

## THE EFFECT OF EMPLOYEE BENEFITS ON THE DEMAND FOR PART-TIME WORKERS

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This paper uses the results of a unique survey of child care centers in 1989 to examine the effect of fringe benefits on the demand for part-time teachers and teacher aides. An analysis that controls for wages and other establishment characteristics shows that as the level of fringe benefit payments at the establishment rises, hours of work by part-time workers fall significantly relative to the hours worked by full-time teachers and teacher aides. Particularly influential are insurance payments (such as health and dental), which have an effect more than twice that of fringe benefits in general.

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**B**y the most recent estimates, 18% of the U.S. labor force, and about 27% of working women, are on the job less than 35 hours per week (Blank 1990b). It has been hypothesized that because of their shorter hours, these part-time workers are likely to be excluded from jobs involving high quasi-fixed labor costs, that is, costs unrelated to hours worked (Rosen 1978). Because fringe benefits are normally a large component of quasi-fixed costs, firms that pay high benefits should be reluctant to hire part-time workers. The effect of fringe benefit payments on the demand for part-time workers, however, may not be so simple. Higher fringes should reduce the attractiveness of part-time workers

only to the extent that part-time workers are eligible to receive them. If part-time workers can be paid a wage similar to that of full-time workers, but denied benefits, high fringes can make them *more* attractive.

As yet, there has been no empirical investigation of the influence of fringe benefit payments on the demand for part-time workers. Given the increasing importance of the fringe benefit component of labor compensation, this issue is an important one. Moreover, in the current debate over health care policy, a number of parties have called for mandatory employer provision of health insurance. What effect would such a policy have on the employment of part-time workers? This paper examines the influence of fringe benefit provision on the demand for part-time workers using a unique survey of establishments providing early childhood education.

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To protect the confidentiality of respondents, the General Accounting Office will not allow public access to the data used in this study.

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Until now, no one has been able to adequately examine the influence of fringe benefits on the demand for part-time workers, because such a study requires detailed data at the establishment level, including the distribution of the establishment's work force between part- and full-time workers, and detailed information about compensation. In 1989 the U.S. General Accounting Office (GAO) conducted a survey of child-care establishments that provides data at the necessary level of detail for this type of study. Nearly 17% of the workers at these establishments were part-time workers, and more than two-thirds of the establishments hired some part-time workers. We use the GAO survey to analyze the impact of fringe benefits on the demand for two groups of workers, one with relatively high skills and one with relatively low skills: teachers and teacher aides. We distinguish between fringes available to all workers and those for which some workers (presumably including part-time workers) are ineligible. We also contrast the effect of fringes in general, including paid vacations and pensions, with that of insurance-type benefits in particular, which are not easily prorated by earnings.

#### Theoretical Framework

Some time ago Walter Oi (1962) introduced the concept of quasi-fixed labor costs—costs that firms pay on a per-worker basis irrespective of the hours a worker puts in on the job. Examples of such costs are hiring and training costs and the cost of supervising and administering the firm's work force. Also among a firm's quasi-fixed costs are any fringe benefits that are not strictly prorated by hours worked or by earnings. In that category might be premiums for health insurance, discounts on company products, and payment for rest periods. Even prorated benefits, such as paid vacation or pension contributions, will be quasi-fixed to the extent that such administrative burdens as record keeping and eligibility review impose some fixed costs for each individual covered.

The implications of quasi-fixed labor costs for the hiring of part-time workers are straightforward: using, say, two half-time workers to

do the work of one full-time worker will involve twice the level of per-person quasi-fixed costs. Holding constant the relative wages of full- and part-time workers, jobs with high quasi-fixed costs are less likely than other jobs to be occupied by part-time workers. Montgomery (1988) used the EOPP establishment survey to confirm that increases in hiring and training costs significantly reduced the proportion of part-time workers in an establishment's work force. But Montgomery's results also showed that the level of fringe benefits in the industry seemed to *increase* the proportion of part-time workers. This finding is plausible if part-time workers tend to be ineligible for some or all benefits, since the savings in benefit payments from using part-time workers may then exceed the increase in other quasi-fixed costs. Montgomery's result is not very reliable, however, because benefit data were available only at the two-digit SIC industry level for manufacturing, and at the one-digit level for nonmanufacturing. There were no benefit data at the establishment level, or even at a detailed industry level.

