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**WAGE DETERMINATION AND THE RELATIONSHIP BETWEEN WAGES,  
NONWAGE COMPENSATION, AND FIRM AND WORKER  
CHARACTERISTICS IN CHILD DAY CARE CENTERS**

By:

Deborah Viola

A dissertation submitted to the Graduate Faculty in Economics in partial fulfillment of the requirements for the degree of Doctor of Philosophy. The City University of New York.

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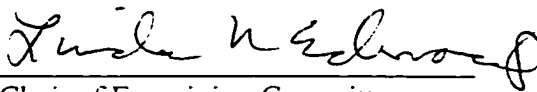
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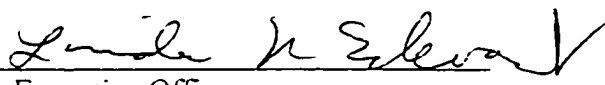
**APPROVAL PAGE**

This manuscript has been read and accepted for the Graduate Faculty in Economics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

10/23/97  
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## Chapter One

### **RESEARCH PURPOSE**

The purpose of this research is to investigate the determinants of wages and the relationships between nonwage compensation, firm characteristics, and worker characteristics in child day care centers. This study is motivated by the increasing use of formalized day care for young children of working (and even nonworking) mothers. Public policy controversy surrounding the relationship between center-based day care and child outcomes often exploits the linkages between low wages and poor staff benefits and poor child outcomes (Nelson 1990, Whitebook, et. at. 1990). However, there has yet to be a definitive wage determination study within this industry that goes beyond answering the question: why do intra-industry wage differentials exist (Preston 1988)? For instance, no explicit link has been made to say that, yes, higher wages and higher quality of service go hand-in-hand. It appears that, given a fuller understanding of the wage determination process, one can truly address the relationship, if any, between the wages paid to child day care workers and the quality of services produced.

Even at its simplest, this paper should shed insight into some public policy dilemmas, such as: Are child day care workers being underpaid with respect to their human capital *or* Are low wages resulting in the hiring of workers with less than desirable levels of human capital? Are workers receiving non-wage benefits to compensate for their lower wages *or* Are lower wages accompanied by poor benefits or working conditions? Are wages determined competitively in this industry *or* Are there non-competitive forces at work within this industry? The extraordinary detail of the data set will allow me to control for the impact on wages of worker characteristics (i.e., age, education, experience, job

tenure, specialized education, number of hours worked), characteristics of the child day care centers (i.e., for-profit or nonprofit, staff-to-child ratio, type of curriculum, age composition of children, number of children served, union status), and the presence of nonwage benefits. Since the child day care industry is strictly characterized by for-profit and nonprofit firms, emphasis will be placed on the investigation of the impact of type of ownership on wages, as well as the relationship between profit status and nonwage benefits. Exploiting the richness of the data set used in this study will permit me to extend the wage determination research previously done within this industry (as well as any other intra-industry wage study). Understanding on what terms labor supply is available to the child day care industry will allow not only an understanding of wages and wage differentials within this industry, but considered with other studies determining the labor supply elasticity to child day care (Blau 1993), will help in predicting how the labor supply will respond to policies concerning child day care.

Further, this research seeks to improve the understanding of behavioral differences between for-profit and nonprofit firms in general. This extension becomes significant when one considers that increasing numbers of our very young and elderly populations are cared for in organized centers (day care and nursing homes), characterized by for-profit and nonprofit firms, and that all health care services are under pressure to lower costs. For instance, does the behavior of nonprofit child day care centers lead to nonprofit wage premiums, as has been found in recent studies? If so, are nonprofit centers inherently less efficient or are they signaling quality differentials that demand a premium? Given the richness of this data set, this research should provide

some insights that will inform further discussion of the significance of profit status.

## Chapter Two

### **CENTER BASED DAY CARE: AN INDUSTRY OVERVIEW**

Child day care arrangements exist in essentially one of four forms: relative care, non-relative individual care, family-based day care, and center-based day care. Given the tenuous situation of relative care (more and more grandparents are continuing to work), the cost prohibitiveness of "nanny" care, and the higher risks involved in family based day care (lack of regulations, high turnover), center-based care is becoming the primary choice for the average family (Hayes 1990, Auerbach 1988).

With over 60 percent of women with children under five years of age working, coupled with the increasing trend toward the use of more formal types of child care arrangements, it is becoming increasingly important to have a better understanding of this market. Table 2-A summarizes some of the characteristics of the children and families of child day care center users. Interestingly, even in households where the mother is not employed, or where income levels are relatively low, roughly 5.2% and 6.5% of the children, respectively, spend some time in organized day care. Critics have often cited these results to the contrary: if quality child day care and before and after school programs were more readily available more cost effectively, more women in these categories would be able to work and their children would receive a "headstart" in realizing increasing returns to their education.

Thus, to allow more women to enter the workforce and to ensure that young children receive the right start, the Omnibus Budget Reconciliation Act of 1990 allocated \$2.5 billion over three years to states to help families pay for child day care, improve the

supply of caregivers, and aid in the creation of before and after- school programs and early childhood education. To receive funds, states were required to set up health and safety standards for caregivers, as well as review their child day care licensing regulations. The Act expanded the Earned Income Tax Credit for low-income working families, gave an additional tax credit to families with children under one year old, and provided for a child health insurance tax credit. In addition, a \$1.5 billion child day care entitlement program for families not on Aid to Families with Dependent Children was established to help working parents finance child day care.

Further, the Human Services Reauthorization Act of 1990 extended grant funds for the development and improvement of child day care services. Ambitious planning has gone into the government's Head Start program, which provides funding to states to finance education programs for children between ages three and five whose families' household income fall below the federal poverty line. More recently, the Welfare Revision Measure passed by Congress and signed by President Clinton includes a significant increase in dollars devoted to child day care assistance to families in need. How successful have these programs been in encouraging more women to enter the workforce or in improving early childhood education? Economic research examining the effects of child care subsidies on choice of child care and mother's employment, as well as the relationship between prices of care and subsidies, have had mixed results. Recent work by Michalopoulos, Robins, and Garfinkel (1992) found that increased subsidies increased child care expenditures but resulted in little impact on quality of services produced or mother's employment. Thus, it is possible that the subsidies are being used inefficiently.

Of additional interest and concern to public policy makers are the varying regulatory requirements and the impact on child outcomes. To help insure certain minimum quality levels, states impose regulations which vary considerably. However, the U.S. government has taken action to assist in standardizing the industry.

In 1990 the National Research Council (NRC) offered recommendations for age appropriate staff-child ratios and group size requirements. These recommendations, as well as the current regulatory requirements for the four states studied here (California, Colorado, Connecticut, and North Carolina), are listed in Table 2-B. Note that Colorado and Connecticut have maintained standards fairly close to those recommended by the NRC. California does, as well, for pre-toddler groups, but then requirements become a bit more relaxed (lower staff-child ratios) for toddlers and pre-school children. In North Carolina, regulations are more relaxed for all age groups, but these requirements are for centers with 30 or more children. Smaller centers have stricter standards that are more consistent with the other states' regulations and are actually more restrictive for toddlers and pre-schoolers (1:6 staff-child ratio with maximum group size of 10). Enforcement, however, is an unknown for all states, but it has been noted, on an anecdotal level, that North Carolina is somewhat more relaxed in enforcement and that enforcement is more difficult due to their two-tier regulatory scheme. What has not been clearly proven in the economics literature, however, is the relationship between these quality measure proxies and measured increases in quality of service produced at day care centers or the extent of improved child outcomes.

And finally, it should be noted that the industry is characterized by for-profit and

nonprofit firms with further nuances of industrial structure (i.e., for-profit part of national chain, nonprofit church affiliated, nonprofit government subsidized) often serving different goals. However, in the child day care industry the services produced by nonprofit and for-profit centers reduce to much the same thing. Children are supervised, fed, cleaned, and given various levels of outside play, rest time, and creative/cognitive stimulation commensurate with their age. Once again, it is the often difficult-to-measure level of quality of services provided that really makes the difference. Further, as a result of the government assistance and regulations mentioned above, many day care centers are publicly owned or affiliated with public schools. Of particular interest is what impact these different forms of ownership structure might have on wages and benefits and quality of services produced.

For instance, pre-existing teachers' unions at the publicly owned or affiliated institutions have found a natural outlet and friendly environment for extending their union membership. Given the findings of educators and behavioral scientists that high turnover results in lower quality of care and poorer child outcomes (Whitebook, et. al. 1990), one often hears policy advocates, women's groups, and politicians calling for increased wages for child care workers and cite unionization as a means of achieving this goal. However, no conclusive studies have been performed to date to assess the impact of unions on child day care services, and only informal, intuitive arguments have been offered addressing the impact on wages paid to workers in these unionized centers. It is theorized that if more child day care workers were unionized, wages and nonwage benefits would improve for these workers. Certainly, as Table 2-C indicates, wages are often not much higher than

minimum wage (whether we consider them as full-time or part-time pay). Further, economic studies have found that returns to general education for child care workers are less than returns to education for the labor force in general (Blau 1992), turnover rates have increased steadily from 15% in 1977 to 41% in 1989 (Nelson 1990), and there appears to be a link between lower wages and higher turnover rates in day care centers (Powell et al. 1994).

In sum, because the child day care industry has become so important, economists have focused on increasing their understanding of all aspects of this industry. This paper should offer a contribution to an even better understanding of the relationship between the characteristics of the child day care industry and the wage determination process.

TABLE 2-A

Number of children 5 years of age and under and percent in day care by selected child and family characteristics: United States, 1988.

CHARACTERISTIC	# of CHILDREN (000s)	% in DAY CARE
All children	13,259	7.8
Age & School Status:		
Under 2 years	3,772	11.8
2-3 years	4,609	3.8
4-5 years, not in school	3,421	2.7
4-5 years, in school	1,323	25.7
Race:		
White	10,854	7.6
Black	1,830	10.5
Family Income:		
Less than \$10,000	1,119	6.5
\$10,000-\$24,999	3,635	6.0
\$25,000-\$39,999	3,635	9.0
\$40,000 or more	3,613	8.5
Geographic Region:		
Northeast	2,242	6.9
Midwest	3,492	6.1
South	4,596	10.2
West	2,913	6.9
Mother's Education:		
Less than 12 years	1,488	3.7
12 Years	5,308	7.2
More than 12 years	6,446	9.3
Mother's Employment:		
Employed	10,060	8.4
Not employed	2,033	5.2

Source: *Advance Data*, Number 187, October 1, 1990, from the National Center for Health Statistics.

TABLE 2-B

Child Day Care Centers  
Staff-Child Ratio and Group Size Requirements

STATES	<1 Year	1 Year	2 Years	3 Years	4 Years	5 Years
NRC <sup>1</sup>	1:4 6 to 8	1:4 6 to 12	1:3/ 1:6 6 to 12	1:5/ 1:10 14 to 20	1:7/ 1:10 16 to 20	1:7/ 1:10 16 to 20
California	1:4 NR	1:4 NR	1:12/ 2:15 NR	1:12/ 2:15 NR	1:12/ 2:15 NR	1:12/ 2:15 NR
Colorado <sup>2</sup>	1:5 10	1:5 10	1:7 14	1:10 20	1:12 24	1:15 30
Connecticut	1:4 8	1:4 8	1:4 8	1:10 20	1:10 20	1:10 20
North Carolina <sup>3</sup>	1:5 10	1:6 12	1:10 20	1:15 25	1:20 25	1:25 25

Key: NR = Not Regulated

Notes: 1. NRC recommendations for 1 Year based on 18 months; 2 Year based on 27 months.

2. Staff-child ratios and group size requirements shown are for large centers of more than 12 children. Small centers care for seven to twelve children: they are required to have two staff members on duty at all times and a maximum group size of 12 children for ages two years and higher.

3. Staff-child ratios and group size shown are for medium and large centers with 30 or more children. Smaller centers have 1:5 and 1:6 staff to children with a maximum group size of 10 and 12 for 0 to 1 year olds and 1 to 5 years old respectively.

Sources: Who Cares for America's Children: The Center for Career Development in Early Care and Education at Wheelock College.

TABLE 2-C

## Child Day Care Services: 1993 Annual Averages

	Avg. Number Establishments	Annual Avg. Employees	Annual Wages per Employee	Avg. Weekly Wage
California	4,945	38,542	\$12,681	\$244
Colorado	636	8,718	10,088	194
Connecticut	832	7,025	11,552	222
North Carolina	1,540	15,808	9,250	178

Note: Data given for the four states surveyed for this research project in the year surveyed.  
Source: "Employment & Wages Annual Averages, 1993", U.S. Department of Labor.

### Chapter Three

#### **WAGE DETERMINATION: THEORETICAL OVERVIEW**

If the market for the factors of production is competitive, the wage received by labor will be determined by the forces of supply and demand.

The demand for labor is a derived demand in that it is derived from the consumer demand for the good or service being produced. The demand for child day care services is actually based on the decision of a couple to have a child and to subsequently purchase a market service to replace what was once considered the sole purview of the mother: child care. Nobel Laureate Gary Becker's fertility model emphasizes that a household's fertility decision responds to changes in income and prices. Given a household utility function:

$$U = U(N, X)$$

where  $N$  is the number of children and  $X$  is all other consumer goods, and a household's budget constraint:

$$I = p_N N + p_X X$$

where  $p_N$  is the price of children and  $p_X$  is the price of the other goods, a household will decide in what combination to bear children and/or consume other goods. Note that the price of children includes explicit costs (food, clothing, medical, education) and implicit costs (foregone earnings). An increase in household income, all other things equal, raises the demand for children. However, the implicit costs of raising children have also risen, which exerts a negative effect on the demand for children. Further, as parents' wages rise, the cost of their own time rises as well, and the more likely will the family produce

child rearing services by substituting market inputs such as child day care for their own time. Thus, the net effect of higher parents' wages on the demand for children and subsequently for child day care appears ambiguous. Although it is widely known that fertility rates have changed through the years, what is certain, as previously highlighted, is that as the labor force participation rates of women have increased, so has the number of children in child day care centers.

In a production function in which centers observe the prices of inputs and determine their behavior in terms of not only how to produce the service but in what quantities, the number of hours of care they are demanded to provide by parents, as well as the staff-child ratios and group size mandated by state regulations (assuming they are binding) translate into the hours of labor centers must purchase.

The supply of labor as well as its demand determines the resulting wage. Similarly, supply to an occupation is influenced by the monetary and nonmonetary characteristics of a job, and an individual will maximize the "net advantage" of one occupation over another (Layard & Walters 1981). Firms, however, often pay wages above the point that the competitive wage equals the marginal revenue product of the last worker hired. Firms often determine wages within a broader scope of total worker compensation packages (i.e., wage and nonwage benefits), as well as offering premiums (or even discounts) motivated by other personnel objectives (such as increasing worker productivity or reducing job turnover). Wages may also be influenced by "other factors" such as unionization or the threat of unionization. Thus, among different firms, it is possible that the same occupation will pay differently:

further, the actual jobs may differ due to differences in work environments, training costs, and even types of ownership. Similarly, individuals may differ in tastes, education, experience, and other opportunities available to them (as influenced by local unemployment, perhaps).

Thus, wage determination is a complex process. Since it is the goal of this research to more fully understand wage determination within the child day care industry and to explain any observed wage differentials, it is necessary to have an appreciation of several theoretical branches of economics that may offer insight into the wage determination process and then to explore the literature to see how economists have modeled the existing theories to conduct empirical studies. The end result should be the development of an economic model that I can use to conduct this research. For ease of exposition, the discussions are grouped as follows: I. Heterogeneous Workers, II. Heterogeneous Firms and Noncompetitive Factors and III. Industry Structure. (Note: the reader may chose to skip pages 15-27).

## I. HETEROGENEOUS WORKERS

Workers are not uniform in either their innate abilities or human capital investment, or for that matter, as previously discussed, their preferences for fringe benefits. For the purposes of this research, we are specifically concerned with the affect on productivity and wages of investments in formal education and training and how these differences could explain wage differentials in the child day care industry.

Gary Becker (1964) introduced a conceptual framework to analyze the impact of training in the labor market. The implications of this model culminated in Jacob Mincer's (1974) human capital earnings function:

$$\log w = \beta s + \delta_1 t + \delta_2 t^2 + \text{other variables} \quad (3.1)$$

where  $w$  is the worker's wage rate,  $s$  is the number of years of schooling,  $t$  gives the number of years of labor market experience, and  $t^2$  is a quadratic in experience that captures the concavity of the age-earnings profile (Borjas 1996). However, caution must be exercised when interpreting coefficients to estimate the returns to education ( $\beta$ ), or the percentage change in wages, since all estimation results may be subject to ability bias. Specifically, one often uses the estimation results to answer the question "How much will wages increase if the worker were to obtain a four-year college degree?" for example. However, it is often impossible to distinguish between the impact of education and the impact of ability on earnings. Differences in ability affect the marginal rates of return to schooling, or percentage change in earnings, that is difficult to quantify and may cause an upward bias in the returns to schooling. It is also possible that individuals, based on their innate ability, may have already self-selected in obtaining additional education. Some

economists have used test scores as proxies for ability, but other economists question how indicative these scores (i.e., IQ tests) are of innate capacity. Nonetheless, there is an undisputed relationship between formal education and IQ scores (Crossen 1997) such that employers may use levels of education as a signal of worker ability and may be more willing to train and educate those workers, further increasing worker productivity and wages.

## II. HETEROGENEOUS FIRMS AND NONCOMPETITIVE FACTORS

### A. *The Theory of Optimal Fringe Benefits*

Within an occupation (i.e., teacher or teacher-aide) jobs may vary according to differing nonwage compensation offered by firms, often referred to as fringe benefits, which can account for roughly more than one quarter of the total compensation paid out by private industry. The Theory of Optimal Fringe Benefits uses indifference curves to model the tradeoff a worker makes in deciding which job to take in terms of total compensation. Similarly, the firm's isoprofit curve, analogous to the budget constraint of the household, takes the form of the firm's total compensation costs. A firm must decide in what combination it can afford to offer fringe benefits given the prices of these forms of compensation. From both the workers' and firms' perspective, fringe benefits are often substituted for wages. The worker may be motivated to substitute fringe benefits since he/she may accrue tax advantages on certain benefits (such as pension plans) or lock-in health and pension plans for his/her retirement (long term planning). Given the shape of his/her indifference curve, the marginal utility of additional units of fringe benefits falls as more fringe benefits are added. Firms can often offer more than a dollar's worth of fringe benefits for every dollar decrease in wages offered because of tax benefits, economies of scale from the collective purchase of such benefits, and efficiency considerations (i.e., pension benefits reduce job quits). The optimal combination of wages and fringe benefits occurs where the firm's isoprofit curve is tangent to the worker's utility curve.

