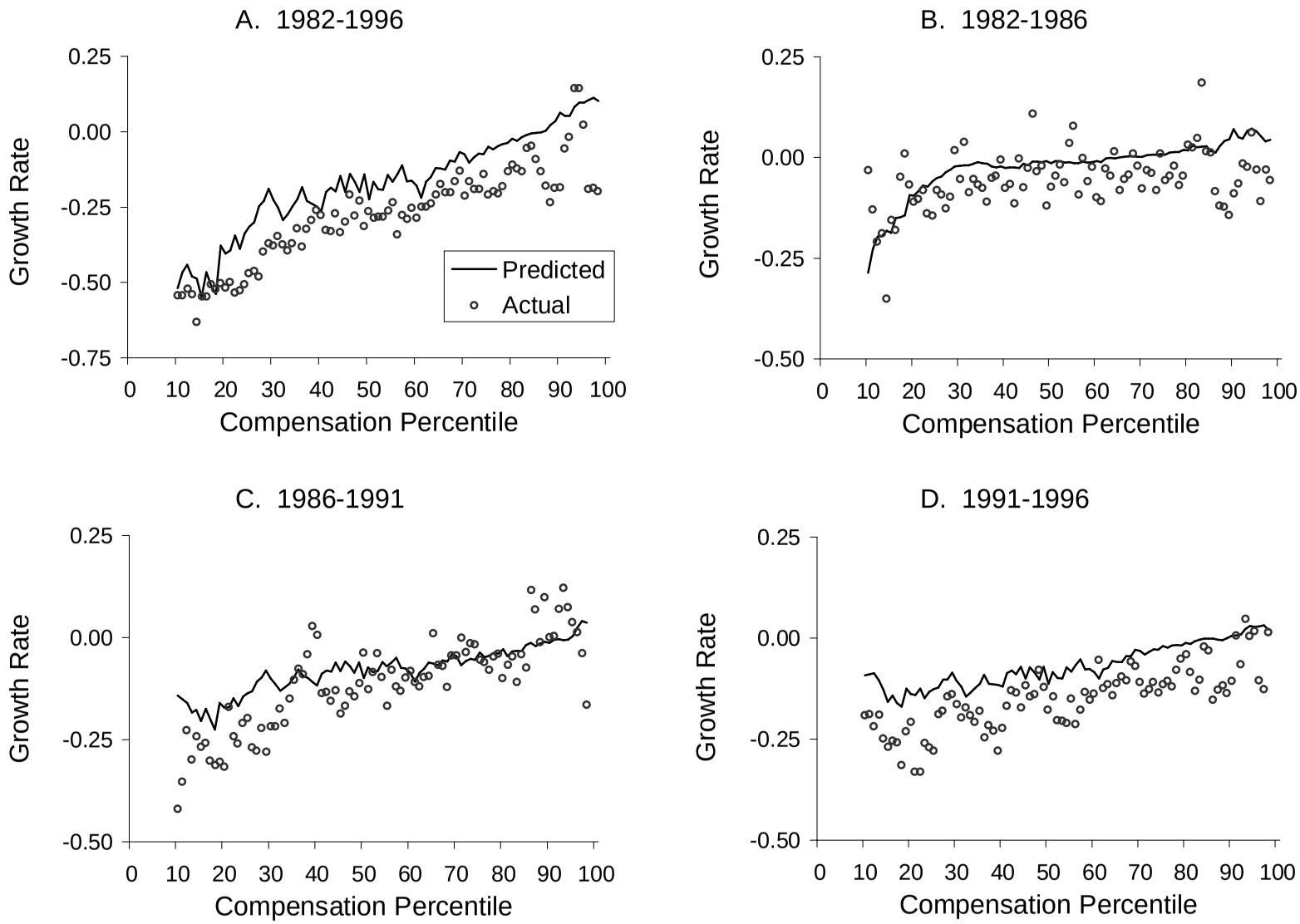

Figure 10. Leave Cost Changes by Percentile