The question of eligibility is obviously important in determining the impact of fringe benefits on the demand for part-time workers. The first evaluation of the issue of benefit eligibility among part-time workers was done by Daski (1974). Daski found that medical insurance, life insurance, and retirement benefits are likely to be offered only to full-time workers, whereas paid holidays and vacations are about as likely to be prorated by hours as offered only to full-time workers. Benefits that are prorated should influence the choice between part-time and full-time workers only if they involve significant administrative costs. More recently, Blank (1990a) used probit analysis of data from the Current Population Survey to show that part-time status significantly reduced the probability that a worker would be covered by a health plan or a pension plan.<sup>1</sup> In the data section below, we discuss what benefits were

<sup>1</sup>For a discussion of the availability of benefits for part-time workers in Canada, see the *Worklife Report* (1989).

available to part- and full-time workers in the establishments in our data set.

In this paper we consider the impact of fringe benefits on the proportion of total hours worked by part-time workers. The proportion of part-time hours, rather than the proportion of part-time workers in the firm's work force, is the variable of primary policy interest because it determines, in large part, the part-time workers' share of total compensation. We model the proportion of part-time hours as a function of the two key variables determining the relative cost of part-time workers and full-time workers: relative wage costs and the level of fringe benefits, which represent quasi-fixed costs. (Below, we consider the possibility that some fringe benefits are not quasi-fixed.)

Naturally, the firm's relative demand for part- and full-time workers will be influenced by aspects of its production function as well as by the relative cost variables described above. By using a sample of firms in the same industry, we avoid problems of inter-industry variation in production functions. Nevertheless, some intra-industry variation will remain, because not all of the child-care centers in our sample produce exactly the same "product." Because children of different ages are likely to be placed in child care for daily periods of differing length, the proportion of part-time workers should vary with the distribution of children's ages. Therefore, our models include the distribution of staff hours among children of four age groups: infants (0–2 years), toddlers (2–4 years), preschoolers (4–5 years), and school-age children (above 5 years). To control for different quality of care, we included the child/staff ratio in the groups containing 4-year-olds (a group of interest to the GAO study [GAO 1990]). Because schools are known to experience economies of scale, we include the number of FTE children at each center. Finally, the empirical models include regional dummies.<sup>2</sup>

<sup>2</sup>It should be noted that most of the centers in our sample were not-for-profit, and might have had less incentive than for-profit firms to minimize costs when choosing inputs. To test this possibility, we ran models that included an interaction term between the cost variables and a dummy for whether the center was a

### The Data

The data for this study are drawn from a survey of 205 establishments providing early childhood education. The survey was undertaken in 1989 by the Human Resources Division of the U.S. GAO (see GAO 1990). All of the establishments were accredited by the National Association for the Education of Young Children (NAEYC). The centers in the sample were distributed among 39 different states. About 15% were private for-profit, and the rest were public or private nonprofit. The GAO survey is very well suited to assessing the effects of fringe benefits on part-time workers because it contains highly detailed information about the establishment, the establishment's compensation structure, and the characteristics of the teachers and aides working there.

Table 1 provides a profile of the establishments in the GAO study sample in terms of mean staff size, percentage hiring part-time workers, average wages, average hours worked, and other variables of interest. As indicated in the table, about one-fourth of the centers hired some part-time teachers and two-thirds hired some part-time aides. (The designation of part- or full-time status for a given staff member was made by the respondent, rather than by the authors.) In those centers that employed them, part-time workers contributed about 16% of all hours worked by teachers and about 30% of all hours worked by aides. On average, the part-time teachers in our sample received 81% of the hourly wages of full-time teachers, and part-time aides received 90% of the wage for full-time aides.

### Availability of Fringe Benefits

We argued above that the influence of benefit payments on the demand for part-time workers would depend on the extent of part-time workers' eligibility for benefits. In

private, for-profit venture. The interaction term for the benefits variable had a negative coefficient—implying that for-profit centers were more responsive to benefit payments—but was not significant for either the teacher model or the aides model.

Table 1. Description of Establishments in the Sample.

<i>Establishment Characteristic</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Establishment Characteristics</i>	<i>Mean</i>	<i>Standard Deviation</i>
Size of Teaching Staff	18.8	14.7	Average Wage of Full-Time Aides	4.58	1.3
Full-Time Equivalent Children	80.3	54.3	Average Wage of Part-Time Aides	4.11	2.0
% with Part-Time Teachers	25.0	—	Average Hours of Full-Time Teachers	36.5	6.0
% with Part-Time Aides	66.7	—	Average Hours of Part-Time Teachers	16.6	* 7.2
Average Wage of Full-Time Teachers	6.42	2.2	Average Hours of Full-Time Aides	34.0	7.9
Average Wage of Part-Time Teachers	5.2	2.14	Average Hours of Part-Time Aides	14.7	6.1

this section we provide a brief description of the types of benefits offered by the centers in our sample and examine the eligibility of part-time workers for those benefits. The GAO survey asked respondents about the availability of 17 different fringe benefits for teachers and aides, respectively. Although the survey did not ask specifically whether part-time workers were eligible for each benefit, it did ask whether each available item was offered to “all” teachers or only “some” teachers, and whether it was offered to “all” aides or only “some” aides. In cases in which only some staff are offered the benefit, we assume that part-time workers are among the ineligible, as are those with insufficient seniority to establish eligibility.

