

Lemke, Robert J.; Witt, Robert; Witte, Ann Dryden

**Working Paper**

## Child care and the welfare to work transition

Wellesley College Working Paper, No. 2001-02

**Provided in Cooperation with:**

Department of Economics, Wellesley College

*Suggested Citation:* Lemke, Robert J.; Witt, Robert; Witte, Ann Dryden (2001) : Child care and the welfare to work transition, Wellesley College Working Paper, No. 2001-02, Wellesley College, Department of Economics, Wellesley, MA

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**WORKING PAPER**

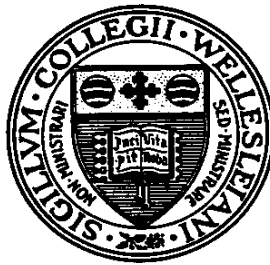
**CHILD CARE AND THE WELFARE TO WORK TRANSITION**

**By**

**Robert J. Lemke, Robert Witt, and Ann Dryden Witte**

**Wellesley College Working Paper 2001-02**

**March 13, 2001**



**Department of Economics  
Wellesley College  
Wellesley, Massachusetts 02481-8203**

# CHILD CARE AND THE WELFARE TO WORK TRANSITION<sup>†</sup>

Robert J. Lemke  
*Florida International University*  
lemker@fiu.edu

Robert Witt  
*University of Surrey*  
r.witt@surrey.ac.uk

Ann Dryden Witte<sup>‡</sup>  
*Wellesley College and NBER*  
awitte@wellesley.edu

March 13, 2001

**Abstract:** We assess the role of child care in the welfare to work transition using an unusually large and comprehensive data base. Our data are for Massachusetts, a state that began welfare reform in 1995 under a federal waiver, for the period July 1996 through August 1997. We find that both the nature of the child care market and the availability and policies of subsidized care and early education affect the probability that current and former welfare recipients will work. Regarding the child care market, we find that the availability of care is most consistently related to employment. However, the price and quality of care also matter. We also find that increased funding for child care subsidies, and the availability of full day kindergarten and Head Start significantly increase the probability that current and former welfare recipients work. Higher state payments to providers are associated with increased probabilities of work. Finally, recipients are more likely to work when they are subject to a work requirement. The effects of imposing time limits on cash assistance are less clear.

**Key Words:** Child Care, Welfare Reform, Vouchers, Labor Supply, Time Limits.

**JEL Classification:** I38, H40, J22, I20.

<sup>†</sup>This study is a product of the Wellesley Child Care Policy Research Partnership and the Child Care Bureau's Child Care Policy Research Consortium. Our work was supported by Wellesley College under Grant #90YE0006 from the Child Care Bureau, Administration for Children and Families (ACF), Department of Human Services (DHHS). The support of these organizations in no way implies their concurrence with our results. We are particularly indebted to Maggie Queralt for sharing with us her unmatched knowledge of Massachusetts' welfare reform and child care voucher programs, allowing us access to her data, and for scholarly discussions concerning economic modeling of the decisions of welfare recipients. We also thank Mark An, Tasneem Chipty, David Cutler, Nada Eissa, Olivia Mitchell, Casy Mulligan and participants at the NBER Public Economics Summer 2000 Program for their comments and suggestions. We also thank Donna Carvelli (Massachusetts Department of Education), Bettejane McCracken (Massachusetts Department of Transitional Assistance), and Rod Southwick (Massachusetts Office of Child Care Services) for helping us assemble the data. All errors are our own.

<sup>‡</sup> Corresponding author: 155 Ocean Lane Dr, Suite 812 West Building, Miami, FL, 33149, USA. Phone: 305-365-0834. Fax: 305-365-0896. E-mail: Awitte@Wellesley.edu.

## 1. Introduction

In this paper, we consider the effects the child care market, child care subsidies, early childhood education programs, and welfare reforms have had on the probability of employment of current and former welfare recipients. Our study builds on previous work examining the impact of child care costs. We extend this work in a number of ways. First, we specifically consider the role of child care in welfare reform. Second, we expand the aspects of child care considered beyond costs to include quality and availability. Third, we consider the impacts of a broad range of child care programs designed to care for and educate low-income children. Fourth, we have data both before and after the imposition of time limits, and thus are in a position to comment on the effect time limits had on the decision to work.

There is a large literature showing that the cost of child care plays a major role in the labor market decisions of women with children (Anderson and Levine, 1999 and Chaplin et al., 2000 provide reviews). However, paucity of data has not allowed assessment of the impact of other aspects of the child care market. Child care is a heterogeneous product and, as such, assessment of impacts requires measures of both the cost and the quality of care. Child care is also a location-specific good. Thus, the local availability of care may affect labor market decisions. Using previously unexploited data, we are able to consider the impact of the price, quality and availability of child care on the labor market decisions of the current and former welfare recipients in our sample.

It is widely maintained that child care provision and early childhood education programs play major roles in determining the successes and/or failures of welfare reform. Indeed, federal welfare reform legislation substantially revised and expanded funding for child care subsidies at the same time that it imposed work requirements and eliminated the entitlement to cash assistance. Since welfare reform, most state governments have not only expanded funding for child care subsidies but have also increased funding for early education programs (Layzer et al., 2001; Loprest et al., 2000). As far as we are aware, there is, at present, no published work that considers simultaneously the impact of all of these varied programs.

We use a unique data set for Massachusetts, a state that began welfare reform in 1995 under a federal waiver, for the period July 1996 through August 1997 to carry out our analyses. The data set contains information from monthly interviews on over ten thousand current and former welfare recipients who used a child care voucher during the month. In order to qualify for a child care voucher, the recipient must be working or participating in other types of approved activities. Thus, our sample is selective in that we only observe those recipients who are actively pursuing further job training/schooling, are in a job search program (administered by the MA Department of Transitional Assistance), are performing community service, or are working. We do not observe welfare recipients who have not pursued one of these options (and therefore do not qualify for a child care voucher under state law). Extrapolation of our

results to such a population would be misleading. Further, in an effort to focus on a set of households with similar choice sets, we restrict our analysis to single mothers with at most a high school education.

To our household data, we have added detailed information on the availability, price, and quality of child care for each township using resource and referral agency data. We have incorporated information on the availability, funding level, and administration of both state and federal child care subsidy and early education programs. In addition, we have included variables to control for other major policies, local labor markets conditions, and community characteristics.

We find that both the nature of the child care market and the availability of subsidized care and early education affect the probability that current and former welfare recipients will work. Regarding the child care market, we find that the cost, stability, and quality of care matter. Our strongest and most consistent result is that the availability of care increases the probability of work. In a typical case, increasing the availability of group care slots by fifty percent (from ten to fifteen slots per 100 kids) increases the probability of working by 3.5 to 7.5 percent. We also find a similar positive work response from increased quality of care. Finally, as the mothers in our sample do not pay the full-cost of child care (and most pay nothing), we cannot predict the effect of the local price of care on the probability that a single mother will choose work or another activity, such as education or training. However, higher child care costs require a greater income to achieve self-sufficiency. The optimal path to self-sufficiency may include schooling or it may emphasize working and building up experience and on-the-job-training. Our results suggest the latter effect dominates. That is, higher local prices of care are associated with a greater probability of working.

Consistent with recent work, we also find that increased funding for child care subsidies is associated with increased probabilities that current and former welfare recipients will work. Further, we find that current and former welfare recipients living in areas with full-day kindergartens or Head Start programs are more likely to work than recipients not living in such communities.

Finally, we find that the pattern of decisions regarding work versus schooling is consistent with the incentives provided by Massachusetts' "work first" welfare reforms. Throughout our study period, parents in families receiving cash assistance became subject to the work requirement when their youngest child turned six years old (and entered first grade). After December 1, 1996, parents with a youngest child at least two years old became subject to time limits. Parents with a youngest child not yet two years old were subject to neither time limits nor the work requirement throughout the study period. We find that parents with children under two years old are significantly less likely to work than parents of older children. Parents with a youngest child at least two years old but not yet six years old are significantly less likely to work than parents whose youngest child is at least six years old. We find no significant differences in the probability of work after the imposition of time limits in December 1996. A possible

interpretation is that it is the work requirement, not time limits, that has significantly affected the probability of work. An alternative explanation is that the mothers in our sample foresaw the imposition of time limits and responded accordingly throughout our sample period.

The outline of the paper is as follows. In the next two sections, we review the relevant literature and describe welfare reform policies in Massachusetts. The two subsequent sections describe our estimation techniques and data. We then present our results before offering some concluding comments.

