

**Full Title:**           **MOTHERS' TIME SPENT IN SPENT IN CARE OF HER CHILDREN  
AND MARKET WORK: A SIMULTANEOUS MODEL WITH  
ATTITUDES AS INSTRUMENTS**

**Authors:**           Peter Howie, Kazakhstan Institute of Management, Economics, and Policy  
John Wicks, University of Montana, Missoula  
John M. Fitzgerald, Bowdoin College\*  
Douglas Dalenberg, University of Montana, Missoula  
Rachel Connelly, Bowdoin College

Classification Codes: J13, J22

Key Words: Women's Employment, Child Care, Time Allocation, Attitudes

Abstract:

Using a model that addresses the potential endogeneity of employment hours on mothers' child care time and visa versa, by including instruments based on parental attitudes, we find a significant negative (but inelastic) relation between the two time uses.

\*Corresponding author. Department of Economics, Bowdoin College, 9700 College Station, Brunswick, ME 04011, [jfitzger@bowdoin.edu](mailto:jfitzger@bowdoin.edu)

# MOTHERS' TIME SPENT IN CARE OF HER CHILDREN AND MARKET WORK: A SIMULTANEOUS MODEL WITH ATTITUDES AS INSTRUMENTS

## **Introduction:**

Increasing hours of employment by mothers of young children has caused some to worry that the time spent by mothers directly providing care for their children has been substantially diminished and maternal child care time is thought to be of high quality in comparison to purchased options or other relative care. Care for one's child and market employment typically take a considerable majority of the discretionary time available to a mother with minor children.<sup>1</sup> Because these two time uses compete for the same scarce time, it would seem that they must be interrelated and determined simultaneously. However, since these are not the only uses of discretionary time, it may be that other time uses have picked up the squeeze caused by the substantial increase in women's employment hours. If this is the case, the employment and time caring for children could be independent of one another.

Time use data needed to test this hypothesis are scarce in the U.S. but the limited studies done to date have shown much less effect of mother's employment hours on child care time than was expected. Robinson and Godbey (1997) look at parental time use with data from 1985. Sandberg and Hofferth (2001) analyze children's time use with data from 1981 and 1997. However, both of these studies take hours of employment as exogenous.

This paper estimates a simultaneous model that addresses the potential endogeneity of employment hours on the time mothers spend with young children and visa versa, using a unique set of instruments based on parental attitudes towards work and child care. Using survey data from mothers in Missoula Montana, we find a significant negative but inelastic relationship between hours of employment and the hours of maternal child care. The inelasticity of child care hours with respect to work hours leads us to conclude that children do not bear a large share of the burden of their mothers' market work in the form of reduced parental time inputs. Rather, it is the mothers who bear most of the burden, since increased market work seems to be crowding out other activities, such as

household production and/or leisure. This finding is in keeping with Bianchi (2000), Robinson and Godbey (1997) and Sandberg and Hofferth (2001) who all find small effects of women's employment on time mothers spend with their own children.

### **Data**

Personal interviews with 371 Missoula, Montana area mothers of minor children provided the data for the study.<sup>2</sup> The information gathered pertained to the care provided to the minor children in the household, the market work hours of the mother, potential instruments for these two likely endogenous variables, and other hypothesized causal variables. Specifically, in terms of child care, respondents were asked, "On your average day, how long is child care your primary activity?"<sup>3</sup> Six attitude questions about parenting recorded as scale values will serve as potential identifiers of hours of child care provided by the mother. They include: "Being a parent is my most important job." (*important*); "How would you compare the quality of child that you provided to the average day care, nanny or babysitter?" (*quality*); "A three-year-old needs to play with other children her/his age on a regular basis." (*kids*); "How important is your child's socialization and peer relations when making your decision to engage in child care?" (*social*); "You can avoid the extra bother, time, and travel of finding a child care provider by providing the care yourself. How do you feel about finding a provider?" (*bother*); and "How important are family values to you?" (*family*). Four attitude questions on employment serve as potential identifiers of employment hours. They include: "In terms of living standards, how important is earning income to you?" (*income*); "How important is maintaining or improving your social class?" (*class*); "If you work for money, how satisfied are you with your work: If you do not now work, how satisfied do you think you would be from working?" (*likework*); and "How important to your parent(s) is/was their job?" (*parents*) The mean answers for these questions and all other variables can be found in an appendix available from the authors.