Table 2 shows the proportion of centers offering selected benefits and, for those that do, the proportion providing each benefit to all (as opposed to some) teachers and aides, respectively. The table is also broken down by whether the center had any part-time employees of the relevant type. The results indicate that although a particular benefit is generally offered to a smaller proportion of part-time than full-time workers in a given category, for most benefits the difference in probability of receipt is relatively small. For all fringes reported, a part-time worker has a better than 50% chance of eligibility in a center that offers that benefit—and in most cases the probability is much higher than 50%. Not surprisingly, the smallest gap in

eligibility is for State Unemployment Insurance and Workers’ Compensation, both of which are regulated by law and prorated by earnings (at least within certain earnings bounds). Part-time teachers and aides had a better than 90% chance of being eligible for these two benefits, if they were offered. Private insurance benefits like health and dental coverage were the least likely to be offered to all staff. For centers providing health insurance, 85% of establishments with no part-time workers offered benefits to all teachers, as opposed to 63% of establishments with some part-time workers.

Table 2 also indicates the results of Chi-square tests for whether centers that hired some part-time workers were less likely to offer a given benefit to all staff than were centers that hired only full-time workers. A Chi-square value of significance suggests that the fact that centers with part-time workers are more likely to exclude some workers from a given benefit is not merely due to chance—it is because they hire part-time workers that they have denied some workers the benefit. The implication is that part-time workers are more likely to be among the ineligible than are full-time workers. Significantly fewer of the centers with part-time teachers than of those without part-time teachers made all teachers eligible for health insurance, life insurance, dental insurance, paid vacation, and a reduced child-care fee. Similarly, centers with part-time aides were sig-

Table 2. Percentage of Centers Offering Selected Benefits to All Staff.

Benefit	Teachers			Aides		
	Percent of Centers Offering the Benefit	Among Centers Offering Benefit: Percent Offering it to All Staff		Percent of Centers Offering the Benefit	Among Centers Offering Benefit: Percent Offering it to All Staff	
		Among Ctrs. with No Part-time Workers	Among Ctrs. with Some Part-time Workers		Among Ctrs. with No Part-time Workers	Among Ctrs. with Some Part-time Workers
Paid Vacation	96 %	93 %	82%**	73 %	91 %	63%**
Sick Leave	95	93	91	75	89	72**
Paid Breaks	82	98	92	67	96	80**
Planning Time	88	94	88	55	86	71**
Pension	45	86	69	32	81	69
Health Ins.	81	85	63**	61	78	61
Life Ins.	49	85	63*	35	81	63*
Dental Ins.	43	81	53**	32	81	50**
Workers Comp.	93	98	96	80	100	94
State UI	76	97	97	62	100	93*
Tuition Asst.	61	82	73	48	73	68
Reduced Fee	54	94	80*	46	96	84*

Single and double asterisks indicate significance at the .1 and .5 levels, respectively, for a Chi-square test of the hypothesis that the proportions of centers offering benefits to all staff are the same for centers with part-time workers as for those without.

nificantly less likely than those without part-time aides to make all aides eligible for any major benefits except pensions and health insurance. Those two exceptions, both of which are important and costly benefits, are a bit surprising. Note, however, that fewer than a third of centers offered pensions to either kind of aide, part-time or full-time, and less than two-thirds of centers offered any aides health insurance.<sup>3</sup>

Bear in mind that "benefit availability" may mean one thing to part-time workers and another to full-time workers. Even when a particular benefit is offered to both part-time and full-time workers, it is not clear that the former will receive the same level of payment as the latter.<sup>4</sup> Indeed, they clearly will not in

the case of benefits that are prorated by earnings, such as paid vacation and sick leave. On the other hand, as we argue below, since these prorated benefits have smaller effects on the relative costs of part- and full-time workers than do benefits that are not prorated, they should also have a smaller impact on relative demand.

#### Constructing the Fringe Benefits Variable

The data describing the benefits that were available and the types of workers to whom they were available, described above, supply the primary measure of fringe benefits for our empirical model of the proportion of hours worked by part-time workers. Our main benefit variable is an index of the benefits that were being offered to at least some staff of the relevant type (teachers or aides). We constructed the index from the centers' responses to the questions about the availability of individual benefits as reported in Table 2.

<sup>3</sup>The reader should be cautioned that centers with part-time workers might have lower eligibility rates simply because higher turnover among part-time workers could reduce the average tenure of workers in the center.

