

**Right Place, Right Time:  
Parents' Employment Schedules and the  
Allocation of Time to Children**

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**Abstract**

We investigate the role of work schedules in parental allocation of time to children. In our model of childcare production, not only total inputs matter but also their timing. In contrast to standard unitary and bargaining models, our model shows that the response of a parent's childcare time to an increase in their spouse's market work depends on the extent of overlap in parents' schedules. An empirical specification nesting both standard and timing sensitive models favors the timing-sensitive model for care of young children in dual full time working families. The results underscore the value of schedule overlaps in increasing parental childcare time, and particularly that of fathers.

JEL Classification: D01, D13, J13, J16, J22, Z13

## 1. Introduction and Motivation

Parental time devoted to caring for children has been linked to a variety of desirable child outcomes such as better educational attainment, fewer behavioral problems and better health (Datcher-Laury 1988, Amato and Rivera 1999, Gordon, Kaestner and Korenman 2006). As a result, academics and policy makers have devoted much attention to how parental time with children has been affected by the tremendous increase in female labor force participation over the past decades<sup>1</sup>.

In this paper we investigate how parental allocation of time to children responds to work schedules. It has been suggested that work schedules are an important way for parents to increase overall parental time with children (Venn 2003). Presser (1994) and Brayfield (1995) found that the degree of schedule non-overlap specifically is associated with greater participation of men in housework and childcare, respectively<sup>2</sup>. Work schedules become important for families simply by virtue of the fact that daycare, as its name suggests, is usually not available outside regular business hours<sup>3</sup>. Also, daycare has been associated with such negative outcomes for kids as increased infection rates (Kaestner and Korenman 2006) and is characterized by imperfect information on quality. Meanwhile, flexible schedules, i.e. employee's ability to set their starting work times, are

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<sup>1</sup> US labor force participation of married mothers has more than doubled since the 1960s, reaching 70 percent by 1995 and staying constant since (Cohany and Sock 2007)

<sup>2</sup> Families have already been shown to synchronize their work schedules in order to synchronize leisure (Hallberg 2003 and Hamermesh 2002)

<sup>3</sup> Most daycare centers, for example, close by 6pm ([www.masskids.org](http://www.masskids.org))

becoming more prevalent. In the US, the percent of workers with flexible schedules has more than doubled since the 1980s, to almost 30% in 2001<sup>4</sup>.

The current study contributes to the literature by formalizing the mechanism through which work schedule overlaps affect childcare time, and controlling in a new way for the unobserved household heterogeneity in empirical analyses of these effects. We develop a model where schedules become important because childcare production is assumed to have a timing-sensitive component. Specifically, care for young children is modeled as having an enjoyment component documented by Hallberg and Klevmarken (2001), and a timing-sensitive maintenance component such as feeding, changing diapers and general supervision—needs that are constant or arise at regular intervals, and that cannot be easily substituted across different parts in a day. One cannot, for example, supervise a toddler twice as hard during the morning and not at all during the afternoon. This feature of childcare, combined with its strong investment/enjoyment components, has been noted as a major reason that childcare responds to economic incentives differently from housework and leisure (Kimmel and Connely 2007).

Taking into account the imperfect substitutability of a parent's inputs across different moments in a day changes the testable implications for the overall substitutability across parents. In the timing-sensitive model, the increased labor force participation of the wife may cause an increase, a decrease, or no change in the husband's childcare time, depending on the effect it has on the family schedule configuration.

The timing-sensitive model provides a testable implication that distinguishes it from the standard (unitary or bargaining) models (Becker 1965, McElroy and Horney 1981, Browning and Chiappori 1998, Lundberg and Pollak 1993). In the standard models,

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<sup>4</sup> "[Workers on Flexible and Shift Schedules in 2001](#)," USDL news release 02–225.

there are diminishing returns to total childcare in a given day and parents are substitutes in its provision. More time at home by one spouse increases his or her childcare input and decreases not only his or her marginal productivity but also that of the other spouse. Thus the longer one spouse is at home, the less childcare should the other spouse do. By contrast, since in the timing-sensitive model childcare inputs are not perfectly substitutable across different parts of a day, longer time at home by one spouse decreases his or her marginal productivity (or utility) of childcare, but does not diminish the quantity of maintenance childcare to be provided in the remainder of the day. Combined with difficulty of outsourcing childcare outside regular business hours this implies that all else equal, longer time alone by one spouse results in higher relative productivity and childcare input of the other spouse. This provides a test of the timing-sensitive model against standard models.

We estimate the comparative statics proposed by the model as demand equations for each parent's childcare time conditional on the parents' work schedule configuration (time "home alone" and the length of non-work time overlap). The data used is the 1992 Australian Time Use Survey, which reports time use of both spouses. Identification relies on the Fixed Effects strategy across the two weekdays. The remaining unobserved heterogeneity is expected to cause us to underestimate, rather than overestimate, the empirical differences between the two model types.

Our empirical analysis offers strong support for our proposed model for childcare among couples with young children where both spouses work full time. In these families, husbands' childcare time during the time together increases with the length of time their spouse spends at home alone. Since the predictions of the model rely on the pleasure and timing sensitivity aspects of childcare, housework provides a useful specification check.

It lacks the enjoyment component of childcare<sup>5</sup>, is less timing-sensitive, and is much easier to outsource outside regular business hours using household appliances. Consistent with this, for housework our empirical analysis favors the standard model: husbands' inputs during the "time together" decrease as the wife's time "home alone" increases. We interpret these results as evidence of spouses' substitutability both in housework and in childcare, where only childcare is a timing-sensitive household production activity and has a direct consumption (utility) component. We also consider the implications of our findings for the role of work schedules in parental allocation of time.

In Section 2 we review the standard unitary model, develop a timing-sensitive model of allocation of time to work, leisure and childcare, and provide a testable implication that distinguishes the two models. Section 3 provides data overview. In Section 4 we outline the empirical specification motivated by the theory, as well as the identification method. Section 5 discusses the results and Section 6 concludes.

## **2. Allocation of Time to Work, Leisure and Childcare**

The aim of this section is to highlight the differences in testable implications from the standard models of household production and a model that captures the importance of timing of childcare inputs over the course of the day. Both models take a gender-neutral view on time allocation. Non-work time takes central role in our model. This approach is in line with empirical evidence (Lundberg & Dickens 1993, Altonji & Paxson 1987) of rigidity in labor demand, and motivates the treatment of childcare investments by each parent as conditional demands, following Pollak (1969). It should be noted that no

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<sup>5</sup> Hallberg and Klevmarken (2001) find that housework ranks lowest in enjoyment, while childcare ranks highest.

available data combines coverage of both spouses' time use together with a good measure of their wages. The data used in the current study allows us to test the theory using childcare demand regressions conditional on work (or non-work) time.