## **2. The Effect of Child Care on Labor Market Participation**

Over the last 15 years, many papers have analyzed the effect of child care, in particular child care costs, on the labor supply of mothers. Heckman (1974) provides the (static) theory in the standard context of a mother choosing her hours worked when facing a specific child care market. Motivated by the ever growing demand for child care services, many empirical papers have tried to measure the responsiveness of mothers' labor supply to changes in the cost of child care.<sup>1</sup> Typically, a data set of mothers is used in which it is known if the mother is employed and, if so, her wage and how much she pays for child care. Using the sub-sample of all working mothers, a predicted wage is estimated for all mothers in the sample.<sup>2</sup> The cost of child care is similarly predicted for each mother.<sup>3</sup> Finally, a labor market participation equation is estimated for the entire sample that includes the predicted wage and predicted price of child care for each mother. Anderson and Levine (1999), however, demonstrate that the results from this procedure are sensitive to the empirical specification and exclusion restrictions.<sup>4</sup> By comparing the results across various specifications, they conclude that the elasticity of labor supply with respect to the price of child care is between  $-0.05$  and  $-0.35$ .

Contrary to these previous studies, the expanse of our data allows us to take a different approach. We limit consideration to single mothers with at most a high school degree. Therefore, as most of our mothers reside in or around Boston (51%) or Springfield (26%), the employment opportunities and potential wage offers faced by these low-skill women are likely to be similar. Moreover, the extent to which opportunities and wage offers differ are likely to be due to either observable individual characteristics (e.g., age or race) or to depend on the conditions of the local labor market to which their

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<sup>1</sup> Anderson and Levine (1999), Averett et al. (1997), Berger and Black (1992), Blau and Robins (1988), Chaplin et al. (2000), Cleveland et al. (1996), Connely (1992), GAO (1994), Gustafsson and Stafford (1992), Johansen et al. (1996), Kimmel (1992, 1995, 1998), Leibowitz et al. (1992), Michalopoulos et al. (1992), Meyers and Heintze (1999), Powell (1997), and Ribar (1992, 1995) all estimate the effect child care costs, subsidies, or tax credits have on the labor supply of mothers.

<sup>2</sup> Michalopoulos et al. (1992) and Ribar (1995) stand out as two exceptions that undertake structural estimation in place of a Heckman correction technique.

<sup>3</sup> Blau and Robins (1988) take the price of care to be the average price paid by the working women in their data set (the Employment Opportunity Pilot Projects) who purchased care within the SMSA or county.

job market search is limited. Thus, in lieu of estimating a single wage offer for each mother, we include the conditions of their local labor market. Similarly, we also forego estimating a price of care equation and then predicting prices for the entire population. In place of the actual child care costs paid by each mother, we are concerned with the spectrum of prices from which the mother can choose. To this end, we focus on the entire local market for child care. In particular, we use the Care Finder records maintained by five Child Care Resource and Referral agencies in Massachusetts to calculate, by the age of the child, the median cost of child care for every township. Thus, by observing local labor market conditions and the local prices of formal child care, we are able to directly estimate (without separately predicting wages or prices) the effect child care costs have on the decision to work versus pursuing some other type of approved activity (e.g., job search or schooling).

Although our treatment of the costs of care provides a suitable description of the spectrum of child care costs, the availability and quality of care can also enter into the decisions made by single mothers.<sup>5</sup> Heckman (1974) makes the reader keenly aware of this by focusing attention not only on the cost of formal care but also on the availability of informal care. Likewise, in an early empirical paper, Blau and Robins (1988) acknowledge the importance of the availability and quality of child care:

“As the child care industry has expanded, there has been increased public attention devoted to various aspects of child care, including availability, quality, costs, and the appropriate role of the government and the family in providing care for children.” (Page 374, *Review of Economics and Statistics*, 1988)

Due primarily to data limitations, the literature by and large ignores the effect of availability and quality on female labor supply.<sup>6</sup> Using state-wide data sources on the supply of formal child care, however, we take into account the availability and quality of care. Our measures of availability, costs, and quality are described more fully in Section 5 and Table 1.

### **3. Massachusetts' Welfare Reform**

In April 1995, the Commonwealth of Massachusetts requested a welfare reform waiver from the federal government. Massachusetts' plan included job training, a work requirement, time limits, medical assistance, and centralization of the public assistance system. The waiver was granted except for time limits. Overseen by the newly formed Department of Transitional Assistance (replacing the

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<sup>4</sup> Hotz and Kilburn (1991) also demonstrate some weaknesses with this procedure when trying to estimate a price of child care for each mother or household.

<sup>5</sup> See, for example, Hofferth (1991), Hofferth and Wissoker (1992) and Waite et al. (1991).

<sup>6</sup> A notable exception is Gustafsson and Stafford (1992). Using data from Sweden, they restrict attention to towns in which child care is not rationed (and thus availability of care is not an issue). Further, quality of care is not of practical importance as all publicly provided child care is of a similar high quality. Many papers also try to control for the availability of *informal* care from a spouse, teen-age sibling, or other relatives living in the same town.

Massachusetts Department of Public Welfare as of July 1, 1995), these reforms were initiated on November 1, 1995. In the following year, President Clinton signed the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA). PRWORA replaced the previous AFDC program with block grants from the federal government to the states, which became known as TANF (Temporary Assistance to Needy Families). Although some restrictions were placed on who is eligible to receive monies from the TANF block grants, states were given considerable leeway in setting up their eligibility requirements for assistance as well as the system used to determine the level of each family's benefits. Two novel components of PRWORA are work requirements and time limits. Massachusetts met the work requirements of PRWORA, and, with its passage, the state was also able (and now required for federal funding) to implement their previously requested time limits.<sup>7</sup>

In Massachusetts, anyone subject to the time limit is permitted to receive TAFDC (as the TANF program is called in Massachusetts) funds for a maximum of 24 months in any consecutive 60 months. Anyone subject to work requirements must, within 60 days of receiving TAFDC funds, be actively involved in some type of *work* for at least 20 hours per week. If the person fails to find a job, she is required to perform 20 hours of community service per week. Although there are some other exceptions (mainly for the disabled and for teenaged parents), the Massachusetts program is straightforward. A TAFDC recipient is exempt from the time limits *and* the work requirement if her youngest child is under the age of two. The clock on time limits starts ticking on the youngest child's second birthday. The recipient remains work exempt, however, until her youngest child turns six years old. It is important to note that these are separate requirements. If one receives benefits while the youngest child is two and three, thus exhausting the time limits, the time limit deadline comes into effect and benefits are terminated even though the recipient would otherwise remain classified as work exempt for the next two years as her youngest child passes through the ages of four and five.

Massachusetts' job training and education program, the Employment Services Program (ESP), is available to all TAFDC recipients. Participation in the ESP is voluntary if one is exempt from the work requirement and mandatory for those not exempt; however, all recipients are strongly encouraged to participate in the ESP. The program includes on-the-job training, job skill development, education, and a "structured job search" program. The structured job search portion of ESP, though originally state run, was privatized by the fall of 1998.

It is important to understand how the work requirement affects participation in the ESP. First, as long as the adult TAFDC recipient remains work exempt, she can enter job training and education programs paid for by the ESP. This includes continuing a high school education, obtaining a GED, or

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<sup>7</sup> Under its waiver authority, the Commonwealth continues to operate other aspects of its TANF program, which in some ways conflict with PRWORA.



even enrolling in a state-funded college for up to two years. Second, the education programs of the ESP are available to *all* TAFDC clients. However, clients subject to the work requirement *must* be working at least 20 hours a week within 60 days of receiving assistance. This means that any educational or training programs offered by the ESP must be attended in addition to working. Pursuing schooling (unlike job training or on-the-job training, which are less time intensive), therefore, becomes more difficult once the individual becomes subjected to the work requirement.

In addition to offering the ESP, the Department of Transitional Assistance also offers vouchers for child care to anyone who is receiving TAFDC monies and participating in approved activities (e.g., work, schooling, actively seeking employment, job training). These child care vouchers can be used to purchase formal or informal child care. The state's reimbursement rate to providers that accept vouchers varies with the age of the child, the type of care, state region, and the amount of child care provided (i.e., part-time or full-time care). For those receiving cash assistance, the Commonwealth pays the entire cost of care, i.e., the provider receives the entire reimbursement rate from the state. Other families are required to pay part of the cost of the care purchased with vouchers. The amount of this "co-payment" varies with family income, family size, and the amount of child care used. In this case, the state pays the provider the difference between the reimbursement rate and the co-payment.

Under the Massachusetts system, anyone receiving TAFDC is eligible to receive Medicaid (and vice versa). The DTA also has worked with the regional transportation authorities to offer subsidized public transportation to TAFDC recipients. Besides subsidizing travel on existing public transportation, the DTA oversaw the re-routing of buses, the starting of new routes and the implementation of shuttles.

When a TAFDC recipient's case is closed due to exhaustion of her time limit or increased earnings, she remains eligible to receive transitional medical assistance, (possibly) food stamps, transitional child care and transportation subsidies, and has access to the structured job search program for at least one year. After the one year transition period, the above-mentioned programs are made available if the family's income is low enough to make them eligible for the program. Families earning less than 75 percent of state median income, for example, remain eligible to receive child care subsidies.