<sup>4</sup>Even laws designed to limit restrictions on benefit coverage often fail to affect part-time workers. For example, the Employment Retirement Income Security Act prevents discrimination in pension coverage among different types of employees, but it applies only

to those working 1,000 or more hours per year—which would exclude most of the part-time workers in our sample.

The 17 separate benefits identified in the survey were each weighted using data from the U.S. Chamber of Commerce (1987) showing the average payment for a benefit of that type, as a proportion of wages, for nonmanufacturing firms that offered that benefit. Formally, then, our measure of the level of benefits available at the  $i^{\text{th}}$  center for staff of type  $t$  ( $t = \text{teachers' aides}$ ) is defined by

$$(1) \quad \text{BENEFITS}_i^t = \sum_{j=1}^{17} d_{ij}^t w_j,$$

where  $d_{ij}^t = 1$  if the  $i^{\text{th}}$  center offered the  $j^{\text{th}}$  benefit to some staff of type  $t$ , and otherwise  $= 0$ , and  $w_j =$  the average (percentage) ratio of payments for benefits of type  $j$  to total wages for nonmanufacturing firms (U.S. Chamber of Commerce 1987).

The mean value of BENEFITS was 20.8 for teachers and 17.9 for aides. These values can be interpreted as indicating that the average center gave teachers a benefit package costing about 21% of the total wage bill for teachers, and gave aides a package costing about 18% of their total wage bill.<sup>5</sup>

As a means of distinguishing between benefits for which part-time workers are eligible and those for which they are not, we also tested models that included separate measures of benefits available to "all" workers and those available to "some" workers. A problem with such a distinction, of course, is that the proportion of benefits denied part-time workers may be dependent on how many part-time workers are at the establishment, implying endogeneity bias. We had, however, no

<sup>5</sup>We expect that these calculated benefit/wage ratios somewhat overstate the true values. The centers in our sample were asked to report total benefit payments for all staff, excluding sick leave and paid vacation. The average ratio of those total benefit payments to total staff wage payments was about 8.7%. In contrast, excluding sick leave and vacation from the calculation of the BENEFITS variable in the text would give a value of 13.4% for teachers and 10.3% for aides. Therefore, even though the ratio of reported benefit payments to reported salaries is crude—it takes no account of the distribution of staff among teachers and aides or between part-time and full-time workers—the comparison does suggest that our BENEFITS variable may be overstating the value of these benefits. Below, we discuss the implications of this possibility for our findings.

appropriate set of instruments with which to control for this potential simultaneity.

We argued in the previous section that fringe benefits that can be prorated by earnings or hours should have less influence on the demand for part-time workers than those that are more quasi-fixed in nature. The results in Table 2 suggest that the latter are offered to part-time workers less frequently than the former. To test for differences in impact between these two types of benefit, we created another alternative measure of fringe payments that dissected BENEFITS into those components that are likely to be prorated and those that are not. The benefits judged less likely to be prorated were the private insurance benefits: health, life, dental, and vision. Unlike, say, pension contributions or vacation pay, insurance premiums are not proportional to an individual's pay. The most important of the insurance variables is health insurance. This variable is of considerable interest to policy makers. It appears likely that the Clinton administration will shortly propose health care reforms requiring employers to extend coverage to broader classes of workers. Part-time workers may well be included among those for whom coverage is legally mandated.

One benefit was treated separately in the models: reduced fees for child care. Because part-time care providers are likely to be mothers with small children, we entered a separate dummy variable for whether the center offered this benefit. In the child care industry this benefit has the unique property of involving very low explicit cost to the establishment. Offering this benefit should help attract part-time workers to the job; we expect its effect to be positive rather than negative.

### Constructing the Relative Wage-Cost Variable

As argued above, in examining the effect of fringe benefits on part-time workers' share of hours, it is important to control for relative wage costs of using part- and full-time workers; fringe benefits and wages are highly correlated (see, for example, Blank 1990a). Relative wages, however, can be difficult to measure. It is impossible to observe the wages of

part-time workers in centers that did not hire any. Moreover, even if all centers did hire part-time workers, the observed differences in wages would reflect, in part, differences in the human capital attributes of part- and full-time workers. Fortunately, the GAO survey provides information not only about establishments, but also about each individual staff member at those establishments, including wages, education, and experience. This information allows us to predict relative wages of part- and full-time workers econometrically.

To estimate the relative wage cost of part-time and full-time workers, we first assume that establishments choose a fixed "block" of labor services that contains a certain number of labor hours having a given configuration of human capital characteristics. That is, we assume that the firm requires a set number of labor hours and that those hours must be of a particular level of quality in terms of the staff's education and experience. We then estimate the wage bill that would be incurred if all of those hours were provided by full-time workers and compare it with the wage bill for providing all of those hours through part-time workers. The ratio of these two hypothetical wage bills forms our measure of relative wage cost.