## 2.1 The Standard Model: Only Total Childcare Input Matters

Let  $l_h$  and  $l_w$  denote husband's and wife's leisure,  $C$  consumption, and childcare inputs consist of husband's and wife's time with children ( $t_h$  and  $t_w$ ) and market childcare time  $t_{mkt}$ . The household derives utility from consumption  $u(C)$ , child quality  $Q(t_h, t_w, t_{mkt})$  and husband's and wife's leisure  $F(l_h)$  and  $F(l_w)$ . There are diminishing returns to consumptions and leisure of each spouse:  $u_C' \geq 0$ ,  $u_C'' \leq 0$ ,  $F'_i \geq 0$ ,  $F''_i \leq 0$ ,  $i = h, w$ .

Childcare input also exhibits diminishing returns:  $Q'_{t_i} \geq 0$ ;  $Q''_{ij} \leq 0$ ,  $i = h, w, mkt$ .

$h_h$  and  $h_w$  stand for the number of work hours by each spouse, and  $p_{mkt}$  denotes the price of market childcare. The price of consumption is normalized to 1 and the household's unearned income is  $Y$ . In the version of the model with labor demand rigidities, work hours observed ( $\bar{h}_h$  and  $\bar{h}_w$ ) are the result of each spouse picking the hours that yield the utility closest to that from the unconstrained optimum. The non-work time is  $24 - \bar{h}_w = T_w$  for the wife and  $24 - \bar{h}_h = T_h$  for the husband. Husband and wife decide on optimal allocation of their non-work time towards leisure and childcare:

$$\begin{aligned} & \text{Max}_{C, t_h, t_w, t_{mkt}, l_h, l_w} U = u(C) + Q(t_h, t_w, t_{mkt}) + f_h(l_h) + f_w(l_w) \\ \text{s.t. } & C \leq Y + \bar{h}_h w_h + \bar{h}_w w_w - p_{mkt} t_{mkt}; t_w + l_w = T_w, t_h + l_h = T_h \end{aligned}$$

Comparative statics derivation is available upon request. It shows the expected result: increased non-work time of one parent increases his or her childcare input and decreases the input of the spouse. Specifically, for the husband  $\frac{\partial t_h}{\partial T_h} \geq 0$  and  $\frac{\partial t_h}{\partial T_w} \leq 0$ , while for the wife  $\frac{\partial t_w}{\partial T_w} \geq 0$  and  $\frac{\partial t_w}{\partial T_h} \leq 0$ , with strict inequalities at the interior optima. The intuition behind this result is that at the interior optimum, if the mother, for example, works more and has less non-work time, her childcare input decreases. This decreases the total amount of parental childcare and increases the marginal product of father's care. The father is expected to do more childcare the more the mother works<sup>6</sup>.

## 2.2 The Timing-Sensitive Model: Childcare Input in Each Period in a Day is Distinct

Childcare has two components: enjoyment and maintenance. Let  $j$  stand for number of regular intervals at which maintenance childcare is to be provided in a day. We assume here for simplicity that childcare is to be provided every hour, so that  $j=1 \dots 24$ .  $Q_1(\cdot) \dots Q_{24}(\cdot)$  stand for hour-specific production functions of maintenance childcare, such that  $Q_j(\cdot) > 0$ ,  $\forall j$ . Parental and market inputs into maintenance childcare in a given hour are substitutes for each other.  $t_{wj}$ ,  $t_{hj}$  and  $t_{mkt_j}$  are husband's, wife's and market childcare time in hour  $j$ . Childcare exhibits diminishing returns in each input in each period:  $Q'_{i_j} \geq 0$ ,  $Q''_{i_j} \leq 0$ ,  $i = h, w, mkt$ ;  $j = 1 \dots 24$ .  $Q''_{h_j w_j} \leq 0$ ,  $Q''_{h_j mkt_j} \leq 0$ ,  $Q''_{w_j mkt_j} \leq 0$ . Each parent also derives utilities  $U(\cdot)$ ,  $F(\cdot)$  and  $u(\cdot)$  from his or her total childcare, leisure and consumption over the course of the day.

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<sup>6</sup> The marginal product and input of market childcare increase as well.

As in the standard timing-insensitive model, diminishing returns are present for each of these components:  $u'_C \geq 0$ ,  $u''_C \leq 0$ ,  $U'_i \geq 0, U''_i \leq 0$ ,  $F'_i \geq 0, F''_i \leq 0$ ,  $i = h, w$ .

The household's optimization problem is:

$$\begin{aligned}
 U &= u(C) + \overbrace{\left( \sum_{j=1}^{24} Q_j(t_{hj} + t_{wj} + t_{mkt,j}) \right)}^{\text{Maintenance childcare}} + \overbrace{U_h \left( \sum_{j=1}^{24} t_{hj} \right)}^{\text{Husband's total childcare}} + \overbrace{U_w \left( \sum_{j=1}^{24} t_{wj} \right)}^{\text{Wife's total childcare}} + \overbrace{\left( \sum_{j=1}^{24} F(l_{hj}) \right)}^{\text{Husband's leisure}} + \overbrace{\left( \sum_{j=1}^{24} F(l_{wj}) \right)}^{\text{Wife's leisure}} \\
 \text{s.t. } C &\leq Y + w_w \sum_{j=1}^{24} h_w + w_h \sum_{j=1}^{24} h_h - p_{mkt} \sum_{j=1}^{24} t_{mkt}, \quad h_j \in \{0,1\}, \quad t_j \in [0,1], \quad l_j \in [0,1] \text{ for both}
 \end{aligned}$$

husband and wife,  $h_{ij} + t_{ij} + l_{ij} = 1$ ,  $i = h, w$ ;  $\forall j$ . Also, since some maintenance childcare is to be provided in each period in a day,  $Q_j > 0, \forall j$ .

