Child Care Costs and Employment Decisions of Greek Women

by

J. J. Daouli, M. Demoussis, N. Giannakopoulos*

* Joan Daouli and Michael Demoussis are professors and Nicholas Giannakopoulos is a Ph.D. candidate at the Department of Economics of the University of Patras.

Address for correspondence:
Michael Demoussis
Department of Economics
University of Patras
University Campus
Rio 26500, Greece
Tel.: +32610 996134
Fax: +32610 996265
E-mail: micdem@upatras.gr

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Abstract

In the present paper we investigate the effects of child care costs on women's labor market decisions. Decisions regarding labor force participation and non-maternal child care are jointly estimated. Employing data from the 1998/99 Greek Household Budget Survey and using a bivariate probit with sample selection and a binomial probit for labor force participation, a strong negative relationship between participation and paying for care is identified. The econometric results indicate that the estimated hourly cost of child care affects negatively and significantly the probability of participation, when the predicted wage rate is taken into consideration.

Keywords: Child care costs, labor force participation, bivariate probit, Greece

JEL Classification: J13, J22, C35

1. Introduction

Over the last 20 years Greece experienced a dramatic increase in female labor force participation (LFP). The greater part of this increase concerns well educated young married women. The accompanied increased demand for child care services constitutes the ground on which the child care industry is founded. Nevertheless, the Greek female LFP rate still remains among the lowest in the EU, a 'performance' that is widely attributed to child care issues confronting Greek mothers. In this paper, a model of female LFP behavior incorporating both, informal and market child care is estimated. The primary objective is to identify the underlying process of selecting among child care alternatives and the effects of this process on mother's LFP decision.

Greece is characterized by substantially lower child care provision rates than other EU countries, (OECD, 2001). Empirical evidence emphasizes the low level of institutional support for working women with children and underscores the fact that Greek women bear most of the responsibility for care of family dependent members (Symeonidou, 2001). Child care at home, paid by parents without any institutional financial support or provided by family members is the typical child care arrangement. Less frequently, child care is provided by expensive private institutions, the cost of which is tax deductible. Child care by public institutions is also available but the number of places is substantially lower than those required to satisfy expressed child care needs. Public institutions can provide child care for about 3 per cent of the total number of children under three (Bagavos, 2000; Eurostat 2002). Last, child care services by large firms in the industrial and

services sector are rare. There is no doubt therefore, that Greek households with dependent children face limited access to child care services.

The interdependencies of decisions concerning time allocation (time spent in the labor market and in home based production activities) have attracted the attention of labor economists over the last thirty years. In this framework, a variety of issues related to child care (e.g. quality and quantity of children, cost of child care, role of the family and related institutional issues) have been extensively investigated (e.g. Becker and Lewis, 1973; Heckman, 1974; Blau and Robins, 1988, 1989; Connelly 1992; Michalopoulos *et al*., 1992; Ribar, 1995).

The objective of the present application concerns the estimation of the effects of child care costs on the employment decisions of mothers in Greece. Assuming that employment decisions may depend on the availability of childcare, labor force participation and the use of non-maternal child care facilities are modeled as joint decisions. In the following section, the theoretical and econometric issues involved are presented. Section 3 contains a discussion of the data used and the results of the econometric estimation. Major findings are summarized in the last section.

2. Theoretical Underpinnings and Econometric Specification

The theoretical framework of the study is based on the neoclassical theory of consumer choices and time allocation (Becker, 1973) as well as on the analytical framework outlined by Connelly (1992). We assume that the member of the household responsible for child care is the mother, if no market child care is

utilized. The time allocation decision facing the mother of the household relates to both, work time in the labor market and spending time in child care. The mother is assumed to maximize a utility function in goods, child quality and leisure. Child quality is produced by mother's time, market goods, number and age structure of children. Furthermore, mothers diversify their time across market, leisure and child care activities. Child care could be provided by the mother at home or it could concern non-maternal care. Connelly (1992) asserts that the mother will substitute between maternal and non-maternal child care until her wage is equal to the net benefit of maternal care. Thus, an increase in the mother' s wage is expected to increase the likelihood of labor force participation, while an increase in the cost of child care is expected to lower the probability of employment (Powell, 1997).