#### **4. Empirical Strategy and Estimation**

Although our data are described in the next section, it is necessary for motivating our question and empirical approach to understand our sample of households. From July 1996 through August 1997, we have 59,218 monthly observations on the employment and schooling/re-training decisions of 10,473 single mothers in Massachusetts who have at most a high school education. Our sample is of current child care voucher recipients who are also current or former TANF recipients.

Work requirements were imposed on welfare recipients in Massachusetts beginning November 1, 1995. Not until December 1, 1996, were time limits imposed. Because we have both pre- and post- time limit data, we are in a position to investigate how time limits have affected behavior. Massachusetts' welfare reforms promote training and education for those with children under two years old, as these recipients are exempt from time limits and the work requirement. Recipients with a youngest child at least two years old but not yet six years old are subject to time limits but remain work exempt, allowing them to pursue training / education if they so choose (a possibly riskier proposition since they will not receive public assistance monies after two years of support). Households with a youngest child at least six years old, however, face a "work first" welfare system, as these recipients are subject to both time limits and the work requirement.<sup>8</sup>

In addition to investigating the new welfare regulations, we also study how the child care market enters into the decisions of single mothers with child care vouchers. The monetary cost of care to voucher recipients depends on their status.<sup>9</sup> The cost is zero for those receiving cash assistance. The cost of care for former cash assistance recipients (i.e., the co-payment) depends on family income, family size and whether care is part-time or full-time.<sup>10</sup> Note that the price of care will not directly affect the choices of the mothers in the sample since co-payments do not depend on the price of care. However, the price of care in the local child care market will indirectly affect the families in the sample.

The decision to work is also affected by the set of child care options available, and so we also include measures for the local availability of care and the local distribution of price and quality of care. By including these three separate features of the child care market, we are able to investigate how each separately relates to labor supply decisions. We also limit our sample to single mothers in order to better control for the availability (or lack thereof) of (unpaid) informal care via a spouse. Finally, we also include features of the state child care voucher system, public grants targeted to caring for disadvantaged children, and variables reflecting the availability of early childhood education programs such as Head Start and full-day kindergarten.

We estimate a reduced form model for the probability of working versus job training / education in which the decision to work depends on human-capital/socio-demographic characteristics of the child care voucher recipient ( $H$ ), characteristics of the formal market for child care ( $C$ ), policy and administrative variables related to the Massachusetts child care voucher system ( $V$ ), characteristics of

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<sup>8</sup> TAFDC recipients are subject to the work requirement whenever their youngest child turns six years old or enters the first grade, whichever comes later.

<sup>9</sup> There generally are non-monetary as well as monetary costs for child care, such as the cost of transporting the child to and from the child care provider.

<sup>10</sup> The schedules relating family income to co-payments level are analogous to tax schedules. Each family faces the same schedule. One can only identify the effect of the schedule on behavior if there are exogenous shifts in the schedule. Unfortunately, we observe no such shifts during our period of study and, hence, are not able to estimate the impact of co-payments on the probability of work. Seventy percent of our sample make no co-payment, 28 percent pay a co-payment of \$8 or less per day.

early childhood education programs ( $E$ ), other public policy variables including welfare reform legislation ( $P$ ), local labor market conditions ( $L$ ), and community and neighborhood characteristics ( $N$ ). To summarize, we model the decision to work as:

$$(1) \quad \text{Prob. of Work} = \text{Logit} (\beta H + \alpha C + \gamma W + \phi E + \delta P + \xi L + \kappa N + \varepsilon).$$

It is important to understand how our empirical analysis confronts the two selection issues concerning wages and child care inherent in labor supply studies of mothers. First, all of the mothers in our sample use the child care voucher for which they are eligible. Thus, our analysis corresponds to individuals having made the decision to purchase care. Second, our specification ignores individual wages. The local labor market opportunities for the mothers in our sample – all single mothers with at most a high school education – are not only likely to be quite similar, but the differences across individuals may be difficult to ascertain. Previous employment, in terms of experience and/or experience in a specific sector are likely to be important factors in determining one’s potential wage, but this information is unknown. Other factors, such as age and race, are controlled for in the analysis. Finally, as these low-income individuals are likely restricted geographically in their job search, we include variables reflecting local labor market conditions.

In addition to the two selection issues, the discussion of several econometric issues is warranted. As we observe households over time, the estimation of equation (1) must reflect unobserved family-specific attributes that may affect the unbiasedness and consistency of the estimation.<sup>11</sup> Specifically, we assume that the error term in equations (1),  $\varepsilon$ , is comprised of a random effect,  $\mu_i$ , and a time-specific and family-specific effect,  $V_{i,t}$ , so that

$$\varepsilon_{i,t} = \mu_i + V_{i,t}.$$

Although the fixed-effects estimator requires few assumptions other than that the unobservable family-specific effect be constant over time, it relies only on deviations from family-specific means to estimate the parameters, and thus is not efficient as it ignores time-invariant information as well as the initial values of time-variant information. Also, generalizing the results from random-effects estimation rests of firmer ground than generalizing results from fixed-effects estimation. The traditional random-effects estimator, however, has been criticized, because it imposes a constant correlation across all time

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<sup>11</sup> This is a well-known problem. See Chamberlain (1983), Greene (1997), and Liang and Zeger (1986) for more detailed discussions of the econometric issues and the techniques employed here.

periods on the unmeasured, family-specific effect, i.e.,

$$\text{Cor}(v_{i,s}, v_{i,t}) = \rho \text{ for all } i \text{ and } s \neq t.$$

This is equivalent to requiring that unmeasured family-specific behavioral patterns have a constant correlation across all time periods. To the contrary, most behavioral models suggest that the degree to which behaviors are correlated declines with time. Liang and Zeger (1986) and Liang et al. (1992) provide for an unstructured random-effects estimator that is free from the restrictive assumption of the traditional random-effects model, i.e., they assume that

$$\text{Cor}(v_{i,s}, v_{i,t}) = \rho_{s,t} \text{ for all } i \text{ and } s \neq t.$$

To discern the robustness of our results, we estimate equation (1) using a traditional random-effects estimator, a generalized random-effects estimator that imposes no structure on the correlation of the family-specific random-effects over time, and a fixed-effects estimator. We also calculate robust standard errors to adjust for the heteroskedasticity imparted by the unbalanced panels of households, as households are observed for varying lengths of time as they enter and leave the child care voucher program.

## 5. Data

Our household data come from two Massachusetts state agencies. The Massachusetts Office of Child Care Services (OCCS) provides monthly information on the use of child care vouchers of current and former TAFDC recipients, and the Massachusetts Department of Transitional Assistance (DTA) provides information from the monthly re-determination interviews of social service recipients and for those enrolled in the Employment Services Program. Sequentially assigned family identifiers allow this information to be merged to form a longitudinal data set containing 14 months of data.

We add to this core data, other information that varies either by geographic region or time or both in order to better capture local child care programs, welfare policies, labor market conditions, and other economic factors. These data are then used to model the labor market outcomes of current and former TAFDC recipients. While not perfect, we believe these data more effectively capture *local* labor and child care markets than many previous studies. We describe our data and sources below and they are listed again in Table 1. Summary statistics for the final data set are reported in Table 2. The final data set contains 59,218 monthly snap-shots of 10,473 single mothers who hold at most a high school education and who are current or former TAFDC recipients.

### *Individual Data*

Our individual data are available for 14 months, July 1996 through August 1997. The DTA intake interview gives us information on several non-changing characteristics of the recipient. For as long

as the voucher recipient continues to receive public assistance or is enrolled in the Employment Services Program, monthly observations regarding the recipient's labor market activities are observed from the monthly re-evaluation interviews. As reported in Table 2, almost 59 percent of voucher recipients worked during the previous week. The recipients in our sample tend to be English speaking, about 28 years in age, and have 2 dependents. A particularly attractive feature of the data is its racial diversity, with blacks and Hispanics each comprising over 30 percent of the sample.