Assuming demand rigidities in the amount and timing of work hours, and supply

rigidities in timing of childcare, let  $\sum_{j:h_w=1} h_w = \bar{h}_w$  be the wife's total number of work

hours and  $\sum_{j:h_h=1} h_h = \bar{h}_h$  the husband's. We can now simplify:

$$\begin{aligned}
 & \text{Max}_{C, t_{hj}, t_{wj}, t_{mkt j}, l_{hj}, l_{wj}} \\
 & \begin{array}{ccc}
 \text{Outside Childcare when} & \text{Childcare vs. leisure} & \text{Childcare vs. leisure when} \\
 \text{both parents work} & \text{when wife is home alone} & \text{husband is home alone} \\
 \hline
 \underbrace{\sum_{j:h_w=1, h_h=1} Q(t_{mkt j})}_{\text{Outside Childcare when both parents work}} + \underbrace{\sum_{j:h_w=0, h_h=1} Q(t_{wj} + t_{mkt j}) + F_w(l_{wj})}_{\text{Childcare vs. leisure when wife is home alone}} + \underbrace{\sum_{j:h_w=1, h_h=0} Q(t_{hj} + t_{mkt j}) + F_h(l_{hj})}_{\text{Childcare vs. leisure when husband is home alone}} \\
 + \underbrace{\sum_{j:h_w=0, h_h=0} Q(t_{hj} + t_{wj}) + F_h(l_{hj}) + F_w(l_{wj})}_{\text{Childcare vs. leisure when both parents are home}} + U_h \left( \sum_{j=1}^{24} t_h \right) + U_w \left( \sum_{j=1}^{24} t_w \right)
 \end{array}
 \end{aligned}$$



$$\text{s.t. } C \leq Y + w_w \bar{h}_w + w_h \bar{h}_h - p_{mkt} \sum_{j=1}^{24} t_{mkt} ; t_{i_j} \in [0,1], l_{i_j} \in [0,1],$$

$$t_{i_j} + l_{i_j} = 1, \quad i = h, w; \quad \forall j \text{ and } Q_j > 0, \forall j$$

For simplicity we use the expression “home alone” to stand for the time a given spouse is not working while the other spouse is. Also, we use “home together” to stand for the overlap in the parents’ non-work time. These terms stand for schedule overlap only, rather than for location or jointness of time use.

A family’s schedule configuration can now be characterized by the lengths of the non-overlap segments (the time each parent spends home alone) and the overlap segments (time home together)<sup>7</sup>. Let  $T_h = \sum_{\forall j: h_{hj} = 0, h_{wj} = 1} j$  be the time home alone by

the husband;  $T_w = \sum_{\forall j: h_{wj} = 0, h_{hj} = 1} j$  the time home alone by the wife and

$T_{h,w} = \sum_{\forall j: h_{wj} = 0, h_{hj} = 0} j$  be the time parents are home together. We are interested in the

allocation of time alone and time together towards leisure and childcare by each spouse.

Let  $t_h$  and  $t_w$  denote childcare time of the husband and wife, respectively, during each one’s time home alone ( $T_h$  and  $T_w$ ). Similarly let  $t_{h(h,w)}$  and  $t_{w(h,w)}$  denote childcare time of the husband and wife, respectively, during each one’s time home together ( $T_{h,w}$ ). The household’s problem can be solved for the optimal leisure and childcare time allocations for each spouse in each of the three periods (derivation

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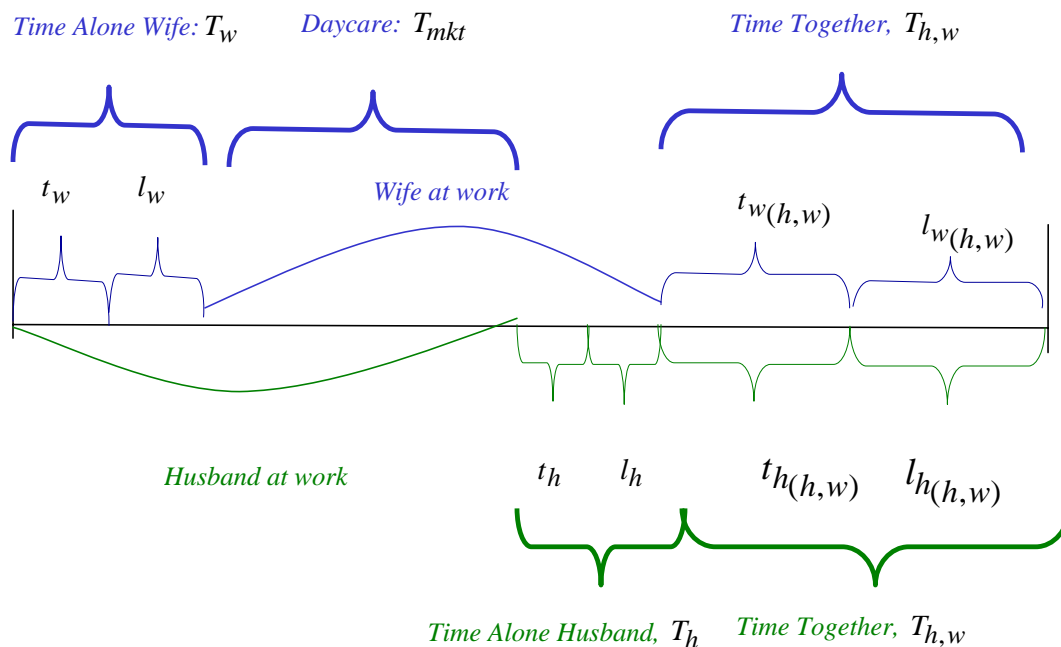
<sup>7</sup> Implications of the model rely neither on the sequence nor the number of alone and together periods, but only on their lengths.

available upon request). Let  $Q(\cdot)$  stand for the production of maintenance childcare in the time together and time alone, separately;  $F_i(\cdot)$  stand for the utility of leisure for spouse  $i$ ,  $U_i(\cdot)$  stand for the utility of total childcare for spouse  $i$ . Time in non-parental childcare is assumed to be market child care, with school included in that category. To focus on parents trading off their childcare time, we assume here that the number of work hours  $T_h$  and  $T_w$ , as well as their overlap, are exogenous, thus fully determining the time in non-parental (market) childcare,  $T_{mkt}$ . This assumption is relaxed in empirical analysis. We assume also that thanks to demand for variety (Hamermesh and Gronau 2007), diminishing returns to market work do not affect childcare time. The simplified optimization problem reads:

$$\begin{aligned}
& \text{Max} \quad t_h, t_w, t_h(h,w), t_w(h,w), l_h, l_h(h,w), l_w, l_w(h,w) \\
& U = T_h Q\left(\frac{t_h}{T_h}\right) + T_h F_h\left(\frac{l_h}{T_h}\right) + T_w Q\left(\frac{t_w}{T_w}\right) + T_w F_w\left(\frac{l_w}{T_w}\right) \\
& + T_{h,w} Q\left(\frac{t_h(h,w)}{T_{h,w}} + \frac{t_w(h,w)}{T_{h,w}}\right) + T_{h,w} F_h\left(\frac{l_h(h,w)}{T_{h,w}}\right) + T_{h,w} F_w\left(\frac{l_w(h,w)}{T_{h,w}}\right) + \\
& + U_h(t_h + t_h(h,w)) + U_w(t_w + t_w(h,w)) + T_{mkt} Q\left(\frac{t_{mkt}}{T_{mkt}}\right); \\
& \text{s.t.} \quad \begin{aligned}
& t_h + l_h \leq T_h \\
& t_w + l_w \leq T_w \\
& t_h(h,w) + l_h(h,w) \leq T_{h,w} \\
& t_w(h,w) + l_w(h,w) \leq T_{h,w}
\end{aligned}
\end{aligned}$$

where  $\frac{t_h}{T_h}$  is the proportion of home alone time that the husband spends in childcare and the rest of the fraction terms can be interpreted similarly. Because we are concentrating here on the tradeoff between parental time allocations, we assume that childcare market intensity or quality  $T_{mkt} Q\left(\frac{t_{mkt}}{T_{mkt}}\right)$  is taken as given. An example of a schedule configuration for a household is depicted in Figure 1.

**Figure 1: An example of a family's schedule configuration**



Changes in hours worked do not necessarily imply changes in timing configurations, and timing configurations may vary given the same number of hours worked. As mentioned previously, while schedules and daycare amount and quality are assumed to be exogenous in this model, we relax that assumption in our empirical analysis.

### 2.3 Implications of the Timing-Sensitive Model

The solution consists of the childcare vs. leisure time allocations during the time alone and time together by each spouse, as functions of the lengths of own time alone, spouse's time alone and time together. The husband's optimal childcare and leisure during his time alone are  $t^*_h(T_h, T_w, T_{h,w})$ ,  $l^*_h(T_h, T_w, T_{h,w})$ , and analogously for the wife. The husband's optimal childcare and leisure time during the time together are  $t^*_{h(h,w)}(T_h, T_w, T_{h,w})$ ,  $l^*_{h(h,w)}(T_h, T_w, T_{h,w})$ . Diminishing returns in total childcare

over the course of the day introduce interdependence between one's childcare inputs across time. Substitutability in maintenance childcare between parents during their time home together introduces interdependence between parents' time inputs. Together, these produce cross-dependences across parents' behavior in each of the segments. Figure 2 compares the predictions of the standard and the timing-sensitive models. Testable implications that distinguish the two models are highlighted.

**Figure 2: Standard vs. Timing-Sensitive Model: Comparison of Predictions**

	Standard model	Timing-sensitive model				
	<i>1</i> <i>Change in total own childcare time</i>	<i>2</i> <i>Change in total own childcare time</i>		<i>3</i> <i>Change in own childcare during joint non-work time</i>		<i>4</i> <i>Change in own childcare during alone non-work time</i>
<i>When own non-work time increases</i>	+	<i>When own time alone increases</i>	+	<i>When own time alone increases</i>	-	+
		<i>When time together increases</i>	+ or -	<i>When time together increases</i>	+ or -	+ or -
<i>When partner's non-work time increases</i>	-	<i>When partner's time alone increases</i>	+	<i>When partner's time alone increases</i>	+	-

Propositions 1-3 provide the timing-sensitive model's basic implications, with proposition 3 explaining the testable implication and the difference in implications regarding effects of wife's increased work hours on husband's childcare. Proposition 4 addresses the intuition of the model on the effect of schedule staggering on parental childcare time. Complete set of comparative statics is available upon request.

**Proposition 1:** *All else equal, the longer spouse  $i$ 's period of time alone or together, the greater his or her childcare input during that period at the interior optimum:*

$$\frac{\partial \alpha_i}{\partial T_i} \geq 0, \frac{\partial \alpha_{i(i,j)}}{\partial T_{i,j}} \geq 0. \text{ This is a trivial result due to the assumption of childcare time being a}$$

normal good with respect to the time budget constraint.

**Proposition 2:** *All else equal, the longer spouse  $i$ 's time home alone, the less childcare does spouse  $j$  do during his or her home alone time, at the interior optimum:  $\frac{\partial \alpha_i}{\partial T_j} \leq 0$ .*

This result is similar to that from the standard model. It arises because each parent's total childcare enters into the household utility function, and can be traded for utility from another parent's total childcare.

**Proposition 3:** *The change in spouse  $i$ 's childcare time while together with the spouse in response to an increase in spouse  $j$ 's time home alone can be used to empirically distinguish the timing-sensitive model from the standard model. Specifically, all else equal, the husband is expected to do less childcare if the wife's increased market work results in her decreased time home alone, ceteris paribus. Thus the predicted change is*

*negative according to the standard model, and positive according to the timing-sensitive model.*

In the standard timing-insensitive model only total non-work time matters, and there is no distinction in non-work time by schedule overlap with spouse. The general result is that longer non-work time by one spouse decreases childcare input by the other spouse. Intuitively, longer non-work time by one spouse results in greater childcare input by that spouse, which decreases the marginal productivity of the other spouse if, as is the case in the timing-insensitive model, output depends on total rather than timing-specific

childcare inputs. Thus  $\frac{\partial i(i,j)}{\partial T_j} \leq 0$ .

By contrast, in the timing-sensitive model the output of the maintenance component of childcare depends on the timing-specific inputs, and these cannot easily substitute for each other across time. Longer time available for childcare during one's time alone increases one's childcare input and lowers one's productivity relative to one's spouse in the ensuing childcare tasks. However, it does not diminish the quantity of maintenance childcare that remains to be provided. Thus the longer one's time home alone, the higher one's spouse's relative productivity and childcare input during the time

together:  $\frac{\partial i(i,j)}{\partial T_j} \geq 0$ . This implies, counter to the intuition of the standard model, that the

husband may do less childcare if as a result of wife's higher labor force participation, her time alone decreases, *ceteris paribus*. This prediction provides a test for the timing-sensitive model against the timing-insensitive model. It also tests the combination of diminishing returns to childcare and parents' substitutability for each other.

