

**Regulating Child Care: The Effects of State Regulations on  
Child Care Demand and Its Cost\***

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## Abstract

In this paper, we examine the effects of existing *state-level* child care regulations on the cost, or price, of non-parental child care, the demand for (non-parental) child care by parents, and the mother's decision to enter the labor force. We distinguish between the indirect effects of regulations on demand via their effect on the cost of such care facing parents as well and the direct (and non-price) effects regulations may have by imposing standards in the form of minimum levels of quality on available care facing parents. In our empirical analysis, we analyze the child care decisions of *all* parents with preschool age children, including households with working *and* non-working mothers, using child care data from the 1986 wave of the National Longitudinal Survey of the High School Class of 1972 (NLS72). We present estimates of the effects of two sets of regulations—namely, restrictions on child-to-staff ratios in day care centers and educational and/or training requirements of workers in either centers or home day care setting—as well as two types of child care subsidies—child care tax credit for working mothers and subsidies to providers—on the child care and maternal work decisions of households as well as on the hourly cost of child care. Our evidence indicates that state regulations both increase the cost of child care as well as have direct (non-price) effects on utilization but that their total effect tends to reduce the utilization of market-based child care, especially among households with non-working mothers. Since economically disadvantaged and black women are disproportionately represented in the latter group, it appears that one of the consequences of regulations are to deter the utilization of child care by households with children for whom the purported developmental benefits of organized day care might be most beneficial.

## 1. Introduction

Over the last two decades, the United States has witnessed a substantial growth in the child care market, fueled, in large part, by the rise in the labor force participation rates of married women. For example, Hofferth and Phillips [1987] estimate that the use of center-based care by full-time employed mothers with children under 5 years of age grew by almost 50% over the five-year period from 1977 to 1982 and, according to statistics from the U.S. Department of Education, the percentage of 3 and 4 year-olds enrolled in some sort of preschool program (such as nursery schools or Head Start programs) grew from 5% and 16%, respectively, in 1965 to 29% and 49% in 1985.<sup>1</sup> Consistent with these trends, the number of persons employed in child care has grown faster than has overall employment in the U.S. economy.<sup>2</sup>

The growth of the child care market has resulted in an increased interest in and debate about the need for governmental regulation of child care services. While most states already regulate some aspects of child care services, child care advocates have pressed for the imposition of more stringent regulations of these services and their standardization across states by the federal government. Their case for imposing minimum standards on child care services appears to be based on one or more of the following arguments: (1) the potential for irreparable harm by exposing children to low-quality child care services, (2) the difficulty that parents may have in evaluating such services due to informational problems which characterize child care markets, and (3) the potential underprovision of parental-determined child care due to the externalities associated with children.

Child developmental specialists argue that exposing young children to child care environments that are unhealthy or unsafe, to arrangements in which children may be abused, or to those which fail to provide young children with adequate developmental stimulation can have pernicious

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<sup>1</sup> U.S. Department of Education [1986].

and irreparable effects on children’s long term cognitive, emotional and social development.<sup>3</sup> To the extent that such effects are irreparable, obtaining *ex post* compensatory relief for exposure to low-quality child care services through the courts is an unsatisfactory option for parents (or children). The imposition and enforcement of minimum standards on available child care services preempt the possibility of such harm being inflicted on children by eliminating low-quality child care services.

The lack of perfect information faced by consumers in the child care market has also been cited as a justification for legislating minimum quality standards and the licensing of day care providers. Parents may be imperfectly informed about the quality of available care because the multi-dimensional attributes of these services are difficult to evaluate and/or monitor.<sup>4</sup> Informational asymmetries—the provider knows the level of quality being provided but the parent may not—give rise to the potential for the underprovision of high-quality services relative to what would be the case if parents were better informed. By imposing minimum standards on the training of providers and the quality of services they must provide, child welfare advocates argue, children and parents can avoid being “defrauded” by providers.

Finally, some who advocate increased regulation of child care services appear to argue that parents, even if fully informed, may fail to purchase child care of sufficient quality because they fail to internalize the externalities their children can impose on society. For example, children who were denied adequate care and stimulation when they are 3 and 4 years old may fail to develop emotionally and socially and, upon entering primary and secondary school, may have learning or disciplinary problems that require special—and costly—help. While parents may bear some of these costs,

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<sup>2</sup> See O’Connell and Bloom [1987].

<sup>3</sup> For a summary of these arguments, see Hayes, Palmer, and Zaslow [1990].

<sup>4</sup> As Walker [1991, p. 67] notes, “the provider can be interviewed and the facilities inspected, yet the consumer can never be perfectly informed about the care his or her child receives.”

some will likely fall on society, either in the form of higher costs to train them in public school systems or of disrupting the learning of other students. Imposing minimum quality requirements on child care may serve a similar role to the imposition of minimum requirements in the curriculum of primary and secondary schools: assurance that society does not bear unnecessary costs associated with the underinvestment of parents in the development of emotionally stable and socially responsible children.

Whatever the justification given for child care regulations, their advocates contend that instituting minimum quality standards for child care should improve the average quality of the non-parental care to which children are exposed. This contention, however, depends crucially how parental demand for such services responds to the imposition of more stringent regulations. Consider, for example, an increase in the minimum standards set for the educational credentials of child care providers. To the extent that the advocates of child care are right, the imposition (and enforcement) of more stringent educational requirements on for child care providers may reduce the uncertainty parents have about the quality of child care services they are likely to receive in the market. As a result of this greater certainty, parents may be more willing to use non-parental child care, taking advantage of the benefits that its enhanced quality has for their children's development. But, as argued by critics of such regulations, imposing more stringent regulations on child care services—such as requiring child care providers to have greater formal training—will result in an increase in the price charged for such services which will cause parents to shift *out of* regulated care into cheaper lower quality care.<sup>5</sup> In the extreme, parents with

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<sup>5</sup> For example, in commenting on the “Nannygate” scandal that ensnared several initial cabinet nominees to the Clinton Administration, a *Wall Street Journal* editorial based its criticism of existing child care regulations on this “increase-in-cost” argument:

young children may withdraw from the child care market entirely and provide for all of their children's care themselves. As a consequence, attempts to increase quality via minimum standards could result in the average child actually being exposed to lower quality care, due to the response in parental demand.

In this paper we exploit across-state differences in legislated minimum quality standards in order to identify how parental demand for and the average price of non-parental child care respond to differences in the stringency of child care regulations. Given the crucial role that the availability and cost of non-parental child care is likely to play in married women's work decisions, we also examine the effects of changes in state child care minimum standards on a mother's participation in the labor force. In this analysis, we attempt to distinguish between parental responses to both the quality assurance and price-increasing aspects of an increase in minimum quality standards noted above. Finally, our econometric analysis explicitly accounts for the selectivity of observing maternal wages only for mothers who work and child care prices only for families who pay for care.

An important feature of our empirical analysis is the population of households we investigate. We analyze the child care decisions of *all* parents with preschool age children, including households with working *and* non-working mothers. Most previous analyses of child care demand have focused only on households with working mothers,<sup>6</sup> largely due to data limitations.<sup>7</sup>

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*“there is a considerable amount of child care legislation and regulation on the books, and it's hardly surprising to discover that when a bureaucracy lays its hands on something like this, the financial impediments to child care begin to proliferate. These and other regulations have already made it unnecessarily difficult for parents to provide trustworthy care.”*

“Zoe's Child Care Lessons,” *Wall Street Journal*, January 26, 1993, p. A14.

<sup>6</sup> An exception is the study of Hofferth, *et al.* [1991].

<sup>7</sup> The primary sources of data used in previous studies of child care demand are the Survey of Income and Program Participation (SIPP), the Current Population Survey (CPS) and the National Longitudinal Survey of Youth (NLSY).

In this study, we make use of a source of child care data which gathered information on child care utilization and expenditures for all households surveyed, regardless of the mother's working status—the 1986 wave of the National Longitudinal Survey of the High School Class of 1972 (NLS72). As noted in Hotz and Kilburn [1992], failure to include both types of households in one's analysis can yield an inaccurate picture of the demand side of the child care market. As we describe below, child care utilization by households with non-working mothers is not only non-negligible it differs, in important ways, across demographic groups and regions of the country from households with working mothers. Moreover, we show that families with working and non-working mothers exhibit different behavioral responses to the stringency of state child care regulation.

The remainder of the paper is organized as follows. In the next section, we briefly describe the NLS72 data set and patterns of child care use and state-level child care regulations. We outline the patterns of child care utilization for sample, indicating the nature of the differences by the mother's working status and by region of the country. We also describe the prevailing state-level child care regulations and subsidies in 1986, the year of the NLS72 survey. In Section 3, we outline a model of parental decision-making concerning the utilization of child care and the mother's participation in the labor market, highlighting the likely ways in which child care regulations subsidies would affect these decisions. We review several alternative theoretical perspectives on child care regulations and the different predictions they would make for the influence of minimum quality standards on the child care market.

After outlining our econometric specification in Section 4, in Section 5 we present estimates of the effects of two sets of minimum quality standards—child-to-staff ratios in day care

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The first two only ask child care questions of households with non-working mothers, as did the latter survey until its 1988 wave.

centers and educational and/or training requirements of workers in either centers or home day care setting—on the child care and maternal work decisions of households as well as on the hourly price of non-parental child care. Our evidence indicates that state regulations both increase the cost of child care as well as have direct, non-price, effects on utilization. While these two effects cancel each other out for households with working mothers, among those with non-working mothers, the net effect of regulation is to reduce the utilization of market-based child care. Hence, raising minimum quality standards may have the unintended consequence of discouraging the utilization of non-parental child care for the latter type of households.

## **2. The Patterns of Child Care Utilization and Regulation**

### ***2.1 The Data***

The data on child care utilization and maternal labor force participation used in this study are taken from the Fifth Follow-Up of the National Longitudinal Study of the High School Class of 1972 (NLS72). All respondents in the NLS72 were high school seniors in U.S. schools during the 1971-1972 school year. In 1986, the year in which the Fifth Follow-Up survey was conducted, the average age of NLS72 sample members was 32, having been out of high school for 14 years. We analyze the child care and labor force participation choices of a subset of the NLS72 respondents, namely, female respondents who were either white or black and who were mothers with preschool age children in 1986. A total of 2,645 women met these criteria.

In the Appendix, we provide a complete description of the NLS72 sample, the way we selected the analysis sample for this study, the content of the Fifth Follow-Up survey and how some of the measures of child care and labor market activity were constructed. The definitions of the variables we use and their sample means and standard deviations are found in Tables 1 and 2, respectively. However, there are several aspects of the sample we use and of our measures of



child care utilization which need to be highlighted.

For several reasons, our sample from the NLS72 is not representative of all households with pre-school age children in the U.S. First, the NLS72 only sampled women (and men) who were high school seniors in the 1971-1972 school-year; women who had dropped out of school by the time they were scheduled to be seniors were not sampled. In addition, the women in our sample were older (31 versus a mean of 29 years of age), more likely to be married (89% in the versus 74%), and less likely to be black (9.8% versus 15%) than the typical mother with at least one preschool age child.<sup>8</sup> However, our sample is similar to the population of women with preschool children who, in 1986, were approximately the same as women in the NLS72.<sup>9</sup> Thus, it would appear that with this data we can draw inferences about the child care and maternal labor force participation of women who had children at later ages from this sample. Whether such inferences are appropriate for the behavior of younger mothers with preschool age children is less certain.

A second feature of our data concerns the information gathered in the 1986 survey about the child care choices made by parents and how it limits our analysis. First, child care information gathered in this survey was obtained for all preschool age children as a group; information was not reported separately for each preschool age child.<sup>10</sup> As a consequence, we cannot do analyses of the child care by child. Second, one is not able to get a very clear picture of the different modes of care—e.g., day care centers versus family home day care versus sitter care, etc.—that parents chose for their various preschoolers. Again, all that is known is which modes were used. One cannot match up those choices with children or determine unambiguously whether multiple modes of child

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<sup>8</sup> For a more detailed comparison of our sample with those from the CPS, see Hotz and Kilburn [1992].

<sup>9</sup> We compared our NLS72 sample with one from the CPS that consisted of mothers between the ages of 30 and 35 who had young children.

<sup>10</sup> We note that separate information was obtained on the child care arrangements for school age children as well. We do not consider the arrangements for these children in this analysis, although we do control for the number of school age children in a household in all of the analysis presented below.

care were used on a given child or that different modes were used for different preschool age children in the household. Because of this ambiguity in the data, we do not attempt to model parental mode choice decisions and restrict our analysis to the decision to use any form of non-parental care for preschoolers in the household. Finally, for parents who report that they were not using non-parental care, we are not able to determine how that care was split between the mother and the father (if he was present).

## ***2.2 Patterns of Non-Parental Child Care Utilization, Hours and Costs***

As shown in Panel A of Figure 1, a large proportion of households with working mothers in the NLS72 (84%) utilized some form of non-parental child care for their preschoolers in 1986. This rate is comparable to that found for working mothers in other data sets, such as the Survey of Income and Program Participation.<sup>11</sup> While much lower, we also find that a non-trivial percentage of households with non-working mothers (26%) reported using some form of non-parental child care in 1986. Some of the mothers in the latter category of households were engaged in educational and/or training activities and, as might be expected, their rate of child care utilization was higher (42%) than average. But, among mothers who neither worked nor were involved in training/education, the rate of utilization was still 24%. Finally, among all households with preschool age children, 59% use some form of non-parental child care.

Figure 1 also displays how child care utilization varies by the socioeconomic status of these families. While the percentage of households with working mothers using non-parental care does not vary substantially across levels of family income other than that earned by the mother, child care utilization rates do vary considerably across income levels for households with non-working mothers. For non-working-mother households, utilization of non-parental care is at its

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<sup>11</sup> See U.S. Bureau of the Census [1987].

highest rates among those who report having no income other than that earned by the mother, declines with higher levels of non-maternal income until relatively high income levels are reached.

One finds that while black households with working mothers are only slightly more likely to use non-parental child care than are whites (89% versus 83%), among all households, the percentage is much higher for blacks relative to whites (78% versus 57%). This disparity is due, in part, to the fact that the preschool children in black households are slightly older than in white households (the average age of preschool children in black households is 3.64 years old versus 3.09 in white households) and to the particularly high rates of utilization among blacks for households with mothers who neither work or are engaged in training/educational activities; the rate of utilization of blacks in this type of household is more than double that for similar whites (49% versus 23%).<sup>12</sup> But, even adjusting for these differences, the rate of utilization are higher for black households with non-working mothers than is the case for white households.

Finally, Figure 1 displays the child care utilization rates by the mother's current marital status (see Panel D). Among all households, mother-only households have much higher rates of child care utilization than do two-parent households (79% versus 56%). Consistent with the differences in utilization by race and family income, among mothers who work, rates of child care utilization differ little between female-headed and husband-and-wife households. All of this difference in utilization by marital status is primarily driven by the differences found among households with non-working mothers. Female heads of households who do not work have child care utilization rates which are twice as high as two-parent households with non-working wives (52% versus 24%).