Formally, we assume that the wages of the  $i^{\text{th}}$  full-time teacher (aide) at the  $j^{\text{th}}$  center,  $w_{ij}^f$ , and the wages of  $i^{\text{th}}$  part-time teacher (aide) at the  $j^{\text{th}}$  center,  $w_{ij}^p$ , are given by

$$(2) \quad w_{ij}^f = \beta_1^f L_j + \beta_2^f X_i^f + \varepsilon_{ij}^f$$

$$w_{ij}^p = \beta_1^p L_j + \beta_2^p X_i^p + \varepsilon_{ij}^p$$

where  $L_j$  is a vector of characteristics of the  $j^{\text{th}}$  center and its location and  $X_i$  is a vector of characteristics of the  $i^{\text{th}}$  individual teacher (aide). Note that this specification allows both center characteristics and individual characteristics to influence part-time and full-time wages differently. The specific components of  $L$  and  $X$  are described in the appendix. To calculate the relative wage cost, we estimated the equations in (2) for teachers and aides, respectively. (The results are reported in the appendix.) The estimates of  $\beta_1$  and  $\beta_2$  from the part-time and full-time regressions were used to estimate the relative

wage cost, WAGE RATIO $_j$ , for teachers (aides) at the  $j^{\text{th}}$  center:

$$(3) \quad \text{WAGE RATIO}_j = \frac{\sum_{i=1}^{N_j} [\hat{\beta}_1^f L_j + \hat{\beta}_2^f X_i^f] h_i}{\sum_{i=1}^{N_j} [\hat{\beta}_1^p L_j + \hat{\beta}_2^p X_i^p] h_i}$$

where  $h_i$  is the weekly hours worked by the  $i^{\text{th}}$  teacher (aide) and  $N_j$  is the number of teachers (aides) at the center. The hats over the coefficients indicate that they are estimated values.

The mean value of WAGE RATIO for teachers is .90 and the mean value for aides is .98. Because some centers did not hire any teacher aides (and a few others failed to provide details about education and experience), we lost 25 observations in the aides models.

### Results

The empirical results are presented in Table 3. Because the distribution of the dependent variable—the percentage of total hours worked by part-time workers—is truncated below at zero, the appropriate model for this problem is tobit. Columns 1, 2, and 3 list the tobit results for teachers, and columns 3, 4, and 5 give the results for teacher aides.

The main benefits variable (which represents benefits available to at least some teachers [aides]) is negative and statistically significant at the .10 level for teachers and at the .05 level for aides. The raw coefficients imply that if the benefit payments for teachers were to rise by an additional 1% of the wage bill, the proportion of total teacher hours worked by part-time teachers would fall by .85%. For aides, additional benefits of 1% of wages would reduce part-time hours by .81% of total aides hours. To interpret these tobit coefficients more accurately, however, we employ the formula given by MacDonald and Moffit (see Judge et al. 1984:783) in calculating the appropriate derivatives.<sup>6</sup> Us-

<sup>6</sup>The formula for calculating the derivative is

$$\frac{\partial E(\% \text{ Part-Time})}{\partial \text{BENEFITS}} = F(z_i) \beta_B \left( 1 - \frac{zf(z)}{F(z)} - \frac{f(z)^2}{F(z)^2} \right) + E(\% \text{ Part-Time}^*) \frac{\partial F(z)}{\partial \text{BENEFITS}}$$

Table 3. Determinants of the Proportion of Hours Worked by Part-Time Workers.