### B. *The Impact of Firm Size*

Several economic studies indicate that larger firms pay wage premiums (Idson & Feasler 1990). In some industries it may be that larger firms are unionized, or it could be that larger firms offer more training or invest greater amounts of capital per worker. It could also be that larger firms offer a compensating wage premium due to a more rigid and bureaucratic work environment or even due to a higher concentration of larger firms locating in more costly major metropolitan areas. It has also been argued that since, on average, larger firms are more profitable, "insider" worker bargaining may command higher wage premiums.

### C. *The Presence Of Unions*

Empirical evidence suggests that, on average, unionization results in higher worker wages and has been a factor in the rise in fringe benefits (Lewis 1988). Various explanations in the economics literature have been offered for this evidence: (a) compensating wage premiums are offered for structured, rigid work requirements; (b) union workers are more productive; (c) unions introduce inefficiencies; and (d) unions exert market power. Others cite evidence that unions gain a larger fringe benefit advantage than wage advantage. It is conceivable that by virtue of higher than average wages, union members may be more willing to "buy" more fringe benefits. Unions act as a collective voice in airing worker grievances and working to improve the quality of work life, reducing job turnover and promoting investment in on-the-job training. Thus, arguments are often made that union workers have higher productivity levels which are reflected in wage premiums.

#### D. *Efficiency Wage Theories*

Pay differentials among similar individuals within an occupation may also result when a firm finds it desirable to offer higher wages to promote increased productive behaviors of its workers (Cappelli & Chauvin 1991). For instance, if it becomes difficult or costly for a firm to monitor the productivity of its workers, or if the higher wage discourages worker shirking. Alternatively, since hiring and training is costly, firms may pay a wage premium to extract efficiency gains. For example, in larger child day care centers or perhaps in those centers that are part of a national chain, where the director may not always be onsite or able to monitor the classroom, the center may pay higher wages to workers to discourage worker shirking. Also, since lower turnover in child day care is often correlated with quality of care (Whitebook, et. al. 1990), firms pay offer efficiency wages to lower turnover and attract demand for their "higher quality" services. The shirking model, for example, theorizes that under imperfect worker monitoring firms may find it beneficial to channel part of the profits back to workers in terms of higher wages. This would increase the opportunity cost of being fired due to lack of performance and therefore create a disincentive for workers to shirk on the job. Whatever the channel of action, according to the efficiency wages theory, an increase in wages paid to workers should enhance their productivity, implying that an increase in the wage rate raises not only the marginal factor cost of labor ( $MFC_L$ ), but the marginal revenue product of labor ( $MRP_L$ ), net of training costs, as well. Efficiency wages may also guarantee a higher quality workforce, since higher wages attract more highly qualified workers who tend to have higher reservation wages.

Borrowing from Borjas (1996), we can model the link between productivity and wages as follows:

$$F = F(w)$$

where effort ( $F$ ) is a function of the wage ( $w$ ) rate. Ignoring capital inputs, the firm's production function can be written as:

$$q = f(F(w) * E)$$

where  $E$  gives the number of workers employed by the firm, and the product ( $*$ ) gives the number of "efficiency units" of labor in the firm. In the presence of efficiency wages the firm must decide how many workers to hire and *set* the wage. The wage a worker now receives in a competitive market no longer equals the increased payroll cost to the firm.

#### *E. Insider/Outsider Bargaining*

Along with other empirical evidence suggesting that workers with similar job qualifications are paid differently by different employers in the same industry, the question of why unemployed workers are unable to bid down the wages of seemingly comparable workers started intriguing economists. Theories emerged which argued that the demand-and-supply framework was the wrong way to think about the labor market. Borrowing from Blanchflower and Oswald (1994), the empirical bargaining model is

$$\ln W = g(H, X, \pi/n, u, \omega), \quad (3.2)$$

where  $H$  and  $X$  are vectors representing human capital and center level characteristics, respectively,  $\pi/n$  is the profit per workers of the firm,  $u$  is the local unemployment rate, and  $\omega$  represents the alternative wage of workers. The model predicts that all else being

the same. higher profits-per-worker should be associated with higher wages. unemployment should be negatively related to wages, and alternative wages should be positively related to wages. More recently, empirical economists are focusing on the specific role and causality of local unemployment in pay determination, with lower wages existing in labor markets with higher unemployment. This "wage curve" representation has been offered as an alternative to the market-level labor supply function.

### III. INDUSTRY STRUCTURE

The theoretical wage determination models in Sections I and II were predicated on a model of a profit maximizing firm operating in a competitive industry. Since the child day care industry is identified by the coexistence of for-profit and nonprofit firms, it is also necessary to have an appreciation of how nonprofit firms differ from for-profit firms.

Does the model change when other external constraints are imposed on the firm? For instance, within an industry characterized by for-profit and nonprofit firms, would we expect to see differences in wage setting behavior based on the nonprofit status of the firm?

Since nonprofits are precluded by definition from distributing any profits, there are two outcomes that may result, even simultaneously: the nonprofit distinction “reduces incentives to take advantage of underinformed consumers” and/or may be accompanied by a corresponding loss of incentive to be efficient” (Weisbrod 1988, p. 20).

Nonprofit managers can work around the nondistribution constraint by concealing the profits in higher wage or nonwage benefits, without any consideration of how consumers are treated. Nonprofits are exempt from certain taxes, including corporate income taxes and subsidies/donations to nonprofits are tax deductible for donors. If nonprofits are perceived to provide greater social benefits, they may attract labor donations (“volunteer labor”) in addition to monetary donations. For example, volunteers make up a greater proportion of the workforce in religious and cultural organizations due to religious affiliations/concerns and the desire to obtain work experience.

Social benefits, or as Weisbrod terms them, “unmeasured outputs”, are often

undermeasured when comparing efficiency of for-profit and nonprofit firms. Some of these benefits might include employing the handicapped, regional economic development, providing services on an "ability to pay" scale, or, in the case of child day care, providing special programs to mentally or physically challenged children. As Weisbrod notes: "The systematic failure of statistical comparisons to account properly for differences in the full mix of outputs...results from a fundamental oversight" (p. 40).

Specifically, the legal distinction between for-profit and nonprofit firms forces a separation between ownership and control. The theory of property rights predicts that once ownership and control are separated within a firm, inefficiencies result (Furubotn & Pejovich 1972). Because there is no owner to which the nonprofit manager is held accountable, there is less incentive for managers of nonprofit organizations to operate efficiently. In a competitive market where firms are profit maximizers and cost minimizers, wage differentials in nonprofit firms may be the result of managerial inefficiencies in the form of higher wages or rents for workers. Note that there is no incentive to lower fees if they are already set at the competitive rate or already discounted.

To illustrate, the nonprofit center manager's problem can be described as the maximization of his/her utility such that:

$$\max U(W_e, NB)$$

where  $W_e$  represents wealth and NB represents nonpecuniary benefits, subject to the constraint that the revenue obtained from private donations, government grants and fees equals the cost of operations (Borjas 1983). The amount of donations and grants are a

positive function of the social benefits and efficiency of the firm (i.e., the level of donations is contingent on the “appropriate” use of donations. Weisbrod and Dominquez (1986) found that the older a nonprofit organization, the higher the level of donations, suggesting that an organization’s age serves as a proxy for its trustworthiness and efficiency), whereas the constraint on profit distribution (or wealth) encourages managers to maximize utility at the expense of profits (i.e., substitute NB for  $W_e$ ). If a manager feels a more highly skilled workforce will provide higher quality services (often a goal of nonprofit firms), the manager could conceivably end up paying higher wages for higher skilled workers, regardless of the required job-skill match. The nonprofit legal distinction could result in an upward pressure on nonprofit wages, somewhat tempered by any sensitivity of donations/grants to firm efficiency. Note that the higher wage costs come at the expense of profits and do not result in higher fees for service. The nonprofit firm can, therefore, ask for the going competitive market fee for service while still offering higher wages.

On the other hand, workers who work at nonprofit centers may have different attitudes towards the job than workers at for-profit centers: those at nonprofit centers may be more dedicated because of altruistic reasons and may consider portions of their labor as a donation. Therefore, a worker maximizes his/her utility such that:

$$\max U(W.NW)$$

where  $W$  equals the wage rate and  $NW$  represents nonwage benefits, including social benefits (Preston 1988). If a worker places a positive utility on generating positive social benefits, he/she may be willing to forego wages, thus resulting in a “labor donations” to

the firm, suggesting that nonprofits could, in fact, pay lower wages. Thus, the direction of the relationship between for-profit/nonprofit status of the child day care center and the wages it pays cannot be predicted.

Further, Weisbrod makes a distinction between for-profit, private nonprofit, and government owned nonprofit firms, arguing that the government institution has differences due to "political entanglements and the weak incentives it provides for efficiency" due to the ability to tax to finance activities. Weisbrod suggests that "there is little to be gained from aggregating" all nonprofit type organizations since levels of donations, volunteer hours, and types of consumers served as well as social benefits generated may vary.

To more fully define the degree of competitiveness within an industry classified by the coexistence of nonprofit and for-profit firms, Weisbrod developed a collectiveness index (CI) to measure the relationship between how a nonprofit firm obtains revenues (namely, from the sale of goods and services that benefit only the buyer on the one end to the receipt of contributions for the provision of purely collective goods on the other) and the nature of its outputs. Since he observed that few nonprofits receive a substantial portion of revenues from donations, the importance of sales revenues to nonprofits could often be used as an indicator of competition between profit and nonprofit firms within an industry. Thus, if two nonprofit organizations had the same absolute level of contributions, gifts, or grants, but one had higher revenues from sales of goods and services, the latter firm would presumably have a lower CI and would be a smaller contributor of external benefits. Weisbrod estimates that of 566 tax deductible, nonprofit,

child day care centers (1976 data), 56% have CI of 0-24, 13% have CI of 25-74, and 31% have CI of 75-100. On average, nonprofit child day care centers appear to be independent financially from donations; they behave, in many respects, as their for-profit counterparts, collecting revenues from sales of goods and services. Weisbrod classifies this as follows: "...Nonprofits are likely to come into competition with proprietary firms. This competition produces economic strains...and leads to interdependency between the two economic sectors" (p. 79). Thus, whereas donations in nonprofits usually serve as a "check and balance" on nonprofit inefficiencies, as nonprofit child day care centers become more independent, there is now more room for inefficiencies to develop (i.e., possibly in the form of higher wages).

Another indicator of how competitive an industry is that consists of nonprofit and for-profit firms is the comparison of the nonprofits' share of sales in the industry. The larger the share compared to those of for-profit firms, the greater the nonprofit impact on the for-profit component. Excluding government-owned child day care centers, nonprofit centers care for as much as eighty percent as many children as for-profits do (Schlesinger 1984), thus further strengthening the presumption that the child day care industry is a fairly competitive one.

In sum, Weisbrod finds that nonprofit and for-profit firms do behave differently due to behavioral constraints as well as differences in goals, even if the industry is fairly competitive. He finds an industry structural justification in industries where consumers are often poorly informed as to quality differences or where access by the disadvantaged is important (i.e., nursing homes, psychiatric facilities). Nonprofits fill the void left as a

result of for-profit firms failing to provide affordable, accessible, quality care. For this research, specifically, it may be that asymmetric knowledge between parent and provider may be a characteristic of the child day care industry as well and that, indeed, there may be a justification for this industry structure.

The relationship between wages and each of the theoretical branches of economics discussed in sections I, II, and III above constitutes separate and overlapping branches of research. An understanding of this literature and the empirical models that they suggest will allow a more focused approach for this wage study to ensure that the research questions raised in the introduction are addressed. In addition, critiques of past research may be resolved with my research provided I can develop a better model or simply use an existing model to exploit the richness of the data (Kreps 1997). Thus, what follows in the next chapter are discussions of empirical studies and models relevant to the goals of this study.

## Chapter Four

### **PREVIOUS RESEARCH: A SUMMARY**

#### **1. WAGE DETERMINATION: A *BRIEF* OVERVIEW**

First, earlier human capital studies, built on work by Becker (1964) and Mincer (1974), and using variations of Equation (3.1), relied on Current Population Survey data and originally focused on the earnings of white males. These studies demonstrated positive, significant relationships between wages and age, education, training, experience, tenure and even marital status. Moving forward, countless studies have isolated gender issues (i.e., Oaxaca 1973) and racial issues (i.e., Reimers 1983) as explanations for wage differentials between different groups after controlling for the other human capital characteristics. More recently, work by Macpherson & Hirsch (1995) and Hutchens (1989) reinforce/support previous studies.

Empirical studies addressing the role of compensating differentials, on the other hand, have failed to find conclusive evidence of wage dispersion, except in the case of differentials associated with risk of injury or death (Biddle & Zarkin, 1988). It is also unlikely that employers' wage differences compensate for differences in fringe benefits. Some previous research (Blank 1990, Brown 1980) has even, contrary to theory, documented a positive relationship between wages and fringe benefits. The most plausible explanation for these findings is that fringe benefits are endogenous to wage determination. One exception to this generalization is Eberts & Stone (1985) study, the findings of which suggest evidence of compensating differentials only after controlling carefully for firm characteristics. Interestingly, they uncover an omitted variables problem in prior studies that fail to include profitability and labor bargaining strength

when these variables are positively related to other monetary benefits as well as favorable working conditions.

As an extension of both of these models, models addressing the relationship between wages and firm size provide evidence that “large employers” pay wage premiums presumably to compensate for less pleasant working conditions and/or the difference in labor quality potentially arising from the difference in capital intensity of large firms (Idson & Feasler, 1990). Other explanations offered for the significantly positive relationship between firm size and wages rely on the goal of union deterrence (Brown & Medoff 1989) as well as the inability of large employers to monitor workers’ productivity (Shapiro & Stiglitz 1984). Separately, Evans & Leighton (1989) extended Brown & Medoff’s findings by revealing that worker sorting by education and tenure resulted in better educated and more stable workers being employed by large firms. More recently, Rebitzer & Taylor (1995) conclude that large law firms pay wage premiums despite the posting of sizable bonds to motivate behavior not covered by these bonds, such as the initial decision to apply for work at a particular firm. Their findings support other studies that conclude the more capital intensive an industry, the more costly to a firm any given job mismatch or job vacancy.

Overall results concerning the impact of unionization itself on wages and productivity are mixed (Edwards & Field-Hendrey 1996). Freeman (1986) reviewed eleven studies of the effects of unions in various public sectors, including teaching and found in seven of these unions had no effect on productivity. Some recent studies have concluded that unions actually reduce productivity (Hoxby 1996). However, according to Freeman & Medoff (1984), in less concentrated or competitive industries there is

little difference between profitability in union and nonunion firms.

Although these wage equations provide important insights into the determinants of wages, nearly 50 percent of the variation in wages remains unexplained (Groschen 1991). Increasingly, empirical studies of wage differentials began utilizing efficiency wages explanations and rationale for observed inter- and intra- industry wage premiums. For instance, studies by Krueger & Summers (1987, 1988) and Katz (1986) resulted in outcomes that could not fully explain industry wage differentials. After controlling for measured or unmeasured differences in human capital and compensating differentials (including firm size), their studies found that industry wage differentials did not “disappear”. They found, instead, that industry differentials correlated with certain industry characteristics, including product market power, profits, and lower turnover. These findings, in turn, have been further developed in the efficiency wages literature.

Recent tests of efficiency wages include Cappelli & Chauvin’s (1991) study that concluded that wage premiums suggest fewer shirking-related disciplinary problems. Abowd & Lemieux (1993) documented the link between profitability of a firm and its wages. Estervao & Tevlin (1994) employed instrumental variable estimates to get around the endogeneity of profits in a wage equation and showed that profit sharing is relevant and widespread. Overall, however, the empirical evidence is mixed. If some firms find it profitable to pay their workers more than the competitive wage, one would expect that workers who moved from a low wage industry (firm) to a high wage industry (firm) might realize a sizable wage increase. In fact, a study by Murphy & Topel (1990) followed workers across industries and found quite the opposite. In fact,

they explained away most of the inter-industry wage differences in their study by sorting of workers by ability.

As the above review indicates, and Groshen (1991b) clearly demonstrates, industry and establishment wage differentials are a large portion of wage variation that merits continuing research. Indeed, Groshen finds substantial amounts of idiosyncratic variation in wages among establishments, suggesting that some pay high wages for workers of a given quality, and others pay low wages for workers of the same quality. Certainly, more definitive findings on an industry by industry basis can only serve to further clarify the wage determination process in general. Therefore, it is of particular benefit to this study to more intensely focus on industry wage determination models that might have applicability to the child day care industry. Please refer to the next section for a review of the corresponding literature.

## II. INTRA-INDUSTRY WAGE DETERMINATION MODELS RELEVANT TO CHILD DAY CARE: *DETAILED* OVERVIEW

Separately, research by Borjas et al. (1983), Weisbrod (1983), Preston (1988) and others began questioning the impact of institutional structure on wage differentials in an attempt to improve the understanding of behavioral differences between for-profit and nonprofit firms in general. The main point of their research was to determine whether nonprofits pay higher wages than for-profits, based on an inefficiencies argument, or whether nonprofits pay lower wages, based on a labor donations model.

Borjas, Frech III, & Ginsburg (1983) originally extended the implications of the property rights theory to the wage rate. Originally, the theory was used to explain efficiency differences in private firms between owner-controlled and manager-controlled firms (Furubotn & Pejovich 1972). However, the theory was later applied in the for-profit versus nonprofit literature, since not only is no owner present in nonprofit organizations, but an important legal restriction of a nonprofit organization is that founders of a nonprofit firm must recognize a "nondistribution constraint" (Hansmann 1980) such that profits may be earned but may not be distributed to individuals (i.e., managers) in control. In their work, Borjas, Frech, & Ginsburg apply the theory of property rights to the nursing home industry's wage determination process. Since the nursing home industry is also subject to various Medicaid reimbursement schemes, Borjas et al. also measure the effects of these reimbursements on a firm's incentive to

minimize costs. They use data from the 1973-1974 National Nursing Home Survey, which provided detailed information on worker and firm characteristics, and ran a pooled regression for the following standard wage-determination equation:

$$\ln w_{ij} = X_i\beta + I_j + \varepsilon_i \quad (4.1)$$

where  $\varepsilon_i$  is a statistical residual uncorrelated with the individual's socioeconomic characteristics in vector  $X_i$  and with firm-specific fixed effects in vector  $I_j$ . They conclude that the type of ownership, particularly government-owned versus for-profit, has a strong, positive affect on wages. Their analysis proved successfully that the property rights theory of the firm, which had previously been applied to overall cost and efficiency analysis, could be extended to a wage-determination (wages being one specific cost to the firm) study.