## **The Model**

Our equations for mothers' hours of child care (*pntcare*) and weekly work hours (*workhours*) may be expressed formally as:

$$\begin{aligned} pntcare_i = & \alpha_0 + \gamma_1 workhours_i + \alpha_1 importance_i + \alpha_2 quality_i + \\ & \alpha_3 kids_i + \alpha_4 social_i + \alpha_5 bother_i + \alpha_6 family_i + \alpha_7 education_i + \\ & \alpha_8 kids01_i + \alpha_9 kids25_i + \alpha_{10} kids610_i + \alpha_{11} kids1115_i + \alpha_{12} kids16p_i + v_i \end{aligned} \quad (1)$$

$$\begin{aligned} workhours_i = & \beta_0 + \gamma_2 pntcare_i + \beta_1 education_i + \beta_2 married_i + \beta_3 nonwage_i + \\ & \beta_4 income_i + \beta_5 likework_i + \beta_6 class_i + \beta_7 parents_i + \beta_8 kids01_i + \\ & \beta_9 kids25_i + \beta_{10} kids611_i + \beta_{11} kids1115_i + \beta_{12} kids16p_i + \varepsilon_i \end{aligned} \quad (2)$$

where *kids01* is the number of children ages one or less, *kids25* is the number of kids age 2 to five, etc. *Education* is the number of years of education of the mother, *married* is a dummy variable which indicates if the mother was currently married, *nonwage* is the percent of household income from sources other than wages. The remaining variables are the attitude variables already described above. Education proxies for mothers' wages. Our primary interest is in the structural coefficients  $\gamma_1$  and  $\gamma_2$  on the endogenous variables. We hypothesize both coefficients will have negative signs due to the mother's time constraint.

The equations are each identified by multiple exclusion restrictions since we assume that that the attitudes towards childcare only affect market hours of work through child care hours, and attitudes toward market work only affect child care through market work hours. We estimate the structural equations using two stage least squares using heteroskedastic-robust standard errors (White, 1980) to account for potential heteroskedasticity of hours spent in the care of one's child.

## **Results and Conclusions**

A key concern with instrumental variable methods is that the instruments need to be strongly correlated with their targets.<sup>4</sup> In our case, the reduced-form shows good predictive ability with significant coefficients on the instruments. Reduced-form results are provided in an appendix available from the authors. Two-stage least squares estimation of equations (1) and (2) with heteroskedastically robust standard errors yielded the results in Table 1, t-stats in parentheses.<sup>5</sup>

Employment hours, mother's education, the number of kids by age category, and one of the attitude variables were significant at the five percent level. Although more employment hours were significantly associated with less child care, the relationship is inelastic (-0.49 at the means), thus, an increase in employment hours outweighs the decrease in the mother's child care time leading to a net increase in hours spent in the two activities. As expected, younger children result in more child care, particularly a child aged 0 or 1. Older children significantly reduce parental child care time as older teenagers may be doing some of the child minding of their younger siblings.

In terms of employment hours, education which is proxying for wages has a significant positive effect on mother's work hours. The mother's child care hours plus being married and having younger children have significant negative effects on mother's employment hours. The elasticity of work hours with respect to child care is inelastic, -0.89 at the mean. As in the other equation, this inelasticity means that an increase in child care time leads to an increase in the total hours devoted to the sum of employment and child care. It is interesting that the presence of young children continues to have negative effect on employment beyond the direct child care hours. We know from other studies that mothers do most of the arranging of non-parental child care and sick day child care so that some of their reduced employment may be still indirectly related to children's care needs. In addition, households with young children may also produce more of the other goods they consume within the household due to a complimentary of other household tasks with supervisory child care. (Fitzgerald, Swenson, and Wicks, 1996)

In conclusion, these two regressions have shown the expected interdependency between mothers' child care hours and their hours of employment.<sup>6</sup> However, the relationship between the variables is inelastic. This confirms of the work of Bianchi (2000), Robinson and Godbey (1997), and Sandberg and Hofferth (2001) who all suggested that mothers tend to provide the needed care for their children regardless of their market work. Instead our regression results suggest that it is the need for care that affects the amount of care so that younger children have the largest positive impact on child care hours while young children have a negative effect on employment hours.