### *Characteristics of Formal Child Care*

The decision to work is affected by the entire array of child care options available (e.g., the location and quality of child care available), and therefore it is not appropriate to include only those characteristics of care that were actually chosen. Thus, we include measures for the local *distribution* of the availability, price, and quality of care.<sup>12</sup>

To account for the availability of care, we use the 1996 OCCS Licensing List. For family child care availability, we aggregate the number of slots offered by family care providers in each township. Using Census population data, we transform this into a slots-per-tots measure and include the number of family care provider slots per 100 children aged 0 to 11 in the township.<sup>13</sup> Likewise we sum over all group care providers to find the number of group care slots in each township. Group care providers, unlike family care providers, report their slots per type of care or per age of child. We define four types of care: infant (0 to 23 months), toddler (24 to 47 months), pre-school (48 to 59 months), and school aged (60 months or older). We then calculate the number of group care slots per 100 kids *in the age group* of the recipients' youngest child.<sup>14</sup> Using the OCCS billing files, we also approximate the number of child care slots per 100 children contracted by the state for each township.<sup>15</sup>

The affect of the child care market on current and former welfare recipients who receive child care subsidies is filtered through the policies and funding levels of the child care subsidy program. The two most important policies are the state set reimbursement rate to providers and the co-payment schedule. In Massachusetts, the state sets the maximum reimbursement rate that it will pay to providers

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<sup>12</sup> Note that we depart from the approach that is standard in the literature (e.g., Cleveland et al. (1996), Connelly (1992), Kimmel (1995, 1998), and Powell (1997) among others). Because most data do not contain information on the nature of child care options available, the standard approach uses information on the type of care actually chosen. However, it is the nature of the options available that affect parental choices. Typically, it is assumed (implicitly or explicitly) that care is available upon demand and that price and quality are perfectly linearly related. Under these assumptions, including the estimated cost of purchased care suffices.

<sup>13</sup> For all population estimates, we start with the 1990 census that reports population numbers at the township and zip code level and by age group (under 1 year old, 1 to 2 years old, 3 to 4 years old, etc.). Populations spanning more than one age are split equally among the ages. We use these numbers and a 1997 estimate of the total population by township provided by the Census bureau to estimate the 1997 township populations by age group.

<sup>14</sup> This is the most commonly used measure of availability of child care (Queralt and Witte, 1998 and 1999).

<sup>15</sup> There is a waiting list for most state contracted slots.

for care under the voucher program. These maximum reimbursement rates vary by type of care, age of child and area of the state. Mothers with child care subsidies are not directly affected by reimbursement rates, even if they are required to make co-payments. Recall that only former TAFDC recipients make co-payments and that the amount of the co-payment is unrelated to either the market price of care or the reimbursement rate. However, mothers are indirectly affected by the reimbursement rate because of its affect on providers. Higher local rates should encourage more providers to participate in the child care subsidy program (i.e., more providers should accept child care vouchers) and encourage providers with vouchers to accept a larger number of children with subsidies. Higher reimbursement rates may also allow providers accepting vouchers to alter the characteristics of the care they provide (e.g., increase their quality of care, extend the hours of care, provide transportation, etc.).

We measure the quality of care by the percent of group care slots in each township that are offered by providers who are certified with the National Association for the Education of Young Children (NAEYC). To do this, we match providers listed in the OCCS 1996 Licensing List to the NAEYC's January 1998 list of accredited providers.<sup>16</sup> Using the OCCS 1996 Licensing List, we also calculate the percent of group care slots in each township that are offered by providers who have been in service for at least three years and the median years in service of the family care providers in each township.

Finally, the cost of child care depends on a variety of factors. We use the 1997 Resource and Referral Database (provided by five local resource and referral agencies) to calculate each township's median weekly price of group child care for the age group of the household's youngest child (i.e., infant, toddler, pre-school and school age). As mentioned earlier, we include the local reimbursement rate in order to control for the availability and possibly the quality of local subsidize care. Finally, we include the number of household dependents and, from the Bureau of Labor Statistics' 1997 Occupation and Employment Wage Survey, the median child care worker hourly wage for the MSA in which the household resides.

### *Child Care Voucher System Variables*

State and federal funding for child care vouchers has steadily increased with time. Using the statewide voucher budget reported by OCCS, we calculate government spending on vouchers to have totaled \$434 per poor child in fiscal year 1997 (which ended June 30, 1997).<sup>17</sup> For fiscal year 1998, our calculations show an average of \$511 was budgeted for each poor child, an 18 percent increase in a single

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<sup>16</sup> As the OCCS list is for May 1996 and the NAEYC list is for January 1998, our matching procedure is not ideal. However, as providers are accredited for three years, the problem should be kept to a minimum.

<sup>17</sup> Throughout the paper, we define "poor" as being in a household earning less than 185 percent of the poverty level. This definition is used to determine which children in the public schools qualify for reduced price or free

year. Funding for the Massachusetts child care voucher system as well as for federal and state public assistance monies are, at times, allocated on the basis of a formula that includes the local TAFDC caseload and child neglect rates. The DTA reports TAFDC caseloads quarterly, and the Massachusetts Department of Social Services reports the total number of child neglect cases for each calendar year. Census data is then used to calculate the number of cases per 1000 people in the zip code. Lastly, child care vouchers are administered with the assistance of regional Child Care Resource and Referral Agencies (CRRAs). Our data are limited to five CRRAs: Child Care Choices of Boston, Child Care Resource Center, Child Care Search, Child Care Works, and the Preschool Enrichment Team.

### *Early Education Programs*

We incorporate information on the three major early education programs in Massachusetts – Head Start, Community Partnerships for Children (funded by the Commonwealth), and publicly provided pre-kindergarten and kindergarten programs.

Head Start is a federally funded, locally administered program.<sup>18</sup> It began as part of the war on poverty to serve disadvantaged four and five year olds on a part-day, part-year basis. Recently the program has been expanded in some areas to also serve zero to three year olds. We have collected the 1996-97 and 1997-98 Program Information Reports filed by the roughly thirty Head Start delegate agencies in Massachusetts. Our analysis takes into account if there is a Head Start program operating in the township in which the child lives. Using information on when the Head Start programs are in operation, we determine if the household's youngest child is "Head Start Eligible". To be eligible there must be a local Head Start program, it must be currently in operation (not on winter or summer break), and it must serve the age group of the household's youngest child.<sup>19</sup>

Starting in the early 1990s, the Massachusetts Department of Education invited grant applications from private organizations, public schools, charities, and others to help care for, educate, stimulate, and protect children. Each grant recipient (no more than one per township) is called a Community Partnership for Children (CPC). In fiscal year 1993, 172 townships received \$13 million through 89 different CPCs. Over the years, the monies have been renewed annually (and increased) and more CPCs have been funded. By fiscal year 1998, 229 townships received almost \$60 million through 157 different CPCs. We include in our analysis the township's annual CPC budget per poor child in the township.

Finally, the Massachusetts Department of Education provided information on which school districts offer free, full-day kindergarten and each school district's age requirement for starting

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lunch. Using data from the Massachusetts's Department of Education on the number of participants in this program for each school district, we estimate the number of poor children in the town for all age levels.

<sup>18</sup> The state of Massachusetts supplements federal funding for Head Start with state dollars.

<sup>19</sup> Recall that all families in our sample qualify for child care subsidies and so most are eligible for Head Start.

kindergarten for the 1996-97 school year. From these data, we determine the pre-kindergarten, kindergarten, and (elementary) school eligibility of the youngest child in the household. As before, eligibility requires that the youngest child be of the acceptable age for the program and that the program be in operation during the month.

#### *Welfare Reform and Other Policy Variables*

The two major welfare reform policies directly affecting the decision to work or pursue a job re-training or schooling program are time limits and the work requirement. As of November 1, 1995, TAFDC recipients with a youngest child at least six years old became subject to a work requirement within 60 days of receiving cash assistance. As of December 1, 1996, TANF recipients with a youngest child over two years old became subject to time limits, receiving at most 24 months of benefits in any 60 month span. To account for these regulations, we include binary variables indicating the appropriate age group of the recipients' youngest child, a binary indicating the imposition of time limits, and the interaction of these two in order to observe changes in behavior when facing time limits.

We also include a time trend and a binary variable indicating whether standard operations at the local welfare office consolidate responsibilities across caseworkers. A binary variable accounting for the October 1996 hike in the federal minimum wage and changes in federal employer tax credits is also included. Finally, during the time period of our study, the Massachusetts Office of Business Development (MOBD) provided tax breaks and other economic incentives and resources on 439 "Certified Projects" throughout the state. Each of these projects is associated with a specific dollar amount to be spent on economic revitalization within a township. We include in the analysis the local annual budget of these certified projects per worker.

#### *Local Labor Market and Costs of Working Variables*

Using the Bureau of Labor Statistic's *Local Area Unemployment Statistics* and ES 202 data respectively, we include each township's monthly employment growth rate (multiplied by 100) and the percent of local jobs that are in the retail trade and service sectors.<sup>20</sup> Transportation costs associated with working are captured by the percent of workers that travel to work using public transportation and the median commute time (in minutes) of all workers. Both of these variables use zip code as the geographic unit of measurement and come from the 1990 Census. We also include a binary variable at the township level indicating the presence of a job center operated by the Massachusetts Division of Employment and Training. Finally, the 40<sup>th</sup> percentile rent for a two-bedroom apartment in the MSA (as reported by the U.S. Department of Housing and Urban Development) and the five-year inter-zip code household



turnover rate (taken from the 1990 Census) are included in the analysis to help take into account the costs and availability of informal child care.