**Proposition 4:** *The effect of an additional hour of work on daily childcare depends on its effect on schedule overlap, i.e. whether this additional work comes at the expense of time alone or time together.*

As Figure 2 shows, keeping time together and time alone by one spouse constant, greater time alone by the other spouse results in greater total daily childcare time both spouses. By contrast, the effect of longer time together on childcare time of each spouse depends on relative marginal utilities of leisure and childcare. Therefore, an additional hour of work by one spouse at the expense of their time home alone will result in less total daily childcare by each spouse. By contrast, if the additional hour of work comes at the expense of time together, its effect on total daily childcare by each spouse is uncertain. This implies that in an attempt to protect time with children, parents in an average family are likely to increase their schedule non-overlap if they increase either parent's amount of market work. Indeed, schedule staggering among parents of young children has been on the rise (Presser 1994, 2005)

### **3. The Data: 1992 Australian Time Use Survey**

A test of the key implications of the model requires data on timing of work and all childcare activities for both parents over the course of the day. We use the 1992 wave of the Australian Time Use Survey, which unlike any recent US and most international data, satisfies this requirement. To relate our analysis to the studies focused on the US, we note that the two countries have undergone similar demographic trends in fertility, marriage rates and female labor force participation (Brusentsev 2002, Preston 1986). Work schedules also appear relatively similar, with the propensity to work non-standard hours more similar than for US compared with, for example, Northern Europe (Burda, Hamermesh and Weil 2007).



The 1992 wave of the survey provides completed interviews with 6,879 people (3,013 households). The full response rate was 69%. Each respondent completed a detailed questionnaire on labor market hours, income and demographic characteristics as well as two time diaries about one's flow of activities over two 24-hour periods.

Because our focus is on work schedules, we restrict the sample to families where both spouses work. The sample consists of two types of families—those where husband works full time and wife works full time (FT/FT) and those where husband works full time and wife works part time (PT/FT). The survey days are same for the two spouses, and we use only weekday respondents as only a small subset of parents of young children is observed working on weekends.

Limiting the sample to dual parent (married or defacto married) families with at least one child between 0 and 9 years of age, where both spouses were interviewed on two weekdays, and where the wife is employed at least part time, yielded 299 households. For the empirical analysis presented, our definition of childcare includes all primary childcare activities. The major components are physical care, teaching, playing, minding children, conversations, computing and transportation related to caring for children<sup>8</sup>. Recent literature underscores the importance of not only primary but also secondary activities in studies of childcare, as well as time spent in presence of children (Folbre et al, 2006). These results are available upon request. Housework time, used in our analysis as a specification check, includes all cooking and cleaning activities, as well as fixing up, management of finances and home improvement<sup>9</sup>. Work time is defined as time in primary job, secondary job and school/training time.

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<sup>8</sup> Childcare activity codes are 200-290.

<sup>9</sup> Housework activity codes are 100-190.

There is considerable variation in the sample across the two survey days in the number of hours devoted to market work, childcare and housework. For example, in dual full time employed couples, 80% of husbands vary their childcare time across the two days, with mean difference of 1.12 hrs. The corresponding numbers for wives are 93% and 1 hr. For housework, the values are 77% and 0.92 hr for husbands and 98% and 1.32 hrs for wives. For labor market hours, the values are 89% and 2.12 hrs for husbands and 63% and 2.5 hrs for wives<sup>10</sup>.

Table 1

Descriptive statistics of the socioeconomic characteristics in our sample of married dual employed parents with at least one child under 9 years old are presented in Table 1. Families with full time employed wives are considered separately from those with part time employed wives. The average age of men is 36.1 years, while that of women is 33.8 years. Families where wives are employed full time have fewer children than those where wives are employed part time—1.75 children on average vs. 2.13. Full time employed women usually work 6 fewer hours per week than full time employed men (42.5 hrs /wk vs.48.4 hrs/wk). On an average survey day, the difference is 5.6 hrs for women compared with 9.3 hrs for men. 20 percent of full time employed women have Bachelors degree or higher, which is similar to the proportion for full time employed men, but considerably higher than 14% among part time employed women.

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<sup>10</sup> Sleep is excluded from either “time together” or “time alone”, as it has a large exogenous component. This is consistent with Kimmel and Connely (2007), who note its physical needs aspect. Because majority of non-work time at home spent eating is spent in the company of children but not identified as childcare, we omit it from analysis as well. Substantive results are robust to different specifications.

## Table 2

Table 2 presents statistics on the time devoted to housework, childcare and leisure. In our sample of families with at least one child under 9 years old, 94% of full time employed women and 76% of their husbands engage in childcare on an average survey day. The difference by gender is higher in families where women work part time. Participation in housework differs little across families with part time vs. full time employed wives, with about 99% wives and 77% of husbands participating.

Consistent with Bianchi et al. (2000, 2005, 2006), there is little difference in daily childcare among full and part time employed women (2.6 hrs vs. 2.9 hrs), while the difference in housework and leisure is above an hour per day. Husbands of full time employed wives do slightly more childcare than those of part time employed wives (1 hr vs. 0.8 hr), and less housework (0.9 hr vs. 1.1 hr). Thus compared with PT/FT families, FT/FT families outsource housework and keep total parental childcare close to the same. Also, husbands' and wives' time use is more similar in FT/FT couples.

Husbands of full time employed wives have somewhat less daily leisure (3.2 hrs vs. 3.6 hrs), which corresponds to the difference of similar magnitude in work hours in Table 1: 9.2 hrs for husbands of full time employed wives vs. 8.9 hrs for husbands of part time employed wives.

## Table 3

Table 3 presents summary statistics for the variables used in our empirical analysis. Average couple's non-work awake time overlaps for about 5 hrs in families with part time employed wives and 4 hrs in families with full time employed wives. Average husband spends 2 hrs not working on the market while the wife is working, and average full time (part time) employed wife spends 5.7 hrs (7.6 hrs) not working on the market while the husband is working. Wives, whose time home alone is longer, spend

proportionately more of it in childcare: part time and full time employed wives both spend about 1.8 hrs, or 25% and 29%, respectively. This is again consistent with previous findings of employed mothers squeezing other time uses in order to protect childcare, e.g. Bianchi et al. (2005, 2006).

Leisure is lower for full time employed wives than their part time employed counterparts; full time employed women spend less time in leisure than their husbands when they are at home together, but more time during their (longer) time at home while the husband is at work.

#### 4. Empirical Specification and Identification

Figure 2, column 3 shows that the comparative statics for our proposed timing-sensitive model imply changes in childcare while alone  $t_i$  and while together  $t_{i(i,j)}$  with the lengths of own time home alone  $T_i$ , spouse's time alone  $T_j$  and time together  $T_{i,j}$ . Our empirical analysis estimates these comparative statics.