Variables	Teachers			Aides		
	1. Main Benefits Variable	2. Benefits by Eligibility	3. Insurance Benefits Only	4. Main Benefits Variable	5. Benefits by Eligibility	6. Insurance Benefits Only
Wage Ratio	-.46** (-2.67)	-.51** (-2.95)	-.48** (-2.75)	-.53** (-2.74)	-.56** (-2.93)	-.51** (-2.63)
Total Benefits for Teachers (Aides)	-.85* (-1.83)	—	—	-.81** (-2.45)	—	—
Benefits for ALL Teachers (Aides)	—	-1.06** (-2.23)	—	—	-1.03** (-3.05)	—
Benefits for SOME Teachers (Aides)	—	.25 (.43)	—	—	-.04 (-.08)	—
Insurance Benefits for Teachers (Aides)	—	—	-2.09** (-2.03)	—	—	-2.30** (-2.56)
Reduced Child Care Fee (dummy)	8.37 (1.55)	7.57 (.44)	8.61 (1.60)	2.48 (.48)	.26 (.05)	2.52 (.49)
% Staff Hours in Infant Care	-17.3 (-.71)	-7.06 (-.30)	-18.5 (-.77)	-35.0 (-1.31)	-21.5 (-.81)	-37.5 (-1.42)
% Staff Hours in Toddler Care	-.15 (-.01)	-6.31 (.34)	-2.25 (-.12)	1.91 (.10)	-6.30 (-.35)	1.81 (.10)
% Staff Hours in Preschool Care	2.90 (.16)	-1.59 (-.09)	3.77 (.21)	-30.6* (-1.66)	-31.0* (-1.70)	-32.0 (-1.74)
FTE Children	.02 (.36)	.004 (.10)	.01 (.16)	-.05 (-1.00)	-.04 (-.92)	-.05 (-1.09)
Children per Teaching Staff	2.53* (1.87)	2.42* (1.84)	2.49* (1.85)	-1.38 (-1.01)	-1.32 (-.98)	-1.32 (-.96)
Located in South	-3.13 (-.36)	4.64 (-.54)	-2.65 (-.31)	-2.40 (-.28)	-3.45 (-.41)	-2.82 (-.32)
Located in West	6.7 (.72)	6.97 (.76)	7.33 (.78)	-2.07 (-.22)	-3.18 (-.35)	-1.11 (-.11)
Located in Midwest	-14.45* (-1.70)	-15.9* (-1.90)	-15.1* (-1.77)	-8.8 (-1.14)	-8.20 (-1.09)	-9.25 (-1.20)
Constant	14.2 (.69)	24.5 (1.21)	9.82 (.50)	105.4** (5.12)	100.0** (4.96)	98.9** (4.85)
Sample Chi-Square	204 16.8	204 22.0**	204 17.7*	180 31.5**	180 36.9**	180 31.8**

Single and double asterisks indicate significance at the .1 and .05 levels, respectively

ing that adjustment, we find that the derivative of the expected proportion of hours worked by part-time workers with respect to benefits is  $-.43$  for teachers and  $-.35$  for aides.<sup>7</sup>

where  $z = X\beta/\sigma$ ,  $\beta_p$  is the tobit coefficient of BENEFITS, and  $f$  and  $F$  are the probability density function and cumulative density function, respectively, of the standard normal distribution. *Part-Time\** is equal to  $X\beta + \sigma f(z)/F(z)$ .

<sup>7</sup>These are likely to be conservative estimates of the derivatives. If, as suggested in note 5, our BENEFITS variable exaggerates the size of benefits payments, then

To put these numbers in context, imagine that a center offering no benefits to teachers were suddenly compelled by law to offer a package worth the sample mean of 20.8% of wages. This change would reduce the expected fraction of hours worked by part-time workers by about 9 percentage points, more than half of the average percentage among

our estimated coefficients understate the true effect. The actual effect of increasing benefits by 1% of wages will be more negative than reported here.



those centers that hired part-time teachers. For aides, increasing benefits from zero to the sample mean reduces the fraction of part-time hours by 6.26 percentage points, about one-fifth of the average for centers having part-time aides. And the reader should bear in mind that given the construction of our main benefits variable, these benefits are *not necessarily* offered to part-time workers. The mere fact that the benefits are offered to some staff members appears to make the firms less likely to hire part-time workers—possibly because denying benefits to a portion of the staff may appear inequitable and be disruptive of harmony in the workplace.

Models 2 and 5 in Table 3 separate benefits by whether they are offered to all staff or only some staff. As expected, benefits offered to all staff have a much larger and more significant effect on the proportion of part-time hours than do total benefits (models 1 and 4). Benefits offered to some staff have a positive effect—they make part-time workers more attractive—but their effect has very low significance for both teachers and aides.

Although these results are consistent with our expectations, we offer them with some caution; because the distribution of benefits between those offered to some staff and those offered to all staff is likely to be related to the proportion of part-time workers, models 2 and 5 are likely to suffer from simultaneity bias. Nevertheless, the very low significance of the benefits restricted to some workers is at least suggestive. Our results offer no evidence that the firms paying high benefits to full-time workers (and *only* full-time workers) find part-time workers more attractive as a consequence. Use of part-time workers as a means of avoiding benefit payments does not appear to be prevalent in our sample.