Turning now to the quality of non-maternal child care, this could be provided either by the formal child care industry or by potential alternative child care takers among family members (informal child care market). International evidence suggests that informal child care market is a low cost child care alternative. Therefore, mothers that employ non-maternal child care face different relative costs. Thus, the existence of low cost child care is expected to increase the probability of work participation (Heckman, 1974; Blau and Robins, 1988; Connelly, 1992; Michalopoulos and Robins, 2000).

Following the utility maximization problem briefly outlined above, mother's labor supply t^m can be specified as follows:

$$t^m = \left(W, C^c, E\right) \qquad (1)$$

where, t^m is mother's time spent in the labor market, W is her hourly wages, C^c stands for the cost of child care and E is a vector of observed exogenous determinants. The structural form of the labor supply equation for the i^{th} woman is represented by the following equation:

$$t_i^m = \beta_0 + \beta_1 \ln W_i + \beta_2 C_i^c + \beta_3 E_i + \eta_i \qquad (2)$$

where, η_i represents an error term which is assumed to be distributed normally. The parameters of equation (2) can be estimated by typical maximum likelihood methods, since the LFP decision is represented by a dummy variable, as follows:

$$LFP_i = \begin{cases} 1, & \text{if} \quad t_i^m > 0 \\ 0, & \text{if} \quad otherwise \end{cases} \qquad (3)$$

The estimation of (3) requires two additional qualifications. First, we have to deal with unobserved wages for non-working mothers and second, with incomplete information about child care costs. The estimation of a wage generating function is pursued by employing the well known two-stage Heckman procedure for sample selection bias (Heckit). Completed years of schooling, reflecting the human capital effect on wages and a non-linear age-wage profile were used as explanatory wage determinants. The estimation of child care costs is pursued along the lines suggested by Connelly (1992). In this context, the cost of child care (over all children) is defined as the total expense of child care per hour the mother is employed.

Then, the child care cost equation is specified as follows:

$$C_i^c = \alpha D_i + u_i \qquad (4)$$

where, D_i is a vector determining care expenses. It includes number of children in several age categories, pecuniary household income, the presence of alternative potential childcare givers, the flexibility of husband's hours of work and the regional location of the household. The term u_i represents an error term, reflecting unobserved variation in the child care cost equation.

Given the linear relation in (4) and the joint character of pay-for-child-care and LFP decisions, a potential selectivity bias may arise. First, family expenses for child care are observed only if the mother is working and second, a large proportion of working mothers pay for non-maternal child care. Therefore, observations with zero value on child care expenses for participating in the labor market mothers requires a correction for selection bias. Thus, the reduced form child care and labor force participation equations are of the form:

$$I_{i1} = \gamma_1 x_{i1} + \varepsilon_{i1} \quad (5.1)$$

$$I_{i2} = \gamma_2 x_{i2} + \varepsilon_{i2} \quad (5.2)$$

where, x_{i1}, x_{i2} are vectors of observed household characteristics and $\varepsilon_{i1}, \varepsilon_{i2}$ are normally distributed error terms. Their correlation coefficient is $\rho_{\varepsilon_1\varepsilon_2} = \frac{\sigma_{12}}{\sigma_1 \sigma_2}$, where, σ_{12} is the covariance of $\varepsilon_1, \varepsilon_2$. We observe that $I_{i1} > 0$ if the mother works and $I_{i2} > 0$ if she works and at the same time participates in the formal non-maternal child care market.

Following Connelly (1992) and Powell (1997) the system of equations (5.1)-(5.2) is estimated by a bivariate probit model with sample selection, since the

respective likelihood function accounts for the selectivity of observing child care costs only for working women. This estimation procedure provides consistent parameter estimates for the vectors γ_1, γ_2 and for ρ. Given the estimated parameters from the bivariate probit with sample selection, we can estimate the child care cost equation (4) by OLS conventional methods, including the selection term from the bivariate model as an additional regressor. The proposed two stage procedure allows for the separation of the decision to pay for care and the decision on the extent of this care (Mroz, 1987; Connelly, 1992; Powell, 1997). After the estimation of the wage and child care cost equations, we can proceed with the estimation of the labor force participation equation, using the generated wage and child care costs as independent variables.