The panels in Figure 2 display the average number of hours per week of non-parental

child care used per preschool-age child in households which used such care. As seen in the corresponding panels of Figure 2, this measure of the intensity of utilization of non-parental child care varies by the mother's work status and the other socioeconomic characteristics of the households in ways quite similar to those displayed in Figure 1. In particular, we draw attention to the fact that the number of hours used by non-working mothers is quite high, especially among black households, those with low incomes, and those that are female-headed.

Finally, in Figure 3, we present data on the average hourly per child cost of child care that parents paid in 1986. Across all households in the NLS72 who used some form of non-parental care, the average hourly price paid was \$1.79 in 1986 dollars. This estimate, and how it varies by modes of care used and region of the country, is comparable to cost estimates found in other studies.<sup>13</sup> The average price paid for child care by households with non-working mothers (\$1.48 per hour) is slightly lower than paid by households with working mothers (\$1.86). Moreover, this difference is only marginal in a statistical sense; the P-value associated with the difference in means between working and non-working mother households is 0.076.<sup>14</sup>

### ***2.3 Regional Variation in State Child Care Regulations, Subsidies, and Child Care Demand and Costs***

We now turn to a description of the across-state variation in state-level governmental interventions in the child care market and regional differences in child care demand and costs. We begin with state regulations of child care services. All states regulate child care in some form, but the types and level of states' involvement vary dramatically. For example, all states license day

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<sup>12</sup> While black mothers in this category are more likely to report themselves as unemployed—a labor force status for which we find higher rates of child care utilization—than are white mothers, it is also the case that black mothers classified as homemakers are three times more likely to use non-parental care than white homemakers.

<sup>13</sup> For example, using data for 1985 from the National Longitudinal Survey of Youths (NLSY), Hofferth [1988] estimates an hourly cost of \$1.14 for relative care, \$1.60 for non-relative care and \$1.37 for day care centers and/or nursery schools.

care centers and all states, except Louisiana, license family day care homes, the more informal type of group-based child care provided in homes of providers. In the licensure of such care, states generally set standards with regard to the attributes of such care, especially those believed to affect children's health, safety or development. These include requiring immunization records, setting maximum group sizes and child-to-staff ratios, imposing minimum education and/or specialized training requirements of providers, and legislating a diverse set of additional requirements. For more detailed information about federal or state government child care regulations, see Morgan [1987], the U.S. Department of Labor [1988], and Robins [1991].

In Figure 4, we examine the variation across regions in state standards for two aspects of non-parental child care in day care centers, nursery schools and family day care homes: child-to-staff ratios and the imposition of educational requirements on child care providers. The child development literature has found that these attributes of child care provision have a significant impact on child development and hence are crucial aspects of the quality of child care (see Hayes, *et al.* [1990], and Studer [1992]). In particular, we examine state maximum allowed children-to-staff ratios in day care centers (and nursery schools) for children less than 2 and children aged 2 to 4 (*Ratio2* and *Ratio4*) as well as dichotomous variables measuring for whether states had minimum educational and/or special training requirements for staff in home-based family day care centers and in regular day care centers (*FamEd* and *CenterEd*).

As can be seen in the four panels of Figure 4, there is considerable variation in the state standards and mandates for these attributes of non-parental child care.<sup>15</sup> For instance, maximum child-to-staff ratios for 2-year-olds range from an average of slightly over four in the New Eng-

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<sup>14</sup> While not displayed in Figure 3, we note that there is little evidence that prices vary by race or the mother's marital status or by the level of the household's non-maternal income.

<sup>15</sup> The data displayed in Figure 4 are weighted by the size of a state's total population in 1986.

land states to an average of over three times that level in states in the West South Central region. Educational requirements exhibit similar variation with the fraction of states in a region imposing some sort of standards for caregivers ranging from zero to 100% for both family day care and day care centers. This data indicates that southern states (those in the South Atlantic, East and West South Central regions) have “less stringent” child care regulations on child-to-staff ratios and on provider educational requirements than the nation as a whole. In contrast, with the exception of educational requirements for family day care homes, states in the northeast (those in the New England and Middle Atlantic regions) and the west (those in the Mountain and Pacific regions) have the more stringent regulations than the rest of the nation. Midwestern states (those in the East and West North Central regions) tend to fall in the middle of the distribution of regulatory stringency for all four of the measures displayed in Figure 4.

In Figure 5, we display the regional patterns for rates of non-parental child care utilization (Panel A), average weekly hours of care used (Panel B), hourly price paid per child for care (Panel C), and the mothers’ labor force participation (Panel D). Among all households and those with working mothers, rates of non-parental child care utilization or average hours of care used are highest in the South and lowest in the Northeast. Among households with non-working mothers, child care demand is lowest in the Northeast, but highest in the western states. The regional patterns for maternal labor force participation rates are very similar to that for child care demand among all households: highest in the South and lowest in the Northeast. Finally, with respect to the average price of child care services, the highest prices prevail in the West and the lowest in the midwestern states.

Comparing the regional patterns in Figures 4 and 5, it appears that households living in states with less stringent child care regulations tend to have higher than average rates of child care demand and maternal labor force participation. In contrast, the relationship between child

care prices and regulations is less clear cut. To gain a more precise sense of their relationships, we present, in Table 3, the sample correlations between the alternative state regulation variables and the measures of child care demand, its price, and maternal work. As can be seen, higher maximum child-to-staff ratios—as measured by either *Ratio2* or *Ratio4*—are positively correlated with the demand for non-parental care and with rates of maternal labor force participation, especially when considering all households together or those with working mothers. This inverse relationship between the stringency of maximum child-to-staff ratios and child care demand and maternal labor force participation is consistent with the view of child care regulation critics noted in the Introduction, namely that placing more constraints on the provision of child care services will cause parents to reduce their demand for such services and will lead to fewer women working.

However, the correlations displayed in Table 3 are not all consistent with the contention that increased regulation reduces child care demand and maternal labor force participation. The correlations between the presence of minimum educational qualifications for providers and child care demand and maternal work are not always positive (note the negative and significant correlation between *CenterEd* and *HrsCC*) and, when positive, are not always significantly different from zero. Moreover, with the exception of the imposition of minimum educational qualifications for family day care providers (*FamEd*), the correlations in Table 3 do not indicate that the price of child care is higher in states that impose more stringent child care regulations.

Drawing accurate inferences about the relationship between child care regulations and child care demand may be compromised by the high degree of collinearity between regulatory stringency and other state policies and/or characteristics which might be expected to affect child care demand or its price. For example, states differed in the generosity of provider-based subsidies for child care that were administered under the federal Title XX Social Service Block Grant

program in 1986. The variable, *TitleXX*, is the daily reimbursement rate for the Title XX program which prevailed in 1986 for the respondent's state of residence.<sup>16</sup> As shown in Table 3, states with more generous subsidies also tend to have more stringent child care regulations. In 1986, over half of the states also provided income tax credits for child care expenditures of working parents. States with higher rates of these subsidies (*SCCSub*) also tend to have more stringent child care regulations, although the statistical significance of this association is not particularly high (see Table 3). With respect to other state-level social programs and labor market conditions, one finds that states with low rates of unemployment (*UnempRt*) and more generosity AFDC benefits (*MaxBen*) in 1986 tended to have more stringent child care regulations (again, see Table 3). For both *UnempRt* and *MaxBen*, also note the presence of significant correlations with the measures of child care demand and the mother's work status.

While the across-state correlations between the stringency of child care regulations and child care demand presented in Table 3 suggest that there may be a negative demand response to the imposition of more stringent regulations, the causal attribution of these relationships are compromised by the above-noted state differences in child care subsidies, other policies and labor market conditions. A more refined analysis is needed before strong conclusions about causal effects can be drawn about the relationship between child care demand (and its price) and child care regulations. To provide some guidance for such an analysis, in the next two sections of the paper we develop a model of child care demand and examine how regulations would be predicted to affect parental choice and the price of care. We use this framework to guide the formulation of an econometric model of parental decision-making.

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<sup>16</sup> Under this program, all states received funds for use on a range of social services. These funds were allocated to states in proportion to their population and states had discretion over how much they spent on different social services. With respect to child care services, states could use Title XX funds to reimburse child care providers for the care of eligible children (typically based on the income of the child's family) and states were required to establish a daily reimbursement rate for such services.



### 3. Theoretical Framework

In this section, we develop an economic model of the way we would expect state child care policies to influence the utilization, hours and price of child care as well as mothers' labor force participation. First, we sketch model of parental decision-making with regard to the child care arrangements for children and the labor force participation of the mother. Then we examine the way that minimum quality standards, child care tax credits, and provider subsidies would affect families' decisions.

#### 3.1 *The Basic Model*

We begin by considering a one-period model in which we assume that: (1) parents have perfect information about the attributes of non-parental child care services available in the child care market; (2) the market for non-parental child care services are not regulated; and (3) there are no governmental subsidies which distort the prices charged in the market for child care services. Later in this section, we describe how parental uncertainty about child care attributes and governmental interventions in the child care market are likely to affect the conclusions drawn from the following simple model.

Parents are assumed to make decisions concerning the care of their  $N_P$  preschool age children, their own consumption, and the allocation of the mother's and father's time to alternative activities. To focus on the essential issues to be modeled, we assume that: (i) a father is present, (ii) the number and age distribution of the children in the household are predetermined, and (iii) any decisions concerning the care of school age children are determined outside of the model.

Parents do make decisions about the production of the "quality" of their preschool age children. We assume that the total amount of quality for these children is produced according to

the following production process:<sup>17</sup>

$$Q = Q(K_S, K_M, K_F, N_P), \quad (3.1)$$

where  $K_S$  is time devoted to the care of children in the form of market-based child care arrangements or educational enrichment programs,  $K_M$  and  $K_F$  are the amount of time the mother and father, respectively, devote to the care of their children. We assume that  $Q(\cdot)$  is a concave function, increasing in  $K_S, K_M, K_F$ .<sup>18</sup>

In addition to caring for their children, mothers and fathers can allocate their limited time to market work, denoted by  $H_M$  and  $H_F$ , respectively, and to non-work, non-child care activities, denoted by  $L_M$  and  $L_F$ . The constraints on their time are given by:

$$T_i = H_i + K_i + L_i, \text{ for } i=M,F. \quad (3.2)$$

The family's choices are also constrained by the following budget constraint:

$$G + pK_S = w_M H_M + w_F H_F + V, \quad (3.3)$$

where  $G$  is parental consumption,  $p$  is the hourly price of market-based child care,  $w_i, i=M,F$ , are the hourly wage offers available to the mother and father, respectively, and  $V$  is the level of the household's non-labor income.

We shall assume that fathers always work, while mothers may not. One of the consequences of a mother choosing to work is that she cannot use that time to care for her children; that is, there are a total of  $H_M$  hours which she cannot provide in the care of her children.<sup>19</sup> We assume that these hours of care are either purchased in the market<sup>20</sup> ( $K_S$ ) or provided by the father ( $K_F$ ).<sup>21</sup>

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<sup>17</sup> For sake of simplicity, we assume throughout this section that all children in a family are of preschool age.

<sup>18</sup> How  $Q(\cdot)$  varies with  $N_P$  indicates whether child quality production exhibits increasing, constant, or decreasing returns to scale in the number of preschool age children.

<sup>19</sup> We assume that the mother cannot care for her children while she is working.

<sup>20</sup> Note that we consider child care provided by other relatives, such as grandparents, for which there is some compensation as a form of market-based child care.

Given the need to “cover” the mother’s working time, the following inequality holds between the mother’s labor supply and the total amount of purchased and father-provided child care:

$$H_M \leq K_S + K_F. \quad (3.4)$$

We note that while child care must be purchased in the market and/or provided by the father if the mother works, parents are free to purchase care even if she does not work.

The parents choose  $H_M$ ,  $H_F$ ,  $K_M$ ,  $K_F$ , and  $K_S$  so as to maximize the following utility function:

$$U(G, \frac{Q}{N_P}, L_M, L_F), \quad (3.5)$$

subject to (3.1) through (3.4), and  $H \geq 0$ ,  $K_S \geq 0$ ,  $K_M \geq 0$ ,  $K_F \geq 0$ , where  $\frac{Q}{N_P}$  **Error! Switch**

**argument not specified.** is the average quality of their preschoolers. The resulting first order conditions are:

$$(U_G w_M - U_{L_M} - \lambda) H_M = 0 \quad (3.6a)$$

$$U_G w_F - U_{L_F} = 0 \quad (3.6b)$$

$$U_Q \frac{Q_{K_M}}{N_P} - U_{L_M} = 0 \quad (3.6c)$$

$$U_Q \frac{Q_{K_F}}{N_P} - U_{L_F} + \lambda = 0 \quad (3.6d)$$

$$\left( -U_G p + U_Q \frac{Q_{K_S}}{N_P} + \lambda \right) K_S = 0 \quad (3.6e)$$

where  $\lambda$ ,  $\lambda \geq 0$ , is the shadow price on the constraint in (3.4) and we assume that the optimal choices of  $H_F$ ,  $K_M$ , and  $K_F$ , are all strictly positive.

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<sup>21</sup> If a father is not present, one could consider the possibility that older children or other family members might also provide care during the periods when the mother works.

Several implications follow from this model that are key to our empirical analysis. First, the model implies that parents allocate their time to child care so as to equate, on the margin, the relative opportunity costs of time in terms of other activities with their relative efficiency in producing child quality. That is, the following condition holds for the optimal choices of  $K_M$  and  $K_F$ :

$$\frac{Q_{K_M}}{Q_{K_F}} = \frac{U_{L_M}}{U_{L_F} - \lambda}, \quad (3.7)$$

where,  $\lambda$  is positive if (3.4) holds with equality, reflecting the increased opportunity cost of devoting more of the father's time to child care.

Second, because we assume that both parents provide some care for their children and that the father always works, conditions (3.6a) - (3.6e) yield interior solutions for optimal values of  $H_F$ ,  $K_M$ , and  $K_F$  which are functions of the model's exogenous variables,  $V$ ,  $w_F$ , and any attributes characterizing the child quality production function and parental preferences.

Third, the mother's decision to participate in the labor force is governed by a decision rule with a reservation price structure. In particular, the mother chooses to enter the labor force if and only if:

$$w_M > \frac{U_{L_M}}{U_G} \Big|_{H=0} \quad \text{if } K_S + K_F > 0 \quad \text{or} \quad w_M > \frac{U_{L_M} + \lambda}{U_G} \Big|_{H=0} \quad \text{if } K_S + K_F = 0, \quad (3.8)$$

with the inequalities in (3.8) reversed if she does not enter and where the right-hand sides of these inequalities represent the *reservation wage* of the mother's time. If (3.8) holds, the optimal number of hours of work for the mother ( $H_M^o$ ) solves:

$$w_M = w_R. \quad (3.9)$$

It also follows that if the mother does not work, constraint (3.4) is not binding, so that  $\lambda = 0$ . If she does work, this constraint may be binding—so that  $\lambda > 0$ —and parents choose a combination of child care provided by the father or purchased in the market to cover the  $H_M$  hours that the

mother works.