Weisbrod (1983) tests the theoretical argument that lower lawyers' wages in nonprofit law firms are a result of socially conscious lawyers willing to supply their services ("labor donation") at lower wages for the perceived social benefit generated by these services. Weisbrod uses data collected from a phone survey of lawyers working in either private law firms or nonprofit public interest law firms. He estimated an OLS earnings function for lawyers working for private law firms and used the coefficient estimates to predict what the public interest lawyers would have earned. He found that actual and predicted earnings differed between the two sectors and that annual wages were significantly lower in the nonprofit sector. Further, he estimated a job choice equation to model potential differences in the lawyers' job preferences as proxied by data collected on their job backgrounds (i.e., political background, size of community

where they grew up, religious background). He found that systematic differences in preferences do exist between lawyers who choose to work in the nonprofit public interest law sector, and these individuals are aware of the financial sacrifice.

However, an interesting piece by Preston (1988) investigates the existence of a nonprofit salary differential for firms in the child day care industry. Preston attempts to model two competing theoretical explanations:

(a) wage differentials in nonprofit child day care centers may be the result of managerial inefficiencies resulting in a positive nonprofit wage differential in the industry attributable to a property rights argument, similar to Borjas 1983:

(b) workers who work at nonprofit centers may have different attitudes towards the job than workers at for-profit centers; those at nonprofit centers may be more dedicated because of altruistic reasons and may consider portions of their labor as a donation, resulting in a negative nonprofit wage differential in the child day care industry attributable to the labor donations theory, similar to Weisbrod 1983.

Preston argues, however, that the social externality created by labor donations is the same between nonprofit and for-profit child day care centers, and therefore, the willingness of workers to donate labor to nonprofit firms should not be any different than their willingness to donate their labor to for-profit firms. Although she makes no strong case for this position, Preston expects to find a positive and significant nonprofit salary differential.

Preston uses data collected by phone survey of nonprofit and for-profit day care centers in the U.S. for the 1976-1977 National Day Care Center Supply Study. She

divides her sample into those centers which receive government subsidies subject to Federal Interagency Day Care Requirements (FIDCR) regulations versus those centers subject only to state and local regulations, or receiving federal aid but waived from additional regulations. She offers these distinctions as an improvement over classifying centers strictly as nonprofit and for-profit since by virtue of funding and regulations, centers may be "operating under different degrees of competition" (p. 342). The empirical model is based on a reduced form log salary equation:

$$\ln(\text{SALARY}_i) = a_1 + b_1 X_i + c_1 Y_i + d_1 R_i + f_1 \text{NP}_i + \varepsilon_i \quad (4.2)$$

where  $\text{SALARY}_i$  represents the weekly caregiver salary in the  $i$ th firm;  $X_i$  is a vector of human capital and demographic controls;  $Y_i$  is a vector of center-specific controls;  $R_i$  is a vector of region controls;  $\text{NP}_i$  is a dummy variable determining nonprofit status; and  $\varepsilon_i$  is the residual assumed standard normal (p. 343).

Important variables include the percentage of staff who are male, black, or other minority to account for discrimination in pay; percentage of special needs children and child-to-staff ratios as proxies for difficulty of work; and the percentage of enrolled children who are black or minority to control for social benefit provision. Preston also considers the impact of donative revenue on salaries and estimates a two stage model where donations are dependent on number of children enrolled in the center, certain clientele and program characteristics, and a dummy variable determining whether parents help raise funds. Preston also adds a variable representing the interaction between the donations variable and nonprofit status. Ultimately, the coefficients on the two donation variables are insignificant. However, Preston finds a five to ten percent positive nonprofit

salary differential in the government subsidized segment of the industry. In the more competitive segment (i.e., for those firms not falling under FIDCR regulation) there is no evidence of a salary differential.

Holtmann and Idson (1993) test an alternative explanation of wage differentials in the nursing home industry. Their work questions the findings of previous studies that have explained wage differentials between nonprofit and for-profit workers in the context of the property rights model. They provide an alternate explanation that in some industries, such as the nursing home industry, nonprofit firms are viewed as a response to the market's failure to provide higher quality care. Informational constraints that arise due to the consumers' inability to judge the quality of care prior to purchase, coupled with the fact that the purchaser is ordinarily not the user of the care (i.e., as in child day care, a parent purchases the service for the child's consumption), the incentive of profit maximizing firms would be such that high fees would be charged regardless of the level of quality care resulting in high fees charged for lower-quality (lower-cost) care. Since nonprofits, by their legal distinction, have less incentive to minimize costs, nonprofits will tend to provide higher quality care which results in a demand for higher quality workers at higher wages. Holtmann & Idson point out that prior studies' results may be biased due to endogenous sorting of workers. Specifically, if worker characteristics that induce them to choose a particular sector over the other are also related to wages in a systematic way, then the omission of these factors from the wage equation would generate selectivity bias in estimated coefficients.

Contrary to earlier findings, in their study of the nursing home industry Holtmann &

Idson find no excessive wages being paid in nonprofit nursing homes. Their data are based on a sample of registered nurses from the 1985 National Nursing Home Survey, which contains detailed firm and worker characteristics. Results from a pooled OLS regression of individual wages suggests that nurses in for-profit nursing homes earn lower wages than their nonprofit counterparts. Similarly, years nursing experience, percent of nurses with advanced degrees, and job tenure are all appreciably higher for nurses employed in nonprofit homes indicating “that selectivity on the part of the employer and/or employees along a quality (of the RN) dimension is evident” (p. 62). Given their rationale, they allow for this endogenous sorting by estimating sample selectivity corrected equations for each sector, for-profit (*fp*) and nonprofit (*np*), described as follows:

$$\ln W_{fp} = \beta_{fp} X_{fp} + \delta_{fp} \lambda_{fp} + \mu_{fp} \quad (4.3)$$

$$\ln W_{np} = \beta_{np} X_{np} + \delta_{np} \lambda_{np} + \mu_{np} \quad (4.4)$$

where  $W$  represents the wage,  $X$  represents a vector of traditional human capital characteristics, and the selection equation contains the same variables plus a vector of dummies that the authors felt were important determinants of sorting (i.e., flexible work hours might be given more weight in nonprofit homes). The  $\delta$ 's represent the coefficients on the truncated mean terms (the  $\lambda$ 's), or put another way, interpreting these coefficients indicates the relationship between unobservables in worker characteristics that might affect sectoral allocations, productivity, and wages (p. 68). Holtmann & Idson uncover a “negative selection” pattern at work in this industry, suggesting “that there are unobservable factors that both increase (decrease) the likelihood of employment in the

for-profit sector and which have an negative (positive) effect on wages” (p. 70).

And finally, a brief mention should be made of those handful of studies that investigate the supply side of the child care market because of the insights they offer concerning labor input and the production of quality. Powell and Cosgrove (1992) estimate a translog cost function using data from 182 child care centers accredited by the National Association for the Education of Young Children in 1989. They find that for-profit centers have costs that are nine percent lower than their nonprofit counterparts. They also detect economies of scale in production. Mukarjee and Witte (1993) estimate a homothetic CES cost function for centers from the state of Massachusetts with data from thirty-five for-profit and forty-six nonprofit centers. They report that the parameters of the cost function do not differ between for-profit and nonprofit centers and conclude that the observed higher costs for nonprofit centers result from different input and output choices, and not from differences in method of operation.

Preston (1993) estimates an average cost function using data from a national survey conducted in 1976-1977. Using a sample of 2703 observations, she finds that the production functions of nonprofit and for-profit centers are similar. She reports that nonprofit centers offer costlier services than for-profit centers and nonprofit centers provide higher quality services if federally regulated. Mukarjee and Witte (1993) and Preston (1993) also acknowledge the heterogeneous nature of the output and control quality by including variables similar to the ones used by Powell and Cosgrove (1992). Powell and Cosgrove control for center quality by adding the staff-child ratio, the group size of children, staff turnover, experience and education to the cost equation and

report significant relationships between these center characteristics and costs.

Mocan (1997), using a similar data set to the one used in this paper, estimates short-run translog cost functions. His findings reveal that there is no difference in quality of services produced between nonprofit and for-profit centers and that the presumed relative inefficiency of nonprofit centers is unfounded. However, centers that receive public money from state and/or federal agencies that mandate higher standards have variable costs that are nineteen percent higher than their other nonprofit cohorts. In addition, there is evidence of economies of scale and scope within the child day care industry. Both Blau (1997) and Mocan (1995) estimate quality production functions where the process quality index is explained by structural center characteristics and human capital variables of teachers and teacher-aides. Both find that center-level quality production functions explain at most fifty percent of the variation in center quality. This implies that at least fifty percent of the variation in the quality of the child care services produced by the centers is not explained by observable worker and center characteristics, but by unobservable worker attributes. The prime candidate for those unobservables is worker quality, not captured by traditional measures such as education, experience, and tenure. In a study of compensation structure and establishment quit and fire rates, Powell et al. (1994) in a study of 205 child care establishments find that higher wages significantly reduce establishment quit and fire rates for teachers and teacher-aides. However, they claim that the effect is too small to be consistent with the efficiency wage hypothesis.

It is the intent of this research to extend the existing literature by focusing on intra-industry wage differentials within the child day care industry and to model as much of the

existing theory as the data will allow. Refer to Chapter 7 for a more detailed discussion.

## Chapter Five

### **DATA DESCRIPTION**

This project will utilize data collected by the "Cost and Quality Study" conducted by the Center for Research on Economic and Social Policy of the University of Colorado at Denver. The research team involved the collaboration of early childhood experts and economists at four universities: University of Colorado at Denver, University of California at Los Angeles, University of North Carolina, and Yale University. The University of Colorado at Denver team coordinated the data collection and analysis of the center cost and quality portion of the study. The centers were located in metropolitan regions in four states: Los Angeles County in California, The Front Range in Colorado, the New Haven-Hartford corridor in Connecticut, and the Piedmont Triad in North Carolina. These regions were selected for their regional, demographic, and child day care program diversity.

Data were collected during the first half of 1993 on a stratified random sample of approximately 100 programs in each participating state, evenly split between for-profit and nonprofit centers. The study included only state-licensed child day care centers serving infants/toddlers and/or preschoolers that offered services at least six hours per day, 30 hours per week, and 11 months per year. To be used in the sample, a center had to have been in operation at least one full fiscal year, and the majority of children had to attend at least 30 hours and five days per week. Data were collected in a total of 228 infant/toddler rooms and 521 preschool rooms. For purposes of this study infant/toddler rooms were defined as those where a majority of children were less than two-and-a-half

years old. Preschool classrooms were defined as those where a majority of children were at least two-and-a-half years old but not yet in kindergarten. Detailed financial data were collected using payroll and other center information.

The data include:

(1) From a two and-a-half hour on site interview with the director or owner of each center, data on costs, revenue, in-kind donations, fees, fee policies, socio-economic and human capital characteristics and wages of individual staff members, characteristics and services provided by individual volunteers, personnel policy, enrollment, programs offered, services offered, age of center, hours open, other center structure characteristics.

(2) Interviewer observation of facilities and personnel: inside and outside square footage, presence of health and safety characteristics, center overall appearance, articulateness of the director, staff appearance.

(3) Classroom observations using the following observation instruments on two randomly chosen classrooms (where possible an infant/toddler room and a preschool room in each center): the Infant/Toddler Environment Rating Scale (ITERS) (Harms, Cryer & Clifford 1990), the Early Childhood Environmental Rating Scale (ECERS) (Harms & Clifford 1980), the Caregiver Interaction Scale (CIS) (Arnett 1989), the UCLA Early Childhood Observation Form (Stipek, Daniels, Galuzzo, & Milburn 1992); the Teacher Involvement Scale (TIS) (Howes & Stewart 1987); the Peer Play scale (Howes & Matheson 1992); and the Observation of Activities in Preschool Form (Palacios and Lera 1991);

(4) A self-reported Teacher Survey from of a sub-sample of 1439 teachers and teacher aides in the observed classrooms: personal characteristics, family status, children receiving care in the center, hourly wage, annual income, other sources of income, household income, Early Childhood Education (ECE) experience, total work experience, education, ECE training, reason for choosing child day care, membership in professional organization, likelihood of leaving job and reason, hours of unpaid work.

Two preliminary data sets were made available for the purposes of this research. A macro-level data set containing aggregates of worker characteristics, center specific characteristics (including benefit dummies by worker type), and pre-determined profit variables (i.e., detailed line-item revenues, expenses, and donations were not provided) for all 400 centers was merged with unemployment data collected for each city that a

center operated in (i.e., specific center locations were not provided). There was only one significant drawback to working with the aggregate data. The raw data provided benefit dollars, which would have allowed me to compute a measured wage that includes the value of fringe benefits. Instead, I was limited to using dummy variables for whether or not a worker received a particular benefit or not. (For a complete discussion, see Chapter 7.) Upon preliminary analysis of the macro-level data set, many centers were omitted because of incomplete data (i.e., too many variables missing) or because of outliers in the variables (i.e., profits were miscalculated).

I created a micro-level data set using comparable data for the 1439 teachers and teacher-aides surveyed (i.e., worker characteristics that were similar to those variables in the macro-level data set) merged with center-level average data provided in the first data set. (Note that as a result of this merge, not all of the centers represented in the macro-level data set appear in the micro-level data set.) Again, many observations were omitted, because of incompleteness. Nonetheless, both data sets were detailed and complete enough to address the research problems identified in the introduction and to offer significant improvements over previous research as detailed in the next Chapter. For a complete list of variables and definitions, please refer to Chapter 8 (macro-level data set) and Chapter 10 (micro-level data set).

## Chapter Six

### IMPROVEMENTS OVER PREVIOUS RESEARCH

Prior wage determination studies have relied on insufficiently detailed data sets, contributing to potential omitted variable bias. For instance, some data sets have detailed individual characteristics, but insufficient firm level detail (i.e., insufficient fringe benefit data). Alternately, many other studies were more concerned with inter-industry wage variation and often lacked sufficient detail on human capital characteristics. Specifically, intra-industry wage studies of nursing home and child day care centers, while allowing for the heterogeneity of output produced, lacked good controls for firm level quality. The impact of unionization in the child day care industry has never even been addressed. Literature addressing profit and nonprofit wage differences often lacked sufficient detail of the dollar amount of donations received by firms. And finally, in most cases, it has been difficult to test for systematic differences caused either by individual preferences affecting firm choice (selectivity bias) or self-selection based on ability (ability bias). Using the data set described in Chapter 5, this research will attempt to offer improvements over prior studies to reduce the impact of these biases. Further, the level of detail provided by this data set, allows one to calculate certain variables in a “bottom-up” manner (i.e., average center wages *by type of worker* versus average center worker wage).

Most U.S. studies of wage differentials within the child day care industry rely on data sets that are based upon phone interviews (i.e., the data of the Affordability Study Team at Wellesley College used by Mukarjee & Witte 1993), or questionnaires mailed

to centers (i.e., the GAO data set used by Powell & Cosgrove 1992). The data of this study were obtained through actual center visits, on-site interviews, and review of center records with center administrators.

Intra-industry explanations of wage dispersion (i.e., studies of different firms within one industry) have been based on inter-industry wage studies (i.e., studies of different industries) and have relied on the same data sets for information. Thus, most studies employ CPS data which includes sufficient detail on worker human capital characteristics, but only a few features of the industry with which the worker is associated (i.e., Krueger & Summers, 1988). Studies that do have the benefit of establishment data have adequate controls for the characteristics of the individual firm (i.e., size, profitability), but they have to rely on proxies of wages as well as human capital characteristics of workers (Blanchflower, Oswald and Garrett 1990). The benefit of intra-industry studies should be, as Groshen (1991) points out, a circumvention of the omitted variables problem of inter-industry studies and should validate some of the same theoretical explanations offered for wage dispersion between industries. This research can lay claim to that improvement.

First, many previous wage studies construct the average wage rate of the firm by dividing the total wage bill by total hours of labor. Since information used in this study was collected on all workers in each child day care center, center average wages *by type of worker* was created. As a result, two separate wage equations can be estimated- one for Teachers and one for Teacher Aides. The type of worker distinction may be significant when designing public policy recommendations that involve child care workers' wages. In addition, the investigation of the structure of worker

compensation and the relationship between wages and benefits is important to the extent that they are related to worker turnover. Tenure differences between worker types suggest that separate wage equations may prove revealing. Further, although the full complement of individual level data was not made available, a micro-level analysis of a sub-sample of over 1400 workers is presented to contrast how and explain why results might differ between center-average and individual-level data.

Second, this data set provides a measure of twenty different benefit variables, by worker type (teacher and teacher-aides), ranging from the provision of life insurance to whether the center allows the worker to bring her children to work, from the availability of flexible hours to paid meals.

In addition to the detailed human capital and fringe benefit variables noted above, the richness of the data set allows one to control for a variety of firm attributes, including magnitude of profits, firm size, and various special programs offered (i.e., bilingual programs, twenty-four hour care) at the centers. External pressures will be captured by the unemployment rate of the county where the child day care center is located.

Further, the impact of unionization on wages and nonwage compensation will be analyzed. As previously described, many child day care centers are publicly owned or affiliated with public schools. Consequently, pre-existing teachers' unions have been able to extend their union membership. Although no conclusive studies have been performed to date to assess the impact of unions on child day care services, there appears to be an impact on wages paid to workers in unionized centers. However, the emphasis of unions on such nonwage benefits as health insurance may be of less value

to women who as members of two earner families are covered under their husbands' plans (Freeman & Medoff 1984). Work by Strober et al. (1995) reveal that child day care workers may value other forms of nonwage compensation more highly. A phone call to the National Center for the Early Childhood Workforce, Washington, DC, confirmed that the believed impacts of unions on day care workers' wages is based more on other industry studies and intuitive appeal. Their only specific references were to the National Child Care Staffing Study (Whitebook, et. al. 1990) and the public and technical reports originally issued after preliminary analyses of these data were completed in Spring 1995 (Helburn 1995). Unions are represented in roughly 12% of the nonprofit firms covered in this data set; it will be interesting to see what, if anything more concrete, can be said about union impact on the compensation packages of child day care workers.