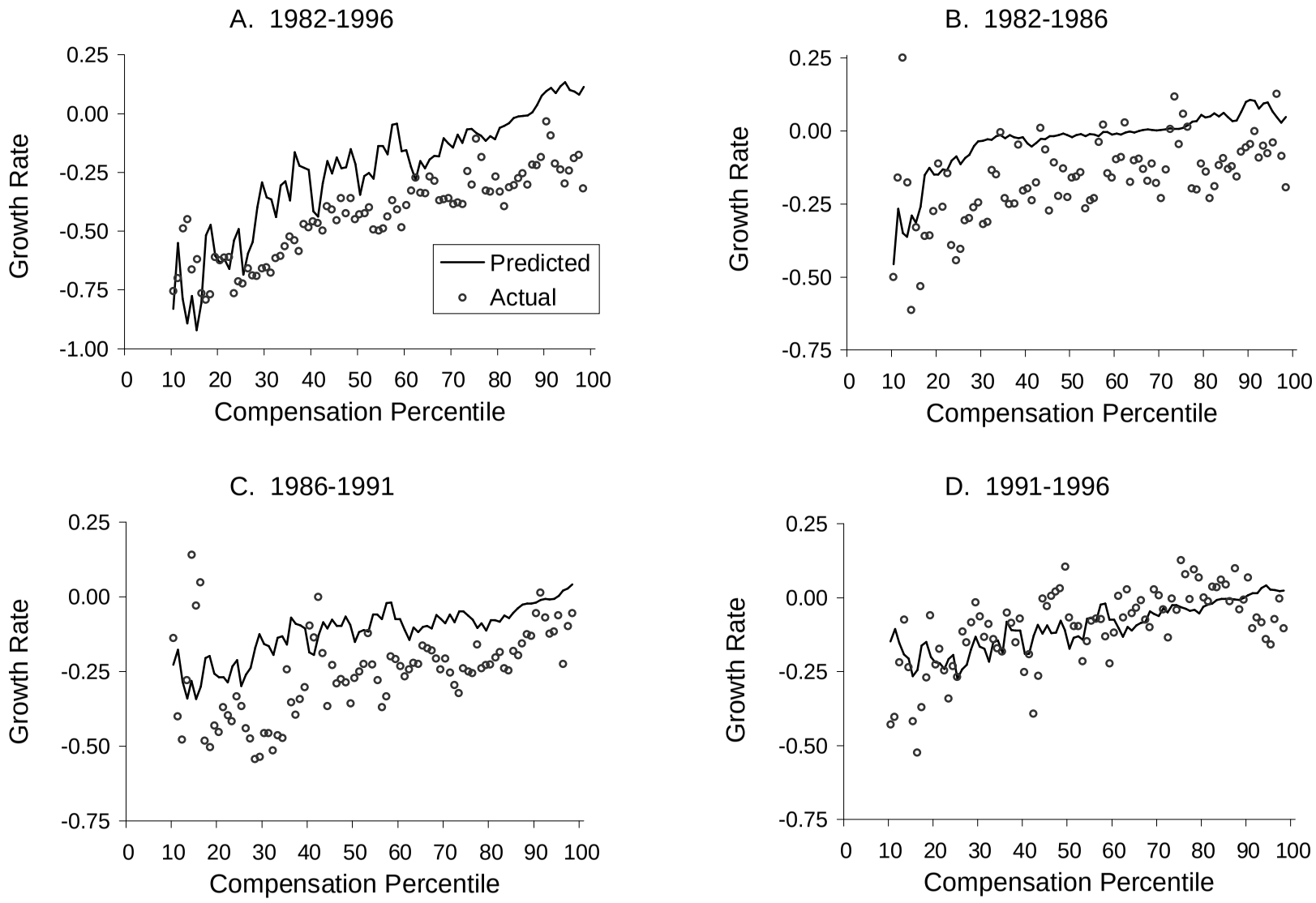

Figure 11. Pension Cost Changes by Percentile