### *Community Characteristics*

Using the 1990 Census data, we include median household income, proportion black, proportion Hispanic, and the proportion of residents who were born in a foreign country for each household's zip code. Using yearly data provided by the Massachusetts Department of State Police, we include the number of arrests for drug crimes per 100,000 people in each township. Lastly, we include a complete set of binaries denoting township, Boston neighborhoods, welfare offices, and metropolitan statistical areas. Boston neighborhoods vary by zip code and were provided by the Boston Development Authority. The assignment of welfare offices to townships was provided by the DTA. Table 3 provides a complete listing of how the 59,218 observations are spread across geographic areas.

## **6. Results**

The results of estimating equation (1) assuming: (1) structured, random, family-specific effects, (2) unstructured random, family-specific effects, and (3) fixed, family-specific effects are presented in Table 4. Because of the logit form of equation (1), the point estimates give the direction of the impact of the explanatory variable, but do not directly provide estimates of the magnitude of the impacts. Table 4 also provides *t*-statistics to convey the statistical significance of the variables.

In order to make the magnitude of the predicted effects from some of the variables clearer, Table 5 reports the difference in estimated effects under several different scenarios. The base case is a 28 year old, black mother with a high school degree and two children living in the South Dorchester neighborhood in Boston. Her youngest child is between two and five years old. English is spoken at home, and time limits have yet to be imposed. She receives child care assistance through Child Care Choices of Boston, her neighborhood does not have a job center, and her local welfare office is Bowdoin Park which is not consolidated. Her neighborhood has five family care slots and two state contracted slots available for every 100 kids between the ages of 0 and 11 and ten group center slots are available for every 100 children in the same age group as her youngest child. The local daily reimbursement rate is \$27. Fifteen percent of all group slots are accredited by the NAEYC; half of all group slots are offered by providers who have been in service for at least three years; and half of all family care providers have offered service for at least five years. The median weekly price of child care is \$80, and the median child care worker hourly wage is \$8. The state and federal child care subsidy per poor child is \$434, and the local Community Partnership for Children's annual budget totals \$50 per poor child. There is no local Head

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<sup>20</sup> Most women of the type in our sample are employed in the services and trade sectors (Witte et al., 1998).

Start program, public school kindergarten is not full-day, and the mother's youngest child is not age eligible for any public school program. For all other variables, she is assigned the average value over all observations in her neighborhood.

Table 5 reports the difference in the predicted probability of working when one (or more) of the variables in the base case is changed. For example, using structured random-effects, the probability that the base case mother chooses to work is .598. When the number of group care slots increases from 10 to 15 per 100 kids, the mother is predicted to choose to work with .640 probability. Thus, the increase in group care slots is predicted to increase the probability that the mother chooses to work by 4.2 percentage points, which is what is reported in the first entry of Table 5. The unstructured random-effects and fixed-effects estimators predict the effect to be 3.5 and 7.5 percentage points respectively. The results from Table 5 are discussed below. Unless a large discrepancy exists across specifications, the results from the structured random-effects estimator are discussed.

### *Child Care Effects*

Increases in the availability of care in centers significantly increase the probability of work, while increases in the availability of family care has no significant effect on parental choice between working and other types of activities. These affects are expected. The rate of turnover in family child care providers is very high (about one-third of providers cease providing care in any given year) while centers are more long lived. Center care is also generally more reliable than family care. These characteristics make center care more compatible with employment.

Increasing the state reimbursement rate from \$27 to \$36 per day increases the likelihood of working by 3.1 percent. Interpreting this result requires care. Recall that we include both the market price of child care and observed measures of quality in our specification. Thus, the coefficient on reimbursement rates holds fixed the price and observable quality of local care. An increase in the reimbursement rate (holding market price constant) can have two effects. First, it can increase the number of providers willing to accept vouchers, increasing the availability of care for parents with vouchers.<sup>21</sup> Second, it may increase aspects of the quality of vouchered care that we do not observe. Both the potential increase in quality and the potential increase in availability should make work more desirable.

The only observed quality variable that consistently has a statistically significant effect on the work decision is NAEYC accreditation. Increasing the percent of slots accredited from fifteen to twenty-five percent increases the probability that a parent in our sample will work by about one percentage point.

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<sup>21</sup> Overall, approximately forty percent of family care providers and centers accept vouchers.

Because we observe single mothers who qualify and use a child care voucher, the expected effect from a change in the market price of child care on the work versus schooling decision is not obvious nor do the results comment on the more traditional labor supply decision of welfare recipients. Most of the mothers in our sample do not pay for child care, and the payments of parents who do pay for care are unrelated to the market price of care. Thus, the estimated effect of price on the probability of work is not a concurrent effect. Rather, child care costs are a future consideration when the mother no longer receives a voucher. In areas with higher child care prices, a mother will want to increase her earnings if she wishes to attain self sufficiency. While receiving a voucher, the mother can either pursue education or training or she can work and build up experience and possibly add to her on-the-job-training. All three estimation procedures suggest that the latter force is more prevalent in household decision making. Increasing the median market price of care from \$80 to \$120 is associated with increasing the probability of working by roughly 3 percent when using random-effects.

Finally, state and federal funding for child care subsidies is strongly related to the decision to work. Increasing funding per poor child from \$434 in fiscal year 1997 to \$511 in fiscal year 1998 is associated with mothers increasing their probability of working by 4.7 percentage points. These results are similar to results obtained using data for Miami-Dade County, Florida (Queralt et al., 2000; Witte et al., 1998).

#### *Early Childhood Education Effects*

Both Head Start and full-day Kindergarten programs are strongly, but not always significantly, related with the decision to work. The presence of either is associated with a minimum increase in the probability of working of 6.6 percentage points. Across specifications, however, the estimated effect varies greatly and the effect is not always statistically significant. Having a youngest child eligible for a full-day school program further increases the likelihood of working by 2.4 percent. In contrast, although having a youngest child age-eligible for Head Start or a half-day school program tends to be positively related to working, Table 5 shows that neither of these programs has an economically important or a statistically significant impact.

#### *Regulatory Effects*

The first two entries of Table 5 under “Regulatory Effects” concern the effect the age of one’s youngest child has on the probability of working *prior to the imposition of time limits*. In particular, mothers with children under the age of two are substantially more likely to be enrolled in an education program compared to mothers with older children. Random-effects estimation suggests these mothers are about 11.5 percentage points more likely of being enrolled, whereas the fixed-effects estimator suggests

they are almost 26 percentage points more likely. In contrast, random-effects suggests that mothers whose youngest child is at least six years old are 10 percentage points more likely to be working than mothers with a youngest child at least two years old but not yet six years old. Fixed-effects suggest an even larger impact. The last three entries in Table 5 show that these effects, for all intents and purposes, did not change following the imposition of time limits.<sup>22</sup>

Notice that the estimated results prior to time limits are what one would expect following the imposition of the entire welfare reform package, i.e., following the enactment of work requirements and time limits. Mothers who are exempt from time limits and the work requirement (because their youngest child is under two years old) have more freedom to pursue education programs. At the other end of the spectrum, mothers with a youngest child at least six years old (and in first grade) are required to work within 60 days of receiving benefits. In short, the reforms emphasize a “work-first” approach as one’s youngest child gets older.

There are at least two possible interpretations. First, note that work requirements were imposed on TAFDC recipients starting on November 1, 1995, i.e., previous to the starting date of our sample. One interpretation of the results, therefore, is that the decision to work is strongly affected by the work requirements as behavior during our entire time frame closely mirrors what one would expect under a program with work requirements. (It is unknown, of course, if the behavior we observe is different than pre-work requirement behavior.) Further, time limits, imposed in the presence of work requirements, changed behavior very little. A second interpretation, however, rests with the timing of our sample. Because our data span only five months preceding time limits, it is possible that welfare recipients could have anticipated this change and had already started to make decisions accordingly. Time limits were requested by Massachusetts in 1995, and were announced and explained during welfare office visits starting in September of 1996. Given that the mothers in our sample have taken steps to apply for and use child care vouchers, these mothers would seem likely to also be well aware of which social service programs exist and how they are likely to change in the near future.

### *Personal Effects*

Though not listed in Table 5, the predicted effects associated with three personal characteristics are interesting to note. First, the probability of working increases with the age of the mother up to age 35. The probability that a 35 year-old mother works is .776 whereas the probability that a 28 year old mother works is .598. Second, mothers yet to receive a high school degree are 10.5 percentage points more likely

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<sup>22</sup> The debate over whether time limits affect welfare case loads remains hotly contested. Whereas Ziliak et al. (2000) find that time limits have little effect, Grogger (2000, 2001) and Grogger and Michalopoulos (1999) find strong negative effects when controlling for the age of the youngest child. Our results suggest that future work should emphasize the role of work requirements as well as time limits.

to use their child care voucher to enable them to attend an education program (such as pursuing a GED) than mothers who already have a high school degree. And finally, blacks and Hispanics are more likely than whites to use their voucher for work, whereas whites are more likely to be using vouchers to pursue more education.