Finally, the parental decision rules governing the purchase of market-based child care also have a reservation price structure and depend on the mother's labor force participation decision.

If the mother works, then parents use non-parental care for their preschoolers if and only if:

$$p < w_M \frac{Q_{K_S}}{Q_{K_M}} \Big|_{K_S=0} \equiv p_R(H_M^o > 0) \text{ if } K_S + K_F > 0, \quad (3.10a)$$

or

$$p < \left( w_M \frac{Q_{K_S}}{Q_{K_M}} - \left[ \frac{Q_{K_S}}{Q_{K_M}} \right] \left[ \frac{\lambda}{U_G} - 1 \right] \right) \Big|_{K_S=0} \equiv p_R(H_M^o > 0) \text{ if } K_S + K_F = 0, \quad (3.10b)$$

where the inequalities in (3.10a) and (3.10b) are reversed if non-parental child care services are not purchased and where  $p_R(H_M^o > 0)$  denotes the *reservation price* for non-parental child care given that the mother works. Regardless of which condition holds, the optimal number of non-parental care used ( $K_S^o$ ) is the solution to  $p = p_R(H_M^o > 0)$ ; let

$$K_S^o = k_{S,W}(p, w_M, w_F, V) \quad (3.11)$$

denote the resulting demand function for hours of non-parental child care, given that the mother works. If, however, the mother does not work, then the following inequality must hold in order for parents to use non-parental care:

$$p < w_R \frac{Q_{K_S}}{Q_{K_M}} \Big|_{K_S=0} \equiv p_R(H_M^o = 0), \quad (3.12)$$

where, as above, the inequality in (3.12) is reversed if non-parental child care is not chosen and, if (3.12) holds,  $K_S^o$  is the solution to  $p = p_R(H_M^o = 0)$  and

$$K_S^o = k_{S,NW}(p, w_R, w_F, V) \quad (3.13)$$

is the corresponding demand function for non-parental care.

As can be seen, the decision rules governing the use and optimal level of non-parental child care differ depending on the mother's labor force participation decision. If she works,  $p_R$  depends on  $w_M$ , while if she does not, it depends on the mother's reservation price of time,  $w_R$ . In addition, if the mother works, the non-parental child care decision may depend on whether or not there is a non-zero opportunity cost,  $\lambda$ , of covering the mother's time spent in the labor market. As a result of these differences, we allow our econometric specifications of non-parental child care decisions rules to differ by the mother's labor force participation choices.

### 3.2 *Modeling the Effects of Regulations*

Until now, we have assumed that there are no constraints on the child care arrangements over which parents exercise choice or on the information parents have about the content of the child care arrangements from which they choose. We now describe the implications for our model of relaxing these assumptions. The introduction of child care regulations into our theoretical model requires some theoretical basis for the imposition of such standards on child care markets. At least three alternative explanations, or theories, have been put forward to explain why non-parental child care services are subject to licensure and the imposition of minimum standards on non-parental child care arrangements.<sup>22</sup>

1. *Child Care Providers as a Pressure Group and the Erection of Barriers to Entry*: One explanation for regulation of child care is that child care providers organize themselves and pressure government to impose barriers to entry, by such devices as the imposition of educational requirements and minimum child-to-staff ratios, in order to cartelize the child care industry, erect barriers to entry, and thus, create non-competitive levels of profits (e.g., economic rents).<sup>23</sup>
2. *Informational Problems Associated with Quality of Services Provided and Moral Hazard*: A second explanation for child care regulation is based on the view that child care is a service in which parent (consumers) have difficulty determining and monitoring the "quality" of service

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<sup>22</sup> The following theories are drawn from the broader literature of the economics of consumer product regulation. See Spudler [1992] for a survey of the models and issues in this area. For a discussion of their applicability to child care services, see Lowenstein and Tinnin [1992] and Walker [1992].

<sup>23</sup> This is an example of the "Capture Theory of Regulation" due to Stigler [1971] and Peltzman [1976].

provided. If the level and/or productivity of inputs associated with child care services are not readily ascertained, private market exchanges may fail as differences in quality cannot be reflected in the price charged.<sup>24</sup> In such cases, imposition of minimum standards which are enforced by a credible third party (such as the government) provides a mechanism for *assuring the quality of the child care services parents purchase* and, *providing appropriate incentives for not shirking on service provision*, via the threat of being sanctioned. Imposing minimum quality standards truncates the distributions of the quality of child care supplied to the market.

3. *Children as Public Goods and the Underprovision of Quality-Enhancing Child Care*: To the extent that children are public goods and/or their behavior imposes externalities on society, parents may tend to underprovide for their development. According to such an argument, parents may fail to fully internalize the externalities of their children—such as good citizenship, responsible behavior, etc.—and thus tend to underprovide for the development of their children. (See Donovan and Watts [1990] for a discussion of this argument.) Regulation of the level of quality in child care (or the inputs in child development) by imposition and enforcement of minimum standards on the provision of child care services can overcome this sort of market (or childrearing) failure.<sup>25</sup> While cast in the terminology of economic reasoning, this appears to be the argument made for minimum child care standards by child welfare advocates.

As discussed in Walker [1992] and Lowenstein and Tinnin [1992], the first motivation for child care regulations, while possible, does not seem to be a very plausible explanation for the existence of minimum standards for child care. The providers-as-a-pressure-group explanation of child care regulations would seem to require that providers be a stable and cohesive group in order to maintain its pressure on legislators or regulators. Given the high degree of turnover which characterizes the child care provider work force, it would seem unlikely that such organizational cohesion would prevail among such workers.

As has been discussed in the economic literature on product quality and liability, it would appear that certification of the quality of services offered by the various child care providers in a market would solve the informational problem and not restrict parental choice. However, as Klein and Leffler [1981] argue in the general case of goods and services in which product quality

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<sup>24</sup> This sort of market failure and the potential gains from regulation of such markets are considered by Akerlof [1970], Leland [1978] and Shapiro [1983].

<sup>25</sup> In general, one would expect that subsidies for high quality child care would also be needed to overcome this problem of parental underprovision.

is difficult to monitor, the maintenance of a licensure system based on meeting minimum quality standards may have beneficial welfare consequences to the extent that a firm's (or provider's) investment in meeting such standards generates a higher stream of earnings. In such cases, the state's ability to revoke such a license for shirking on quality imposes a real cost on licensed firms, making it less likely that such shirking will occur.<sup>26</sup>

Finally, it is difficult to rule out the argument that the potential externalities of poorly reared children is a *positive* motivation for imposing minimum standards on child care services, although it is equally difficult to verify the conditions required for it to justify such standards.

Regardless of which latter two motivations for governmental regulation of child care services, each suggests that the imposition of more stringent minimum standards will have two distinct, and potentially contradictory, effects on the demand for non-parental child care: one through changes in the price of market-based care (relative to the opportunity cost of parent-provided child care) and the other which directly affects the demand for non-parental care due to the alteration of the quality of inputs provided when care is regulated.<sup>27</sup> More formally, let  $\mathbf{R} = (R_1, R_2, \dots, R_J)'$  denote the vector of the  $J$  child care regulations—e.g., minimum educational requirements for providers and staff, minimum child-to-staff ratios, etc.—that states impose on non-parental child care, where  $\mathbf{R}$  is defined in such a way that increases in the elements of  $\mathbf{R}$  represent more stringent minimum standards. We consider the following hypotheses concerning the effects of changes in  $\mathbf{R}$ :

*Hypothesized Effects of Changes in  $\mathbf{R}$  on the Price of Care:*

To the extent that regulations, or changes in regulations, are *enforced* by government, all

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<sup>26</sup> See Lowenstein and Tinnin [1992] for more on the application of this argument in the context of child care services.

<sup>27</sup> See Rose-Ackerman [1983], Walker [1992], and Lowenstein and Tinnin [1992] for more on the predicted effects of regulation on parental choice.



three of the theoretical explanations for the existence of regulations would predict that the price of regulated modes of care should rise as the stringency of standards are increased. That is:

$$\frac{\partial p}{\partial R_j} > 0, \quad (3.14)$$

for regulation  $R_j$ . This increase in  $p$  comes about because compliance with increases in  $R_j$  either necessitate an increase in the level of inputs (e.g., a reduction in the child-to-staff ratio), making the provision of the newly mandated services more expensive, or introduce costly activities in order to comply with a regulation (e.g., having to have criminal background checks done on staff members).

*Hypothesized Effects of Changes in  $\mathbf{R}$  on Parental Demand for Child Care:*

The three alternative theories of regulation suggest that there are at least two avenues by which changes in child care regulations would affect the demand for non-parental care that. The *first effect* is one transmitted through the change in the per unit price of non-parental child care. As is apparent from, conditions (3.10a) and (3.10b), an increase in the price of non-parental child care,  $p$ , will, all else equal, *decrease* the likelihood that parents will use non-parental child care, and conditional on using it, will *decrease* the number of hours,  $K_S$ , used.

A *second effect* of regulation on the demand for non-parental child care services is suggested by the asymmetric information motivation for child care regulations. The imposition of credible (enforced) minimum standards on such services would be expected to diminish the uncertainty parents would have about its quality. This is accomplished by eliminating low quality child care services from the market. To the extent that parents prefer *high* quality child care, such standards provide an *assurance of quality* which, holding price constant, will tend to *increase* the likelihood and amount of non-parental child care such parents consume. But a positive quality assurance effect need not hold for everyone. Parents, who either already know the quality of

available child care arranges or who can monitor such quality at a relatively low cost, gain little or nothing, in an informational sense, from the increase in standards. Similarly, for those parents who preferred lower quality child care arrangements, the imposition of minimum standards would eliminate child care options they would prefer, making them worse off than they would have been without such regulations. Thus, this quality assurance effect with respect to the demand for non-parental care is *ambiguous*.

The overall effect of changes in minimum standard regulations on the demand for non-parental child care services is ambiguous, depending on the relative sizes of the price and quality assurance affects. While indeterminate, the relative sizes of these effects would likely vary across different demographic groups and with different types of regulations. For example, one would expect to find the price effect to dominate the quality assurance effect among parents for whom the cost of monitoring the quality of child care services, either because they have more time for monitoring and/or are more able to evaluate them. In addition, we expect the imposition and enforcement of certain types of standards by government to have greater impacts than others. For example, while it may be relatively easy for parents to verify the child-to-staff ratio for certain child care arrangements, it is more difficult to obtain the criminal records of care providers. As a result, we would expect to find a larger demand response to regulations such as checks of providers' criminal records than to those that establish maximum child-to-staff ratios.

### ***3.3 The Effect of Child Care Subsidies***

As we noted in Section 2, governments also intervene in child care markets by providing targeted tax credits and/or subsidies. We briefly consider how these interventions would be expected to affect the price and demand for non-parental child care services.

Consider the availability of a child care tax credit through the income tax systems of state (or federal) governments. Let  $t_I$  denote the (constant) marginal income tax rate and  $t_C$  denote the

marginal child care tax credit subsidy rate on child care expenditures. In states which have child care tax credits, the family's budget constraint in (3.3) would be:

$$\begin{aligned} G + p(1-t_C)K_S &= (1-t_I)[w_M H_M + w_F H_F + V] \text{ if the mother works,} \\ G + pK_S &= (1-t_I)[w_F H_F + V] \quad \text{if she does not,} \end{aligned} \quad (3.3')$$

where  $p(1-t_C)$  is the effective price of child care for households with working mothers, and  $w_j(1-t_I)$ ,  $j = M, F$ , is the effective wage rates of mothers and fathers, respectively. Several features of child care tax credits are important to keep in mind. First, these child care tax credits only change the price of child care for households in which both parents, including the mother, work. They have little direct effect for households in which the mother does not work. Second, if taxes and credits vary with levels of income (i.e., there are multiple tax brackets), there will be alternative values of  $t_I$  and  $t_C$  depending on the household's level of income. While their levels vary from state-to-state, all states have a maximum credit that a household with a working mother can receive against child care expenditures, which we denote by the variable,  $CC_{Max}$ ). Finally, the child care tax credits against federal income taxes, as well those applicable against state income tax liabilities, are non-refundable (i.e., a household must have a positive tax bill in order to receive a credit) and require that both husband and wife work in order to be eligible for such claims against taxes.

For households with working mothers for whom  $p(1-t_C)K_S \leq CC_{Max}$ , the availability of a child care tax credit lowers the effective price of care, generating typical substitution and income effects with respect to parental demand for non-parental child care. For households whose child care expenditures exhaust this maximum, the effective price for child care reverts to  $p$ . Such tax credits would not be predicted to have any effect on the child care demand of households in which the mother does not work. In our empirical analysis, we include state tax credit variables in the child care demand functions only for households with working mothers. Finally, one would

expect that such credits would increase the likelihood of mothers working, given that such credits lower one of the important costs associated with working in the market. Therefore, we include this variable in the econometric specifications of the maternal labor force participation decision.

The other child care subsidy that states offer are those made to child care providers, such as under the Title XX Block Grant Program. Such subsidies take the form of a percentage reimbursement of the provider's costs. Let the reimbursement rate be  $r$ . Then the effective price of care becomes:

$$p^* = p(1-r). \quad (3.15)$$

We would expect that provider subsidies would lower the price that parents are charged for child care. An important qualification to this prediction is that Title XX provider subsidies are primarily intended to benefit low-income households as access to Title XX subsidized child care facilities are means tested. Consequently, one might presume that this reduction in the net price of child care would only affect low income households. However, the costs of child care provision by day care facilities could be lowered by receiving such subsidies and, as a consequence, the child care market may act to pass on the impact of such subsidization to all parents. Thus, in our empirical analysis, we examine the effect of across-state variations in this provider subsidy on *all* households and not just those that are low-income.

#### **4. Econometric Specification**

In this section, we describe econometric specifications for parental child care choices, the labor force participation decisions of mothers, as well as the price of non-parental child care and the mother's market wage rate. These specifications account for the joint nature of the child care utilization, hours of non-parental care, and mother's labor force participation decisions made by a family. In specifying our econometric model, we assume that the following variables are exogenous with respect to the parental decisions: variables characterizing state child care regulations

and subsidies variables ( $\mathbf{R}$ ,  $t_C$ ,  $CC_{Max}$ , and  $r$ ); the household's non-labor ( $V$ ); the father's labor market earnings, if he is present (denoted by  $Y_F \equiv w_F H_F$ ); the number of preschool and school age children (denoted by  $N_P$  and  $N_S$ , respectively); the mother's market wage ( $w_M$ ); the market price for non-parental child care ( $p$ ); and measures of other state policies and/or labor market characteristics.