We argued above that benefits that are quasi-fixed in nature should influence the demand for part-time workers more than those that are more easily prorated by earnings. Insurance payments should be more quasi-fixed because the required premiums depend on worker characteristics (health status, family size, the size of the group plan) rather than on earnings of individual workers. We therefore performed two further analyses (models 3 and 6) that include only

insurance benefits: health, life, dental, and vision. The mean of this variable was 5.1 (% of wages) for teachers and 4.2 for aides.<sup>8</sup>

As expected, for both teachers and aides, the INSURANCE variable is highly significant and has more than twice the effect that overall benefits have. To place the numbers in context, the average nonmanufacturing firm that offered health insurance contributed premiums equal to 5.5% of wages in 1985 (U.S Chamber of Commerce 1986). When we use this value and the MacDonald-Moffitt adjustment of the tobit coefficients, our results imply that requiring a center that offers no health insurance to begin offering some reduces the expected proportion of part-time teachers' hours by 6 percentage points, and reduces the expected proportion of part-time aides' hours by 7.4 percentage points. Given that the average center that hires part-time teachers commits only 16% of hours to them, this is a very sizable effect.<sup>9</sup>

Finally, we note in passing that the results in Table 3 also confirm that relative wages are a significant determinant of relative demand for part- and full-time workers, and show the wage elasticity of substitution between these types of workers to be fairly high: 2.6 for teachers and 1.7 for aides (in models 1 and 4).

### Conclusions

This study is the first to use establishment compensation data to test the hypothesis that firms paying relatively high fringe benefits employ fewer part-time employees than do other firms. That hypothesis is supported both for high-skilled workers (teachers) and

<sup>8</sup>In unreported models that included both insurance and noninsurance benefits, neither was significant, presumably due to multicollinearity. When noninsurance benefits are in the model alone, their coefficient is less than unity. The results for the insurance variables were fairly robust with respect to which specific benefits were included.

<sup>9</sup>Mindful that we might be overstating the ratio of benefits to wages, we computed derivatives for models that included only dummies for health care. The results were similar. Providing this benefit reduced the proportion of part-time teachers by 5.5 percentage points and the proportion of part-time aides by 6.7 percentage points.

less-skilled workers (teacher aides). We find that increasing benefits by 1% of the wage bill decreases the proportion of part-time hours by .43 percentage points for teachers and by .35 percentage points for aides.

As expected, private insurance payments have a much larger impact on the use of part-time workers than do benefits in general (benefits including, for example, pensions and paid vacations)—more than twice as large, in fact. We find, for example, that if a firm that offers part-time workers no health insurance were required to give them the average level of this type of benefit, the proportion of total teacher hours accounted for by part-time teachers would fall some 37%—from 16% to 10%—in firms that have some part-time workers. This finding has important policy implications in light of the growing debate over whether employers should be required to provide health insurance. Whereas it might be supposed that employers will respond to legislated augmentation of mandatory benefits by reducing the wages of all employees to compensate for the added burden, our findings suggest that part of their response might be, instead, to reduce their hiring of part-time workers. If they do, the labor market for those seeking part-time employment will shrink. Although our results are limited in generality—we have evidence from only one industry—they are based, we believe, on the best data currently available to examine this issue.

To test the possibility that part-time workers are more attractive to employers when there are fringes for which they are not eligible, we contrasted the effects of fringes offered to “all” workers with the effects of those restricted to “some” workers. (This differentiation was our best approximation of the eligibility breakdown.) The results of that analysis provide no evidence that firms were employing part-time workers as a means of reducing fringe benefit costs. It might be predicted that if health care reform expanded coverage only to full-time workers, it would increase demand for part-time workers. Our results do not support that prediction.

This study also provides evidence on what types of benefits are made available to part-time workers in this industry, early childhood

education. For every type of benefit, part-time workers were eligible in most establishments hiring part-time workers; indeed, they were eligible for most benefits in the overwhelming majority of such establishments. The largest eligibility gap between part- and full-time workers was for insurance payments and pensions.

Some caveats must be borne in mind. First, our primary measure of benefits is exogenous only if firms make decisions about what benefits to offer their full-time staff independently of whether they will employ part-time workers. This supposition is plausible—we normally assume that competitive firms face fixed “prices” of inputs—but it may be untrue in some cases. Firms have some flexibility in trading wages and working conditions for benefits, and some firms could find it less costly to pass up some benefits for all staff than to deny them to part-time workers or forgo hiring part-time workers altogether. If that is the case, then our coefficients are biased upward, and fringe benefits could have a smaller effect than estimated here.

A second limitation of this study is that our results are confined mainly to women, who surely comprise almost all of our sample of teaching staff. It may be, for example, that part-time women are more often secondary earners than part-time men and consequently demand fewer benefits like health insurance. To the extent that we have measured eligibility imprecisely, our estimates may not apply as well to men as to women. It could be that for a given level of benefits available to at least some workers—our main benefits variable—part-time men would tend to receive a larger fraction of those benefits than do our part-time women. If this is true, the effect of a given level of observed benefits for some workers at the firm will have a larger effect on the demand for part-time workers than our results show.

The results of this paper suggest the need for further study of an unresolved issue: the determinants of the specific benefits part-time workers receive. There is substantial empirical evidence, here and elsewhere, that part-time workers are offered key benefits with less frequency than are full-time workers. We saw, for example, that in as many as a

third of the establishments in our sample, part-time workers were apparently ineligible for medical and dental benefits. Resolution

of this issue will have to await a data set rich enough to allow us to model eligibility determination.