Although previous studies acknowledged the heterogeneity of the output produced, they often lack a good control for center quality (Hofferth 1992). For example, Powell and Cosgrove (1992), Mukarjee & Witte (1993), and Preston (1993) acknowledge the heterogeneous nature of the output and control quality by including various center characteristics, such as staff-child ratio, staff education and experience, also known as structural quality measures. As a significant improvement of the prior research, this study employs a process quality index similar to Blau (1997) and Mocan (1995) to control for heterogeneity in output. Classroom process describes aspects of the overall quality of the services received by children. More specifically, classroom process refers not only to structural aspects of the classroom, but to the way that children are cared for, such as the

amount of warmth a caregiver shows for a child, or the emotional tone that is present in the classroom. The activities that are available for children to engage in, and the learning opportunities that are present are also aspects of classroom process. This index is widely used in early childhood literature and has been shown to be positively related to children's social and cognitive developments. (Refer to Appendix A for a description.)

The level of detail of donations received by each center will introduce further improvement over existing data sets and tests of property right theory. Because donations are received more heavily by nonprofit centers, failure to account for the value of donations would create an inaccurate picture as to the relative costs of nonprofit centers and resulting profit calculations. Economic profits will be calculated as the difference between revenues and expenses plus the total value of donations, including the dollar value of volunteer hours. In addition, because detailed firm ownership data were collected (i.e., for-profit part of national chain, nonprofit publicly owned, nonprofit privately owned), this paper will offer a refinement over previous studies addressing wage differentials between for-profit and nonprofit centers to provide a more rigorous test of the property rights model. Preston (1988) excluded government owned centers from her study, for example, and drew no distinctions between government owned nonprofits versus non-government owned nonprofit centers; Holtmann & Idson (1993) could not separate government owned nonprofit nursing homes from non-government owned nonprofit nursing homes, although they would have liked to be able to. As previously noted, Weisbrod (1988) suggests that "there is little to be gained from aggregating" all nonprofit type organizations. For instance, it may not be enough to assert that nonprofits are by definition inefficient; it may well

be that centers that receive public money may be tied to higher standards than their non-publicly (government) owned or supported nonprofit and for-profit counterparts and may be employing workers with better skills who command higher wages.

In general, human capital differences have been measured by years of experience, race, sex, age, years of education completed, marital status, occupation or specialized training with varying levels of completeness (Weisbrod 1983, Borjas 1983, Holtmann & Idson 1993). Although individual preferences affecting firm choice have been studied in the context of the labor donations model (Weisbrod 1983, Preston 1988, 1989), the more difficult challenge has been to test for self-selection based on ability. Borjas et al. (1983) and Preston (1988) claim to have sufficient controls for ability/productivity differentials of individuals by using the human capital proxies listed above. Weisbrod (1983) merely discounts any attempt at dealing with ability bias, stating “[it] is not a simple matter, because existing techniques generally make questionable, but critical, assumptions about normality of disturbance terms...” (p. 251). Preston (1988) uses center level wage equations and makes no attempt to test for selectivity bias based on ability and explains away any preference bias by claiming that the social benefits produced by child day care centers do not vary by profit status; she can not test for whether workers may have preferences based on variables other than social benefits produced (i.e., flexible work schedules may be an option offered more in nonprofit centers versus for-profit centers). As noted earlier, Holtmann & Idson (1993) critiqued these studies and state that “while these regressions provide baseline estimates, evaluating wage differentials across different institutional forms using simple OLS regression is highly questionable” when

endogenous sorting is a concern (p. 66). However, after considering their argument for why this sorting takes place, mainly that the existence of for-profit and nonprofit nursing homes signal verifiable quality differences between the two types of homes in an industry characterized by informational asymmetries, I realized that this concern was perhaps not directly applicable to the child day care industry. Specifically, they cite: “consumers are unable to judge the quality of the care until after they purchase the care, and that they make the purchase once.” and that nonprofits will be “especially attractive providers in the markets where monitoring is difficult and the transaction costs of switching between suppliers are high.” As a parent consumer of child day care for my son, I have been able to judge quality *ex ante*; I continually monitor; and I have switched child day care providers three times at very little cost. Thus, given the more detailed level of data and better controls for worker skills and center level quality that are available in this data set, and assuming as Preston does that social benefits are similar across profit status, selectivity bias based on preferences or ability will not be considered a serious issue.

## Chapter Seven

### **MACRO-LEVEL ANALYSIS: ESTIMATION EQUATIONS AND ECONOMETRIC ISSUES**

To investigate the determinants of wages and the validity of competing theories of compensation, the following reduced form log wage equation, based on Preston's (1988) model, will be estimated:

$$\ln(W_{ij}) = \alpha_j + \sum \beta_{kj} X_{ikj} + \sum \gamma_{nj} Y_{in} + \sum \Omega_{pj} D_{ip} + \sum \delta_{bj} Z_{ibj} + \varepsilon_{ij} \quad (7.1)$$

where:

- $W_{ij}$  = the average wage paid at center  $i$  to  $j$ th type of worker;
- $X_{ikj}$  = the average human capital characteristics,  $k$ , of workers in the  $j$ th category;
- $Y_{in}$  = the  $n$ th center level characteristics;
- $D_{ip}$  = the  $p$ th special program offered at the center;
- $Z_{ibj}$  = the availability of the  $b$ th type of benefit for the  $j$ th type of worker.

The unit of observation is the center: separate equations will be estimated for teachers ( $j=1$ ) and teacher-aides ( $j=2$ ). Tables 7-A,B,C, and D give a complete list of variables by vector.

Human capital theory predicts that individuals with higher levels of education, training, job tenure, experience and specialized education/experience, should realize higher wages. Thus, one would expect a positive and significant relationship between these variables and wages. In addition, the proportion of staff who are non-white may account for potential discriminatory differences in pay.

Inclusion of the benefit variables into the wage equation will control for the impact of the availability of nonwage benefits on wages and will reveal the extent to which higher benefits are associated with lower wages. For example, keeping all worker and firm

characteristics constant, the provision of health insurance should lower wages paid to workers.

Center level characteristics that might influence wages consist of firm size and types of programs offered. The number of workers employed by the center will be used to represent firm size and to test the possibility that higher pay may simply reflect the larger average size of the child day care center. Dummy variables representing the existence of specialized programs, such as Headstart, twenty-four hour care or bilingual programs, may justify a wage premium, if for example, higher wages must be offered to attract workers with these skills or willingness to work certain hours. Similarly, staff-child ratios and group size may also proxy level of job difficulty and responsibility.

To test the profit-sharing hypothesis, the wage equations include a profit per hour variable which represents economic profits per hour of labor. Because nonprofit centers receive more donations when compared to for-profit centers, failure to account for the value of donations would create an inaccurate picture as to the relative costs of nonprofit centers. Therefore, economic profits are calculated for each center as revenues less expenses plus the total value of donations minus the imputed salaries of owner-directors. Specifically, the data set contains dollar value of the following variables for fiscal year 1992: total revenue, total wages (payroll), total nonwage benefits (expenses on life, health and disability insurance, workers' compensation, unemployment insurance and FICA or equivalent), education costs of the staff, sub-contracting expenditures, expenditures on food, insurance and occupancy, overhead and other operating expenses. The difference between total revenue and the sum of the expenditure items listed above is

the net accounting earnings, or accounting profits of the center. The data set also contains information on line-item donations such as food, equipment, facilities, insurance and supplies. It also contains information about individual volunteers, including the hours donated by each volunteer, and the job performed at the center. The value of volunteer services is calculated by multiplying the volunteer hours by the wage rate of the paid labor doing similar work. Since some for-profit centers are owned and operated by individuals who are also the directors of the center, director wages or salaries were often not reported. Missing salaries of owner-directors were imputed by multiplying their hours by the highest wage at the center plus a 23% premium (equivalent to the mean premium a director receives above the highest wage for those centers where owner-director salaries were reported). And finally, economic profits divided by total labor hours gives profits per hour. Theory suggests a positive and significant relationship between profits and wages.

A union dummy variable in the regression equations should provide more insight into the effect union membership has on compensation issues. (Note that this variable is center specific, not job title specific as a result of how the original data was collected: teachers and/or teacher-aides may be unionized within a center.) One would expect a statistically significant positive coefficient for this variable. Although the union dummy may be erroneously coded for any given worker type (i.e., if only one job type is unionized at some centers), theory would suggest that the existence of a union for one worker group would exert positive wage influences on other worker types as well (Lewis 1988). The local unemployment rate will provide a test of the "wage curve" where unemployment

should be negatively related to wages. State dummies are included to capture state fixed-effects including the effects of regulations. For example, given the geographic location as well as the comparatively stringent regulations of centers in Connecticut, one would expect a positive and significant relationship with respect to wages.

Evidence on possible non-competitive wage setting behavior due to industry structure will be tested for as well. The estimated coefficient of the profit status variable (for-profit versus nonprofit) will reveal whether nonprofit workers are receiving additional compensation attributable to working in a nonprofit setting, controlling for other determinants of wages. In addition, detailed ownership dummies (i.e., for-profit national chain, government owned and operated nonprofit, church affiliated nonprofit) will allow a more rigorous test of the property rights theory. As previously stated, although we might assume that there are no differences in social benefits generated by for-profit and nonprofit centers, this assumption does not totally eliminate the possibility of some labor donation pressures within the industry exerting negative wage pressures. The percentage of children who are non-white can serve as an alternate control for the provision of positive social externalities, or labor donations, because as noted in Preston (1988), "it is assumed that day care provision to the underprivileged generates greater social benefits." (p. 344) Alternatively, Preston further notes that these same children may be more difficult to care for, thus offsetting the anticipated negative coefficient one would expect for this variable.

As modeled above, several econometric issues come to light. First, the OLS estimator is BLUE (best linear unbiased), consistent and asymptotically normally distributed, and if the disturbances are normally distributed, asymptotically efficient among

all consistent and asymptotically normally distributed estimators. However, when disturbances are not normally distributed, OLS estimation is undesirable. If the disturbance variance is not constant across observations, which is the case given the nature of this data set (where the dependent variable is center average wages based on different numbers of workers at each center) the disturbances are said to be heteroscedastic. According to Greene (1993), "Heteroscedasticity usually arises in cross-section data when the scale of the dependent variable and the explanatory power of the model tend to vary across observations" (p. 358). Thus, possible heteroscedasticity is corrected using weighted least squares estimation techniques (Greene 1993) by weighting center level observations by the square root of the number of workers used in calculating the average wages for each center.

Endogeneity concerns arise when regressing wages on the profit per hour variable since one could argue that profits are jointly determined with wages. However, the center profits calculated in this study are for the fiscal year 1992, whereas center level average wages are based on 1993 fiscal year data. Having previous year's profits negates the potential simultaneity between wages and profits by treating profits as predetermined.

Inclusion of the monetary value of fringe benefits into a wage equation explanatory variables may create a simultaneity bias. If a change in the wage structure generates modifications in fringe benefits, the coefficients of benefits in a wage equation will not be unbiased estimates of the true parameters. One solution to this problem would be to estimate a total compensation equation, which includes wages and fringe benefits (Cappelli & Chauvin 1991). This has not been done frequently in the literature, because of the unavailability of the breakdown of fringe benefits by worker or even by type of worker.

This data set also does not allow one to compute total compensation by worker type. Alternately, one can instrument fringe benefits in a wage equation, but it is very difficult to find exogenous proxies of fringe benefits. On the other hand, the inclusion of dummy variables for the presence of fringe benefits by type of worker is econometrically more sensible than including the monetary value of nonwage benefits as an explanatory variable. The existence or lack of benefits for teachers and teacher-aides can be thought of as being attached to the job, at least in the short-run. Therefore, if an increase in the wage rate causes a firm to decrease their monetary contribution to health benefits, this modification in benefit levels will not be detected by the model and should not result in biased benefit coefficients.

Theory indicates that unionization may be endogenous. Freeman and Medoff (1979) argue that firms facing weaker cost-minimizing incentives may increase the likelihood of the firm's being unionized and may provide the source through which higher wages are paid. However, as concluded by Mocan (1995) using the same data source as this study, nonprofit and for-profit centers have similar cost functions regardless of their objective to maximize profits or maximize quality. Therefore, endogeneity of the union variable becomes less of an issue.

As with all wage differential studies, selectivity bias is an econometric issue worth noting. Teachers' and teacher-aides' choices between nonprofit and for-profit child day care centers may reflect not only their preferences but systematic differences in the quality of these workers not captured by other regression variables. For example, if different firms use different technologies in a particular industry, and if certain technologies are more sensitive to worker quality (conditional upon observable worker attributes), this may

generate sorting of workers by ability. Assuming that productivity is correlated with ability, this would create an intra-industry wage differential. Since it is difficult to control for innate ability differences, one needs to be aware of the potential for ability bias when interpreting, for example, returns to education.

Ideally, to have a better understanding of intra-industry wage differentials by nonprofit and for-profit sector, it has been suggested in the literature (Weisbrod 1983, Holtmann & Idson 1993) that it would be more appropriate to estimate a job choice equation to model differences in teachers' and teacher-aides' job preferences. Using cross-section, firm level aggregated data presents a challenge when attempting to do so. However, as discussed in Chapter Six, it is not believed that the selectivity bias issue is serious enough to pursue in this study, although the potential for such bias should be kept in mind when interpreting the results.

Finally, there is also the potential for aggregation bias. Although individuals differ by ability and preferences for wage payments and non-wage benefits, this model makes the assumption that there is an average worker who closely approximates the attributes and indifference maps of the individual workers. My interpretation will be limited to, for example, the impact of earning a college degree on center level average wages, making an assumption that all workers will realize the same increase or monetary returns to education. However, as noted earlier, differing levels of ability result in differing levels of returns to education; differing preferences for non-wage returns versus wage increases will also result in different monetary returns to education. In sum, using aggregated data discounts the impact of heterogeneity among workers with respect to their preferences.

Similarly, not all firms have identical isoprofit curves: some firms may, for example, be able to purchase training for their workers at a lower cost. Thus, while on average wages may be lower by \$.10 for those firms offering on-the-job training, for any one firm wages may diminish by \$.05.

Since I am limited by the nature of the data itself, there is not much I can do to overcome this potential bias. However, there is nothing in the data that suggests it is so highly skewed that the averages are not representative of the individual elements. (Bridge 1971) Using the micro-level data set, I will re-estimate equation (7.1) with micro-level data to investigate the differences in results. This model specification is discussed in more detail in Chapter 10.

**TABLE 7-A**  
 Human Capital Characteristics Weighted by Hours Worked:  
 For the  $j$ th Type of Worker

Variable	Definition
WAGE	the average wage paid at each center
HIGHSCHL	proportion that have 12 or fewer years of education
COLLEGE+	proportion that have 16 or more years of education
SPECED1	proportion that have child development certification
SPECED2	proportion that have associate degrees in child development
AGE	average age in years
EXPER	average prior child care experience in years
TENURE	average tenure in this center in months

**TABLE 7-B**  
Center Level Characteristics

Variable	Definition
PROFIT	dummy=1 if center is for-profit
PUBAUSP	dummy=1 if center publicly owned and operated
PUBSUPP	dummy=1 if center not pubausp but received >50% of revenue from public funds
PUBREGUL	dummy=1 if center receives public money tied to higher standards
ONSITE	dummy=1 if center is located at a worksite
NATCHAIN	dummy=1 if center is a member of a national child day care chain
RELIGIOUS	dummy=1 if center is religiously affiliated
QUALITY	process quality index ranging from 1 to 7 (refer to Appendix A)
RATIO	prime time staff-child ratio weighted by the percent of center full-time enrolled children in the given age-group
GROUP	prime time group size weighted by the percent of center full-time enrolled children in the given age-group
SNONWHITE	percent nonwhite staff
CNONWHITE	percent children nonwhite
CENTERYR	number of years center in operation
PROFITHR	economic profit per hour of labor employed (refer to pages 43-44 in the text)
WORKERS	total staff employed (includes all worker types)
UNION	dummy=1 if teachers and/or aides unionized
CAL	dummy=1 for California location
COL	dummy=1 for Colorado location
CONN	dummy=1 for Connecticut location
UNEMP93	1993 unemployment rate in the city where center is located; for cities where data unavailable, rates are imputed as the average unemployment rates of neighboring cities within a 20 mile radius

**TABLE 7-C**  
Center Level Program Variables

Variable	Definition
PARTDAY	dummy=1 if part-day program such as two or three hours in the morning and/or in the afternoon (pre-school)
PRTDAYEX	dummy=1 if part-day extended care before, during, or after the preschool program
SPONSOR	dummy=1 if center is public school sponsored part-day program
HEADSTRT	dummy=1 if part of HEADSTART program
EXPANCARE	dummy=1 if before & after school care provided for school-agers
SUMMER	dummy=1 if summer camp program provided for school-agers
EVENING	dummy=1 if evening care offered
WEEKEND	dummy=1 if weekend care offered
SICKCARE	dummy=1 if sick care offered
24HOUR	dummy=1 if 24 hour care offered
BILNGUAL	dummy=1 if bilingual program provided

**TABLE 7-D**  
Benefit Level Dummy Variables For the *j*th Type of Worker  
Dummy=1 if center offers:

Variable	Definition
RETIRE	partially paid retirement plan
LIFEINS	life insurance (paid or unpaid)
MATERN_P	paid maternity/paternity leave
MATERN_U	unpaid maternity/paternity leave
HEALTH_F	fully paid health insurance-worker
HEALTH_P	partially paid health ins.-worker
HEALTH_D	paid health insurance for dependents
DENTAL	at least partially paid dental insurance
SICKTIME	paid/unpaid sick leave
VACATION	paid vacations
MTGTIME	paid meeting & training time
OVERTIME	overtime pay
FLEXHRS	flexible work hours
WRJOB	written job description
CONTRACT	written contract
WRSAL	written salary schedule
CHLDWRK	ability to bring own children to work
CHLDFEES	reduced fees for own children
BONUS	bonuses
MEALS	paid meals

## Chapter Eight

### **MACRO-LEVEL ANALYSIS: DESCRIPTIVE STATISTICS**

Reported in Tables 8-A and 8-B are summary statistics of human capital by job title (teacher and teacher-aides) within center type (for-profit and nonprofit). Nonprofit centers pay higher wages to both types of workers. Teachers in nonprofit centers have more schooling, specialized education, experience and tenure than do their for-profit counterparts. The education of teacher-aides is not different between the two sectors, but aides at nonprofit centers are older, have more experience and tenure. In sum, the significant difference between wages and human capital characteristics between for-profit and nonprofit centers may be indicative of selectivity on the part of the employer and/or employees along a quality of worker dimension. Interestingly, as shown in Table 7-C, the average quality of care is higher in nonprofit centers, which might suggest selectivity on the part of the employer. However, further analysis of the quality variable by state reveals that there is no significant difference in quality between for-profit and nonprofit centers in California, Colorado and Connecticut. North Carolina for-profit centers have significantly lower average quality than their nonprofit counterparts. This may be a result the nature of the regulations: it is hypothesized that in North Carolina regulations are difficult to enforce and comply with because of their complexity (please refer to Table 2-B in Chapter 2).