We first characterize the econometric specification of the mother's labor force participation decision rule. It follows from our theoretical model that the mother's reservation wage is a function of the following variables:<sup>28</sup>

$$w_R = w_R(\mathbf{R}, t_C, CC_{Max}, p, N_P, N_S, V, Y_F, AFDC_{Max}, Z), \quad (4.1)$$

where  $t_C$  and  $CC_{Max}$  are state child care tax credit variables,  $AFDC_{Max}$  denotes the maximum AFDC benefit level for the state-of-residence, and  $Z$  denotes a vector of household characteristics which affect the parents' preferences and child quality production functions. The mother's labor force participation decision rule can be expressed as the following latent index function:

$$I_H^* = w_M - w_R(\mathbf{R}, t_C, CC_{Max}, p, N_P, N_S, V, Y_F, AFDC_{Max}, Z), \quad (4.2)$$

where the mother works (denoted by  $I_H = 1$ ) if  $I_H^* \geq 0$  and does not ( $I_H = 0$ ) if  $I_H^* < 0$ . In the empirical analysis below, we estimate the following linear approximation to (4.2):

$$I_H^* = X_1 \delta_H + \varepsilon_H, \quad (4.3)$$

where  $X_1 = (w_M, \mathbf{R}, t_C, CC_{Max}, p, N_P, N_S, V, Y_F, AFDC_{Max}, Z)'$ ,  $\delta_H$  is a vector of parameters to be estimated, and  $\varepsilon_H$  is a random disturbance term.

As noted in the previous section, the decision rules characterizing parental child care decisions differ depending on the mother's labor force participation status. To account for this, we

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<sup>28</sup> Note that the reservation wage will depend upon the choices parents make for  $H_F$ ,  $K_M$ , and  $K_F$  (see (3.8)). To formulate  $w_R$  as a function of exogenous variables, we assume that solutions for the optimal levels of these choice variables are derived from (3.6a) - (3.6e) and substituted into the expression for  $w_R$ . The same strategy is used for  $p_R$ .

specify *conditional child care decision rules*. Again, substituting out for all parental choices except for the mother's labor force participation choice, conditions (3.10a), (3.10b) and (3.12) imply that the reservation price for non-parental child care can be expressed as a function of the following variables, if the mother works:

$$p_R(w_M, \mathbf{R}, t_C, CC_{Max}, N_P, N_S, V, Y_F, Z | I_H = 1), \quad (4.4a)$$

and, as the following function, if she does not:

$$p_R(\mathbf{R}, N_P, N_S, V, Y_F, AFDC_{Max}, Z | I_H = 0), \quad (4.4b)$$

where we have solved out for the mother's reservation wage,  $w_R$ , in (4.4b), excluded the child care tax credit rate and maximum credit variables,  $t_C$  and  $CC_{Max}$ , and included the AFDC benefit amount,  $AFDC_{Max}$ , in (4.4b). Then, conditional on  $I_H = 1$ , the parents' child care decision rule can be expressed in terms of the following index function:

$$I_{S,W}^* = \begin{cases} p_R(w_M, \mathbf{R}, t_C, CC_{Max}, N_P, N_S, V, Y_F, Z | I_H = 1) - p \geq 0 \Leftrightarrow I_{S,W} = 1, \\ p_R(w_M, \mathbf{R}, t_C, CC_{Max}, N_P, N_S, V, Y_F, Z | I_H = 1) - p \leq 0 \Leftrightarrow I_{S,W} = 0, \end{cases} \quad (4.5a)$$

and, conditional on  $I_H = 0$ , as:

$$I_{S,NW}^* = \begin{cases} p_R(\mathbf{R}, N_P, N_S, V, Y_F, AFDC_{Max}, Z | I_H = 0) - p \geq 0 \Leftrightarrow I_{S,NW} = 1, \\ p_R(\mathbf{R}, N_P, N_S, V, Y_F, AFDC_{Max}, Z | I_H = 0) - p \leq 0 \Leftrightarrow I_{S,NW} = 0. \end{cases} \quad (4.5b)$$

where  $I_{S,j} = 1$  if the households uses non-parental child care and  $I_{S,j} = 0$ , if they do not, and where  $j = W$  denotes that the mother works ( $I_H=1$ ) and  $j = NW$  that the mother does not work ( $I_H=0$ ). For econometric purposes, we use the following linear approximations for  $I_{S,W}^*$  and  $I_{S,NW}^*$ , respectively:

$$I_{S,W}^* = X_1 \alpha_W + \varepsilon_W, \quad (4.6a)$$

$$I_{S,NW}^* = X_2 \alpha_{NW} + \varepsilon_{NW}, \quad (4.6b)$$

where  $X_2 = (\mathbf{R}, p, N_P, N_S, V, Y_F, AFDC_{Max}, Z)'$ ,  $\alpha_W$  and  $\alpha_{NW}$  are parameter vectors, and  $\varepsilon_W$  and  $\varepsilon_{NW}$  are

random disturbances.

Conditional on the parents' decision to use non-parental child care services ( $I_{S,W} = 1$  or  $I_{S,NW} = 1$ ) and on the mother's labor force participation decision ( $I_H = 0$  or 1), the model implies the following demand equations for hours of non-parental child care purchased:

$$K_S = k_{S,W}(w_M, \mathbf{R}, t_C, CC_{Max}, p, N_P, N_S, V, Y_F, Z), \quad (4.7a)$$

if the mother works, and:

$$K_S = k_{S,NW}(\mathbf{R}, p, N_P, N_S, V, Y_F, AFDC_{Max}, Z), \quad (4.7b)$$

if she does not. For econometric purposes, we again use linear approximations to the functions in (4.7a) and (4.7b):

$$K_S = X_1 \beta_W + v_W, \text{ if } I_H = 1 \text{ and } I_{S,W} = 1, \quad (4.8a)$$

$$K_S = X_2 \beta_{NW} + v_{NW}, \text{ if } I_H = 0 \text{ and } I_{S,NW} = 1, \quad (4.8b)$$

where  $\beta_W$  and  $\beta_{NW}$  are parameter vectors and  $v_W$  and  $v_{NW}$  are disturbance terms.

Finally, while we assume that parents take both the market price for non-parental child care services and the wage offer the mother can receive as exogenous, we only observe these variables for households that purchase such care and/or that has a mother that works. To account for the potential selectivity in what we observe and to account for the price and/or wage that households face who do not consume child care and/or have non-working mothers, we specify equations which characterize the wage and price levels in the markets in which households reside. In particular, we assume that  $p$  can be expressed as the following linear function:

$$p = X_3 \theta_p + \eta_p, \quad (4.9)$$

where  $X_3 = (B_1, \mathbf{R}, r, AFDC_{Max})'$  and  $B_1$  is a vector of variables which control for the characteristics of the child care market in which the household resides, and the (log) of the mother's wage,  $w_M$ , is given by:

$$\ln w_M = X_4 \theta_w + \eta_w, \quad (4.10)$$

where  $X_3 = (B_2, C)$ , where  $B_2$  is a set of variable which control for labor market characteristics and  $C$  denotes characteristics of the mother which affect her labor market productivity, such as educational attainment.

The above specifications of the non-parental child care utilization decision rules and the conditional child care demand functions include the regulation variables,  $\mathbf{R}$ , as well as the price of such care,  $p$ . The direct effects of  $\mathbf{R}$  on  $p_R$ , holding  $p$  constant, enable us to estimate the quality assurance effects of child care regulations suggested by the lack-of-information motivation for regulating the market for child care services outlined in subsection 3.2. The inclusion of  $\mathbf{R}$  in the price equation (4.9) allows us to also derive an estimate of the indirect effect that regulations may have on child care demand through prices. In the next section, we report on our estimates of these two alternative ways in which regulation might be predicted to affect child care demand.

Given the joint nature of parental decisions over the allocation of their time to the various activities and their decisions about the care of the children, it is reasonable to presume that the disturbances in equations (4.3), (4.6a), (4.6b), (4.7a) and (4.7b) are correlated. The model also implies that mother who choose to work—the group for which we observe market wages—and those households that purchase non-parental child care—the group for which we have data on  $p$ —do not represent random a draw from the population of all households with pre-school age children. Thus, the disturbances in (4.9) and (4.10) also are likely to be correlated with the disturbances in the behavioral equations. Given the conditional (on maternal labor force status) nature parental child care choices and the correlation structure of the disturbances in the above equations, our econometric model is a *switching regression system with endogenous switching*.

More formally, let  $\omega$  denote the vector of all disturbances in the model, i.e.,





gitudinal data on the child care choices of parents and inadequate within-state sample sizes in our data preclude us from including state dummy variables. As a second best strategy, we include, in all of the equations, a set of dummy variables for which of the nine census regions in which the household resided.

We utilize maximum likelihood methods to estimate the above switching regression system of equations. The estimation of this system was implemented using the statistical package, HotzTran. A description of the exact form of the likelihood function that was used is available from the authors upon request.

## **5. Empirical Results**

In this section we present estimates for the system of equations specified in the last section. We use the model's parameter estimates to calculate estimates of the elasticities of various variables in the model; these elasticities are evaluated at the sample means of these variables. The actual parameter estimates, and their associated standard errors, are displayed in Table A in the Appendix. We focus our presentation on elasticities rather than the parameter estimates themselves, as the former are easier to interpret, given that the specification of four of the equations in our model are index functions. We present two types of results. The elasticities presented in Table 4 show the direct effect of each of the right-hand side variables included in a particular specification on either the outcome variable or—in the case of the non-parental child care utilization and maternal labor force participation decision rules—the probabilities of an event occurring. Such effects enable us to assess the importance of the two alternative effects on the demand for non-parental child care that our theoretical model suggested, namely quality assurance effects and price or cost effects of regulations. The second set of results, displayed in Table 5, give the total effect of variables on the outcomes considered. Thus, the latter table enables us to assess the overall effects of variables, especially our state regulation variables, on parental child care and

maternal labor force participation choices. In the latter table, we also present the effects of variables on the overall demand for child care, which includes not only the direct and indirect effects of these variables on the choices made by households with working and non-working mothers, but also the effects that these variables may have that would result from the indirect influence these variables have by causing mothers to shift between the working to the non-working regimes.

First consider the results displayed in Table 4. We begin by considering the effects of regulation variables on child care utilization and, conditional on utilization, on the demand for such services. Recall that the first two variables in the table, *Ratio2* and *Ratio4*, indicate the child-to-staff ratio of two-year-olds and four-year-olds in day care centers, respectively. The estimated elasticities indicate the effect of these standards on utilization and demand, independent of any effect they may have on the price of care. Focusing in the effects of child-to-staff standards on child care utilization, note that these effects vary substantially by whether one considers households with working or those with non-working mothers. Increases in *Ratio2* reduce the likelihood that non-working mothers use non-parental child care, but have only a negligible effect on the likelihood that working mothers use such care. Similarly, an increase in *Ratio2* slightly reduces the number of hours used by working mothers but induces a large increase in the hours consumed by non-working women. Recall that increases in the child-to-staff ratios mandated by states represent less stringent regulation of child care services. With respect to child-to-staff standards for 3 and 4 year olds, while *Ratio4* has the same sign for working and non-working mother's utilization, the magnitude of the effect of this regulation is substantially larger for households with working mothers.

State standards on child-to-staff ratios also have significant direct effects on the mother's decision to enter the labor force. While a one percent increase in *Ratio2* raises the probability that

a mother works by .109 percent, a comparable increase in *Ratio4* actually lowers the probability that a mother works by almost one percent.

Finally, note that the regulation of child-to-staff ratios appears to directly affect the price of non-parental child care. As can be seen in the second to the last column in Table 4, increases in *Ratio2* raise the hourly price of care while increase in *Ratio4* reduce it. The estimated elasticity for *Ratio4* on the price of care is fairly large, with a one percent increase in the child-to-staff ratio for 3 and 4 year olds reducing the price of such care by .793 percent.

Turning to the effects of state regulations of the educational or special training qualifications of care providers in day care centers—*CenterEd*—and day care family homes—*FamEd*—we find that these regulations also have direct effects on the decision of parents to utilize non-parental child care services and that their effects differ depending on the working status of the mother. The presence of educational requirements for day care center providers (*CenterEd*) reduces the probability that a working mother will utilize non-parental care but raises the probability of utilization for non-working mother households. Alternatively, the presence of minimum educational for providers in family day care centers (*FamEd*) lowers the likelihood that a non-working mother will choose to utilize non-parental child care services.

With respect to the number of hours of non-parental care used, neither *CenterEd* or *FamEd* appear to have any direct effect. We also note that the presence of the latter educational requirements in a state increases the likelihood that a mother will enter the labor force. Thus, while a bit less consistent than the effects of child-to-staff ratio regulations, the presence of educational requirements do appear to directly influence parental child care utilization choices, although they do not directly influence the parental decision concerning the number of hours used of such care.

Finally, the presence of educational minimum standards on the educational qualifications

of providers in family day care centers does appear to raise the average price of non-parental child care. In particular, states with such regulations are estimated to have a 19 percent higher price than states that do not mandate such provider standards. At the same time, there is no evidence that educational requirements for providers in day care centers influence the average price charged for non-parental child care services.

Taken together, the estimates of the effects of the various state-level minimum standards on child care services support the notion that such regulations do have an effect on the decision of parents to utilize such care that is independent of any effect of these variables that might be transmitted through the changes in the price of such care. As noted above, such findings are consistent with the theoretical motivation for regulating the child care market due to the difficulty of parents in discerning or monitoring the quality of such services.

Our theoretical considerations also suggested that child care regulations would affect parental demand for child care services indirectly through their influence on the price of care. Given the effects of *Ratio2*, *Ratio4*, and *FamEd* on the price of care, the importance of such indirect effects depends on whether the non-parental child care utilization is price elastic. As shown in Table 4, increases in the price of child care services have significant and fairly sizable negative effects on the parental decisions to utilize non-parental child care for households with working mothers and those with non-working mothers. Moreover, the estimates indicate that the child care utilization choice for households with working mothers appears to be more price sensitive than is the case for non-working mothers (compare elasticities of -1.758 with -1.031). Thus, our evidence suggests that this second, indirect, effect of regulations on parental child care decisions is also present.

Several other results in Table 4 are worth noting. First, we note that the extent to which states subsidize child care services also seems to significantly affect parental demand for child

care services and the price of such care. In states with higher state child care tax credits, households with working mothers are significantly more likely to utilize non-parental child care services and to use more hours of such care, although the magnitudes of such effects appear to be small. In addition, states which have higher Title XX reimbursement rates tend to have significantly lower prices for child care, although, again, these effects are not large.

Second, it is interesting that rather than inducing mothers to purchase more care, having higher spouse's earnings, *SpEarn*, reduces the likelihood that both working and non-working mothers use non-parental care and lowers the number of hours of care utilized. Higher levels of spouse earnings also have the predictable effect of reducing the mother's probability of participating in the labor force. In contrast, higher levels of non-labor income (*NonLbInc*) significantly increase the likelihood that households with working mothers use non-parental care and boosts the hours of care consumed.

Third, we note that the decision to utilize non-parental child care by households with working mothers is also quite wage elastic; a one percent increase in the wage rate a mother can receive is estimated to increase the probability of using non-parental care by 3.555. We also find that the mother's labor force participation decision is quite wage elastic.