#### APPENDIX

This appendix reports the regressions used to estimate the relative wage cost of part- and full-time workers. As discussed in the text, we considered each center's staff to be providing a certain "block" of weekly hours of labor service with a specific amount of education and experience. The WAGE RATIO variable is an estimate of how much that block of labor services would cost if it were compensated at the local part-time rate relative to its cost if compensated at the local full-time rate. To estimate the part- and full-time rates for these blocks of services, we regressed hourly compensation for staff members on (a) individual characteristics (education, experience, and the age of children cared for); (b) some characteristics of the center (the ratio of benefit payments to wage bill, the class size for 4-year-olds, total number of children, and the child-staff ratio); and (c) characteristics of the center's location that could be expected to influence wages (average teacher salary in the state, county population, county per-capita income, local median home value, and region). Separate regressions were run for full-time teachers, part-time teachers, full-time teacher aides, and part-time teacher

aides. The total sample included 3,798 staff members at 204 centers.

The regression results are reported Table A1. It should be noted that the t-statistics are not unbiased. Because the unobserved influences on wages for workers at the same center are almost certain to be correlated, the error terms in these regressions are not iid (independent and identically distributed). The failure of the errors to be iid does not, however, bias our measure of relative wages.

The coefficients reported in Table A1 may suffer from the well-known problem of selection bias. Unobservable characteristics of workers that influence whether they choose part- or full-time work may corrupt the coefficients on experience and education. Our data set lacks the set of variables normally used to correct for selection bias, variables (such as marital status and number of children) that influence hours worked but not wages. Nevertheless, because we are interested only in the predicted wages, and not the value of individual coefficients, this is likely to be a minor problem in our study.

**Table A1**  
Determinants of Hourly Wages

Variable	Teachers		Aides	
	Full-Time	Part-Time	Full-Time	Part-Time
Education	.06** (5.01)	.05 (.89)	.015** (3.14)	.14** (4.99)
Experience	.18** (14.35)	.26** (5.10)	.07** (6.81)	.14** (4.37)
(Experience) <sup>2</sup>	-.002** (-11.24)	-.002** (-4.87)	-.001** (-7.00)	-.001** (-4.48)
Benefits/Wage-Bill (for center)	-.003 (-.50)	-.05** (-2.40)	.017** (3.36)	.05** (3.44)
Cares for Infants	.64** (3.73)	-.60 (-.63)	.22* (1.96)	.35 (.93)
Cares for Toddlers	-.33** (-2.41)	.46 (.91)	-.28** (-3.21)	.14 (.52)
Cares for Preschool	-.08 (-.67)	.48 (1.16)	-.09 (-1.13)	.11 (.49)
Children per Teaching Staff	.07** (2.83)	.10 (.93)	.016 (1.00)	.06 (1.10)
Class Size for 4-year-Olds (Quality)	.02* (1.81)	-.04 (-1.19)	-.007 (-1.14)	.06** (3.21)
FTE Children	.001* (1.76)	-.001 (-.22)	.0004 (.84)	-.003** (-1.70)

(Continued)

Table A1 (Continued)

Variable	Teachers		Aides	
	Full-Time	Part-Time	Full-Time	Part-Time
County Population <sup>a</sup> (mil)	.19** (5.17)	.11 (.71)	.008-.12* (.41)	(-1.95)
County Per Capita Income (000) <sup>a</sup>	.11** (3.47)	.13 (.96)	.07** (3.10)	-.10 (-1.33)
State Avg. Teacher Salary <sup>b</sup>	.08** (4.13)	.27** (3.09)	.025* (1.98)	-.03 (-.91)
County Median Home Value (000) <sup>a</sup>	.02** (3.43)	-.03 (-1.61)	.02** (6.30)	.04** (4.16)
Located in South	-1.81** (-6.19)	.75 (1.03)	-.31** (-2.54)	.03 (.10)
Located in West	-1.81** (-8.45)	1.01 (1.11)	-.91** (-6.45)	-1.24** (-3.32)
Located in Midwest	-1.00** (-6.14)	-.60 (-.91)	-.18* (-1.67)	-.44 (-1.51)
Constant	-.07** (-.01)	-4.27 (-1.64)	1.59 (3.51)	.31 (.23)
Sample R <sup>2</sup> adj.	1715 .28	131 .29	1418 .20	504 .15

Single and double asterisks indicate significance at the .1 and .05 levels, respectively.

<sup>a</sup>Source: *County and City Data Book*, 1988

<sup>b</sup>Source: *Digest of Educational Statistics*, 1989

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