We are particularly interested in identifying the effect of changes in time alone and time together on each parent's childcare time during the time together. This is the key result (Figure 2, Column 3) that distinguishes the timing sensitive model from standard models (Figure 2, Column 1). Accordingly, our key estimating equation for husbands (1) and wives (2) are:

$$t_{h(h,w)} = \delta_0 + \delta_1 T_h + \delta_2 T_w + \delta_3 T_{h,w} + \delta_4 X + \delta_5 \eta_h + v_h \quad (1)$$

$$t_{w(h,w)} = \lambda_0 + \lambda_1 T_h + \lambda_2 T_w + \lambda_3 T_{h,w} + \lambda_4 X + \lambda_5 \eta_w + v_w \quad (2)$$

where  $X$  are the fixed personal and household characteristics,  $\eta_h$  and  $\eta_w$  are the unobserved own and spouse's characteristics fixed across the different survey weekdays, and  $\varepsilon_h, \varepsilon_w, v_h$  and  $v_h$  are residuals uncorrelated with  $\eta_i$ . According to the timing-sensitive model  $\delta_2 \geq 0$  in (1) and  $\lambda_1 \geq 0$  in (2), since one's childcare time during the joint non-work time should increase with time alone by one's spouse. According to the standard model, these coefficients should be non-positive: one's childcare time should generally decrease as one's spouse spends more time not working.

Housework provides an interesting specification check. While childcare is expected to follow the timing-sensitive model, housework is expected to follow the standard model since it lacks the timing-sensitive component and also can be more easily outsourced outside business hours using appliances. We therefore estimate all comparative statics in Figure 2 not only for childcare but also for housework. Substituting housework for childcare in equations (1) and (2) above, we expect, in line with the standard model, that  $\delta_2 \leq 0$  in (1) and  $\lambda_1 \leq 0$  in (2): one's housework time should generally decrease as one's spouse spends more time not working.

Figure 2, column 2 shows that differences between the timing-sensitive and standard models in childcare (or housework) behavior during the time together translate into differences in *total* childcare time. Estimating the comparative statics for total daily childcare and housework involves replacing dependent variables above with each spouse's total childcare and housework.

OLS estimates are likely to be biased since the family and individual level unobservables affect both schedules and childcare time. To account for this unobserved household level heterogeneity we use Fixed Effects, taking advantage of the fact that spouses' time use is observed on two days of the week. Each equation is estimated

separately. Our Fixed Effects estimates can be interpreted as causal to the extent that the schedule differences across two days in a week are exogenous with respect to desired childcare time allocation. Differences between the OLS and FE estimates are considered in the Results section. It should also be noted that since standard and timing-sensitive models predict opposite directions of change, any unobserved heterogeneity that remains after controlling for Fixed Effects is expected to cause us to underestimate, rather than overestimate, the empirical differences between the two model types.

## **5. Results and Discussion**

Our empirical analysis first tests the timing-sensitive vs. standard model and checks for parental substitutability for each other. We then consider what the estimates imply about the way schedules affect parental childcare time.

### **5.1 Standard vs. Timing-Sensitive Model**

According to the comparative statics in Section 2, what determines the preferred model is parents' behavior during their time home together in response to changes in the lengths of time home alone. The key estimates are whether an increase in length of time one is home alone causes a decrease in one's childcare when parents are home together, and an increase in the childcare by the other spouse during time home together. This would lend support to childcare inputs not being easily substitutable across different parts of a day, and to the timing sensitive model.

As Figure 2, Columns 2 and 3 show, differences in predicted responsiveness across the two models during the time together translate into differences in total childcare time changes. The corresponding results are presented in Tables 4 and 5 while Table 6 presents the results of *totals* regressions most comparable with existing literature. Table 7

reports results for childcare and housework by each spouse during their time at home alone.

Each table presents Fixed Effects (columns 1-4) and OLS (columns 5-8) estimates for childcare and housework of each spouse as determined by the relevant explanatory variables. While Fixed Effects specification prevents from estimating the effects of variables that are constant during the survey week (income, education, age, number of children), we are able to estimate the effect of number of work hours and work schedule configuration. Because of limited sample size, we pool families with full and part time working wives, and control for wife's labor force participation status using the interaction of full time indicator with the variables of interest. Separate analyses by wife's employment status provide very similar results to those presented and are available upon request.

Empirical analysis suggests three important dimensions of comparison: husbands vs. wives, PT/FT vs. dual full time employed families (FT/FT), and childcare vs. housework.

### *5.1.1 Time allocations by husbands*

Table 4 addresses the testable implication of the model—behavior during time together. We see that husbands of full time employed wives behave according to the timing-sensitive model (Figure 2, col. 3), while those of part time employed wives behave according to the standard model (Figure 2, col. 1). Specifically, husbands of full time employed wives increase their childcare during time together with wife's greater time alone ( $0.161 - 0.029 = 0.132$  hr,  $p = 0.0068$ ) while this effect is not present for husbands in part time employed wives. (Effect of husband's time alone in FT/FT families is not statistically different from zero,  $p = 0.7588$ ). In addition, in FT/FT families, husbands'

childcare time during time together increases with time together at a higher rate ( $0.263+0.085=0.348\text{hr}$ ,  $p=0.0000$  vs.  $0.085$  hr).

Table 5 shows that differences in behavior during time together translate into differences in total daily childcare responsiveness. Consistent with the timing-sensitive model, husbands of full time employed wives increase their daily childcare both with own time alone ( $0.158-0.005=0.153$ ,  $p=0.0712$ ) and the wife's time alone ( $0.195-0.065=0.130$  hr,  $p=0.0167$ ), as well as the time together ( $0.308+0.019=0.327$  hr,  $p=0.0000$ ). Husbands of part time employed wives increase their childcare during the time together only with time together ( $0.085$  hr in Table 4), and decrease it with the wife's time alone ( $-0.029$  hr in Table 4), consistent with the standard model. Wife's time alone has no effect on husbands of part time employed wives while it has an effect on husbands of full time employed wives. This is consistent with the timing-sensitive model for FT/FT couples and the standard model for PT/FT couples.

Keeping in mind the relationships between time together, time alone and each spouse's work hours (husband's non-work time = own time home alone + time together, wife's non-work time = wife's time home alone + time together, and husband's (wife's) work time = wife's (husband's) time home alone + market childcare time), how does total childcare time respond to total work hours by each spouse? Results can be found in Table 6. Consistent with Table 5, in dual full time employed families husbands' childcare time actually decreases with work hours of the wife, in line with the timing-sensitive model. In the view of this model this effect is driven by complementarity between the two parents' daily childcare that arises because of the combination of diminishing returns to childcare and parents being substitutes for each other during the time together. Again, what drives the result in FT/FT families is the behavior during the time together: in that



segment, the husband increases rather than decreases his childcare with greater time alone by the wife, and increases it by more as time together increases.