Finally, note that both working and non-working black women are more likely to use non-parental care and use more hours of care than white women with the same labor force status, despite the fact that they face a higher than average hourly child care price than white women. Black women are also significantly more likely to work, net of other factors.

We now turn to Table 5, which presents the combined direct and indirect effects of child care regulations and other variables on child care utilization, hours used, and the mother's labor force participation decisions presented in Table 4 for households with working and non-working mothers as well as for all households, regardless of the mother's working status. The latter effects

take account of not only how variables affect child care demand of the two different types of households, but also how these variables affect child care demand by shifting the proportions of households with working and non-working mothers.

Examining the combined effects of regulation variables on non-parental child care utilization and the number of hours of such care used by households, we find a noticeable difference between households with working mothers versus those in which the mother does not work. Conditional on a mother working, the price and quality assurance effects of regulations tend to cancel each other out so that, overall, the imposition of more stringent child-to-staff ratios has little effect on the rates of non-parental child care utilization of this type of family. Such results are consistent with findings in Ribar [1992] and Blau [1992], which find little effect of child care regulations on child care utilization for samples that include only working mothers. However, a different story emerges among households with non-working mothers. There, the negative price effect associated with more stringent child-to-staff ratios tends to dominate any positive quality assurance effects such increases in minimum standards may have on child care utilization. Thus, the net effect of reducing the child-to-staff ratio decreases the rates of utilization of non-parental child care among this group. The effect of these two standards on the total market as indicated by the “All” column is to reduce overall child care utilization and hours. Tougher child-to-staff ratios also depress female labor force participation.

While less consistent that the effects of regulations of child-to-staff ratios, educational requirements for providers also tend to reduce the use of child care and their effects also display variation by mothers’ labor force status. Requiring home care providers to have special training reduces the utilization of both working and non-working mothers and reduces the hours used by non-working mothers. Educational requirements for day care centers reduces the child care utilization of working mothers and the hours used by non-working mothers. As with the state-level

child-to-staff ratios, the magnitude of the effect of educational requirements tends to be stronger for non-working mothers. The effect of educational requirements on the overall market is to reduce the number of hours used, and to reduce utilization in the case of family day care center requirements and slightly raise utilization in the case of day care center requirements. Family day care home educational requirements also reduce the likelihood of mothers working while day care center educational requirements raise mothers' probability of working.

The other policy variables included in our analysis generally affect the outcomes in the expected manner. An increase in the state marginal tax subsidy rate has the expected effect on child care utilization, the hours used, and its price, but the effects of the maximum allowable state child care tax credit results are anomalous. The higher a state's marginal tax subsidy rate (only workers are eligible for subsidy), *SCCSub*, the more likely a family is to use care, the more hours of care a family uses, and the more likely the mother of the family is to work. The higher the maximum allowable credit, *SMaxCSub*, the lower the number of hours used and the less likely the mother is to work. A state's daily provider reimbursement rate, *TitleXX*, has the anticipated effect of reducing the hourly price of care.

The effects of several other variables are also worth noting. First, we see that the price effect is significantly negative in all child care use and hours equations in accordance with economic theory and that price reduces mothers' labor force participation. Second, it is interesting to note that non-labor income, *NonLbInc*, suppresses labor force participation but raises the likelihood that mothers use non-parental care and boosts the hours of care consumed. Also, more generous AFDC benefits as indicated by *MaxBen* reduce the overall utilization and hours and make women less likely to work. Finally, earning higher wages makes women more likely to use care and to use more hours of care as well as to increase their labor force participation.



## 6. Conclusions

In the Introduction to this paper, we noted two contending claims about who the imposition of more stringent quality standards on child care would affect parental demand and a mother's decision to work. One emphasized the cost consequences of such regulations and the substitution away by parents from non-parental child care. The other stressed the non-price effects of such regulations, in which the consumer protection aspect of such regulations may actually enhance parental demand. While far from definitive, this paper has found evidence that provides support for each claim. We find that the net average price for non-parental child care facing parents is significantly higher in states which have more stringent child care regulations and both the mother's decision to work and the parents' child care utilization decisions are quite responsive to the price of child care. Taken together, these two results clearly lend support to the first claim that imposing more stringent regulations deters the utilization of non-parental care and maternal work.

But we also find evidence of non-trivial non-price quality effects of such regulations. We find that in states with more stringent minimum quality standards, the use non-parental child care rises, holding price constant. These effects tend to be stronger among households with working mothers relative those with non-working mothers. This is consistent with the view that the quality assurance aspects of such regulations might be expected to have a greater impact on those consumers who face higher costs of monitoring and self-assuring the quality of the child care services they consume.

Our evidence on the net consequences of these two offsetting effects on child care utilization has some interesting implications. Recall that we find that among working mothers the net effect of the stringency of child care regulations on child care demand is negligible. However, this is not the case for households with non-working mothers; nor does it characterize the overall

net impact for the population of households with preschool age children in the U.S. Our estimates imply that raising minimum standards result in non-negligible reductions in the utilization of non-parental care among households with non-working mothers and that they deter labor force participation. As a consequence an increase in the stringency of child care quality standards has the effect of reducing the demand for non-parental child care of the typical household with preschool children.

This latter finding has potentially important consequences for the public policy debate over child care regulation in the U.S. First, they indicate that minimum quality standards induce families to rearrange child care consumption decisions, shifting out of non-parental care and discouraging mothers' labor force participation. That is, these regulations do have a distortionary impact on consumer choices. Our evidence that the tightening minimum quality standards actually induces parents to shift away from regulated care, thus hampering rather than furthering the goal of child development advocates to raise the quality of care to which children in the U.S. In addition, our results suggest that increases in minimum standards may disproportionately affect the child care utilization of economically disadvantaged households. Recall that the utilization of non-parental care among households with non-working mothers was disproportionately poor, black and female headed. To the extent that the children in disadvantaged families may have a great deal to gain in terms of cognitive and social development from non-parental child care or that these families could benefit if the mother worked, our results suggest that increasing the stringency of child care regulations may deterring the use developmentally enriching care by groups for which the marginal social and private gains are high.

While the paper reports important findings, it also raises additional questions for future research. For example, we see parents shifting out of non-parental care in response to the regulations. Do parents also shift among child care modes in response to regulations? Is a consequence

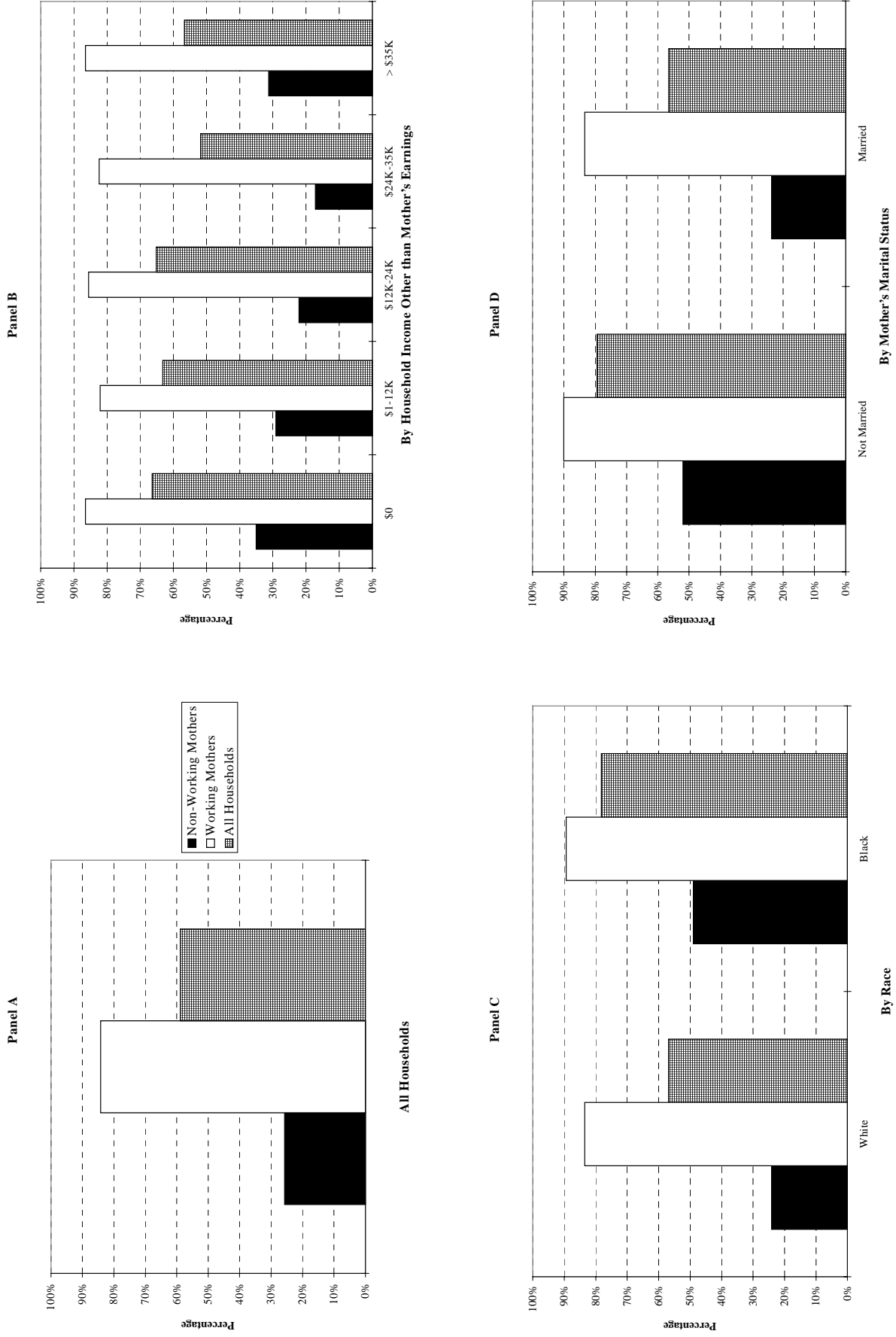
of this demand response that the typical child in states with more stringent child care regulations more or less likely to have better cognitive and social skills as they enter primary school? What are the differential impacts of the other child care regulations imposed by states on child care providers on the price of child care services, parental demand and the developmental outcomes of preschool age children? We hope that our work helps stimulate a careful investigation of these question concerning this important regulated market.

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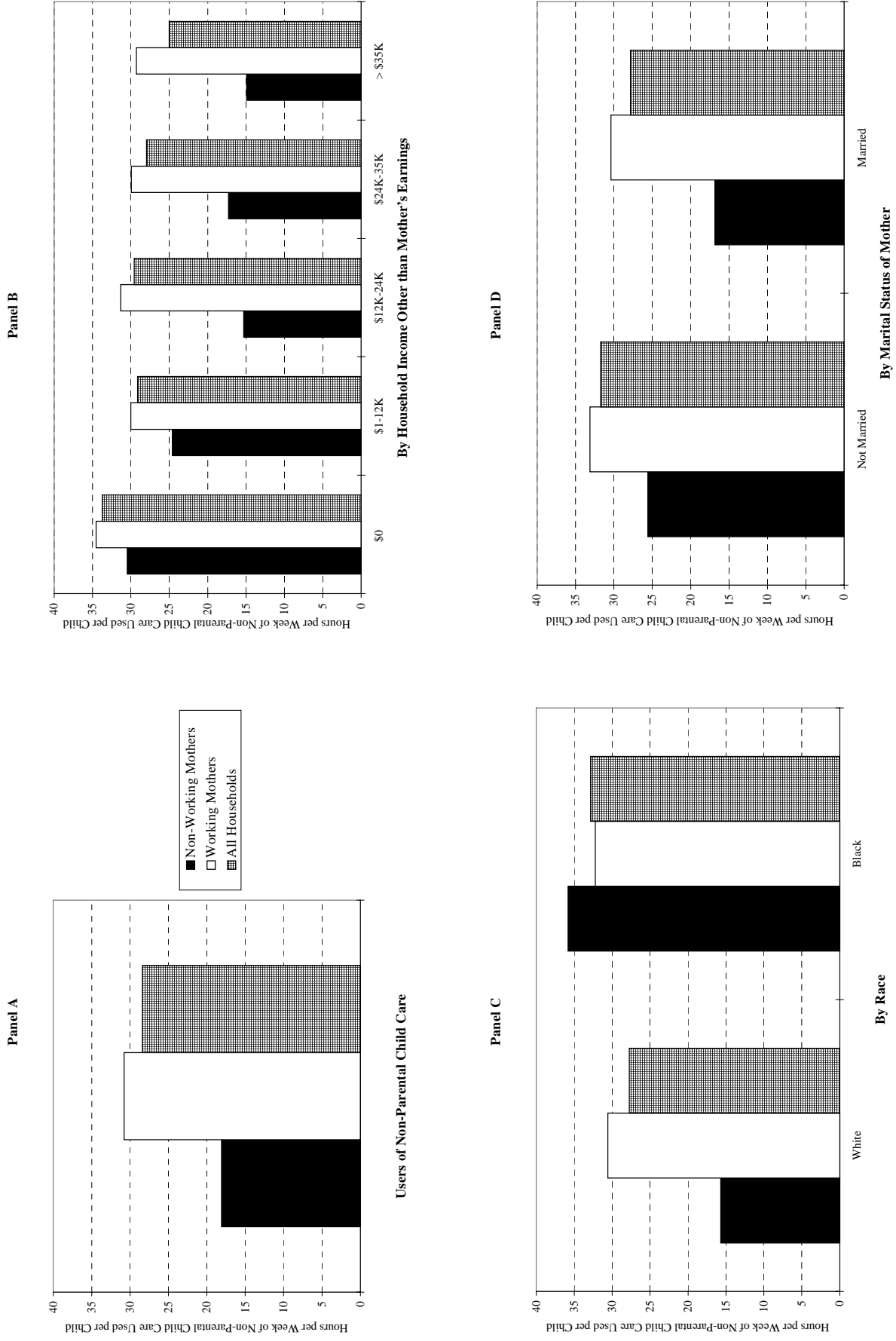
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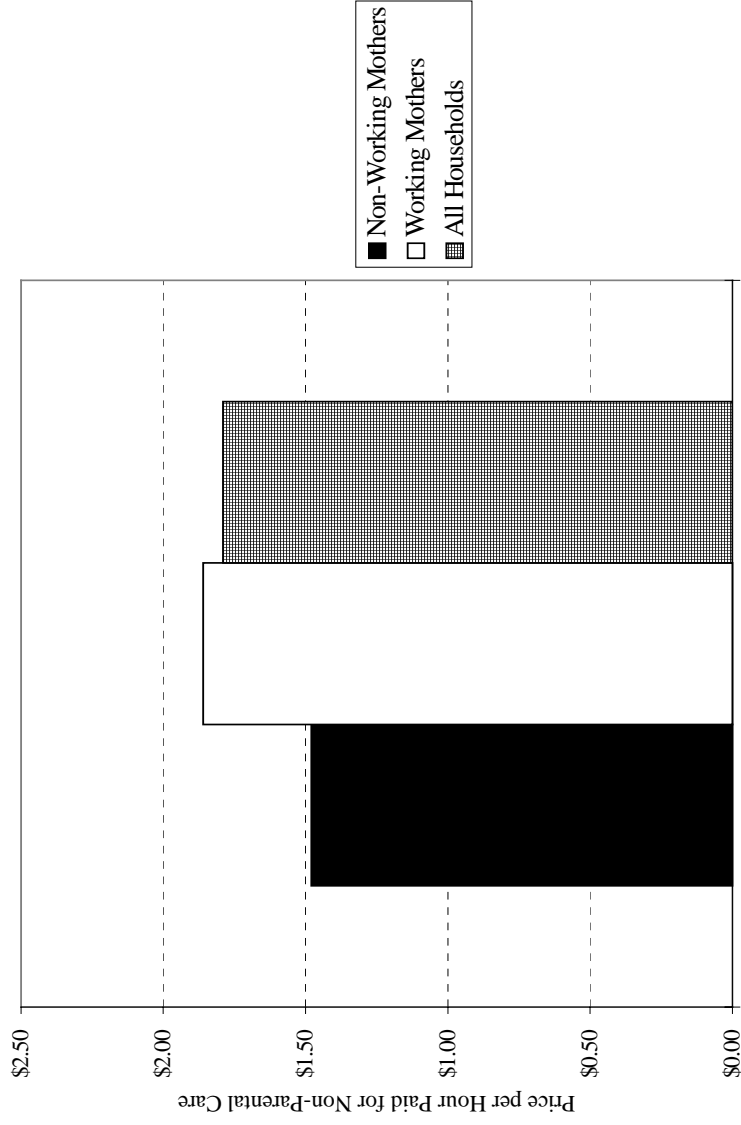
**Figure 1: Utilization of Non-Parental Child Care**