Further, as seen in Table 8-C, for-profits are more likely to offer expanded care and summer programs. However, nonprofit centers are more likely to participate in Headstart programs and serve a significantly larger proportion of nonwhite children

(signaling job difficulty), yet also have higher staff-child ratios. Group sizes are similar. The results, therefore, are difficult to interpret. Given the significance of staff-child ratios to day care center workers, for-profit jobs might appear more "difficult", yet pay less, contrary to expectations.

Nonprofit centers are older and employ more workers. Given the literature on the positive relationship between firm size and wages, it is possible that higher wages in nonprofits reflect the larger average size of these centers. Interestingly, nonprofit centers have a greater proportion of nonwhite staff and are located in areas with higher local unemployment rates. Once again, these distinctions are counter-intuitive. However, consistent with expectations, roughly 12% of nonprofit centers are unionized, raising the possibility that higher wages in nonprofit centers may be the result of unionization.

Finally, there is no significant difference between profit per hour of labor employed, location, or for the most part, ownership classification between nonprofit and for-profit centers (where the comparisons are appropriate). However, ownership distinctions may prove more interesting in the regressions when assessing, for example, wage differentials within nonprofit centers between government owned nonprofits versus privately owned nonprofit centers.

Tables 8-D and 8-E reveal the nature of nonwage benefits offered by center type. For both teachers and teacher-aides, a higher proportion of nonprofit centers offer retirement benefits and full paid health and dental insurance. These differences negate somewhat the possibility that for-profits may be trading lower wages for increased benefit levels. On the other hand, a larger proportion of for-profit centers provide over time pay.

offer flexible work hours, the permission to bring children to work, and reduced fees for the children of staff. Given the significance of these fringe benefits to child day care center workers, it is quite possible that lower pay in for-profit centers may simply be a result of the tradeoff between wage and non-wage benefits.

All of the benefit variables will be included in the first estimation of equation (7.1) as controls to isolate the effects of the other variables on wages. However, at this point an obvious concern might be the issue of multicollinearity among so many independent benefit variables. One method for detecting multicollinearity is through the use of a correlation matrix. Table 8-F details simple correlation results between all pairs of independent benefit variables. The diagonal elements are all one since any one variable is perfectly correlated with itself. Depending on the outcome of the regression model, but fully anticipating the possibility that most benefit variables will be insignificantly different from zero, interpreting a high value of one of these correlation coefficients between any two benefit variables might prove useful in addressing the possibility that some of the benefit variables correlate and might represent an estimation problem.

Overall, despite the significant lack of differences in quality of child care services provided by either type of center, nonprofit centers employ a higher-quality worker pool, make fewer demands on their workers, have unionized shops and offer higher levels of traditional compensation (higher wages, medical, dental, and pension benefits) than their for-profit counterparts. Looking at the total picture, there is some support for the possibility that nonprofit centers may be inherently inefficient. They could be recruiting

and paying for an overqualified staff. It is also possible that workers may be sorting themselves according to wage/nonwage tradeoffs, i.e. workers endowed with lower levels of human capital may be selecting jobs in for-profit centers because of the fringe benefits offered whereas workers with higher levels of human capital may be selecting jobs in nonprofit centers to receive monetary awards commensurate with their education and experience. It could also be that given that unemployment is higher in areas where nonprofit centers are located, nonprofit managers may be able to draw from a more select worker pool, further fueling inherent inefficiencies of nonprofit centers.

In order to investigate and isolate the influence of these variables (human capital, center-level, fringe benefit) on wage determination within the child day care industry, I ran GLS regressions of equation (7.1) for both teacher and teacher-aides. Please refer to the next Chapter for a review of regression results.

**TABLE 8-A**  
**Teachers' Human Capital Characteristics Profile By Profit and Non-Profit Centers**

<b>Variable</b>	<b>Profit (N=181)</b>	<b>Non-Profit (N=182)</b>	<b>All (N=363)</b>
WAGE*	6.547 (1.794)	7.733 (2.538)	7.103 (2.251)
HIGHSCHL*	.226 (.271)	.139 (.226)	.185 (.254)
COLLEGE+	.299 (.291)	.395 (.297)	.344 (.297)
SPECED1*	.703 (.312)	.812 (.250)	.754 (.290)
SPECED2*	.351 (.296)	.486 (.347)	.414 (.328)
AGE*	32.841 (5.747)	35.704 (7.399)	34.181 (6.77)
EXPER*	3.425 (2.388)	4.162 (3.038)	3.770 (2.733)
TENURE*	34.241 (24.167)	54.769 (38.758)	43.852 (33.411)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

**TABLE 8-B**  
Teacher-Aides' Human Capital Characteristics Profile By Profit and Non-Profit Centers

<b>Variable</b>	<b>Profit (N=181)</b>	<b>Non-Profit (N=182)</b>	<b>All (N=363)</b>
WAGE*	5.340 (.928)	5.871 (1.31)	5.589 (1.158)
HIGHSCHL	.374 (.364)	.373 (.329)	.373 (.348)
COLLEGE+	.085 (.312)	.088 (.180)	.086 (.175)
SPECED1	.336 (.363)	.435 (.344)	.382 (.359)
SPECED2	.090 (.190)	.124 (.222)	.106 (.206)
AGE*	27.259 (7.759)	32.943 (9.603)	30.09 (9.167)
EXPER*	1.09 (1.585)	2.213 (2.908)	1.653 (2.403)
TENURE*	15.514 (13.138)	35.248 (32.775)	25.370 (26.806)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

**TABLE 8-C**  
Center Level Characteristics

<b>Variable</b>	<b>Profit (N=181)</b>	<b>Non-Profit (N=182)</b>	<b>All (N=363)</b>
PROFIT	1.000 (.000)	—	0.504 (.501)
PUBAUSP	—	.147 (.355)	.069 (.253)
PUBSUPP*	.029 (.169)	.137 (.345)	.080 (.272)
PUBREGUL	—	.140 (.348)	.065 (.248)
ONSITE	.012 (.109)	.072 (.260)	.040 (.197)
NATCHAIN	.311 (.464)	—	.165 (.371)
RELIGIOUS*	.028 (.164)	.368 (.484)	.198 (.399)
QUALITY*	3.820 (.818)	4.179 (.772)	3.988 (.816)
RATIO*	.157 (.109)	.215 (.191)	.184 (.156)
GROUP	12.295 (8.320)	12.567 (5.948)	12.433 (7.209)
SNONWHITE*	25.535 (27.973)	35.854 (31.222)	30.372 (29.947)
CNONWHITE*	25.157 (24.639)	37.499 (33.911)	30.861 (29.892)
CENTERYR*	9.650 (8.064)	17.360 (15.325)	13.356 (12.694)
PROFITHR	.500 (1.677)	.581 (1.528)	.580 (1.604)
WORKERS	15.680 (6.743)	17.142 (10.989)	16.365 (9.004)
UNION	—	.117 (.322)	.055 (.228)
PARTDAY	.854 (.354)	.692 (.463)	.778 (.416)
PRTDAYEX	.655 (.477)	.436 (.497)	.553 (.498)
SPONSOR	.044 (.205)	.080 (.271)	.061 (.239)

**TABLE 8-C**  
Continued

Variable	Profit (N=181)	Non-Profit (N=182)	All (N=363)
HEADSTRT	—	.025 (.157)	.011 (.108)
EXPANCARE*	.758 (.429)	.491 (.501)	.633 (.482)
SUMMER*	.709 (.455)	.447 (.498)	.587 (.492)
EVENING	.034 (.182)	.076 (.267)	.054 (.226)
WEEKEND	.014 (.119)	.030 (.171)	.021 (.146)
SICKCARE	.010 (.099)	.026 (.161)	.017 (.132)
24HOUR	.002 (.050)	—	.001 (.036)
BILNGUAL	.084 (.278)	.113 (.317)	.098 (.297)
CAL	.256 (.437)	.289 (.454)	.271 (.445)
COL	.270 (.445)	.252 (.435)	.262 (.440)
CONN	.175 (.381)	.157 (.365)	.166 (.373)
UNEMP93*	6.010 (1.917)	6.361 (2.135)	6.175 (2.027)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

**TABLE 8-D**  
Center Level Worker Benefit Dummies For Teachers

<b>Variable</b>	<b>Profit (N=181)</b>	<b>Non-Profit (N=182)</b>	<b>All (N=363)</b>
RETIRE*	.266 (.443)	.447 (.498)	.351 (.498)
LIFEINS*	.495 (.501)	.618 (.487)	.552 (.497)
MATERN_P	.139 (.347)	.250 (.434)	.191 (.394)
MATERN_U	.667 (.472)	.736 (.441)	.699 (.458)
HEALTH_F*	.076 (.265)	.416 (.494)	.235 (.425)
HEALTH_P	.534 (.500)	.413 (.493)	.478 (.500)
HEALTH_D	.165 (.372)	.244 (.431)	.202 (.402)
DENTAL*	.323 (.469)	.420 (.495)	.369 (.483)
SICKTIME*	.795 (.404)	.888 (.315)	.839 (.367)
VACATION	.875 (.331)	.884 (.320)	.879 (.325)

**TABLE 8-D**  
Continued

<b>Variable</b>	<b>Profit (N=181)</b>	<b>Non-Profit (N=182)</b>	<b>All (N=363)</b>
MTGTIME	.757 (.429)	.744 (.437)	.751 (.432)
OVERTIME*	.828 (.378)	.713 (.453)	.774 (.418)
FLEXHRS	.750 (.434)	.664 (.473)	.710 (.454)
WRJOB*	.909 (.287)	.970 (.170)	.938 (.241)
CONTRACT	.332 (.472)	.416 (.494)	.372 (.484)
WRSAL*	.338 (.474)	.649 (.478)	.483 (.500)
CHLDWRK*	.826 (.380)	.689 (.464)	.761 (.426)
CHLDFEES*	.915 (.278)	.623 (.485)	.778 (.415)
BONUS	.640 (.481)	.549 (.498)	.597 (.491)
MEALS	.537 (.499)	.525 (.500)	.531 (.499)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

**TABLE 8-E**  
Center Level Worker Benefit Dummies For Teacher-Aides

<b>Variable</b>	<b>Profit (N=181)</b>	<b>Non-Profit (N=182)</b>	<b>All (N=363)</b>
RETIRE*	.240 (.428)	.323 (.469)	.279 (.449)
LIFEINS	.397 (.490)	.489 (.501)	.440 (.497)
MATERN_P	.116 (.322)	.197 (.399)	.154 (.362)
MATERN_U	.540 (.499)	.639 (.481)	.586 (.493)
HEALTH_F*	.043 (.204)	.291 (.455)	.159 (.366)
HEALTH_P*	.445 (.498)	.330 (.471)	.391 (.488)
HEALTH_D	.132 (.339)	.195 (.397)	.161 (.368)
DENTAL	.280 (.450)	.306 (.462)	.292 (.455)
SICKTIME*	.626 (.485)	.701 (.458)	.661 (.473)
VACATION	.697 (.460)	.694 (.461)	.696 (.460)

**TABLE 8-E**  
Continued

<b>Variable</b>	<b>Profit (N=181)</b>	<b>Non-Profit (N=182)</b>	<b>All (N=363)</b>
MTGTIME	.655 (.476)	.662 (.474)	.658 (.474)
OVERTIME*	.701 (.458)	.610 (.488)	.658 (.474)
FLEXHRS	.630 (.483)	.562 (.497)	.598 (.490)
WRJOB	.781 (.414)	.848 (.359)	.812 (.390)
CONTRACT	.291 (.455)	.292 (.456)	.291 (.455)
WRSAL*	.296 (.457)	.575 (.496)	.425 (.495)
CHLDWRK*	.709 (.455)	.568 (.496)	.643 (.479)
CHLDFEES*	.782 (.414)	.489 (.501)	.644 (.479)
BONUS	.556 (.498)	.459 (.499)	.510 (.500)
MEALS	.419 (.499)	.445 (.498)	.431 (.495)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

**TABLE 8-F**  
Correlation Results

Variable	RETIRE	LIFEINS	MATERN P	MATERN U
RETIRE	1.000			
LIFEINS	0.5102	1.0000		
MATERN P	0.4079	0.3000	1.0000	
MATERN U	0.0434	0.2257	-0.2057	1.0000
HEALTH F	0.3180	0.3035	0.1067	0.0769
HEALTH P	0.2188	0.2797	0.1944	0.1718
HEALTH D	0.3091	0.2805	0.2072	0.0684
DENTAL	0.5501	0.4514	0.2865	0.0782
SICKTIME	0.2491	0.2164	0.1443	0.1820
VACATION	0.1037	0.1772	0.1571	0.1269
MTGTIME	0.2117	0.1888	0.1538	0.0855
OVERTIME	0.0301	0.0909	0.0798	0.1476
FLEXHRS	-0.1045	-0.1358	-0.0014	-0.0230
WRJOB	0.1484	0.1406	0.1209	0.1300
CONTRACT	0.1110	-0.0181	0.0035	0.0029
WRSAL	0.3280	0.3062	0.2345	-0.0434
CHLDWRK	-0.0446	-0.0590	-0.0110	0.0782
CHLDFEES	-0.1361	-0.1717	-0.0887	0.0462
BONUS	-0.0078	0.0279	0.1241	0.0984
MEALS	0.1269	0.1511	0.0506	0.0146

**TABLE 8-F**  
Continued

Variable	HEALTH F	HEALTH P	HEALTH D	DENTAL
HEALTH F	1.0000			
HEALTH P	-0.3498	1.0000		
HEALTH D	0.1677	0.2095	1.0000	
DENTAL	0.3923	0.2482	0.3839	1.0000
SICKTIME	0.1652	0.1672	0.1285	0.2423
VACATION	0.0992	0.1615	0.0768	0.1790
MTGTIME	0.0754	0.1859	0.0926	0.2101
OVERTIME	-0.1338	0.1891	0.0364	0.0455
FLEXHRS	-0.1136	-0.0024	-0.0417	-0.0822
WRJOB	0.0431	0.1407	0.0663	0.0994
CONTRACT	0.0635	0.0383	0.0709	0.1153
WRSAL	0.2196	0.0852	0.1867	0.2339
CHLDWRK	-0.0325	-0.0558	-0.0374	0.0235
CHLDFEES	-0.2086	0.0556	-0.0957	-0.0251
BONUS	-0.0702	0.1087	0.0105	0.0617
MEALS	-0.0121	0.0845	0.0353	0.1152

**TABLE 8-F**  
Continued

Variable	SICKTIME	VACATION	MTGTIME	OVERTIME
SICKTIME	1.0000			
VACATION	0.3438	1.0000		
MTGTIME	0.1738	0.1634	1.0000	
OVERTIME	0.0301	0.2041	0.2917	1.0000
FLEXHRS	0.0051	0.0919	0.1558	0.0560
WRJOB	0.2049	0.2195	0.2377	0.1963
CONTRACT	0.1075	0.0873	0.0722	-0.0141
WRSAL	0.2032	0.1203	0.1906	0.0433
CHLDWRK	0.0021	0.0374	0.1029	0.0963
CHLDFEES	-0.0430	-0.0087	0.0859	0.1505
BONUS	0.0257	0.1914	0.1445	0.1936
MEALS	-0.0506	0.0105	0.1686	0.0709

**TABLE 8-F**  
Continued

Variable	FLEXHRS	WRJOB	CONTRACT	WRSAL
FLEXHRS	1.0000			
WRJOB	0.1301	1.0000		
CONTRACT	-0.0100	0.0913	1.0000	
WRSAL	-0.0309	0.1958	0.1382	1.0000
CHLDWRK	0.1605	-0.0225	-0.0003	-0.0524
CHLDFEES	0.1282	-0.0530	0.0449	-0.1305
BONUS	0.1929	0.1822	0.0100	0.0022
MEALS	0.0362	0.0278	-0.0617	-0.0414

**TABLE 8-F**  
Continued

Variable	CHLDWRK	CHLDFEES	BONUS	MEALS
CHLDWRK	1.0000			
CHLDFEES	0.5344	1.0000		
BONUS	0.1242	0.1145	1.0000	
MEALS	0.1264	0.0730	0.1018	1.0000

## Chapter Nine

### **MACRO-LEVEL ANALYSIS: REGRESSION RESULTS**

In order to isolate the influence of human capital characteristics, fringe benefits and center level characteristics on wage determination within the child day care industry, several versions of Equation (7.1.) were estimated.

First, to replicate prior wage determination studies that sought to investigate the influence of the attenuation of property rights or labor donations on wages (Preston 1988, Borjas 1983, Weisbrod 1983), Equation (7.1) was estimated for teachers and teacher-aides without the union variable. These results are reported in Table 9-A. Then, equation (7.1) was re-estimated with the inclusion of the union variable. These results are detailed in Table 9-B. The existence of a union at a center exerts a significantly positive influence on wages of teachers and teacher-aides (14% and 10% respectively). Although for the most part there are no pronounced differences concerning human capital and fringe benefit outcomes (discussed in more detail below), one notable exception is for teacher-aides whose wages are no longer influenced by the existence of paid maternity benefits, suggesting that this benefit may have been a proxy for the union variable. The impact of firm size, however, is now positively significant for teacher-aides. A more significant contrast between Tables 9-A and 9-B has to do with the influence of the ownership variables on wages. When the union variable is omitted, religiously affiliated centers reduce wages of teacher-aides and teachers; publicly owned centers exert positive and significant wage pressures for both types of workers. One could argue that for nonprofit centers that are religiously affiliated, workers are willing to donate labor, consistent with

the nonprofit literature. And, consistent with the property rights findings of Preston, government owned centers are paying higher than average wages as a result of their institutional structure. Contrasting the results of tables 9-A and 9-B highlights a classic example of omitted variable bias. Once the union variable is introduced, unionization, not type of ownership per se, exerts the positive and upward influence on wages.