3. Data and Estimation Results

The data utilized in this application were derived from 1988/99 Greek Household Budget Survey (GHBS) carried out by the National Statistical Service of Greece. It is a micro-survey of income and expenditures for a representative sample of 6258 Greek households. The child care information pertains to home based market child caretakers (babysitters) and to centre based child care facilities. Married women with spouse present in the household and the presence of at least one child under the age of 13 are used as selection criteria. We have also excluded self-employed, farmers and students and we deleted observations with missing data on any of the variables used in the analysis, resulting in a total sample of 1125 observations. Summary statistics of the relevant variables are represented in Table 1.

Insert Table1 about here

Table 2 presents the estimated results of the two decisions regarding paying for care. It should be stressed that the estimated results for the decision regarding participation in the pay for care market are obtained from the joint estimation of the bivariate probit model with selection. The results in column 1 indicate that the probability of paying for care is positively related to the presence of preschool age children, while the impact of school-age children is negative but insignificant. Furthermore, the presence of children in secondary education exerts a negative effect on the probability of using non-maternal child care services. The cohabitation with the married couple's parents has an expected negative effect on the decision to pay for care. The latter finding corroborates the widely held view that grandparents are the main non-market child care providers. The husband's hours of work exercise a positive and significant effect, implying that his work schedule, i.e., non-flexible time table, plays a significant role in the decision to buy child care services. The same holds for unearned income (property plus husband's earnings). With regard to the place of residence, it appears that living in the greater Athens conurbation exerts a positive impact on the decision to utilize child care services.

The correlation coefficient between the two jointly determined decisions, i.e., paying for care and participating in the labor market, is -0.38 and statistically significant, indicating that the two decisions are inversely correlated. This in turn implies that if the mother participates in the labor market then there is a high

probability that she does not pay for child care. This finding is in agreement with other empirical studies worldwide (e.g. Connelly, 1992; Powell, 1997).

The OLS results of the child care cost equation, corrected for sample selection are presented in column 2 of Table 2. Child care expenses appear to be influenced only by the number of pre-school age kids. In other words, once the decision to pay for child care is taken the amount of expenditures is exclusively determined by the number of kids. The negative coefficient possibly captures the fact that average child care cost is a decreasing function of the number of children. For example, a non-maternal child care-taker (baby-sitter) that initially offers her services for one child, if asked to take care of two children would only charge an incremental amount over and above her initial fee, where the increment is lower than the initial fee. The statistically significant estimate of selection correction variable (lambda) shows that selection effects are important.

Insert Table 2 about here

Table 3 presents the parameter estimates of the labor force participation probit, when predicted wages and predicted hourly cost of care are included as additional covariates. As expected, wages are found to have a significant positive effect on the labor force participation decision while the hourly cost of care exercises a statistically significant negative effect. The number of pre-school age children reduces the probability of LFP, a finding that seems to indicate that the number of children exercise (after controlling for child care expenditures) an autonomous negative effect on LFP (Powell, 1997). Finally, the regional dummy indicates that

living in the province of Attiki increases the probability of participation in the labor market.

Insert Table 3 about here

4. Summary of Findings

The prime objective of this paper was to investigate the effects of child care costs on the employment decisions of married mothers in Greece. Assuming that employment decisions of Greek mothers may depend on the availability of childcare, labor force participation and the use of non-maternal child care are modeled as joint decisions. The analysis employed data from the 1998/99 Greek Household Budget Survey, which contains country-wide data on expenditures for several non-maternal child care alternatives. The underlying reduced form model support the hypothesis that women are inclined to participate in labor market activities when wages increase and non-maternal child care costs decrease.

Furthermore, the empirical results imply that the probability of paying for non-maternal child care increases in the presence of pre-school children and decreases as the children grow. Cohabitation with grandparents is apparently a valid explanation of the observed low levels of market child care in Greece. Furthermore, Greek women with high unearned income and husbands with non-flexible working schedules are associated with higher probabilities of being involved in the market for child care services. Finally, it appears than once the mother decides to utilize paid child care, child care expenses are determined solely by the number of children.