**Figure 2: Weekly Hours of Non-Parental Child Care Used per Child**



**Figure 3: Hourly Price Paid for Non-Parental Child Care Used**

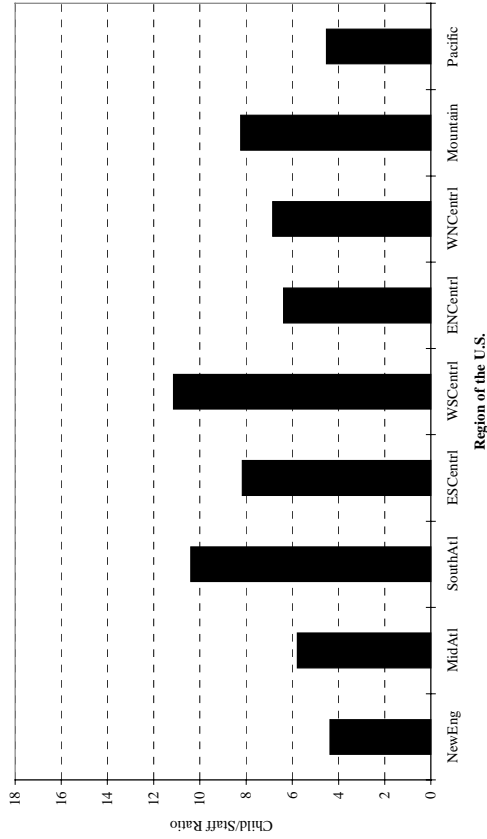


**Users of Non-Parental Child Care**

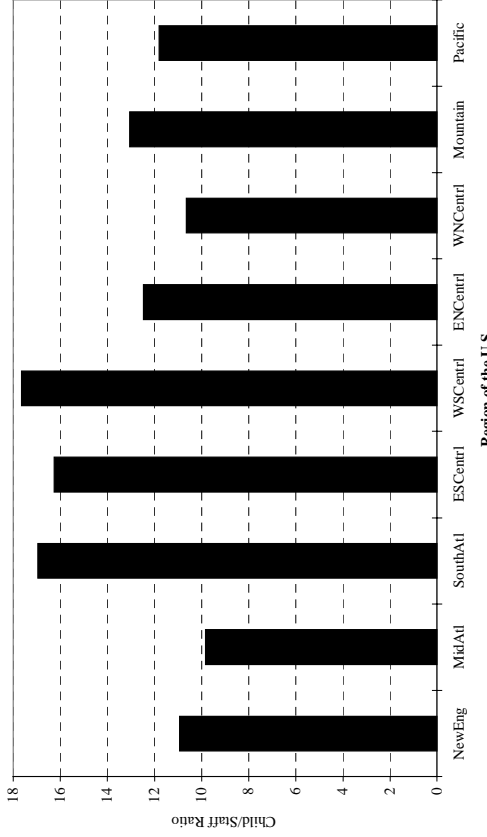


**Figure 4: State Child Care Regulations by Region of the U.S.**

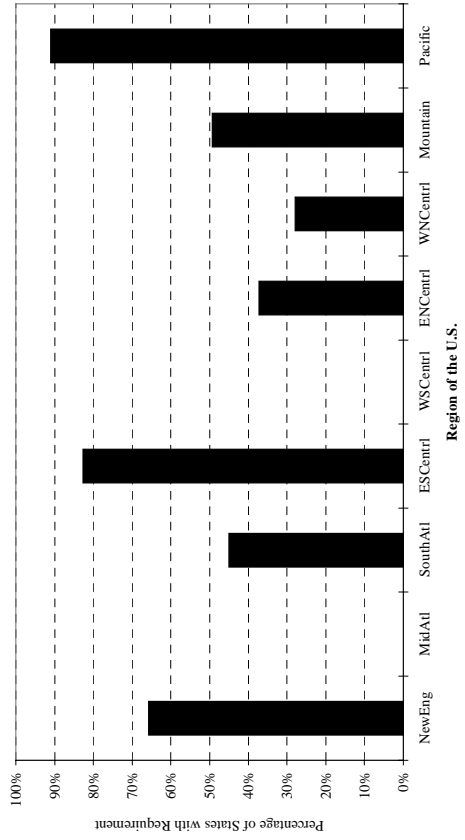
**Panel A: State Maximum Child/Staff Ratio for 2 Year Olds**



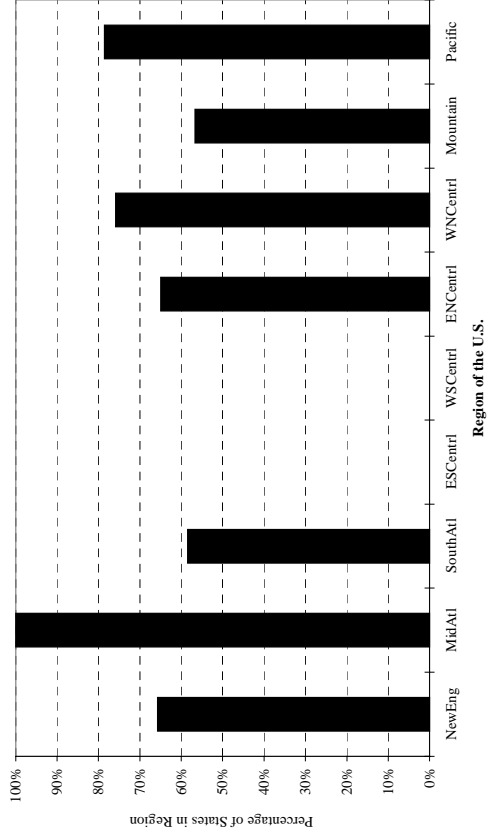
**Panel B: State Maximum Child/Staff Ratio for 4 Year Olds**



**Panel C: Whether State Has Educational Requirements for Staff of Family Day Care Centers**

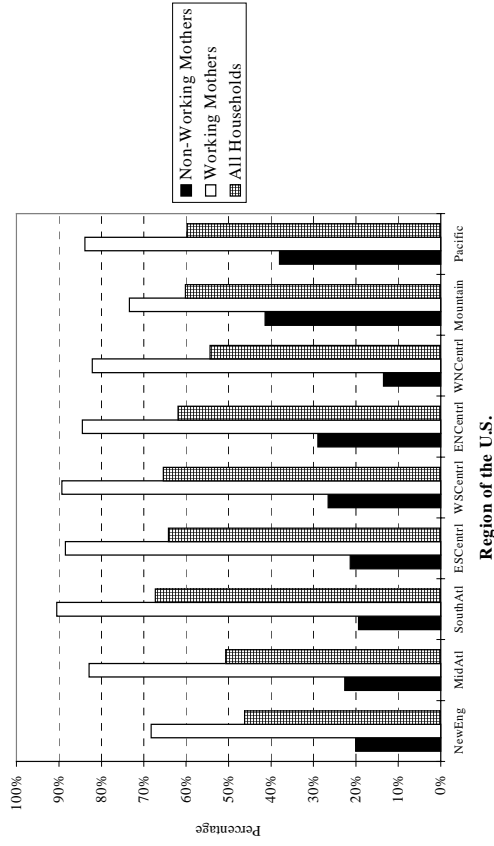


**Panel D: Whether State Has Educational Requirements for Staff of Day Care Centers**

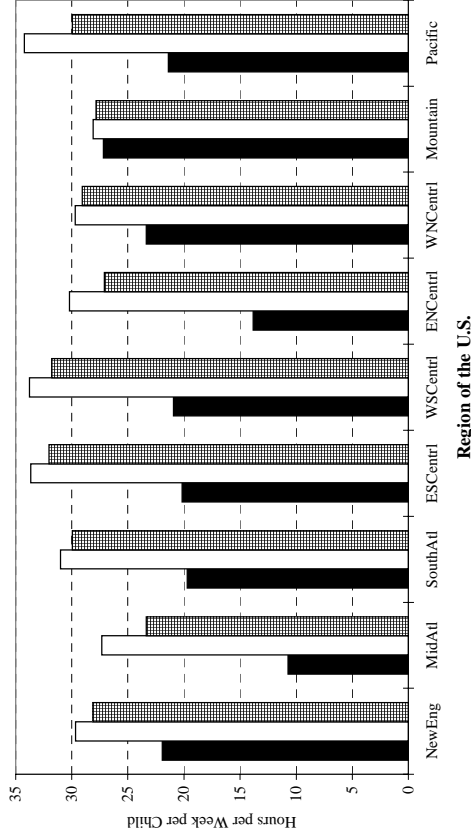


**Figure 5: Region Distribution in Non-Parental Child Care, Its Price, Mother's Labor Force Participation and Wages**

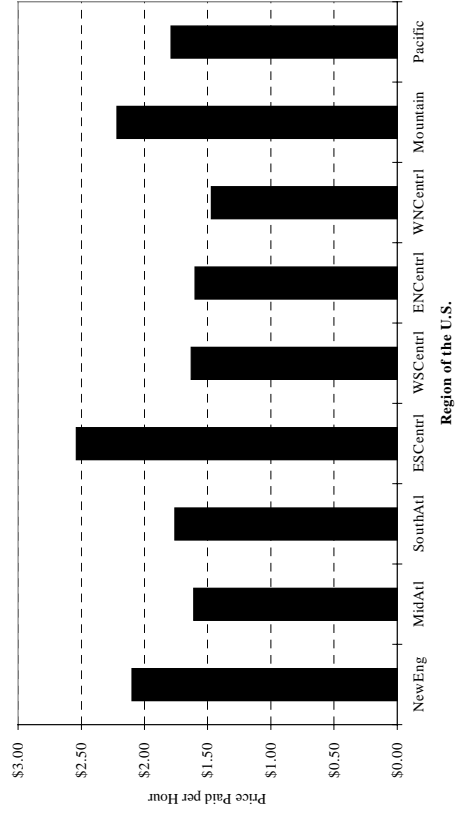
**Panel A: Non-Parental Child Care Utilization**



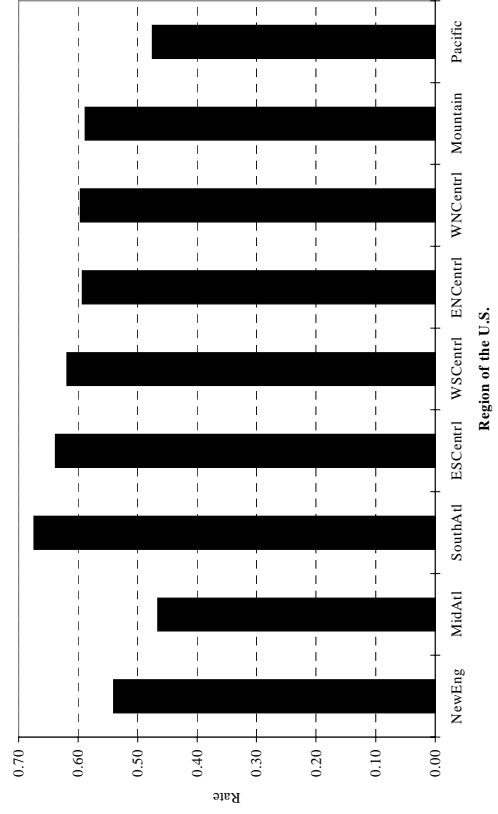
**Panel B: Hours per Week of Non-Parental Child Care Used**



**Panel C: Price per Hour Paid for Non-Parental Child Care**



**Panel D: Maternal Labor Force Participation Rates**



**Table 1**  
**Definition of Variables**

<b>Variable</b>	<b>Definition</b>
<u>Child Care Variables:</u>	
<i>UseCC</i>	Do parents use at least some non-parental child care for any pre-school aged children? (1 = Yes, 0 = No)
<i>HrsCC</i>	Total Hours per week of non-parental child care used for household's pre-school aged children.
<i>CCPrice</i>	Average hourly cost of non-parental child care for pre-school aged children.
<u>Mother's Work-Related Variables:</u>	
<i>Work</i>	Was mother working in February 1986? (1 = Yes, 0 = No)
<i>InWage</i>	Log of mother's hourly market wage rate in February 1986, if she was working.
<u>State Child Care Regulations and Subsidies:</u>	
<i>Ratio2</i>	State of residence's maximum children-to-staff ratio state imposed in 1986 on licensed day care centers with respect to the care of children aged 2 1/4 years old.
<i>Ratio4</i>	State of residence's maximum children-to-staff ratio state imposed in 1986 on licensed day care centers with respect to the care of children aged 4 years old.
<i>FamEd</i>	Does state have pre-service educational, ongoing training and/or previous work experience requirements for staff in licensed home day care or group home centers in 1986? (1 = Yes, 0 = No)
<i>CenterEd</i>	Does state have educational and/or previous work experience requirements for staff as condition of employment in licensed day care (and nursery school) centers in 1986? (1 = Yes, 0 = No) [Most states (16) with requirements require college coursework; in 9 other states, requirement can be met with either coursework or work experience.]
<i>SCCSub</i>	State's subsidy rate for child care expenditures for a household with annual income of \$15,000 in 1986 [= the marginal tax credit rate for child care expenditures.]
<i>SMaxCSub</i>	State's maximum tax credit for child care expenditures (in \$10,000) for a household with \$15,000 of income in 1986.
<i>TitleXX</i>	State's daily rate of reimbursement to child care providers for Title XX funds in 1986. (\$ reimbursed per day from Title XX funds).