Continuing with the analysis of the results found in Table 9-B, the influence of human capital characteristics are generally consistent with prior wage studies. For teachers, higher levels of all types of education, as well as experience and tenure raise wages. (It is worth noting that in Table 9-A, although the experience variable is significant for teachers as well, the sign of the coefficient is negative.) Most dramatically and intuitively appealing, teachers with more than four years of college realize on average roughly 16% higher wages than teachers with some college or a four-year degree. Although teacher-aides are rewarded similarly for having more than four years of college and tenure, there are notable differences between returns to other human capital. Teacher-aides are paid 14% less than their college educated peers if, on average, they have less than or equivalent to a high school diploma. In addition, there are no returns for teacher-aides who receive certification or specialized training. I find these results somewhat counterintuitive. One would think that teacher-aides, given their job functions, would be valued more highly for child care certification even if only accompanied by a high school diploma than for a masters degree.

As concerns compensating differential influences, with the exception of written salary schedules, which increase wages for teachers and teacher-aides between 5-6%, the

influence of fringe benefits on wages differs. Further, as with the existence of written salary schedules, some fringe benefits exert a positive influence on wages, and others, more in line with theoretical expectations, exert a negative influence on wages. For teachers, the existence of written job schedules exerts a positive influence on wages of 6%; unpaid maternity leave and dental benefits exert a negative influence on wages. Since teachers are often considered white collar positions, the existence of a written job description would seem to be a positive wage influence if it implies that teachers can be held more accountable for classroom outcomes. The flexibility of unpaid maternity leave might be more indicative of a compensating differential offsetting wages, as is the provision of dental benefits.

The opportunity to bring children to work is a benefit offered to teacher-aides in 64% of all centers and may be a primary fringe benefit luring women of young children to work in child day care centers and earn some extra money. Consistent with Strober et al (1995), I would expect this variable to be significant and negative for teacher-aides. However, I was not surprised to see this was of no significance for teachers, since being a teacher is a profession of choice, or a career, and teachers are more likely to make human capital investments, including gaining experience and tenure, and to expect rewards consistent with these investments. In other words, teachers may value less a benefit that will only benefit them for a short time of their professional life. Fully paid health insurance, offered in only 4% of for-profit centers, but in 29% of nonprofit centers to teacher-aides, has a positive and significant influence on wages of teacher-aides, although positive and not significant for teachers. It is possible that in those nonprofit centers that

pay higher than average wages, certain other characteristics about the job, including certain fringe benefits, may also be higher than average, supporting some of the literature on inefficiencies of nonprofit centers borne out of the nondistribution constraint.

Given the mixed results of the fringe benefit variables, as well as the lack of significance of a majority of them, I consulted the correlation matrix from the previous chapter but could not make an argument that any of the correlations were strong (.70 or higher) enough to suggest a grouping of fringe benefit variables to the extent that such groupings would significantly reduce the number of variables in a meaningful way. Similarly, F-tests performed after the regression to test joint significance of groupings of benefit variables (i.e., to test the joint hypothesis that fully paid health insurance, life insurance, and retirement benefits for teachers, as a group, are significant), displayed no such relationships: thus, all fringe benefit variables were kept for completeness.

Center level characteristics have varying influences on wages and are more dependent upon job title. Staff-child ratios, group size, average center quality, age of center, and racial composition of workforce and of children have no significant influence on wages. Further, whether a teacher works in a for-profit or nonprofit center, regardless of ownership or affiliation (i.e., church affiliated, government owned) has no bearing on wages. However, center size has a significant and positive influence on wages, although the impact is minimal. This result lends support for the monitoring or shirking based wage models. Teachers are supervised by the director(s) of the center, who has limited opportunity to visit each classroom on somewhat of a routine basis. As the size of the center goes up, it becomes more difficult for the director to supervise the teachers; thus,

the positive teacher wage-size relationship may be attributable to the efficiency wages paid to the teachers to prevent shirking. If a center offers before and after school or 24 hour care, teachers' wages are reduced 4% and 45% respectively; however, evening care increases wages 8%. Before and after school care is nothing more than "baby-sitting" until formal classes begin or until parents can come for the child. The existence of such care may require more staffing; to keep costs in check, perhaps centers offer somewhat lower wages overall. Twenty-four hour "baby-sitting" care is only available in a handful of for-profit centers, most likely for specialized purposes, and as such, one could argue that it is difficult to draw any conclusions about the significance of this variable anyway. Evening care is offered in 10% of the centers and is principally early evening care between the hours of 5-7 p.m. Usually a teacher will be left in charge to monitor the aides that stay until closing and to lock up the center. It makes sense then that the positive influence would be reflective of compensation for these additional responsibilities.

The story is a little different for teacher-aides. Again, it is difficult to say anything meaningful about the offering of 24 hour care; however, more significantly, centers that have Headstart programs increase wages by 19%. Higher staff-child ratios (measured on a scale of zero to one), as expected, lower wages by 13%, lending support for compensating differentials based on difficulty of job. Center size has no influence on teacher-aides' wages, which may make sense if one considers that a teacher-aide is supervised/monitored by a teacher within a certain class/group setting, regardless of the number of these settings. Larger group size has a negative influence on wages (albeit

minimal). which may suggest that as group size increases, centers are bound by regulations to increase the number of staff to conform to staff-child ratios or to form another group, exerting upward cost pressures and possibly exerting negative pressure on wages of teacher-aides that will be hired to meet the "head count".

Interestingly, aides that work in publicly regulated centers receive 9% less wages than teacher-aides that work in other types of centers, contrary to the property rights argument of Preston (1988) but more consistent with the labor donations model of Weisbrod (1983). The bigger question is "Why"? All publicly regulated centers are nonprofit centers, but so are publicly owned (public auspice) centers: the government ownership distinction is muted by the over-reliance of publicly regulated centers on government funding. In addition, it would be difficult to find differences in the positive social benefits generated by one type of center versus another. What is it about these two types of centers that makes them so different that teacher-aides receive less at publicly regulated centers? It is possible that stricter regulations as a result of funding, or existing regulations that are more strictly enforced, may require higher staff-child ratios or smaller group sizes.

Lastly, with the exception of the union influence, the other insider/outsider and wage curve variables, namely economic profits and local unemployment, are not significant. The location dummies are consistent with expectations: the two coasts (Connecticut and California) pay higher wages.

**TABLE 9-A**  
 Dependent Variable: LNWAGE  
 UNION Variable Omitted

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
HIGHSCHL	-.039 (-0.558)	-.141 (-2.457)
COLLEGE+	.154 (3.545)	.152 (2.763)
SPECED1	-.013 (-.204)	-.080 (-1.485)
SPECED2	.077 (1.844)	.020 (0.395)
AGE	-.001 (-0.660)	.000 (0.190)
EXPER	-.002 (3.991)	.003 (0.328)
EXPER^2	-.002 (-2.267)	.000 (0.239)
TENURE	.002 (-2.267)	.003 (6.758)
RETIRE	.029 (1.172)	-.003 (-0.125)
LIFEINS	-.002 (-0.072)	-.017 (-0.730)
MATERN_P	.012 (0.460)	.052 (1.808)
MATERN_U	-.050 (-2.326)	-.016 (-0.773)
HEALTH_F	.039 (1.388)	.084 (2.728)
HEALTH_P	-.035 (-1.565)	-.008 (-0.337)
HEALTH_D	.012 (0.500)	-.028 (-1.099)
DENTAL	-.043 (-1.740)	.027 (1.031)
SICKTIME	.018 (0.726)	.036 (1.507)
VACATION	-.010 (-0.364)	-.016 (-0.633)
MTGTIME	-.006 (-0.254)	-.019 (-0.867)

**TABLE 9-A**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
OVERTIME	-.020 (-0.904)	.017 (0.727)
FLEXHRS	.014 (0.720)	-.022 (-1.084)
WRJOB	.063 (1.810)	.033 (1.027)
CONTRACT	.002 (0.138)	-.014 (-0.724)
WRSAL	.058 (3.002)	.051 (2.682)
CHLDWRK	.004 (0.149)	-.057 (-2.341)
CHLDFEES	-.015 (-0.555)	-.001 (-0.036)
BONUS	.012 (0.616)	.027 (1.435)
MEALS	-.012 (-0.623)	-.011 (-0.548)
PROF	.005 (0.228)	.005 (0.201)
PUBAUSP	.129 (2.832)	.086 (1.964)
PUBREGUL	-.018 (-0.351)	-.089 (-1.782)
PUBSUPP	.037 (0.907)	.033 (0.822)
ONSITE	.045 (0.962)	.017 (0.365)
NATCHAIN	-.030 (-0.875)	-.022 (-0.681)
RELIGIOUS	-.040 (-1.625)	-.040 (-1.635)
RATIO	-.049 (-0.835)	-.122 (-2.280)
GROUP	.001 (0.707)	-.002 (-2.130)
QUALITY	.013 (1.064)	.017 (0.955)
CNONWHITE	-.000 (-0.094)	.000 (0.382)

**TABLE 9-A**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
SNONWHITE	-.001 (-1.241)	-.001 (-1.261)
CENTERYR	.000 (0.046)	-.001 (-1.135)
PARTDAY	-.031 (-1.220)	.009 (0.341)
EXTENDED	.026 (1.138)	.012 (0.543)
HEADSTR	.106 (1.121)	.204 (1.862)
SPONSOR	.008 (0.194)	.015 (0.321)
EXPANCARE	-.048 (-1.839)	-.024 (-0.894)
SUMMER	.034 (1.411)	.033 (1.324)
EVENING	.084 (1.703)	.040 (0.754)
WEEKEND	.030 (0.443)	.013 (0.167)
SICKCARE	.039 (0.530)	.046 (0.494)
24HOUR	-.459 (-2.180)	-.549 (-2.138)
BILINGUAL	.044 (1.408)	-.006 (-0.186)

**TABLE 9-A**  
Continued

PROFITHR	-.002 (-0.353)	.006 (1.12)
WORKERS	.003 (2.268)	.002 (1.653)
UNEMP93	.003 (0.107)	-.003 (-0.125)
CAL	.281 (6.611)	.111 (2.791)
COL	-.006 (-0.210)	-.004 (-0.143)
CON	.246 (6.499)	.147 (4.041)
CONSTANT	1.446 (9.716)	1.576 (11.547)
ADJ. R <sup>2</sup>	0.7801	0.6737
N	320	265

Note: t-ratios in parenthesis.

**TABLE 9-B**  
Dependent Variable: LNWAGE

Variable	Teachers	Teacher-Aides
HIGHSCHL	-.037 (-0.523)	-.142 (-2.454)
COLLEGE+	.157 (3.642)	.155 (2.794)
SPECED1	-.009 (-0.145)	-.075 (-1.387)
SPECED2	.083 (1.989)	.019 (0.374)
AGE	-.001 (-0.624)	.001 (0.536)
EXPER	.031 (3.631)	.002 (0.147)
EXPER^2	-.001 (-2.136)	.000 (0.223)
TENURE	.002 (5.253)	.003 (6.752)
RETIRE	.023 (0.932)	-.009 (-0.344)
LIFEINS	-.005 (-0.231)	-.021 (-0.914)
MATERN_P	.000 (0.015)	.041 (1.373)
MATERN_U	-.048 (-2.282)	-.018 (-0.889)
HEALTH_F	.035 (1.231)	.079 (2.526)
HEALTH_P	-.030 (-1.332)	-.001 (-0.033)
HEALTH_D	.009 (0.389)	-.028 (-1.074)
DENTAL	-.042 (-1.712)	.026 (0.980)
SICKTIME	.022 (0.891)	.039 (1.624)
VACATION	-.008 (-0.275)	-.015 (-0.590)
MTGTIME	-.002 (-0.104)	-.014 (-0.624)

**TABLE 9-B**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
OVERTIME	-.025 (-1.141)	.014 (0.606)
FLEXHRS	.009 (0.434)	-.024 (-1.206)
WRJOB	.065 (1.878)	.034 (1.079)
CONTRACT	.004 (0.193)	-.011 (-0.608)
WRSAL	.057 (2.968)	.048 (2.506)
CHLDWRK	.012 (0.504)	-.050 (-1.993)
CHLDFEES	-.018 (-0.668)	-.008 (-0.289)
BONUS	.015 (0.813)	.027 (1.469)
MEALS	-.010 (-0.561)	-.009 (-0.483)
PROF	.008 (0.305)	.006 (0.229)
PUBAUSP	.070 (1.352)	.036 (0.697)
PUBREGUL	-.025 (-0.478)	-.090 (-1.818)
PUBSUPP	.038 (0.943)	.031 (0.781)
ONSITE	.072 (1.509)	.035 (0.743)
NATCHAIN	-.031 (-0.91)	-.022 (-0.675)
RELIGIOUS	-.031 (-1.297)	-.033 (-1.330)
RATIO	-.060 (-1.046)	-.130 (-2.438)
GROUP	.001 (0.682)	-.002 (-2.102)
QUALITY	.017 (1.384)	.015 (1.251)
CNONWHITE	-.000 (-0.097)	.000 (0.370)

**TABLE 9-B**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
SNONWHITE	-.001 (-1.296)	-.001 (-1.339)
CENTERYR	-.000 (-0.127)	-.000 (-1.259)
PARTDAY	-.020 (-0.777)	.022 (0.775)
EXTENDED	.025 (1.112)	.010 (0.437)
HEADSTRT	.095 (1.021)	.188 (1.712)
SPONSOR	.002 (0.043)	.015 (0.324)
EXPANCARE	-.049 (-1.88)	-.032 (-1.171)
SUMMER	-.032 (1.362)	.036 (1.447)
EVENING	.088 (1.788)	.043 (0.798)
WEEKEND	.017 (0.247)	.012 (0.148)
SICKCARE	.038 (0.524)	.041 (0.445)
24HOUR	-.453 (-2.174)	-.547 (-2.133)
BILINGUAL	.051 (1.599)	-.001 (-0.029)

**TABLE 9-B**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
UNION	.139 (2.368)	.101 (1.672)
PROFITHR	-.000 (-0.090)	.007 (1.214)
WORKERS	.003 (2.143)	.002 (1.442)
UNEMP93	.006 (0.187)	-.003 (-0.102)
CAL	.269 (6.318)	.092 (2.255)
COL	-.015 (-0.488)	-.011 (-0.395)
CON	.225 (5.833)	.131 (3.472)
CONSTANT	1.427 (9.631)	1.557 (11.365)
ADJ. R <sup>2</sup>	0.7859	0.6778
N	317	262

Note: t-ratios in parenthesis.

## Chapter Ten

### INVESTIGATION OF WAGES USING MICRO- LEVEL DATA

To further investigate the determinants of wages and the validity of competing theories of compensation, the following reduced form log wage equation, based on equation (7.1), will be estimated using the Teacher Survey data set of 1439 individuals:

$$\ln(W_{il}) = \alpha + \sum \beta_k X_{ikl} + \sum \gamma_n Y_{in} + \sum \Omega_p D_{ip} + \sum \delta_b Z_{ibl} + \varepsilon_i \quad (10.1)$$

where:

- $W_{il}$  = the hourly wage paid at center  $i$  to the  $l$ th worker:
- $X_{ikl}$  = human capital characteristics,  $k$ , of the  $l$ th worker:
- $Y_n$  = the  $n$ th center level characteristics:
- $D_p$  = the  $p$ th special program offered at the center:
- $Z_{ibl}$  = the availability of the  $b$ th type of benefit for the  $l$ th worker.

The unit of observation is now the individual as opposed to the center: separate equations will be estimated for teachers and teacher-aides within center type (for-profit and nonprofit) to replicate the macro-level analysis. The same variables will also be used, except now human capital characteristics are specific to individual  $l$  as opposed to reflecting center-level averages by worker type  $j$ . (Tables 7-A,B,C, and D give a complete list of variables by vector. Note: there was no corollary to the SPECED1 variable in the micro-level data set.)

Reported in Tables 10-A and 10-B are summary statistics of human capital by job title (teacher and teacher-aides) within center type (for-profit and nonprofit) for the micro-level data. Nonprofit centers pay higher wages to both types of workers. Teachers in nonprofit centers have more schooling, specialized education, experience and tenure than do their for-profit counterparts. The education of teacher-aides is not different

between the two sectors, but aides at nonprofit centers are older, have more experience and tenure. (Experience and tenure differences between macro-level and micro-level data may be reflective of the differences in the data collection method: the individuals self-responded to the survey and may have "guesstimated" somewhat.)

Tables 10-C,D, and E report center-level characteristics and benefits by worker type (teacher and teacher-aides) for for-profit and nonprofit centers respectively, and are similar to the results from the macro-level analysis. However, there are some exceptions to this generalization. First, for-profit centers are represented in only 46.5% of the micro-level data as opposed to 50% of the macro-level data; publicly supported and publicly regulated centers represented a higher proportion of ownership, whereas centers that part of national chains are underrepresented in this sample. Centers are, on average, smaller (13 total staff employed versus 16 for the total sample), and there are more significant differences between the types of special programs offered between for-profit and nonprofit centers. Thus, regression results may differ as a result of the mix of centers represented in the micro-level data set. It should also be noted that, although on average three teachers and/or teacher-aides were sampled from each center, it is possible that six, seven, or even eight teachers and/or teacher-aides were surveyed in any one center.

In order to investigate and isolate the influence of these variables on wage determination, I ran OLS regressions of equation (10.1) for both teacher and teacher-aides using the micro-level data set. Please refer to the next Chapter for a review of regression results.