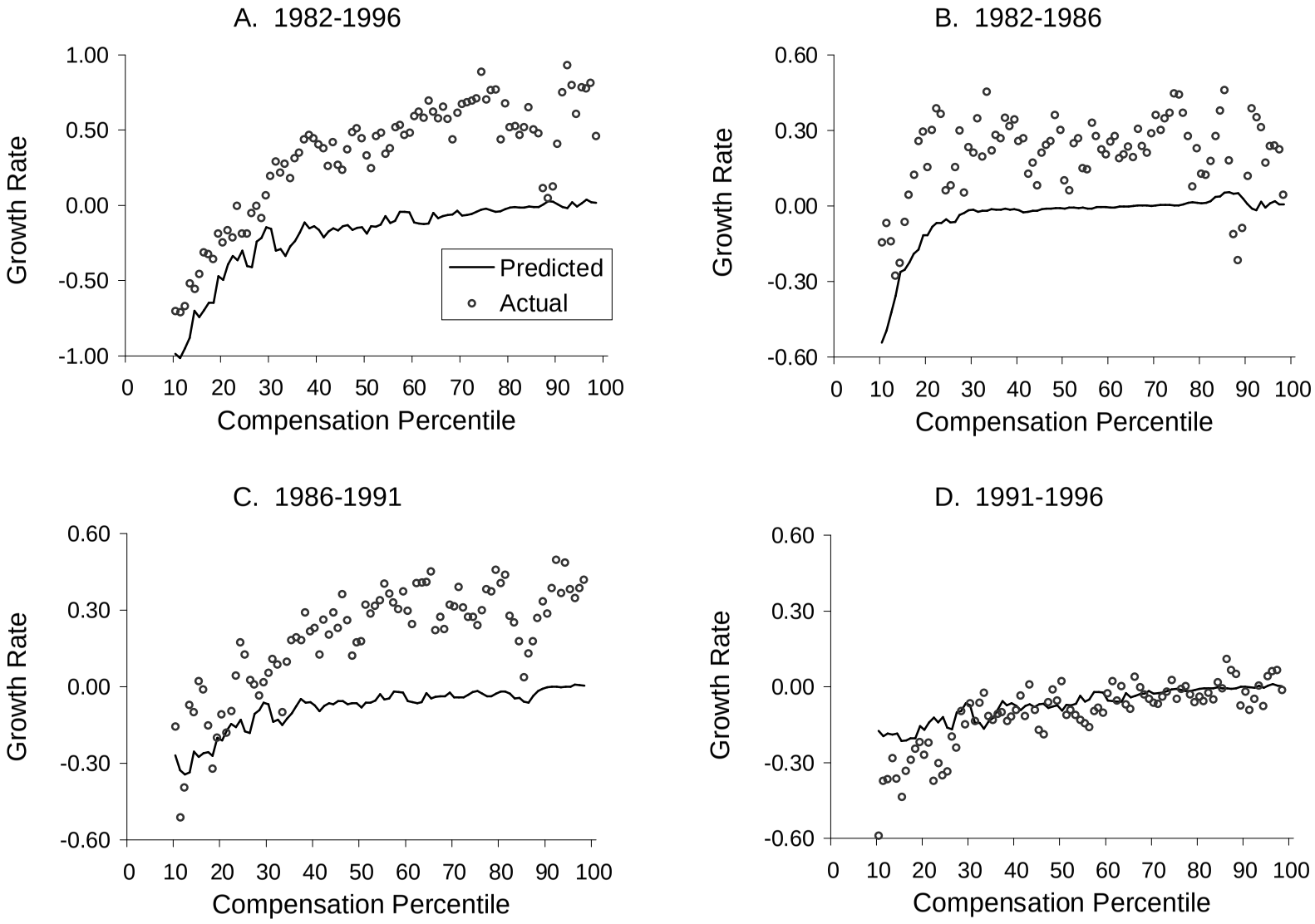

Figure 12. Health Insurance Cost Changes by Percentile