**Table 1 (Continued)**

<b>Variable</b>	<b>Definition</b>
<i>SpEarn</i>	Total 1985 annual labor earnings of mother's spouse (in \$10,000).
<i>NonLbInc</i>	1985 annual nonlabor income of mother and her spouse (in \$10,000).
<u>Mother's Educational Attainment:</u>	
<i>TwoYr</i>	Mother's highest level of education is a degree from a two-year junior college or vocational training program (1 = Yes, 0 = No).
<i>SomeColl</i>	Mother's highest level of education is high school plus some college (1 = Yes, 0 = No).
<i>Coll</i>	Mother's highest level of education is bachelor's degree (1 = Yes, 0 = No).
<i>MoreColl</i>	Mother's highest level of education includes bachelor's degree plus some graduate education (1 = Yes, 0 = No).
<u>Family's and Mother's Demographic Characteristics:</u>	
<i>Black</i>	Family's is black (1 = Yes, 0 = No).
<i>NumPre</i>	Number of pre-school age children in household.
<i>NumSch</i>	Number of school age children in household
<i>LiVWRels</i>	Does family live with other relatives at time of 1986 interview? (1 = Yes, 0 = No).
<i>MomClose</i>	Does mother's mother live less than 10 miles away at time of 1986 interview? (1 = Yes, 0 = No).
<u>Characteristics of States of Residence:</u>	
<i>UnempRt</i>	State unemployment rate in 1986.
<i>MaxBen</i>	State's annual AFDC benefit (in \$10,000) for a family of four in 1986.
<i>BrkEven</i>	Maximum level of annual income for which a family of four in 1986 is still eligible for AFDC (= MaxBen/[AFDC Benefit Reduction Rate]).

**Table 1 (Continued)**

<b>Variable</b>	<b>Definition</b>
<i>Region of Residence:</i>	
<i>NewEng</i>	Family resided in the New England census region (i.e., Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, or Connecticut) in 1986 (1 = Yes, 0 = No).
<i>MidAtl</i>	Family resided in the Middle Atlantic census region (i.e., New Jersey, New York, or Pennsylvania) in 1986 (1 = Yes, 0 = No).
<i>SouthAtl</i>	Family resided in the South Atlantic census region (i.e., Delaware, D.C., Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, or West Virginia) in 1986 (1 = Yes, 0 = No).
<i>ESCentrl</i>	Family resided in the East South Central census region (i.e., Alabama, Kentucky, Mississippi, or Tennessee) in 1986 (1 = Yes, 0 = No)
<i>WSCentrl</i>	Family resided in the West South Central census region (i.e., Arkansas, Louisiana, Oklahoma, or Texas) in 1986 (1 = Yes, 0 = No).
<i>ENCentrl</i>	Family resided in the East North Central census region (i.e., Illinois, Indiana, Michigan, Ohio, or Wisconsin) in 1986 (Yes, 0 = No).
<i>WNCentrl</i>	Family resided in the West North Central census region (i.e., Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota or South Dakota) in 1986 (1 = Yes, 0 = No).
<i>Mountain</i>	Family resided in the Mountain census region (i.e., Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, or Wyoming) in 1986 (1 = Yes, 0 = No).
<i>Pacific</i>	Family resided in the Pacific census region (i.e., Alaska, California, Hawaii, Oregon, or Washington) in 1986 (1 = Yes, 0 = No).

**Table 2**  
**Sample Means and Standard Deviations**  
**(Data Source: NLS72)**  
**(Weighted)**

<b>Variable</b>	<b>Obs.</b>	<b>Mean</b>	<b>Std. Dev.</b>
<i>UseCC</i>	2645	0.589	0.492
<i>HrsCC</i>	2645	16.740	19.869
<i>CCPrice</i>	1376	1.79	2.50
<i>Work</i>	2645	0.568	0.495
<i>InWage</i>	1210	2.102	0.542
<i>Ratio2</i>	2474	7.295	2.804
<i>Ratio4</i>	2474	13.156	3.516
<i>FamEd</i>	2474	0.383	0.486
<i>CenterEd</i>	2474	0.590	0.492
<i>SCCSub</i>	2474	0.036	0.055
<i>SMaxCSub</i>	2474	0.0020	0.0032
<i>TitleXX</i>	2474	11.494	3.718
<i>SpEarn</i>	2395	2.341	1.873
<i>NonLbInc</i>	2409	0.162	0.518
<i>TwoYr</i>	2645	0.102	0.303
<i>SomeColl</i>	2645	0.274	0.446
<i>Coll</i>	2645	0.214	0.410
<i>MoreColl</i>	2645	0.056	0.229
<i>Black</i>	2645	0.098	0.297
<i>NumPre</i>	2645	1.264	0.665
<i>NumSch</i>	2645	0.860	0.924
<i>LivWRels</i>	2645	0.050	0.218
<i>MomClose</i>	2411	0.397	0.489
<i>UnempRt</i>	2474	7.087	1.914
<i>MaxBen</i>	2474	0.0510	0.0184
<i>BrkEven</i>	2645	0.0685	0.0295
<i>NewEngl</i>	2474	0.066	0.248
<i>MidAtl</i>	2474	0.147	0.355
<i>SouthAtl</i>	2474	0.150	0.357
<i>ESCentrl</i>	2474	0.062	0.242
<i>WSCentrl</i>	2474	0.102	0.303
<i>ENCentrl</i>	2474	0.193	0.395
<i>WNCentrl</i>	2474	0.101	0.302
<i>Mountain</i>	2474	0.066	0.249
<i>Pacific</i>	2474	0.112	0.315

**Table 3**  
**Sample Correlations between Measures of Non-Parental Child Care Demand, the Price of Child Care Services, and Maternal Labor Force Participation and State Child Care Regulations, State Child Care Subsidies, and State Unemployment Rates and AFDC Benefits**

<b>Variable/Variable</b>	<b>UseCC</b>	<b>HrsCC</b>	<b>CCPrice</b>	<b>Work</b>	<b>Ratio2</b>	<b>Ratio4</b>	<b>FamEd</b>	<b>CenterEd</b>
<b>Ratio2</b>								
All Households	0.111***	0.077***	-0.019	0.119***				
Mother Does Not Work	-0.018	0.094						
Mother Works	0.109***	0.038						
<b>Ratio2</b>								
All Households	0.114***	0.148***	-0.030	0.108***				
Mother Does Not Work	0.032	0.104*						
Mother Works	0.089***	0.139***						
<b>FamEd</b>								
All Households	0.005	0.058**	0.059***	0.001				
Mother Does Not Work	0.037	0.090						
Mother Works	-0.022	0.063**						
<b>CenterEd</b>								
All Households	0.012	-0.049*	-0.003	-0.005				
Mother Does Not Work	0.080***	0.026						
Mother Works	-0.036	-0.046*						
<b>TitleXX</b>								
All Households	0.003	-0.017	-0.014	-0.054***	-0.569***	-0.469***	0.257*	0.559***
Mother Does Not Work	0.119***	0.004						
Mother Works	-0.027	0.020						
<b>SCCSub</b>								
All Households	0.013	0.002	-0.023	0.021	-0.050	-0.163	0.085	0.187
Mother Does Not Work	-0.006	0.093						
Mother Works	0.001	-0.021						
<b>MaxBen</b>								
All Households	-0.080***	-0.078***	-0.008	-0.129***	-0.753***	-0.634***	0.279***	0.507***
Mother Does Not Work	0.072**	-0.031						
Mother Works	-0.075***	-0.041						
<b>UnempRt</b>								
All Households	0.044**	0.015	0.002	0.023	0.229*	0.184	-0.143	-0.498***
Mother Does Not Work	0.017	-0.020						
Mother Works	0.057**	0.017						

\* Significant at 10% level; \*\* Significant at 5% level; \*\*\* Significant at 1% level.

**Table 4**  
**Estimated Elasticities for Variables in Conditional Utilization of Non-Parental Child Care Equations, Conditional Total Weekly Hours of Child Care Equations, Mother's Labor Force Participation Equation, Mother's (Log) Wage Equation and Hourly Price of Child Care Equation<sup>a</sup>**

Variable	Non-Parental Child Care Utilization:		Weekly Hours of Care:		Labor Force Participation	Child Care Price	InWage
	Working Mothers	Non-Working Mothers	Working Mothers	Non-Working Mothers			
<i>Ratio2</i>	.206	-.003***	-.028***	.452**	.109***	.062*	
<i>Ratio4</i>	-1.351***	-.066***	.208	-.831	-.995***	-.793***	
<i>FamEd<sup>b</sup></i>	.311**	-.307***	.011	.133	.198**	.188***	
<i>CenterEd<sup>b</sup></i>	-.090**	.459***	.024	-.188	.017	-.018	
<i>TitleXX</i>						-.063***	
<i>SCCSub</i>	.014***		.030***	.001	.063***		
<i>SMaxCSub</i>	.002		-.034***	-.000	-.055***		
<i>CCPrice</i>	-1.758***	-1.031*	.089	-1.413	-1.261***		
<i>Wage</i>	3.555**		2.159		2.956***		
<i>SpEarn</i>	-.024	-.998**	-.843***	-2.392***	-1.828***		
<i>NonLbInc</i>	.015	.231***	.097***	.372***	-.088***		
<i>MaxBen</i>		.523***	-.000	.217	-.211***	.020	
<i>BrkEven</i>		.186***	-.000	-.053	-.063***		
<i>UnempRt</i>						-.279**	-.076***
<i>TwoYr<sup>b</sup></i>	-.517**	.134**	-.198	.073	-.217		.068***
<i>SomeColl<sup>b</sup></i>	-.865**	.240***	-.188	-.154	-.463*		.121***
<i>Coll<sup>b</sup></i>	-1.292**	.533***	-.273	.068	-.882**		.185***
<i>MoreColl<sup>b</sup></i>	-1.898**	1.070***	-.254	.391	-1.386**		.297***
<i>NumPre</i>	.038***	.091*	.076***	-.321***	-.223***		
<i>NumSch</i>	-.063***	-.205***	-.026**	-.056	-.070***		
<i>LivWRel<sup>b</sup></i>	.081***	-.265***	.135***	-.205	.234***		
<i>MomClose<sup>b</sup></i>	.030***	-.023	-.052***	.086**	.136***		
<i>Black<sup>b</sup></i>	.553**	.799***	.134	.784***	.433***	.089***	-.051***
Sample Size	1235	792	988	193	2022	1295	1149

\* Significant at 10% level; \*\* Significant at 5% level; \*\*\* Significant at 1% level.

<sup>a</sup>All elasticities are evaluated at means for relevant sample and working or non-working subsamples.

<sup>b</sup>The calculations for effects with respect to dummy variables give the percentage change in the outcome variable (or probability) due to a change in the dummy variable from 0 to 1.



**Table 5**  
**Total Estimated Effects (Expressed as Elasticities) of Regulation and Subsidy Variables on Utilization of Non-Parental Care and the Mother's Labor Force Participation Decisions<sup>a</sup>**

Variable	Outcome		
	<i>Utilization of Non-Parental Care for Households with:</i>		
	<b>Non-Working Mothers</b>	<b>Working Mothers</b>	<b>All</b>
<i>Ratio2</i>	-.064	.093	.077
<i>Ratio4</i>	.726	.077	.205
<i>FamEd<sup>a</sup></i>	-.501	-.019	-.132
<i>CenterEd<sup>a</sup></i>	.477	-.058	.065
<i>SCCSub</i>		.014	.047
<i>SMaxCSub</i>		.002	-.029
<i>TitleXX</i>	.067	.109	.145
<i>Maxben</i>	.501	-.034	-.073
<i>NonLbInc</i>	.231	.015	.002
<i>CCPrice</i>	-1.031	-1.758	-2.331
<i>Wage</i>		3.555	4.508
	<i>Hours of Non-Parental Care Used by Households with:</i>		
	<b>Non-Working Mothers</b>	<b>Working Mothers</b>	<b>All</b>
<i>Ratio2</i>	.370	-.022	.102
<i>Ratio4</i>	.268	.133	.154
<i>FamEd<sup>a</sup></i>	-.133	.028	-.029
<i>CenterEd<sup>a</sup></i>	-.162	.022	-.020
<i>SCCSub</i>	.001	.030	.034
<i>SMaxCSub</i>	-.000	-.034	-.034
<i>TitleXX</i>	.091	-.006	.040
<i>Maxben</i>	.217	.002	-.005
<i>NonLbInc</i>	.372	.097	.112
<i>CCPrice</i>	-1.413	.089	-.647
<i>Wage</i>		2.159	1.113
	<i>Mother's Labor Force Participa- tion Rate:</i>		
<i>Ratio2</i>		0.030	
<i>Ratio4</i>		.005	
<i>FamEd<sup>a</sup></i>		-.039	
<i>CenterEd<sup>a</sup></i>		.040	
<i>SCCSub</i>		.063	
<i>SMaxCSub</i>		-.055	
<i>TitleXX</i>		.054	
<i>Maxben</i>		-.237	
<i>NonLbInc</i>		-.088	
<i>CCPrice</i>		-1.261	
<i>Wage</i>		2.956	

<sup>a</sup>See notes to Table 4.

**Appendix**  
**The Data Used from the Fifth Follow-Up of the**  
**National Longitudinal Study of the High School Class of 1972 (NLS72)**

***The Sample Used:***

In this Appendix we provide a brief description of the NLS72 sample, the content of the Fifth Follow-Up survey and the way we selected the analysis sample for this study. Respondents in the NLS72 were high school seniors in U.S. schools during the 1971-1972 school year. The sample interviewed in the Fifth Follow-Up survey was generated by a two-stage sampling procedure.<sup>29</sup> In the first stage—which generated the original sample of high school seniors—students were randomly selected from schools which themselves were randomly drawn from each of 608 strata based on type of school (public versus private), geographic region, proportion of minority students, income level of community, and other criteria. Generally, 18 students were chosen at random from each of the selected schools, but students in low-income areas and schools with a high proportion of minorities were oversampled. The original sample consisted of 22,652 respondents, with approximately equal numbers of males and females.

At the time of the Fifth Follow-Up survey, a subset of the original members was selected for re-interview. To be considered for the re-interview, members of the original sample had to have participated in at least one of the earlier waves of the NLS72. Among these respondents, the subset was selected probabilistically, with retention probabilities depending on: (i) their base-year selection probabilities; (ii) whether they had completed an interview during the fourth Follow-Up; (iii) their ethnicity (Hispanics were retained at a higher rate); (iv) their educational status (respondents with four-year college degrees or who had completed two years or less of college at the time of the fourth Follow-Up were oversampled); (v) their marital status (divorced, widowed, separated and never-married respondents were oversampled); and (vi) whether they were identified in the fourth

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<sup>29</sup>The following discussion draws heavily from Tourangeau, *et al.* [1987].