**TABLE 10-A**  
**Teachers' Human Capital Characteristics Profile By Profit and Non-Profit Centers**

<b>Variable</b>	<b>Profit (N=360)</b>	<b>Non-Profit (N=371)</b>	<b>All (N=731)</b>
WAGE*	6.801 (.208)	7.937 (3.347)	7.374 (2.88)
HIGHSCHL*	.200 (.401)	.159 (.366)	.179 (.384)
COLLEGE+	.311 (.464)	.348 (.477)	.330 (.470)
SPECED2*	.208 (.406)	.214 (.410)	.211 (.408)
AGE*	33.371 (12.070)	36.238 (11.364)	34.822 (11.797)
EXPER*	8.429 (6.994)	9.90 (7.179)	9.172 (7.121)
TENURE*	33.520 (48.341)	40.563 (48.711)	37.102 (48.622)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

**TABLE 10-B**  
**Teacher-Aides' Human Capital Characteristics Profile By Profit and Non-**  
**Profit Centers**

<b>Variable</b>	<b>Profit (N=233)</b>	<b>Non-Profit (N=311)</b>	<b>All (N=544)</b>
WAGE*	5.918 (1.52)	6.422 (2.13)	6.203 (1.907)
HIGHSCHL	.283 (.452)	.318 (.467)	.303 (.460)
COLLEGE+	.288 (.454)	.167 (.374)	.219 (.414)
SPECED2	.141 (.349)	.126 (.333)	.132 (.339)
AGE*	29.272 (10.531)	34.395 (12.661)	32.192 (12.052)
EXPER*	5.664 (5.042)	6.864 (6.045)	6.350 (5.664)
TENURE*	16.645 (22.866)	27.804 (40.093)	22.976 (34.161)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

**TABLE 10-C**  
Center Level Characteristics

<b>Variable</b>	<b>Profit (N=593)</b>	<b>Non-Profit (N=682)</b>	<b>All (N=1275)</b>
PROFIT	1.000 (.000)	—	.465 .498
PUBAUSP	—	.157 (.364)	.084 (.277)
PUBSUPP*	.029 (.167)	.167 (.373)	.103 (.304)
PUBREGUL	—	.133 (.340)	.071 (.258)
ONSITE	.027 (.162)	.065 (.246)	.047 (.212)
NATCHAIN	.251 (.434)	—	.117 (.321)
RELIGIOUS*	.024 (.152)	.346 (.476)	.196 (.397)
QUALITY*	3.962 (.832)	4.252 (.814)	4.118 (.835)
RATIO*	.176 (.127)	.223 (.177)	.202 (.158)
GROUP	13.163 (9.272)	12.841 (6.030)	12.990 (7.690)
SNONWHITE*	21.208 (26.890)	35.318 (32.743)	28.755 (30.962)
CNONWHITE*	22.232 (23.573)	39.233 (34.205)	31.196 (30.838)
CENTERYR*	9.415 (7.476)	17.229 (17.079)	13.661 (14.109)
PROFITHR	.360 (1.176)	.469 (1.622)	.418 (1.689)
WORKERS	13.366 (6.367)	13.501 (8.139)	13.438 (7.366)
UNION	—	.117 (.322)	.063 (.244)
PARTDAY	.879 (.327)	.694 (.461)	.780 (.414)
PRTDAYEX	.700 (.459)	.421 (.494)	.551 (.498)
SPONSOR	.032 (.176)	.068 (.251)	.051 (.220)

**TABLE 10-C**  
Continued

<b>Variable</b>	<b>Profit (N=593)</b>	<b>Non-Profit (N=682)</b>	<b>All (N=1275)</b>
HEADSTRT	—	.033 (.178)	.017 (.131)
EXPANCARE*	.703 (.457)	.435 (.496)	.560 (.497)
SUMMER*	.597 (.491)	.343 (.475)	.461 (.499)
EVENING	.034 (.181)	.046 (.209)	.040 (.196)
WEEKEND	.022 (.147)	.019 (.137)	.020 (.142)
SICKCARE	.013 (.115)	.037 (.188)	.026 (.159)
24HOUR	.005 (.071)	—	.002 (.049)
BILNGUAL	.081 (.273)	.135 (.342)	.110 (.313)
CAL	.224 (.417)	.264 (.441)	.245 (.431)
COL	.275 (.447)	.246 (.431)	.260 (.439)
CON	.287 (.453)	.247 (.432)	.266 (.442)
UNEMP93*	6.102 (1.960)	6.649 (2.297)	6.394 (2.163)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

**TABLE 10-D**  
Center Level Worker Benefit Dummies For Teachers

<b>Variable</b>	<b>Profit (N=360)</b>	<b>Non-Profit (N=371)</b>	<b>All (N=731)</b>
RETIRE*	.233 (.424)	.388 (.488)	.312 (.464)
LIFEINS*	.433 (.496)	.590 (.492)	.513 (.500)
MATERN_P	.114 (.318)	.202 (.402)	.159 (.366)
MATERN_U	.675 (.469)	.714 (.452)	.695 (.461)
HEALTH_F*	.100 (.300)	.391 (.489)	.248 (.432)
HEALTH_P	.494 (.501)	.383 (.487)	.438 (.496)
HEALTH_D	.156 (.363)	.191 (.394)	.174 (.379)
DENTAL*	.283 (.451)	.402 (.491)	.343 (.475)
SICKTIME*	.781 (.414)	.914 (.281)	.848 (.359)
VACATION	.831 (.376)	.884 (.321)	.858 (.350)

TABLE 10-D

Continued

Variable	Profit (N=360)	Non-Profit (N=371)	All (N=731)
MTGTIME	.772 (.420)	.749 (.434)	.761 (.427)
OVERTIME*	.814 (.390)	.674 (.469)	.743 (.437)
FLEXHRS	.747 (.435)	.704 (.457)	.725 (.447)
WRJOB	.903 (.297)	.957 (.203)	.930 (.255)
CONTRACT*	.239 (.427)	.213 (.410)	.226 (.418)
WRSAL*	.319 (.467)	.596 (.491)	.460 (.499)
CHLDWRK*	.800 (.401)	.722 (.448)	.761 (.427)
CHLDFEES*	.864 (.343)	.628 (.484)	.744 (.437)
BONUS	.639 (.481)	.579 (.494)	.609 (.488)
MEALS	.458 (.499)	.477 (.500)	.468 (.499)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

**TABLE 10-E**  
Center Level Worker Benefit Dummies For Teacher-Aides

<b>Variable</b>	<b>Profit (N=233)</b>	<b>Non-Profit (N=311)</b>	<b>All (N=544)</b>
RETIRE*	.223 (.417)	.315 (.465)	.276 (.447)
LIFEINS	.429 (.496)	.486 (.501)	.461 (.499)
MATERN_P	.124 (.331)	.180 (.385)	.156 (.363)
MATERN_U	.635 (.482)	.637 (.482)	.636 (.482)
HEALTH_F*	.073 (.261)	.331 (.471)	.221 (.415)
HEALTH_P*	.455 (.499)	.286 (.453)	.358 (.480)
HEALTH_D	.142 (.349)	.141 (.349)	.142 (.349)
DENTAL	.288 (.454)	.331 (.471)	.313 (.464)
SICKTIME*	.665 (.473)	.778 (.416)	.730 (.444)
VACATION	.661 (.474)	.759 (.428)	.717 (.451)

**TABLE 10-E**  
Continued

<b>Variable</b>	<b>Profit (N=233)</b>	<b>Non-Profit (N=311)</b>	<b>All (N=544)</b>
MTGTIME	.704 (.458)	.678 (.468)	.689 (.463)
OVERTIME*	.708 (.456)	.563 (.497)	.625 (.485)
FLEXHRS*	.687 (.465)	.566 (.496)	.618 (.486)
WRJOB	.850 (.358)	.862 (.346)	.857 (.351)
CONTRACT	.142 (.349)	.164 (.371)	.154 (.362)
WRSAL*	.309 (.463)	.540 (.499)	.441 (.497)
CHLDWRK*	.734 (.443)	.595 (.492)	.654 (.476)
CHLDFEES*	.781 (.414)	.486 (.501)	.612 (.488)
BONUS	.511 (.501)	.495 (.501)	.502 (.500)
MEALS	.382 (.487)	.444 (.498)	.417 (.494)

The numbers in each cell are the means. The values in parenthesis are the standard deviations. (\*) indicates that the means between for-profit and nonprofit centers are different at the 5% level.

## Chapter Eleven

### **REGRESSION RESULTS FOR MICRO-LEVEL DATA**

To further investigate the influence of human capital characteristics, fringe benefits and center level characteristics on wage determination within the child day care industry, several versions of Equation (10.1) were estimated and results contrasted with those from the macro-level analysis. Overall, the results are similar with respect to human capital influences, fringe benefits and special programs offered at the centers, but differ with respect to ownership, discrimination, and unemployment factors.

First, to replicate the macro-level estimation, Equation (10.1) was estimated for teachers and teacher-aides using the full set of variables, excluding the union variable. These results are reported in Table 11-A. Equation (10.1) was then re-estimated with the inclusion of the union variable. These results are reported in Table 11-B. The existence of a union at a center exerts a significantly positive influence on wages of teachers and teacher-aides (16% and 11% respectively). Differences concerning human capital and fringe benefit outcomes (discussed in more detail below) include the significance of unpaid maternity leave and bonuses on teacher's pay, as well as the lack of significance of summer programs once the union variable is included. For teacher-aides, the existence of retirement benefits as well as age exert upward influences on wages. However, as with the macro-level analysis, a more significant contrast between Tables 11-A and 11-B has to do with the influence of the ownership variables on wages. When the union variable is omitted, publicly owned (government owned) centers exert positive and significant wage pressures for teachers (and interestingly, not of teacher-aides).

consistent with the property rights findings of Preston (1988). Contrasting the results of tables 8-A and 8-B highlights, yet again, a classic example of omitted variable bias. Once the union variable is introduced, unionization, not type of ownership per se, exerts the positive and upward influence on wages.

To continue analysis of Table 11-B results, human capital influences are generally consistent with prior wage studies. For teachers, higher levels of all types of education, as well as experience and tenure raise wages. However, the impact on wages is not as pronounced as they were with the macro-level data. For instance, teachers with more than four years of college realize 10% higher wages than their peers with at least some college or a four year degree; these same teachers would realize on average roughly 16% higher wages if one were to base their interpretation on the macro-level analysis. Both types of workers are paid 7% less wages if they have less than or equivalent to a high school diploma than their peers who have some college or a four year degree. In the macro-level analysis, teachers were not penalized for having lower levels of schooling. In addition, there are no returns for teachers who receive certification, yet teacher-aides do experience a 5% increase in wages when certified. This is more consistent with expectations than what was found in the macro-level analysis (where teachers were rewarded for certification but teacher-aides were not).

As concerns compensating differential influences, with the exception of written salary schedules which increase wages for teachers and teacher-aides 3% and 7% respectively, the influence of fringe benefits on wages differs dependent on the variable in question. Further, some fringe benefits exert a positive influence on wages, and others,

more in line with theoretical expectations. exert a negative influence on wages. For teachers, the existence of written job schedules no longer exerts a positive influence on wages of 6%; the existence of dental benefits, partially paid health insurance, overtime, and flexible work hours exert a negative influence on wages. Time allowed for meetings and training exerts a positive influence on wages.

The opportunity to bring children to work and overtime exert negative influences on wages, while the existence of full health benefits, sicktime, and a written contract increases wages for teacher-aides. Interestingly, the effect of fringe benefits on wages differs not only by worker type, but the outcomes significantly differ by the level of the analysis (macro-level or micro-level). Tables 11-C and 11-D summarize fringe benefit results by worker type from both the macro-level and micro-level regressions. Some of these differences can be explained by the different mix or weighting of centers, no doubt. However, it is also possible that as a result of using individual-level data for human capital characteristics and center-level data for center-level and fringe benefit characteristics, OLS standard errors of the center-level variables could be underestimated (i.e., t-statistics are overestimated) leading to misinterpretation of the significance of some of the variables. Before explaining this econometric issue in detail, it would make sense to complete the review of regression results for center-level variables first.

As contrasted with the results of the macro-level analysis, micro-level analysis results for center-level characteristics and endowments are somewhat different. Average center-level quality is now wage affecting, with higher quality centers (as measured on a scale of 1 to 7) paying higher wages to both types of workers. Staff-child ratios and

group-size no longer are significantly related to wages for teacher-aides. If a center offers before and after school programs, teachers' wages are reduced 5%; extended care increases wages 4%, as does offering summer programs. As noted previously, before and after school care is nothing more than "baby-sitting" until formal classes begin or until parents can come for the child. Extended care and summer programs are more specialized and occur during times that teachers ordinarily do not work. It makes sense that the positive influence would be reflective of additional compensation to motivate teachers to work during these times.

The story is a little different for teacher-aides. Only the offering of twenty-four hour care is wage affecting, but it is difficult to draw any conclusions from this result since this form of care is only available in a handful of for-profit centers. Older centers pay less to teacher-aides: center size and profits-per-hour are not wage affecting for either worker type. Although the racial composition of children is not significant, as the percent of nonwhite teachers increases, wages decrease, suggesting a discriminatory component to the wage-determination process for teachers, but interestingly, not for teacher-aides. Further, as the local unemployment rate increases by 1%, teacher wages increase 1.2%, yet the wages of teacher-aides are not affected (and note that the sign of the coefficient for teacher-aides is positive). This result is counter-intuitive on all levels. For instance, a downward shift in the demand for teachers, assuming an upward sloping supply function, should cause wages to fall. Given the non-competitive wage determination models offered by Blanchflower and Oswald (1994), one would also expect that as the rate of local unemployment goes up, wages should go down.

Of even more interest, the micro-level analysis outcomes associated with the ownership variables tell somewhat of a different story than the outcomes associated with the macro-level analysis. In both cases, the profit status designation is not wage affecting, but ownership distinctions are of greater importance and significance. These results are contrasted in Tables 11-E and 11-F. For teachers, ownership is not a wage affecting issue once unions are controlled for in the macro-level analysis, but in the micro-level analysis, even after controlling for unions, various forms of ownership become significantly wage affecting. For teacher-aides, although publicly regulated centers offer lower wages consistent with the results of the macro-level analysis, other forms of ownership become wage affecting as well. For both worker types, onsite centers pay higher wages, and for-profit centers that are part of a national chain pay lower wages; interestingly, religiously affiliated centers pay lower wages to teachers, but have no affect on the wages of teacher-aides. These results lend some support to the property rights theory; onsite child day care centers may have a certain amount of monopoly power that could allow a certain amount of inefficiencies in the form of higher wages. For-profit centers would be expected to act as a competitive firm and as such would cost minimize to maximize profits. Consistent with the nonprofit literature, religiously affiliated centers should benefit from some forms of labor donations; it is however curious that these results are not consistent for teacher-aides.

Apparently, the conclusions one can draw concerning wage determination within the child day care industry from these two types of analyses, although similar with respect to human capital influences and in general somewhat similar with respect to fringe benefit

levels and special programs offered at the centers, becomes somewhat confusing once one considers the impact of ownership, discrimination, and unemployment factors. In particular, as mentioned earlier, care must be taken when evaluating the results of variables in the micro-level analysis that are collected at the center level (such as the center level characteristics/endowments and fringe benefit variables). The sample size for estimating the coefficients on the human capital variables is the number of individual observations, but the true sample size for estimating the coefficients on the center level characteristics/endowments and fringe benefit variables is only the number of centers, not individuals. In this type of model, often referred to as either an "error components", "variance components", or "random coefficients" model, there is no true independent observation on the center-level variables for each person, just one per center, unless you have only one worker per center. In the micro-level data set, the average number of workers surveyed per center is three. OLS estimation assumes that there is an independent observation on the center-level variables for each person and that the center specific intercept is predicted by the observed center-level variables in the model and that there are no unobserved center-level variables that affect wages. Overall, standard errors of the aggregate (or center-level variables) in the micro-level analysis are biased downward (Moulton 1986). Although standard econometric packages offer solutions for estimating random effects models using panel data (the situation here), the problem is not as significant if the number of individuals per center in the sample is small. Given that on average three individuals were surveyed, which means that in many cases at most two of any worker type were surveyed (i.e., teacher or teacher-aide), I did not view this as

much of a problem in this analysis.

Finally, as previously stated, both levels of analysis are subjected to selectivity bias of estimated coefficients as a result of employer or employee selection based on unobservable characteristics that are also related to wages in a systematic way. Although there was little that could be done in the macro-level analysis to control for this potential bias, there is more of a possibility with the micro-level data set as suggested by the work of Holtmann & Idson (1993). However, as discussed in Chapter Six, it is not believed that the selectivity bias issue is serious enough to pursue in this study, although the potential for such bias should be kept in mind when interpreting the results.

**TABLE 11-A**  
 Dependent Variable: LNWAGE  
 UNION Variable Omitted

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
HIGHSCHL	-.077 (-3.097)	-.070 (-3.280)
COLLEGE+	.099 (5.110)	.138 (6.299)
SPECED2	.015 (0.725)	.049 (1.945)
AGE	.001 (1.390)	.000 (0.481)
EXPER	.024 (5.842)	.009 (2.009)
EXPER^2	-.001 (-4.447)	-.000 (-0.779)
TENURE	.001 (4.235)	.001 (4.735)
RETIRE	.068 (2.520)	.030 (1.074)
LIFEINS	.021 (0.919)	-.026 (-0.892)
MATERN_P	.019 (0.628)	-.005 (-0.144)
MATERN_U	-.033 (-1.548)	-.042 (-1.696)
HEALTH_F	.036 (1.249)	.079 (2.397)
HEALTH_P	-.059 (-2.533)	-.044 (-1.609)
HEALTH_D	.028 (1.051)	-.002 (-0.056)
DENTAL	-.053 (-2.016)	-.008 (-0.250)
SICKTIME	.021 (0.806)	.061 (2.155)
VACATION	-.009 (-0.300)	-.026 (-0.962)
MTGTIME	.050 (2.302)	.024 (0.970)

**TABLE 11-A**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
OVERTIME	-.069 (-3.168)	-.049 (-2.114)
FLEXHRS	-.046 (-2.199)	.027 (1.172)
WRJOB	.007 (0.201)	.017 (0.450)
CONTRACT	-.008 (-0.363)	.052 (2.097)
WRSAL	.033 (1.718)	.071 (3.401)
CHLDWRK	-.038 (-1.427)	-.085 (-2.992)
CHLDFEES	.023 (0.871)	.033 (1.189)
BONUS	.030 (1.541)	.022 (1.065)
MEALS	-.025 (-1.275)	.021 (0.974)
PROF	-.037 (-1.403)	-.011 (-0.421)
PUBAUSP	.133 (2.923)	-.035 (-0.756)
PUBREGUL	.013 (0.220)	-.145 (-2.614)
PUBSUPP	.050 (1.113)	.034 (0.775)
ONSITE	.167 (3.349)	.220 (5.262)
NATCHAIN	-.072 (-1.936)	-.084 (-2.128)
RELIGIOUS	-.084 (-3.206)	-.025 (-0.919)
RATIO	-.024 (-0.368)	-.054 (-0.952)
GROUP	.002 (1.396)	.002 (1.519)
QUALITY	.022 (1.718)	.043 (3.371)
CNONWHITE	-.000 (-0.542)	.001 (1.066)

**TABLE 11-A**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
SNONWHITE	-.001 (-1.869)	-.001 (-1.532)
CENTERYR	-.000 (-0.344)	-.002 (-2.216)
PARTDAY	-.014 (-0.489)	-.044 (-1.431)
EXTENDED	.044 (1.921)	.038 (1.508)
HEADSTRT	.007 (0.077)	-.050 (-.0565)
SPONSOR	-.016 (-0.381)	.074 (1.505)
EXPANCARE	-.050 (-2.000)	-.023 (-0.855)
SUMMER	.042 (1.754)	.037 (1.354)
EVENING	-.013 (-0.237)	.018 (0.295)
WEEKEND	.029 (0.413)	.085 (0.983)
SICKCARE	.013 (0.193)	.007 (0.100)
24HOUR	-.029 (-0.137)	-.375 (-2.578)
BILINGUAL	.026 (0.804)	-.003 (-0.085)

**TABLE 11-A**  
Continued

PROFITHR	-.003 (-0.643)	.001 (1.294)
WORKERS	.001 (0.918)	-.000 (-0.196)
UNEMP93	0.130 (2.283)	-.007 (-1.168)
CAL	.272 (6.615)	.160 (3.776)
COL	.042 (1.336)	.044 (1.296)
CON	.216 (6.077)	.221 (5.602)
CONSTANT	1.460 (17.276)	1.419 (17.017)
ADJ. R <sup>2</sup>	0.6351	0.6286
N	598	425

Note: t-ratios in parenthesis.