As discussed earlier, housework is crucially different from childcare in its ability to be outsourced, a pattern we have already observed in Table 3. It also lacks enjoyment and the same degree of sensitivity to timing. Consistent with this, we see that in dual full time families, housework by husbands during time together (Table 4) doesn't respond to the length of time together ( $-0.198+0.167=0.031$  hr,  $p=0.5801$ ) and, consistent with the standard model, decreases with the time home alone by the wife ( $-0.132+0.036=-0.096$  hr,  $p=0.0379$ ). This translates in expected ways into total daily childcare as function of schedules (Table 5) and as function of total work hours (Table 6). Husbands' housework in FT/FT families increases with their time home alone, and doesn't respond to the length of time together ( $-0.136+0.101=-0.035$  hr,  $p=0.5839$ ), overall consistent with standard model. Their daily housework also decreases with own work hours and increases with those of the wife, consistent with the interior solution to the standard model.

Interestingly, it appears that housework increases more with time alone, while childcare increases more with time together. Jointness in provision of childcare is consistent with its enjoyment component and has been documented by Hallberg and Klevmarken (2001).

In PT/FT families, husbands' total housework does increase with time together, consistent with it being outsourced less in these families. It does not respond to the wife's time alone ( $0.101$ hr,  $SE=0.042$  in Table 5), which suggests limited substitutability between the two spouses in housework in these families. Looking at total housework as a function of schedules (Table 5) and total housework as a function of total work hours (Table 6) it appears that their housework increases only with own non-work time—while wife's availability (wife's time alone in Table 5 and wife's work hours in Table 6) have no effect. This is most consistent with an identity based explanation for spouses' behavior

in PT/FT families (Akerlof and Kranton 2000; Fernandez and Sevilla-Sanz 2006), whereby identity places constraints on parental substitutability for each other assumed by both the standard and the timing-sensitive models. It is not consistent with either interior or corner solution to either model, as interior solution implies sensitivity to both own and spouse's work hours, corner solution implies sensitivity to neither, and we observe sensitivity to own work hours but not those of the spouse.

Comparing OLS with Fixed Effects, it appears that in OLS cross-sectional correlations conceal the within-household tradeoffs. For childcare, the OLS results for husbands of full time employed wives appear biased upwards: the fact that husbands of full time employed wives do more childcare on average than husbands of part time employed wives conceals that their childcare in a given day decreases with the work hours of their wives. For housework, OLS results for husbands of full time employed wives appear biased downwards due to negative cross-sectional correlation of housework with dual full time status (outsourcing of housework).

### *5.1.2 Time allocations by wives*

As documented in previous literature (Bianchi et al, 2000, 2005, 2006) mothers have been successful at protecting their childcare time investments from effects of their increased labor force participation. Table 3 shows that this is done via outsourcing of housework and a decrease in leisure. Given this trend, we do not expect symmetry in fathers' and mothers' behavior, even though sample averages suggest that the decrease in mothers' childcare in FT/FT vs. PT/FT sample is made up by the corresponding increase by their husbands. Indeed, we see from Table 3 that proportion of time together devoted to childcare by husbands in FT/FT families is higher than that for husbands in PT/FT families (14% vs. 10%), while that for mothers is not lower, but constant at 18%.

What we observe is consistent with this expectation. Wives' childcare during time together with their spouses responds only to the length of time together. Wives do not appear to match their husbands' childcare done while home alone. This is not surprising given that husbands' average time alone in the FT/FT sample is 3 hours lower than wives', and their childcare time during time alone is 0.4 hr vs. 1.8 hr for wives—so that women have a lot less of husbands' childcare during time alone to match during time together. As is the case of husbands' housework in PT/FT families, wives' childcare behavior is most consistent with the identity placing constraints on parental substitutability for each other. This conclusion holds for both part time and full time employed wives.

There are no differences in responses of part time and full time employed wives, except for diminishing returns to housework for full time employed wives in Table 4. Results for wives' housework are consistent with the standard model for wives in both FT/FT and PT/FT households. Wives' housework during time together (Table 4) increases with length of time together (0.214 hr) in PT/FT households and stays constant ( $-0.198+0.214=0.016$  hr,  $p=0.7607$ ) in FT/FT households, consistent with outsourcing of housework in FT/FT families. For full time employed wives, housework during time together decreases with length of time alone ( $-0.117-0.019=-0.136$ ,  $p=0.0086$ ), consistent with diminishing returns. Also, housework by part time employed wives appears to respond to time home alone by husbands ( $-0.073$ ,  $p=0.12$ ). No such responsiveness is apparent for full time employed wives. Consistent with this, the decrease in wives' *total* housework in response to the increase in the husband's time alone is negative and statistically significant for part time employed wives in Table 5 ( $-0.202$  hr) but not full time employed wives ( $0.07-0.202=-0.132$  hr,  $p=0.3707$ ). Wives' total housework decreases with own work hours and increases with those of the spouse (Table 6),

regardless of employment status. Overall it therefore appears that housework follows the standard model for both part time and full time employed wives.

Table 7 presents results for each spouse's childcare and housework during their time alone. Increase in the length of this segment increases both childcare and housework for each spouse. Diminishing returns are apparent for husbands (negative effect of time together) but not for wives.

Figure 3 presents the summary of which model best explains husbands' and wives' behavior with respect to childcare and housework. Childcare in dual full time working families (the shaded cells) is where we expect the timing-sensitive model to be applicable. Unlike housework, childcare has strong timing-sensitive and enjoyment components—the two important drivers of the timing-sensitive model. Also, supply of market childcare outside business hours is restricted, making it difficult to outsource, while household appliances enable outsourcing of many housework tasks. Compared with families where wives work part time, dual full time working families are more likely to behave according to the timing-sensitive model since substitutability between the husband and wife in market work as well as household production is higher in these families, and timing-sensitive model applies best to couples where substitutability between the spouses is high. It should be noted that the dual full-time working families with young children are a large and growing subset of the population. In the US currently, in close to 40% of American dual parent families with children under 6 mothers are employed full time (Bianchi and Write 2006).

We observe the expected result only for husbands, and not for their wives. While husbands increase their childcare time during the time together with their wives as their wives spend more time home alone, the wives do not behave symmetrically. This is not

surprising given the starting asymmetry in levels of childcare time devoted by women compared to men.