Follow-Up interview as “potential teachers” (such individuals were oversampled). The application of these second-stage selection criteria identified 14,489 individuals from the original sample to whom Fifth Follow-Up surveys were mailed in the first half of 1986. Approximately 89% of these individuals returned the questionnaire, yielding a final sample of 12,841.<sup>30</sup> At the time of this interview, the average age of sample members was 32 and members had been out of high school for 14 years.

In the analysis reported below, we use a subsample of the respondents to the Fifth Follow-Up questionnaire which met the following criteria. We only use data on respondents who: (a) were white or black females; (b) responded that they had preschool children and that they had at least some responsibility for the care and upbringing of these children; and (c) reported their marital status and hourly per child costs of non-parental child care of \$25 or less. Since we wish to compare child care arrangements by mother’s working status, we were forced to restrict our attention to female respondents, as this information was not gathered for the wives of male respondents. We included only black and white respondents because these were the only racial/ethnic groups for which we could identify state of residence at the Fifth Follow-Up interview. We need state of residence information in order to examine the effects of state-level variables on child care demand and costs. The final set of exclusions—on missing marital status information and on extremely high reported values of child care costs—were to ensure adequate and reliable information on some crucial vari-

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<sup>30</sup>The following gives the distribution of returned questionnaires by month in 1986:

<b>Percent of Sample Members Who Responded in Each Month</b>	
<i>Month</i>	<i>Percent of Sample</i>
February	0.3
March	53.6
April	9.3
May	8.9
June	8.9
July	14.4
Missing	4.6

ables. Our final sample includes 2,645 respondents.

As noted in the text, this is not a random sample of mother-present households with preschool age children. There are several dimensions in which it is non-representative of this population. First, the NLS72 only sampled individuals who were seniors in the 1971-1972 school-year. Second, the women in our sample, who were around 31 years of age at the time of the survey, are older than the average age of mothers with preschool age children in the U.S. In Hotz and Kilburn [1992], we conducted a detailed comparison of the characteristics with our sample of women from the NLS72 with a representative sample of households with preschoolers from the 1986 Current Population Survey (CPS). Despite the discrepancies between the two populations noted above, based on a comparison of a range of demographic characteristics and measures of economic status, we find that our sample from the NLS72 looks a good deal like the population of households with preschool age children. This is especially true when comparing our sample with U.S. households with mothers between the ages of 30 and 35. Thus, while appropriately cautious about the generalizability of our findings, we anticipate that our results are applicable to households in which the mothers fall within the age cohort covered by the NLS72, and may apply to the broader population of those households with young children present.

***The Variables Used:***

The respondents to Fifth Follow-Up survey were asked a range of questions about their child care arrangements and expenses as well as about their family income and the respondent's labor supply. In addition, using information on the state of residence at the 1986 interview, we supplemented the survey data with state-level variables, including measures of the prevailing child care regulations. Here we briefly describe the data available and the variables we constructed.

The Fifth Follow-Up questionnaire asked child care information in two modules. The first module covered child care arrangements for preschool age children, while the second covered ar-

rangements for school-age children. In this paper, we focus on the information in the first module.<sup>31</sup>

Respondents were asked to “describe the usual child care arrangements” for their preschool children. They were asked to “circle all that apply,” and indicate the average numbers of hours per week for each one circled for the following list of particular child care arrangements:

- (a) Not applicable; I have no preschool age children
- (b) Mother or father cares for child at home
- (c) In child’s home by relative
- (d) In child’s home by non-relative
- (e) In relative’s home
- (f) In non-relative’s home
- (g) Private day care center or nursery school, other than kindergarten
- (h) Public day care center or nursery school, other than kindergarten
- (i) Child cares for self (without supervision)
- (j) Mother or father cares for child at work
- (k) Employer-provided day care
- (l) Other (specify)
- (m) Don’t know

They were also asked: “Thinking back over the last six months, how much money did you usually spend on child care for all your preschool children during an average month?”

From these responses, we constructed several variables measuring non-parental child care utilization and costs. The definitions of these and the other variables used in the paper are found in Table 1 and their sample means and standard deviations are reported in Table 2. The variable *UseCC* is a dichotomous variable which measures whether the respondent used *only* parental child care (*UseCC* = 0) or if she used some non-parental care (*UseCC* = 1). Since the questionnaire only includes the response “mother or father cares for child at home (or work),” we are not able to determine whether parental care was only provided by the mother or by both parents.

To measure the intensity of non-parental child care utilization, we constructed the variable, *HrsCC*, measuring the average hours per week (and per child) of care used. Finally, using the responses on typical child care expenditures, we constructed the variable *CCPrice*, which gives the

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<sup>31</sup> The questionnaire did not specify the ages of these two groups of children, but we found that the preschool age chil-

average cost per hour (per child) of non-parental child care. As we discuss in the text, the limited information collected on the child care in the 1986 wave prevents us from conducting an analysis of the particular mode of care parents use and the average prices paid for specific modes.

The other crucial dimension for our analysis is the labor force status of the mother. As noted in the Introduction, most existing surveys only ask working mothers or mothers in school or in training programs about their child care arrangements. In order to classify our respondents according to these work and training distinctions, we used their responses to a modified version of the CPS labor-force-activity question asked for the reference period of the first week of February 1986. We classified a woman in one of two categories: (a) “*Working*” if she reported that she was “working for pay at a full-time or part-time job” or on active duty in the military; (b) “*Not Working*,” if she was not working or was not working but was taking technical, college, or graduate courses or was in an apprentice program. We find that 57% of the mothers in the sample were working.<sup>32</sup> For respondents working in February, we constructed a measure of their hourly wage, labeled *Wage*, using her “highest current or ending hourly wage rate (before deductions)” reported for any jobs held during the first week of February 1986.

The other variables defined in Table 1—in particular, the measures of state child care regulations, child care subsidies, and tax credits—are described in section 2.3 of the paper.

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dren were generally less than six years old, and that the school-age children were generally six years old and above.

<sup>32</sup> Inadvertently, we did not include those households with mothers who reported that they had a job but were temporarily not at work in the “*Working*” category. Such women would be classified as working by the standard CPS labor force status classification scheme and would be asked the child care questions in most of the existing surveys. We have investigated the sensitivity of our analysis to this misclassification and found that it had not discernible impact on the results reported here.

**Table A**  
**Maximum Likelihood Parameter Estimates for Conditional Utilization of Non-Parental Care Decisions, Con-**  
**ditional Weekly Hours of Child Care Used per Child, Hourly Price of Child Care Equation, Mother's Labor**  
**Force Participation and (Log) Wage Equations**  
**[Data Source: NLS72, 1986 Wave]**

<i>Variable</i>	<i>Child Care Utilization:</i>		<i>Weekly Hours of Child Care:</i>		<i>Labor Force Participation</i>
	<i>Working Mothers</i>	<i>Non-Working Mothers</i>	<i>Working Mothers</i>	<i>Non-Working Mothers</i>	
<i>Ratio2</i>	.0736* (.0409)	-.1157*** (.0380)	-1.6466*** (.3266)	-3.4151** (1.3723)	-.0694*** (.0196)
<i>Ratio2<sup>2</sup></i>	.0014 (.0017)	.0083*** (.0024)	.0992*** (.0192)	.3377*** (.0870)	.0062*** (.0011)
<i>Ratio4</i>	-.4583*** (.1445)	-.2512*** (.0327)	.1838 (.8898)	.1857 (2.4041)	-.0887 (.2294)
<i>Ratio4<sup>2</sup></i>	.0040*** (.0009)	.0097*** (.0010)	.0110 (.0101)	-.0520 (.0711)	-.0008 (.0005)
<i>FamEd</i>	1.0840** (.4220)	-.2447*** (.0714)	.2921 (2.3419)	2.3853 (4.9947)	.2857** (.1200)
<i>CenterEd</i>	-.3134** (.1531)	.3655*** (.0377)	.7533 (.6774)	-3.4261 (2.7871)	.0248 (.0488)
<i>SCCSub</i>	1.3227*** (.5092)		24.1629*** (5.7084)		2.5111*** (.2305)
<i>SMaxCSub</i>	.0415 (.0951)		-.5318*** (.1063)		-.4293*** (.0436)
<i>CCPrice</i>	-3.5170*** (1.3072)	-.4725* (.2891)	1.7351 (7.4622)	-14.5498 (15.8332)	-1.0465*** (.3655)
<i>lnWage</i>	12.3611** (5.0756)		18.8694 (25.4895)		4.1842*** (1.5001)
<i>SpEarn</i>	-.0040 (.0126)	-.0293** (.0117)	-1.2547*** (.1436)	-1.5941*** (.3173)	-.1128*** (.0030)
<i>NonLbInc</i>	.0345 (.0248)	.1020*** (.0161)	1.9852*** (.3198)	2.7245*** (.8341)	-.0789*** (.0114)
<i>MaxBen</i>		.0775*** (.0165)		.8058 (.7206)	-.0599*** (.0085)
<i>BrkEven</i>		.0179*** (.0038)		-.1111 (.1564)	-.0111*** (.0022)
<i>TwoYr</i>	-1.8025** (.7372)	.1068** (.0453)	-6.0086 (3.6666)	1.3416 (1.2133)	-.3138 (.2206)
<i>SomeColl</i>	-3.0197** (1.2896)	.1910*** (.0450)	-5.6403 (6.2871)	-2.7338 (1.7497)	-.6698* (.3821)
<i>Coll</i>	-4.5068** (1.9679)	.4252*** (.0435)	-8.1971 (9.5087)	1.3437 (3.1020)	-1.2748** (.5826)
<i>MoreColl</i>	-6.6210** (3.1673)	.8528*** (.0741)	-7.5058 (14.9604)	7.2460 (6.0167)	-2.0040** (.9360)
<i>NumPre</i>	.1142*** (.0272)	.0523* (.0282)	1.9694*** (.3373)	-4.0425*** (.7422)	-.2555*** (.0078)
<i>NumSch</i>	-.2682*** (.0142)	-.1779*** (.0160)	-1.0606** (.4721)	-1.3720 (1.4087)	-.1180*** (.0055)
<i>MomClose</i>	.1054*** (.0249)	-.0183 (.0298)	-1.5992*** (.3501)	1.5454** (.7293)	.1961*** (.0109)
<i>LivWRels</i>	.2844*** (.0476)	-.2116*** (.0686)	4.1366*** (.7832)	-3.7437 (3.9623)	.3378*** (.0296)

Table A (Continued)

<i>Variable</i>	<i>Child Care Utilization:</i>		<i>Weekly Hours of Child Care:</i>		<i>Labor Force Participation</i>
	<i>Working Mothers</i>	<i>Non-Working Mothers</i>	<i>Working Mothers</i>	<i>Non-Working Mothers</i>	
<i>Black</i>	1.9296** (.7578)	.6366*** (.0625)	4.0416 (3.9717)	14.0861*** (4.9324)	.6265*** (.2219)
<i>MidAtl</i>	-.3533 (.4982)	-.5490*** (.1250)	4.0232** (1.8391)	-1.9927 (6.4511)	-.8254*** (.1451)
<i>SouthAtl</i>	1.4925*** (.4547)	-.4926*** (.0948)	3.6372 (2.8002)	3.0652 (7.0182)	.0531 (.1380)
<i>ESCentrl</i>	4.9037*** (1.5134)	.4960** (.2070)	5.9276 (9.4667)	31.2201 (19.3153)	.9860** (.4348)
<i>WSCentrl</i>	1.6191*** (.5206)	-.2279** (.1131)	5.7080* (2.9547)	10.7923 (9.9700)	-.1190 (.1576)
<i>ENCentrl</i>	.0927 (.3968)	.0547 (.1009)	4.3009*** (1.1652)	5.4303** (2.5648)	-.4512*** (.1200)
<i>WNCentrl</i>	-.8849 (.6778)	-.6621*** (.1606)	8.4985*** (2.6576)	-1.6369 (9.7229)	-.5414*** (.1959)
<i>Mountain</i>	1.2184** (.5467)	.7355*** (.0982)	.7912 (2.4752)	24.6512** (10.0910)	.0581 (.1662)
<i>Pacific</i>	-1.2950 (.8357)	.1136 (.1186)	9.2779** (3.6610)	3.0095 (4.0328)	-1.1072*** (.2377)
<i>Constant</i>	12.4313* (6.7486)	1.3198** (.6351)	-7.9614 (28.7301)	85.5002 (52.3698)	-3.4432 (2.0977)
$\sigma^*$			15.3760*** (.0558)	12.9984*** (.1874)	



Table A (Continued)

Variable			Equation Error Correlations:	
	Child Care Price Equation	lnWage Equation	Correlation	Estimate
Ratio2	.0148* (.0086)		$\rho_{..}$	.0075 (1.1690)
Ratio4	-.1050*** (.0078)		$\rho_{..}$	.0053 (4.4891)
FamEd	.3273*** (.0373)		$\rho_{..}$	-.0110 (1.0021)
CenterEd	-.0317 (.0380)		$\rho_{..}$	-.0010 (.9241)
TitleXX	-.0095*** (.0033)		$\rho_{..}$	-.0021 (.7370)
UnempRt	-.0686*** (.0139)	-.0222*** (.0029)	$\rho_{..}$	-.0121 (1.5964)
MaxBen	.0695 (.0430)		$\rho_{..}$	-.0924 (.1464)
TwoYr		.1414*** (.0090)	$\rho_{..}$	-.0924 (.1464)
SomeColl		.2532*** (.0064)	$\rho_{..}$	-.1640*** (.0376)
Coll		.3865*** (.0085)	$\rho_{..}$	-.0991 (.1465)
MoreColl		.6214*** (.0138)	$\rho_{..}$	.0890 (.0897)
Black	.1543*** (.0464)	-.1068*** (.0098)	$\rho_{..}$	.1943*** (.0521)
MidAtl	-.2490*** (.0745)	.0057 (.0139)	$\rho_{..}$	.0221 (.0510)
SouthAtl	.3587*** (.0703)	.0335*** (.0129)	$\rho_{..}$	.0278 (.1059)
ESCentrl	1.2222*** (.1098)	.0304 (.0250)	$\rho_{..}$	.1137** (.0522)
WSCentrl	.6570*** (.1006)	.1119*** (.0227)		
ENCentrl	-.0196 (.0850)	.0477*** (.0173)		
WNCentrl	-.4899*** (.0960)	-.0189 (.0134)		
Mountain	.5304*** (.0835)	.0805*** (.0209)		
Pacific	-.1418 (.0872)	.1270*** (.0171)		
Constant	3.3614*** (.1113)	2.0066*** (.0167)		
$\sigma_*$	2.4671*** (.0074)	.5055*** (.0011)		
Log-Like.	-62518.75			

\* Significant at 10% level; \*\* Significant at 5% level; \*\*\* Significant at 1% level.