**TABLE 11-B**  
Dependent Variable: LNWAGE

Variable	Teachers	Teacher-Aides
HIGHSCHL	-.078 (-3.116)	-.070 (-3.280)
COLLEGE+	.098 (5.057)	.138 (6.299)
SPECED2	.012 (0.565)	.049 (1.945)
AGE	.001 (1.271)	.009 (2.009)
EXPER	.023 (5.816)	.009 (2.009)
EXPER^2	-.001 (-4.420)	-.000 (-0.779)
TENURE	.001 (4.017)	.001 (4.735)
RETIRE	.061 (2.254)	.052 (2.097)
LIFEINS	.010 (0.417)	-.026 (-0.892)
MATERN_P	-.005 (-0.174)	-.005 (-0.144)
MATERN_U	-.035 (-1.649)	-.042 (-1.696)
HEALTH_F	.031 (1.092)	.079 (2.397)
HEALTH_P	-.060 (-2.556)	-.044 (-1.609)
HEALTH_D	.028 (1.075)	-.002 (-0.056)
DENTAL	-.049 (-1.824)	-.008 (-0.250)
SICKTIME	.026 (0.995)	.061 (2.155)
VACATION	-.003 (-0.103)	-.027 (-0.962)
MTGTIME	.059 (2.660)	.024 (0.970)

**TABLE 11-B**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
OVERTIME	-.073 (-3.378)	-.049 (-2.114)
FLEXHRS	-.050 (-2.392)	.027 (1.172)
WRJOB	.005 (0.161)	.017 (0.450)
CONTRACT	-.011 (-.0531)	.052 (2.097)
WRSAL	.034 (1.793)	.071 (3.401)
CHLDWRK	-.033 (-1.214)	-.085 (-2.992)
CHLDFEES	.012 (0.451)	.033 (1.189)
BONUS	.032 (1.662)	.022 (1.065)
MEALS	-.019 (-0.942)	.021 (0.974)
PROF	-.041 (-1.562)	-.011 (-0.421)
PUBAUSP	.059 (1.142)	-.035 (-0.756)
PUBREGUL	.020 (0.351)	-.145 (-2.614)
PUBSUPP	.050 (1.110)	.034 (0.775)
ONSITE	.199 (3.944)	.220 (5.262)
NATCHAIN	-.065 (-1.755)	-.084 (-2.128)
RELIGIOUS	-.084 (-3.222)	-.025 (-0.919)
RATIO	-.029 (-0.453)	-.054 (-0.952)
GROUP	.002 (1.488)	.002 (1.519)
QUALITY	.023 (1.790)	.043 (3.371)
CNONWHITE	-.000 (-0.739)	.001 (1.066)

**TABLE 11-B**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
SNONWHITE	-.001 (-1.799)	-.001 (-1.532)
CENTERYR	-.000 (-0.435)	-.002 (-2.216)
PARTDAY	-.002 (-0.071)	-.044 (-1.431)
EXTENDED	.046 (1.993)	.038 (1.508)
HEADSTRT	-.013 (-0.140)	-.050 (-0.565)
SPONSOR	-.017 (-0.409)	.074 (1.505)
EXPANCARE	-.045 (-1.798)	-.023 (-0.855)
SUMMER	.038 (1.588)	.037 (1.354)
EVENING	-.004 (-0.076)	.018 (0.295)
WEEKEND	.013 (0.182)	.085 (0.983)
SICKCARE	.015 (0.233)	.007 (0.100)
24HOUR	-.014 (-0.067)	-.375 (-2.578)
BILINGUAL	.026 (0.775)	-.003 (-0.085)

**TABLE 11-B**  
Continued

<b>Variable</b>	<b>Teachers</b>	<b>Teacher-Aides</b>
UNION	.164 (2.886)	.112 (1.936)
PROFITHR	-.002 (-0.391)	.007 (1.294)
WORKERS	.001 (0.663)	-.000 (-0.196)
UNEMP93	.012 (2.022)	-.007 (-1.168)
CAL	.258 (6.252)	.160 (3.776)
COL	.030 (0.949)	.045 (1.296)
CON	.190 (5.224)	.221 (5.602)
CONSTANT	1.482 (17.520)	1.419 (17.017)
ADJ. R <sup>2</sup>	0.6415	0.6286
N	591	425

Note: t-ratios in parenthesis.

**TABLE 11-C**  
Fringe Benefits for Teachers: Macro-level vs. Micro-Level Results

Variable	Macro-level	Micro-Level
RETIRE	.023 (0.932)	.061 (2.254)
LIFEINS	-.005 (-0.231)	.010 (0.417)
MATERN_P	.000 (0.015)	-.005 (-0.174)
MATERN_U	-.048 (-2.282)	-.035 (-1.649)
HEALTH_F	.035 (1.231)	.031 (1.092)
HEALTH_P	-.030 (-1.332)	-.060 (-2.556)
HEALTH_D	.009 (0.389)	.028 (1.075)
DENTAL	-.042 (-1.712)	-.049 (-1.824)
SICKTIME	.022 (0.891)	.026 (0.995)
VACATION	-.008 (-0.275)	-.003 (-0.103)
MTGTIME	-.002 (-0.104)	.059 (2.660)
OVERTIME	-.025 (-1.141)	-.073 (-3.378)
FLEXHRS	.009 (0.434)	-.050 (-2.392)
WRJOB	.065 (1.878)	.005 (0.161)
CONTRACT	.004 (0.193)	-.011 (-0.531)
WRSAL	.057 (2.968)	.034 (1.793)
CHLDWRK	.012 (0.504)	-.033 (-1.214)
CHLDFEES	-.018 (-0.668)	.012 (0.451)
BONUS	.015 (0.813)	.032 (1.662)
MEALS	-.010 (-0.561)	-.019 (-0.942)

**TABLE 11-D**  
Fringe Benefits for Teacher-Aides: Macro-level vs. Micro-Level Results

<b>Variable</b>	<b>Macro-level</b>	<b>Micro-Level</b>
RETIRE	-.009 (-0.344)	.052 (2.097)
LIFEINS	-.021 (-0.914)	-.026 (-0.892)
MATERN_P	.041 (1.373)	-.005 (-0.144)
MATERN_U	-.018 (-0.889)	-.042 (-1.696)
HEALTH_F	.079 (2.526)	.079 (2.397)
HEALTH_P	-.001 (-0.033)	-.044 (-1.609)
HEALTH_D	-.028 (-1.074)	-.002 (-0.056)
DENTAL	.026 (0.980)	-.008 (-0.250)
SICKTIME	.039 (1.624)	.061 (2.155)
VACATION	-.015 (-0.590)	-.027 (-0.962)
MTGTIME	-.014 (-0.624)	.024 (0.970)
OVERTIME	.014 (0.606)	-.049 (-2.114)
FLEXHRS	-.024 (-1.206)	.027 (1.172)
WRJOB	.034 (1.079)	.017 (0.450)
CONTRACT	-.011 (-0.608)	.052 (2.097)
WRSAL	.048 (2.506)	.071 (3.401)
CHLDWRK	-.050 (-1.993)	-.085 (-2.992)
CHLDFEES	-.008 (-0.289)	.033 (1.189)
BONUS	.027 (1.469)	.022 (1.065)
MEALS	-.009 (-0.483)	.021 (0.974)

**TABLE 11-E**  
Ownership Variables. Teachers: Macro-level vs. Micro-Level Results

<b>Variable</b>	<b>Macro-level</b>	<b>Micro-Level</b>
PROF	.008 (0.305)	-.041 (-1.562)
PUBAUSP	.070 (1.352)	.059 (1.142)
PUBREGUL	-.025 (-0.478)	.020 (0.351)
PUBSUPP	.038 (0.943)	.050 (1.110)
ONSITE	.072 (1.509)	.199 (3.944)
NATCHAIN	-.031 (-0.91)	-.065 (-1.755)
RELIGIOUS	-.031 (-1.297)	-.084 (-3.222)

Note: t-ratios in parenthesis.

**TABLE 11-F**  
Ownership Variables. Teacher-Aides: Macro-level vs. Micro-Level Results

<b>Variable</b>	<b>Macro-level</b>	<b>Micro-Level</b>
PROF	.006 (0.229)	-.011 (-0.421)
PUBAUSP	.036 (0.697)	-.035 (-0.756)
PUBREGUL	-.090 (-1.818)	-.145 (-2.614)
PUBSUPP	.031 (0.781)	.034 (0.775)
ONSITE	.035 (0.743)	.220 (5.262)
NATCHAIN	-.022 (-0.675)	-.084 (-2.128)
RELIGIOUS	-.033 (-1.330)	-.025 (-0.919)

Note: t-ratios in parenthesis.

## Chapter Twelve

### CONCLUSION

Using a new data set obtained from child day care centers in California, Colorado, Connecticut and North Carolina, this paper investigated the determinants of wages in the child day care industry. Wage equations were estimated separately for teachers and teacher-aides, controlling for human capital variables, firm characteristics and nonwage compensation. I found that, on balance, the results are consistent with the results of previous studies and most theoretical expectations: increasing levels of human capital improve wages to varying degrees by job type, fringe benefit results are inconsistent but compensating differentials do exist for job difficulty, and larger firm size exerts a positive influence on wages.

The results suggest fairly competitive wage determination in the industry. There is no evidence of profit sharing: higher profits do not translate into higher wages, although the outcomes differ for the macro- versus micro-level analysis when one considers the impact of ownership, discrimination, and unemployment factors. However, profit status (for-profit versus nonprofit) is never significant. On balance, union membership may be the only consistent and significant explanation for why any non-competitive wage differential exists at all. The results presented here and the finding of Blau (1993) which shows that the labor supply elasticity to child care is around 2.0 help explain the relatively low wages of child day care center workers.

Child day care workers are not of low quality, despite wages, and teachers (and teacher-aides in nonprofit centers) actually have admirable levels of job tenure given that

young children change classrooms each September. Workers do realize lower returns to human capital on average than the labor force in general (Blau 1992); however, there is some compensation for additional job responsibilities or job difficulty, as a result of low staff-child ratios, larger group size or special programs. In addition, there are a decent complement of fringe benefits that accompany this apparently lower wage. Further, no strong link could be made between center average quality and wages. Therefore, public policy needs to focus on more than just increasing wages to increase quality of services to lead to improved child outcomes. Perhaps society needs to re-evaluate its expectations more clearly and define exactly what is, as well as what contributes to, *quality* child day care service. Current research by Blau (1997) and Krueger (1997), for example, challenges conventional wisdom in that their findings reveal no apparent relationship between staff-child ratios and child outcomes.

As the wage determination process in this industry is more clearly understood as a result of economic studies such as this one, it may well be that continued research in the field of early childhood education may provide more public policy solutions for improving the quality of child day care services.

## APPENDIX A: THE PROCESS QUALITY INDEX

Classroom process describes aspects of the overall quality of the services received by children. More specifically, classroom process refers to the way that children are cared for, such as the amount of warmth a caregiver shows for a child, or the emotional tone that is present in the classroom. The activities that are available for children to engage in, and the learning opportunities that are present are also aspects of classroom process.

To determine a single score to represent classroom process quality, a process quality index was created using principal component techniques. A total of 228 infant/toddler classrooms and 521 preschool classrooms were observed to collect information about process quality. Infant/toddler rooms were defined as those where the majority of children were less than two-and-a-half years old. Preschool classrooms were defined as those where the majority of children were at least two-and-a-half years old, but not yet in kindergarten. At each center, two classrooms were randomly chosen: one preschool and one infant/toddler room if the center served both age groups. No school age or kindergarten classrooms were observed.

In each state, a pair of observers who were trained in a week-long intensive program visited each center for one day (from 8:30 a.m. to 3:00 p.m.) to observe the classrooms. They used two well-established global observation instruments to comprehensively assess the day-to-day quality of care provided for children: the Early Childhood Environmental Rating Scale (ECERS) (Harms & Clifford 1980), and its infant/toddler version, the Infant/Toddler Environmental Rating Scale (ITERS) (Harms, Cryer & Clifford, 1990). The ECERS is a 37-item scale organized under seven categories: personal care routines,

furnishings and display for children. language-reasoning experience. fine and gross motor activities. creative activities. social development. and adult needs. Each item is scored on a seven point scale from inadequate to excellent. The ITERS is a similar instrument designed to assess center rooms for children from birth to 30 months of age.

In addition, observers used two instruments designed specifically to measure teacher involvement: the Caregiver Interaction Scale (Arnett 1989) which measures the lead teacher's sensitivity, harshness, degree of attachment, and permissiveness; and the Teacher Involvement Scale (Howes & Stewart 1987), which measures the amount and quality of teacher-child interactions. For all four instruments, test of interrater reliability at each site and between sites were very high. (See Helburn 1995 for further details.) Observers also counted classroom staffing ratios and group size five different times throughout the day.

Principal components analyses were performed including both the factor and the total scores from most of the measures of process quality (ECERS, ITERS, Caregiver Interaction, and Adult Involvement Scale). The principal components analyses were conducted separately for the infant/toddler and preschool data. In both infant/toddler and preschool classrooms, high correlations were observed between the factor scores for each process quality measure and the total scores for each process quality measure. These high correlations indicated that process quality could be indexed by a single score. Thus, the final process index includes the total scores from the ECERS, ITERS, Caregiver Interaction Scale, and Adult Involvement Scale. Separate indices were also computed for infant/toddler and preschool classrooms. The index was scaled to a seven-point scale (similar to ECERS and ITERS) with a range from 1 (inadequate), to 3 (minimal), to 5

(good), and to 7 (excellent). Each center's process quality index is a weighted average of room-level indices, weighted by the percent of center full-time enrolled children in the given age-group.

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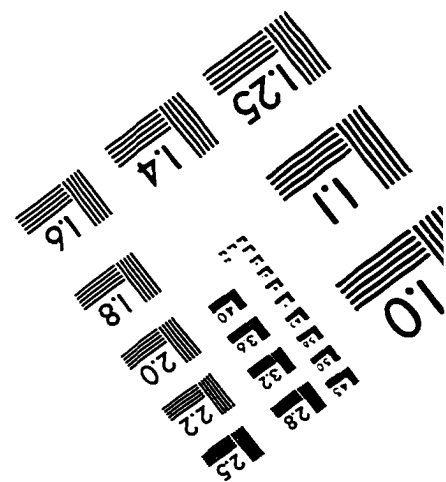
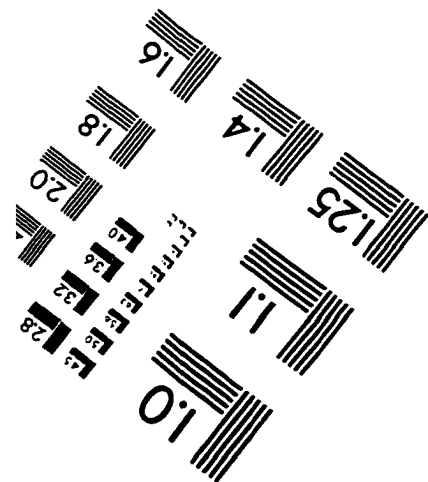
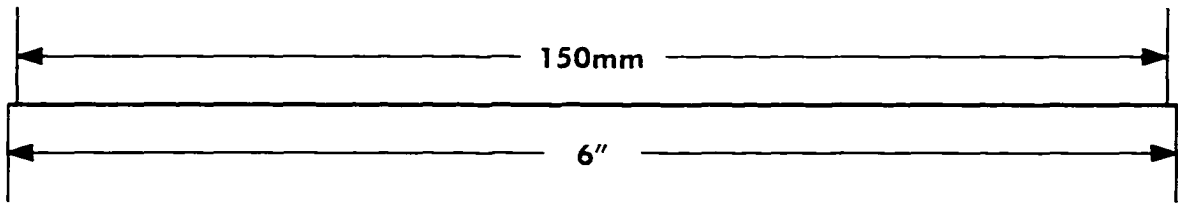
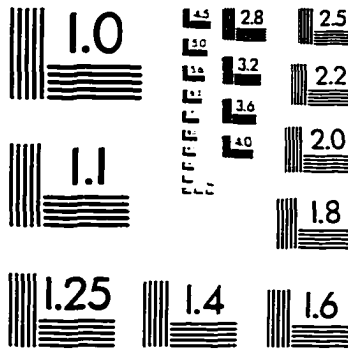
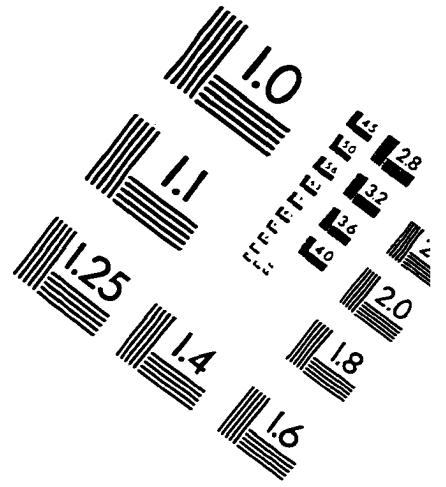
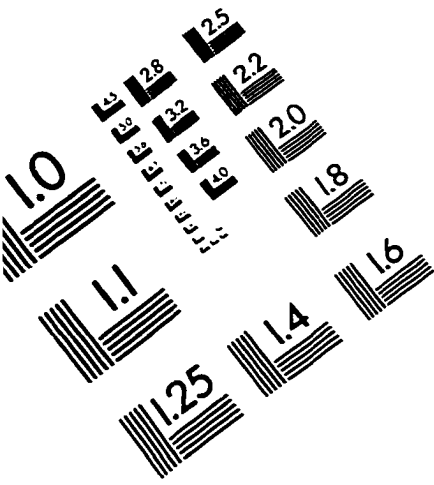
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