## **7. Concluding Remarks**

We have estimated a reduced-form specification of the decision of single mothers to use child care vouchers to care for their children while working versus attending a schooling or job training program. We supplement household data with data on local child care markets, local labor markets, and other neighborhood characteristics.

Our first set of results concerns the market for child care. Our strongest and most consistent finding is that the increased availability of child care and early education programs increases the probability that a single mother will work. To be more specific, we find that increased availability of group child care slots, Head Start programs, and full-day kindergarten is associated with a higher probability of working.

Turning to the quality and price of child care, our results are harder to interpret. The child care payments of mothers in our sample, if any, are not related to the market price of child care. Thus, the price of child care should have no concurrent effect on parental choice between work and other types of activities. The market price of care can, however, have an effect on current decisions if the parent wishes to eventually become self-sufficient. A mother who wishes to become self-sufficient and who lives in an area with higher child care prices would choose the option that she believes would, in the future, provide a higher income. Our results indicate that residence in areas with higher child care prices is associated with significant increases in the probability that a mother will work rather than pursue education and training. Thus, our results might be interpreted as indicating that single mothers see work rather than education and training as the route to self-sufficiency. However, there are other potential interpretations of our results. At any rate, higher child care prices are associated with increased probabilities of work.

Of the measures of child care quality that we observe, only accreditation has a significant affect on parental decisions. Greater availability of accredited centers (from 15 percent to 25 percent) increases the probability of work by approximately one percent.

Our second set of results relate to the child care subsidy system. First, consistent with other recent findings, we find that the probability of working increases as the budget for child care subsidies increases. Second, we find that higher levels of state payments to providers for providing vouchered care increases the probability that parents will work. We obtain this result while controlling for both market price and observable quality. With price and observed quality held constant, increasing payments to

providers can either increase availability or improve unobserved aspects of quality. Thus, this result provides further support for the importance of the availability of care and may possibly provide support for the importance of quality. At any rate, it does indicate the importance of the level of provider payments in the welfare to work transition.

Our final set of results concerns responses to welfare reforms. Compared to mothers with a youngest child at least two years old but not yet six years old, we find consistent evidence that mothers with children under two years in age are roughly 10 percentage points more likely to pursue schooling options in place of working, whereas mothers with a youngest child at least six years old are almost 10 percentage points more likely to choose to work. This ordering of decisions is in line with the “work first” emphasis associated with Massachusetts’s work requirement that applies to households with a youngest child that is at least six years old coupled with the 24/60 time limit regulation that applies once the household’s youngest child reaches the age of two. Although we do not find strong time limit effects, households may have been making their work versus schooling decisions with the work requirement and time limits in mind during our entire sample period. This is possible due to the short span of data prior to the imposition of time limits and the early announcement of the time limits regulation.

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Table 1. Definitions of variables and sources.

| THEORETICAL CONSTRUCT  | EMPIRICAL MEASURE   | DATA SOURCE  |
|--|---|--|
| <i>Dependent Variable</i>  |   |  |
| Mother is working.   | Worked positive hours last week.  | DTA & ESP  |
| <i>Socio-Economic Variables</i>  |   |  |
| Age of adult client.   | Age of mother in years (and age squared).   | DTA Monthly Files  |
| Education  | Binary for the mother having no high school degree vs. having a high school degree.                                       |  |
| Language   | Binary for English being spoken vs. not spoken in the household   |  |
| Race   | Binaries for race being black, Hispanic, white, or other.   |  |
| <i>Characteristics of Formal Child Care</i>  |   |  |
| Availability   | Family care slots per 100 kids in town.   | 1996 OCCS Licensing List;<br>OCCS Monthly Billing Files  |
|  | Group care slots per 100 kids of the same age of the household's youngest child in town.                                  |  |
|  | State contracted slots per 100 kids in town.  |  |
|  | State daily reimbursement rate by age of youngest child and town.   |  |
| Quality  | Percent group care slots NAEYC accredited.  | 1998 NAEYC Accreditation List;<br>OCCS 1996 Licensing List   |
|  | Percent group care slots available from providers that have existed for at least 3 years.                                 |  |
|  | Median years of service of family care providers in town.   |  |
| Cost   | Median weekly price of group care by age of youngest child.   | 1997 Resource and Referral Database.   |
|  | Number of household dependents.   | DTA Monthly Files  |
|  | MSA median child care worker wage.  | 1997 BLS Occ Emp Wage Survey   |
| <i>Policy &amp; Administrative Variables Related to the Child Care Voucher System</i>      |   |  |
| Funding for State/Federal Child Care Subsidies   | State & federal subsidy per poor child in town.   | OCCS Budget Allocation   |
|  | AFDC cases per 1000 people in zip code.   | DTA; US Census   |
|  | Child neglect cases per 1000 people in zip code.  | MA Dept of Social Services; Census   |
| Administration   | Binaries for the household's subsidy administering agency (CCRA).   | OCCS Monthly Billing Files   |
| <i>Policy &amp; Administrative Variables Related to Early Childhood Education Programs</i> |   |  |
| Head Start   | Head Start exists in township.  | Head Start Program Info Reports  |
| Kindergarten   | Full-day Kindergarten.  | MA Department of Education   |
| CPC  | Community Partnerships for Children funding per poor child in town.   | MA Dept of Education; 1990 Census  |
| Early Childhood Education Eligibility  | Binary = 1 if the youngest child is age eligible for Head Start on 9/1/96 and the local Head Start program is in session. | DTA Monthly Files; Head Start 1996 &<br>1997 Program Information Reports;<br>MA Department of Education. |
|  | Binary = 1 if the youngest child is age eligible for pre-school or half-day Kindergarten and school is in session.        |  |
|  | Binary = 1 if the youngest child is age eligible for full-day Kindergarten or elementary school and school is in session. |  |

| THEORETICAL CONSTRUCT  | EMPIRICAL MEASURE  | DATA SOURCE                         |
|--|--|-------------------------------------|
| <i>Welfare Reform and Other Policy Variables</i>                     |  |                                     |
| Imposition of Time Limits  | Youngest child is under 2 years old.                                     | DTA Monthly Files                   |
|  | Youngest child is 2 to 5 years old.                                      |                                     |
|  | Youngest child is over 5 years old.                                      |                                     |
|  | Time limits imposed on Dec. 1, 1996.                                     |                                     |
|  | Time limits * youngest child is under 2 years old.                       |                                     |
|  | Time limits * youngest child is at least 2 but not yet 6 years old.      |                                     |
|  | Time limits * youngest child is at least 6 years old.                    |                                     |
| Time Trend   | Time trend.  |                                     |
| Welfare Office   | Local welfare office is consolidated.                                    |                                     |
| Minimum Wage & Federal Employer Tax Credits                          | Equals 1 after the October 96 minimum wage increase and FETC changes.    | 1996 US Tax Code (IRS)              |
|  | Dollars per worker in town for "Certified Projects".                     | MA Office of Business & Development |
| <i>Local Labor Market Conditions &amp; Cost of Working Variables</i> |  |                                     |
| Job Availability   | Monthly employment growth rate of town.                                  | BLS LAUS Statistics                 |
|  | Low skill (retail trade & service) jobs per worker in town.              | 1996 & 1997 ES202 Data              |
| Transportation Costs   | Percent of workers in zip code using public transportation.              | 1990 Census                         |
|  | Average commute time of workers in zip code.                             |                                     |
| Information  | DET Job Center exists in township.                                       | MA Division of Employ. & Training   |
| Cost and Availability of Informal Child Care                         | MSA 40 <sup>th</sup> percentile fair market rent.                        | US Dept of Housing & Urban Dev.     |
|  | Five year housing turnover rate.   | 1990 Census                         |
| <i>Community Characteristics</i>                                     |  |                                     |
| Community Characteristics  | Median household income in zip code.                                     | 1990 Census                         |
|  | Percent population black in zip code.                                    |                                     |
|  | Percent population Hispanic in zip code.                                 |                                     |
|  | Percent population foreign born in zip code.                             |                                     |
|  | Drug crimes per 100,000 people in town.                                  | MA Department of State Police       |
|  | Binaries for townships, Boston neighborhoods, welfare offices, and MSAs. | Boston Redevelopment Authority      |

Table 2. Descriptive Statistics (N = 59,218).