Given that the Greek Government is interested in increasing the labor force participation of women, to the extent that it relates to child care, there are several venues to be followed. For instance, the state should increase the provision of child care services, (i) by directly establishing child care centers whose pricing policies should be based on average cost, (ii) subsidizing home-based child care expenses and (iii) offer incentives via tax deductions to private sector employers in order to set up in-house day care centers for their employees in early parenthood. Finally, public – private partnerships in the child care market should be encouraged and supported.

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Table 1. Descriptive statistics of demographic and economic variables

Variable	*All obs.*	*Non-workers*	*Workers*	*Use unpaid care*	*Use paid care*
Child Care Expenditures (in 000 drachmas)	-	-	-	-	447 (203)
No. of kids age 0-5	0.63 (0.69)	0.65 (0.71)	0.60 (0.66)	0.49 (0.60)	1.05 (0.68)
No. of kids age 6-12	0.90 (0.76)	0.92 (0.78)	0.88 (0.74)	0.96 (0.73)	0.57 (0.68)
No. of kids age 13-18	0.28 (0.55)	0.31 (0.58)	0.24 (0.52)	0.29 (0.54)	0.05 (0.36)
No. of kids age > 18	.079 (0.33)	0.08 (0.34)	0.07 (0.32)	0.08 (0.35)	0.01 (0.10)
Unearned Income (in 000 drachmas)	4704 (3314)	4689 (3488)	4724 (3072)	4609 (3127)	5154 (2821)
Mother's Education	11.78 (3.96)	10.43 (3.56)	13.56 (3.77)	13.30 (3.86)	14.55 (3.24)
Mother's Age	34.54 (6.10)	33.78 (6.54)	35.55 (5.30)	35.78 (5.93)	34.72 (4.87)
Attiki (Dummy)	0.51 (0.50)	0.45 (0.49)	0.59 (0.49)	0.56 (0.49)	0.70 (0.45)
Husband's Hours of Work	43.48 (16.03)	44.41 (16.74)	42.25 (14.97)	41.22 (15.48)	46.15 (12.10)
Cohabitating Grandparents (Dummy)	0.08 (0.28)	0.09 (0.29)	0.07 (0.26)	0.09 (0.28)	0.02 (0.14)
Number of Observations	1125	641	484	383	101

Numbers in parentheses represent standard deviation

Table 2. Two-stage child care cost estimation with sample selection

	Pay for Care Probit[1]		Child Care Expenditure	
Variables	***Coeff.***	***St. Error***	***Coeff.***	***St. Error***
Intercept	-1.738	.396***	7.445	1.096***
No. of kids age 0-5	.640	.145***	-.666	.345**
No. of kids age 6-12	-.016	.116	.187	.221
No. of kids age 13-18	-.381	.146***	-	-
No. of kids age > 18	-.615	.580	1.259	1.294
Husband's Hours	.010	.005**	-	-
Cohabitating Grandparents	-.631	.362*	.993	.957
Unearned Income	.044	.025*	.049	.050
Attiki	.362	0.157**	-	-
$\tilde{n}(\aa_1,\aa_2)$	-0.380	0.194**	-	-
Log-Likelihood	-853.04	-	-	-
Lambda	-	-	-1.184	.726*
Adjusted R^2	-	-	0.078	-
Number of Observations	1125	-	101	-

Asterisks indicate statistical significance at: *** 1%, ** 5%, *10%.
1: The results are drawn from a bivariate probit model (LFP and pay for care).
The F (7, 93) – statistic for the child care expenditure equation is 2.30, significant at the 5% level.
The estimation is carried out with LIMDEP 7.0.

Table 3. Estimated coefficients of LFP probit

Variables	***Coeff.***	***St. Error***
Intercept	-15.531	2.464***
Predicted Wage	11.070	.949***
Predicted expenditure for child care	-2.083	.185***
No. of kids age 0-5	-.665	.287***
No. of kids age 6-12	.020	.211
Unearned Income	.024	.032
Attiki	.476	.234**
Restricted Log-Likelihood	-768.79	
McFadden pseudo R^2	0.90	
X^2 (6 d.f.)	1389***	
Number of Observations	1125	

Asterisks indicate statistical significance at: *** 1%, ** 5%, *10%.
The X^2 – statistic with 10 d.f., is 406.87, significant at 1%
Correct predictions for:
a) workers: 96%, b) non-workers: 98%, c) both workers and non-workers: 97%