## References

- Bianchi, S., 2000, Maternal employment and time with children: dramatic change or surprising continuity? *Demography* 37, 401-414.
- Bound, J., D. Jaeger and R. Baker, 1995, Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak, *Journal of the American Statistical Association* 90, 443-50.
- Dalenberg, D., J. Fitzgerald and J. Wicks, 2004, Direct valuation of personal care by households, *Population Research and Policy Review* 23, 73-89.
- Fitzgerald, J., M. Swenson, and J. Wicks, 1996, Valuation of household production at market prices and estimation of production functions, *Review of Income and Wealth* 42, 165-180.
- Robinson, J. and G. Godbey, 1997, *Time for life: the surprising ways Americans use their time* (Pennsylvania State University Press State College, State College Pennsylvania).
- Sandberg, J. and S. Hofferth, 2001, Changes in children's time with parent, U. S. 1981-1997, *Demography* 38, 423-436.

## Endnotes

<sup>1</sup> Discretionary time is defined as the hours remaining after biologically necessary bodily maintenance such as sleeping and eating.

<sup>2</sup> The sampling technique was similar to that reported in Dalenberg, et al. (2004)

<sup>3</sup> The following definition of child care time provided the basis for this question: “This includes only the time spent actively engaged in child care when that was the primary activity. Merely being at home with a child is NOT time spent at child care. For instance, if you are primarily doing something else (e.g. meal preparation or sleeping) that is NOT child care time.” The definition of child care itself was important for its study. On the basis of discussions with a number of child care experts in the Missoula area, we defined child care as follows: “Child care is all activities which constitute the care or nurturing of a child, i.e. teaching, changing, exercising, cleaning, feeding (but not meal preparation), entertaining, transporting, nursing, coaching, disciplining, playing with, holding, monitoring, or any other activity with the purpose of enhancing the child's life or fulfilling the child's needs.”

<sup>4</sup> See Bound, Jaeger and Baker (1995) for a discussion of problems caused by weak instruments.

<sup>5</sup> Hausman tests are unable to reject the null hypothesis of exogeneity leading to the conclusion that two-stage least squares is necessary for this estimation.

<sup>6</sup> Using the amount of care provided by the mother instead of mother's hours of child care as described in Dalenberg, et al. (2004) yielded similar results to those reported here.

Table 1:

<b>Explanatory Variable</b>	<b>Structural Model for Child Care Time and Work Hours</b>	
	<i>Dependent Variable: Mother's Child Care Hours</i>	<i>Dependent Variable: Mother's Work Hours</i>
<i>Constant</i>	3.56 (3.95)	28.86 (2.22)
<i>Work hours/ Child care hours</i>	-0.10 (-13.04)	-4.34 (-6.33)
<i>Importance</i>	-0.00 (-0.08)	
<i>Quality</i>	-0.04 (-0.67)	
<i>Kids</i>	-0.00 (-0.15)	
<i>Social</i>	-0.05 (-1.22)	
<i>Bother</i>	-0.03 (-1.13)	
<i>Family</i>	0.18 (2.11)	
<i>Married</i>		-10.39 (-1.94)
<i>Nonwage</i>		-0.22 (-1.59)
<i>Income</i>		0.62 (0.88)
<i>Likework</i>		0.02 (0.04)
<i>Class</i>		0.01 (0.02)
<i>Parents</i>		0.59 (0.84)
<i>Education</i>	0.20 (3.27)	1.42 (1.94)
<i>kids01</i>	2.70 (4.85)	-8.90 (-2.21)
<i>kids25</i>	0.70 (2.56)	-3.97 (-1.76)
<i>kids610</i>	-0.10 (-0.56)	-1.00 (-0.48)
<i>kids1115</i>	-0.36 (-1.95)	0.22 (0.08)
<i>kids16p</i>	-1.27 (-4.78)	-2.75 (-0.65)
$\hat{\sigma}_\varepsilon$	4.46	199.32
$R^2$	0.42	0.30
<i>F-Stat</i>	20.08	11.86
<i>Obs</i>	371	371