|   | Mean    | Median  | Minimum | Maximum  |
|---|---------|---------|---------|----------|
| Worked positive hours last week.                  | 0.586   | 1       | 0       | 1        |
| Age of mother.                                    | 27.936  | 26.667  | 15      | 56       |
| Age of mother squared.                            | 827.478 | 711.111 | 225     | 3136     |
| Mother has no high school degree.                 | 0.467   | 0       | 0       | 1        |
| Mother has a high school degree or GED.           | 0.533   | 1       | 0       | 1        |
| English is spoken in the household.               | 0.931   | 1       | 0       | 1        |
| English is not spoken in the household.           | 0.069   | 0       | 0       | 1        |
| Household race is black.                          | 0.374   | 0       | 0       | 1        |
| Household race is Hispanic                        | 0.338   | 0       | 0       | 1        |
| Household race is white, non-Hispanic.            | 0.271   | 0       | 0       | 1        |
| Household race is other, not white.               | 0.018   | 0       | 0       | 1        |
| Family care slots per 100 kids.                   | 5.038   | 5.503   | 1.304   | 7.427    |
| Group care slots per 100 kids by age of child.    | 6.408   | 5.269   | 0       | 24.743   |
| State contracted slots per 100 kids.              | 1.408   | 1.667   | 0.034   | 2.675    |
| State daily reimbursement rate.                   | 24.98   | 27.5    | 14      | 38       |
| Percent group centers NAEYC accredited.           | 0.163   | 0.151   | 0       | 1        |
| Percent group slots existed 3 or more years.      | 0.783   | 0.878   | 0       | 1        |
| Median years of family care providers.            | 5.334   | 5.455   | 2.100   | 7.551    |
| Median weekly price of care by age group          | 80.13   | 72.96   | 45.00   | 225.00   |
| Number of household dependents.                   | 2.651   | 2       | 1       | 8        |
| MSA median child care worker wage.                | 8.11    | 8.59    | 7.01    | 8.59     |
| State & federal subsidy per poor child in \$100.  | 4.475   | 4.34    | 4.34    | 5.11     |
| AFDC cases per 1000 people.                       | 8.419   | 4.868   | 0       | 62.469   |
| Child neglect cases per 1000 people.              | 72.186  | 73.055  | 10.311  | 127.348  |
| CCRA = Child Care Choices of Boston               | 0.377   | 0       | 0       | 1        |
| CCRA = Child Care Resource Center                 | 0.079   | 0       | 0       | 1        |
| CCRA = Child Care Search                          | 0.109   | 0       | 0       | 1        |
| CCRA = Child Care Works                           | 0.177   | 0       | 0       | 1        |
| CCRA = PET/NEFWC                                  | 0.258   | 0       | 0       | 1        |
| Head Start exists in township.                    | 0.455   | 0       | 0       | 1        |
| Full-day Kindergarten.                            | 0.848   | 1       | 0       | 1        |
| CPC funding per poor child in town.               | 5.25    | 3.52    | 0       | 53.13    |
| Youngest child is Head Start eligible.            | 0.121   | 0       | 0       | 1        |
| Youngest child is half-day school eligible.       | 0.085   | 0       | 0       | 1        |
| Youngest child is full-day school eligible.       | 0.100   | 0       | 0       | 1        |
| Youngest child is under 2 years old.              | 0.261   | 0       | 0       | 1        |
| Youngest child is 2 to 5 years old.               | 0.522   | 1       | 0       | 1        |
| Youngest child is at least 6 years old.           | 0.217   | 0       | 0       | 1        |
| Time limits imposed on Dec. 1, 1996.              | 0.712   | 1       | 0       | 1        |
| Time limits * youngest child is under 2.          | 0.183   | 0       | 0       | 1        |
| Time limits * youngest child is 2 to 5.           | 0.370   | 0       | 0       | 1        |
| Time limits * youngest child is over 5 years old. | 0.158   | 0       | 0       | 1        |
| Time trend.                                       | 8.222   | 9       | 1       | 14       |
| Welfare office is consolidated.                   | 0.439   | 0       | 0       | 1        |
| October 1996 minimum wage increase.               | 0.843   | 1       | 0       | 1        |
| EDIP dollars per worker.                          | 441.17  | 32.21   | 0       | 2,349.07 |
| Town monthly employment growth rate x 100.        | 0.287   | 0.430   | -2.070  | 2.310    |
| Low skill jobs per worker in town.                | 0.549   | 0.561   | 0.205   | 0.808    |
| Percent workers use public transportation.        | 0.161   | 0.081   | 0       | 0.433    |
| Average commute time in minutes.                  | 24.509  | 21.810  | 16.474  | 34.889   |
| DET Job Center exists in township.                | 0.570   | 1       | 0       | 1        |

| Table 2. Continued.                               |           |           |         |           |
|---|-----------|-----------|---------|-----------|
|   | Mean      | Median    | Minimum | Maximum   |
| MSA 40 <sup>th</sup> percentile fair market rent. | 728.56    | 808.00    | 566.00  | 839.00    |
| Five year housing turnover rate in zip code.      | 0.448     | 0.442     | 0.251   | 0.847     |
| Median household income in zip code.              | 26,519    | 25,723    | 13,721  | 70,928    |
| Percent population black in zip code.             | 0.231     | 0.062     | 0       | 0.899     |
| Percent population Hispanic in zip code.          | 0.121     | 0.086     | 0       | 0.672     |
| Percent population foreign born in zip code.      | 0.158     | 0.160     | 0.022   | 0.670     |
| Drug crimes per 100,000 people in township.       | 1,219.790 | 1,445.322 | 49.785  | 3,305.341 |

Table 3. Frequency of Geographic Variables.

| <i>Townships</i>                      |        |                        |        |                  |        |
|---------------------------------------|--------|------------------------|--------|------------------|--------|
| Acushnet                              | 191    | Framingham             | 1,198  | Springfield      | 11,215 |
| Boston                                | 21,840 | Holyoke                | 2,045  | Taunton          | 982    |
| Cambridge                             | 1,194  | Lowell                 | 4,241  | Waltham          | 634    |
| Chelsea                               | 1,386  | New Bedford            | 4,898  | Wareham          | 462    |
| Chicopee                              | 1,467  | Newton                 | 226    | Westfield        | 610    |
| Dartmouth                             | 349    | Revere                 | 804    | Winthrop         | 145    |
| Fall River                            | 4,036  | Somerville             | 952    | Woburn           | 343    |
| <i>Boston Neighborhoods</i>           |        |                        |        |                  |        |
| Allston-Brighton                      | 557    | Jamaica Plain          | 767    | South Boston     | 724    |
| Central Boston                        | 579    | Mattapan               | 1,437  | South Dorchester | 8,119  |
| Charlestown                           | 655    | North Dorchester       | 1,722  | South End        | 929    |
| East Boston                           | 1,099  | Roslindale             | 842    | Not in Boston    | 37,378 |
| Hyde Park                             | 855    | Roxbury                | 3,535  |                  |        |
| <i>Welfare Offices</i>                |        |                        |        |                  |        |
| Bowdoin Park                          | 9,841  | New Bedford            | 5,438  | Taunton          | 982    |
| Davis Square                          | 3,027  | New Market Square      | 6,344  | Waltham          | 634    |
| Fall River                            | 4,036  | Revere                 | 3,434  | Wareham          | 462    |
| Framingham                            | 1,198  | Roslindale             | 3,901  | Westfield        | 610    |
| Holyoke                               | 2,045  | Springfield Liberty St | 12,682 | Woburn           | 343    |
| Lowell                                | 4,241  |                        |        |                  |        |
| <i>Metropolitan Statistical Areas</i> |        |                        |        |                  |        |
| Boston                                | 30,166 | New Bedford            | 5,438  | Springfield      | 15,337 |
| Lowell                                | 4,241  | Providence             | 4,036  |                  |        |

Table 4. Estimation Results.

|  | Random-Effects<br>Structured Corr. |          | Random-Effects<br>Unstructured Corr. |          | Fixed<br>Effects |          |
|--|------------------------------------|----------|--------------------------------------|----------|------------------|----------|
|  | Coef.                              | t - stat | Coef.                                | t - stat | Coef.            | t - stat |
| Age of mother.                                     | 0.37445                            | 16.396   | 0.34482                              | 15.686   |                  |          |
| Age of mother squared.                             | -0.00543                           | -14.638  | -0.00499                             | -13.918  |                  |          |
| Mother has no high school degree.                  | -0.41910                           | -10.943  | -0.43330                             | -11.580  |                  |          |
| English is not spoken in the household.            | -0.47367                           | -6.261   | -0.48282                             | -6.457   |                  |          |
| Household race is black.                           | 0.20218                            | 3.698    | 0.18683                              | 3.513    |                  |          |
| Household race is Hispanic                         | 0.27135                            | 4.777    | 0.27621                              | 5.020    |                  |          |
| Household race is other (not white).               | -0.08207                           | -0.539   | -0.06801                             | -0.450   |                  |          |
| Family care slots per 100 kids.                    | -0.00146                           | -0.008   | -0.02202                             | -0.134   | -0.26099         | -0.774   |
| Group care slots per 100 kids.                     | 0.03523                            | 3.206    | 0.02829                              | 2.533    | 0.06859          | 3.053    |
| State contracted slots per 100 kids.               | -0.02366                           | -0.267   | -0.02239                             | -0.284   | 0.48987          | 1.875    |
| State daily reimbursement rate                     | 0.01445                            | 2.996    | 0.00835                              | 1.778    | 0.04471          | 4.281    |
| Percent group centers accredited.                  | 0.40643                            | 2.063    | 0.23294                              | 1.235    | 1.29964          | 3.366    |
| Percent group slots 3 years old.                   | 0.09445                            | 0.807    | 0.21297                              | 1.907    | 0.16884          | 0.727    |
| Median years of family care providers.             | -0.25076                           | -1.316   | -0.07234                             | -0.415   | -0.27729         | -0.788   |
| Median weekly cost of care.                        | 0.00323                            | 1.785    | 0.00270                              | 1.463    | 0.01111          | 3.201    |
| Number of household dependents.                    | -0.02840                           | -1.330   | -0.02787                             | -1.324   |                  |          |
| MSA median child care worker wage.                 | -0.22038                           | -0.294   | -0.09535                             | -0.134   | 0.34731          | 0.229    |
| State & federal subsidy per poor child.            | 0.25984                            | 4.293    | 0.34608                              | 6.392    | 0.36543          | 2.192    |
| AFDC cases per 1000 people.                        | -0.00048                           | -0.297   | -0.00106                             | -0.718   | -0.00072         | -0.175   |
| Child neglect cases per 1000 people.               | -0.00414                           | -1.438   | -0.00069                             | -0.247   | -0.00528         | -0.836   |
| CRRA = Child Care                                  | 0.04941                            | 0.406    | 0.01279                              | 0.108    |                  |          |
| CRRA = Child Care Search                           | 0.06901                            | 0.579    | 0.05952                              | 0.505    |                  |          |
| CCRA = Child Care Works                            | -0.06290                           | -0.520   | -0.02938                             | -0.244   |                  |          |
| CCRA = PET/NEFW                                    | 0.21991                            | 2.286    | 0.18559                              | 1.975    |                  |          |
| Head Start exists in township.                     | 0.50481                            | 1.453    | 0.41054                              | 1.275    | 1.73452          | 2.799    |
| Full-day Kindergarten.                             | 0.62354                            | 1.603    | 0.27077                              | 0.757    | 1.05423          | 1.344    |
| CPC funding per poor child.                        | 0.00635                            | 0.759    | -0.00262                             | -0.339   | 0.05722          | 2.492    |
| Youngest child is Head Start eligible.             | 0.02831                            | 0.855    | 0.00822                              | 0.237    | -0.04525         | -0.509   |
| Youngest child is half-day school eligible.        | 0.03775                            | 0.846    | 0.01200                              | 0.266    | 0.10486          | 0.843    |
| Youngest child is full-day school eligible.        | 0.10101                            | 2.650    | 0.12551                              | 3.272    | 0.05170          | 0.451    |
| Youngest child is under 2 years old.               | -0.89367                           | -5.927   | -0.85099                             | -5.915   | -2.01203         | -6.222   |
| Youngest child is at least 2, not yet 6 years old. | -0.42342                           | -4.561   | -0.39312                             | -4.334   | -0.95591         | -4.361   |
| Time limits imposed on Dec. 1, 1996.               | 0.02277                            | 0.488    | 0.03457                              | 0.809    | -0.02711         | -0.201   |
| Time limits * youngest child is under 2.           | -0.01220                           | -0.209   | -0.06727                             | -1.290   | -0.01819         | -0.131   |
| Time limits * youngest child is 2 to 6.            | -0.05355                           | -1.120   | -0.06512                             | -1.483   | -0.08551         | -0.685   |
| Time trend.  | 0.06526                            | 3.929    | 0.03390                              | 2.234    | 0.22499          | 6.839    |
| Welfare office is consolidated.                    | -1.12523                           | -2.412   | -0.94688                             | -2.141   | -3.35448         | -3.668   |
| Oct. 96 minimum wage increase.                     | -0.13914                           | -4.801   | -0.22448                             | -8.499   | -0.33022         | -4.207   |
| EDIP dollars per worker.                           | 0.00010                            | 1.486    | 0.00003                              | 0.497    | 0.00039          | 2.386    |
| Monthly employment growth rate.                    | 0.00620                            | 0.832    | 0.01441                              | 2.153    | 0.00280          | 0.112    |
| Low skill jobs per worker.                         | 2.37760                            | 1.101    | 1.94322                              | 0.915    | 5.25017          | 1.128    |
| Percent workers use public transportation.         | -1.32695                           | -0.752   | -0.27484                             | -0.176   | -2.54535         | -0.884   |
| Average commute time in minutes.                   | 0.02600                            | 0.965    | 0.00794                              | 0.326    | 0.04654          | 0.999    |
| DET Job Center exists in township.                 | -0.49716                           | -1.604   | -0.41886                             | -1.468   | -1.36839         | -2.453   |
| MSA 40 <sup>th</sup> percentile fair market rent.  | -0.00375                           | -3.475   | -0.00236                             | -2.383   | -0.01326         | -4.299   |
| Five year housing turnover rate.                   | -0.18202                           | -0.277   | -0.29795                             | -0.517   | -0.42422         | -0.383   |
| Median household income.                           | 0.00001                            | 1.001    | 0.00001                              | 0.944    | 0.00004          | 2.285    |
| Percent population black.                          | -0.02398                           | -0.082   | -0.18158                             | -0.692   | 0.19349          | 0.384    |
| Percent population Hispanic.                       | 0.25544                            | 0.740    | 0.09982                              | 0.305    | 1.27233          | 1.865    |
| Percent population foreign born.                   | 0.77907                            | 0.954    | 0.88493                              | 1.222    | 1.94678          | 1.534    |
| Drug crimes per 100,000 people.                    | 0.00011                            | 1.352    | 0.00009                              | 1.038    | 0.00016          | 0.847    |

Table 5. Predicted Differences in the Probability of Working and *t*-statistics.

|  | Structured Correlation | Unstructured Correlation | Fixed Effects    |
|--|------------------------|--------------------------|------------------|
| <b><i>Child Care Market Effects</i></b>  |                        |                          |                  |
| Group care capacity increases from 10 to 15 slots per 100 kids.  | 0.042<br>3.584         | 0.035<br>2.661           | 0.075<br>4.402   |
| State reimbursement rate increases from \$27 to \$36 per day.  | 0.031<br>3.343         | 0.019<br>1.836           | 0.087<br>8.906   |
| NAEYC accredited group centers increases from 15% to 25 %.   | 0.010<br>2.098         | 0.006<br>1.241           | 0.029<br>3.661   |
| Median cost of weekly care increases from \$80 to \$120.   | 0.031<br>1.928         | 0.027<br>1.516           | 0.095<br>5.524   |
| State & federal child care subsidy increases from \$434 to \$511 per poor child in township.           | 0.047<br>6.126         | 0.065<br>8.774           | 0.062<br>5.364   |
| <b><i>Early Childhood Education Effects</i></b>  |                        |                          |                  |
| A local Head Start program exists.   | 0.113<br>1.588         | 0.098<br>1.337           | 0.270<br>5.295   |
| The local public school district offers full-day Kindergarten.   | 0.137<br>1.809         | 0.066<br>0.777           | 0.196<br>1.824   |
| Youngest child is Head Start eligible and Head Start is in session.                                    | 0.007<br>0.858         | 0.002<br>0.237           | -0.010<br>-0.506 |
| Youngest child is eligible for a half-day public school program that is currently in session.          | 0.009<br>0.849         | 0.003<br>0.266           | 0.024<br>0.857   |
| Youngest child is eligible for a full-day public school program that is currently in session.          | 0.024<br>2.680         | 0.031<br>3.301           | 0.012<br>0.455   |
| <b><i>Regulatory Effects</i></b>   |                        |                          |                  |
| Youngest child is under 2 years old as compared to being at least 2 years old but not yet 6 years old. | -0.116<br>-3.886       | -0.114<br>-3.929         | -0.258<br>-4.614 |
| Youngest child is at least 6 old as compared to being at least 2 years old but not yet 6 years old.    | 0.096<br>4.317         | 0.094<br>4.198           | 0.182<br>3.609   |
| <b><i>Imposition of the time limit:</i></b>  |                        |                          |                  |
| When the youngest child is under 2 years old.  | 0.003<br>0.235         | -0.008<br>-0.827         | -0.011<br>-0.183 |
| When the youngest child is 2 to 6 years old.   | -0.007<br>-1.009       | -0.008<br>-1.101         | -0.026<br>-0.603 |
| When the youngest child is at least 6 years old.   | 0.005<br>0.490         | 0.008<br>0.813           | -0.004<br>-0.199 |

Note: The base specification is for black, single mother with a high school degree and two children living in the South Dorchester neighborhood of Boston. For more details, the reader is referred to page 14 of the text.