**Figure 3: Which models best explain the data**

<b>Husband works FT, wife works FT (FT/FT families)</b>		
	<i>Childcare</i>	<i>Housework</i>
Husbands	Respond to own and wives' availability according to <i>timing-sensitive</i> model	Respond to own but not wives' availability, consistent with <i>identity</i> rather than comparative advantage determining behavior
Wives	Respond to own but not husbands' availability, consistent with <i>identity</i> rather than comparative advantage determining behavior	Respond to own and husbands' availability according to <i>standard</i> model

<b>Husband works FT, wife works PT (PT/FT families)</b>		
	<i>Childcare</i>	<i>Housework</i>
Husbands	Respond to wives' availability according to <i>standard</i> model	Respond to own but not wives' availability, consistent with <i>identity</i> model
Wives	Respond to own but not husbands' availability, consistent with <i>identity</i> and not comparative advantage determining behavior	Respond to own and husbands' availability according to <i>standard</i> model

## 5.2 Schedule overlaps and parental time devoted to childcare

According to Figure 2 and Proposition 4, an additional hour of work by one spouse at the expense of their time home alone will result in less total daily childcare by each spouse. By contrast, if the additional hour of work comes at the expense of time together, its effect on total daily childcare by each spouse is ambiguous, and depends on

relative marginal utilities of childcare and leisure. This implies that if a household wishes to increase market work hours for a given spouse, one unambiguous way to maximize parental childcare time is to keep time alone by each parent constant while decreasing joint non-work time. This implies lower schedule overlap, as commonly defined in the literature (e.g. Presser 1994). Indeed, schedule staggering among parents of young children has been on the rise (Presser 1994, 2005).

However, while schedule staggering may be an important trend for some households, our data indicate that, at least for husbands, awake time home alone while the wife is at work is relatively low: 2 hrs vs. 5.7 hrs of home alone time for full time employed wives and 4.1 hrs of time together in dual full time working households. Estimates in Table 5 show that all else equal, husband's daily childcare does increase with an additional hour at home alone (by 0.16 hr), but it increases by twice as much with each additional hour home together with the spouse (0.31 hr). This suggests the importance of family time for husbands' childcare time allocations, and is consistent with the importance of jointness in provision of childcare. For leisure, importance of jointness and spouses' active schedule coordination has already been documented by Hamermesh 2002 and Hallberg 2003. Interestingly, for women an additional hour of non-work time has similar effect on childcare time regardless of whether it is time home alone or home together with the spouse. This is in again in line with the strong role of identity in mothers' allocation of time to childcare.

## **6. Conclusion**

With notable exceptions of leisure coordination (Hamermesh 2002, Hallberg 2003) work schedules have so far been omitted from theoretic and empirical analysis of household production in economics. We propose a model that incorporates schedules by

incorporating the timing-sensitive nature of childcare—the fact that time inputs at different moments in a day may not easily substitute for each other. Supervision, feeding or changing diapers and are all needs that are constant or arise at regular intervals so that greater past involvement does not diminish the need for future involvement. Our model focuses on parents trading off their childcare time allocations depending on the degree of their schedule overlap. We show that the effect of increased labor force participation of the wife on husband's childcare time should depend on its effect on the family schedule configuration. For example, if the increase in the wife's market work does not result in a change in the schedule configuration, the husband's childcare is expected to stay constant, while if it results in her spending less time at home alone while time together stays constant, then husband's childcare should actually decrease. This testable implication distinguishes our model from standard models.

Our empirical analysis offers strong support for our proposed model for childcare in couples with young children where both spouses work full time. In these families, husbands' childcare is strongly responsive to the timing of their wives' work. Consistent with the timing-sensitive model and counter to the standard models, all else equal, the husband will do more childcare during his time at home with the wife, the longer she is at home alone.

We observe interesting differences in parental time trade offs by full time vs. part time work status of the wife. While wives' behavior changes little with their full time vs. part time status, husbands in the two types of families respond differently. Husbands and wives are observed trading off their housework and childcare inputs to a much greater extent in families where both husband and wife work full. In families where wife works part time and husband works full time, the predominant determinant of one's household involvement is own availability, most consistent with identity-based models of behavior.

In families where both spouses work full time, childcare behavior is consistent with parental substitutability for each other in the context of the timing-sensitive model where schedules are important. Consistent with being easier to outsource outside business hours, housework follows the standard models of the household.

The evidence we find of parents in dual full-time working couples responding to schedule configurations is important given the large and steadily growing number of these families. In close to 40% of American dual parent families with children under 6 mothers are employed full time (Bianchi and Write 2006), and weekly work hours among full-time workers have been increasing (Kuhn and Lozano 2005). However, the flexible timing of these hours has risen as well, more than doubling since 1980s to reach 30% in 2001<sup>11</sup>. Whereas changes in schedules or schedule flexibility are irrelevant in the context of the standard models, our analyses show that work schedules play a role in parental childcare. While much discussion has addressed the pros and cons of daycare as an enabling force for combining work and family, our study suggests that schedule flexibility is another important potential public policy tool to help families increase parental time with children and promote work-family balance.

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<sup>11</sup> "[Workers on Flexible and Shift Schedules in 2001](#)," USDL news release 02-225.



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**Table 1: Socioeconomic Characteristics**

	<b>Wives employed Part Time, Husbands employed Full Time</b>			<b>Wives employed Full Time Husbands employed Full Time</b>		
	<b>Mean</b>	<b>SD</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>N</b>
Age husband	36.133	5.621	347	36.083	6.826	144
Age wife	33.870	5.102	347	33.854	6.299	144
Age youngest child	2.046	0.842	347	2.174	0.864	144
Number of children 0-1 y.o.	0.363	0.544	347	0.299	0.459	144
Number of children 2-4 y.o.	0.501	0.586	347	0.326	0.499	144
Number of children 5-9 y.o.	0.867	0.768	347	0.736	0.637	144
Number of children	2.135	0.884	347	1.750	0.705	144
Marital status (1 married, 2 defacto married)	1.040	0.197	347	1.035	0.184	144
Usual weekly work hours, husband	51.472	14.494	345	48.389	12.202	144
Usual weekly work hours, wife	16.294	8.271	347	42.507	8.636	144
Hrs worked on survey day, husband	8.925	4.079	347	9.281	3.659	144
Hrs worked on survey day, wife	2.612	3.275	347	5.655	4.385	144
Median weekly earnings range husband	482-673		323	482-673		131
Median weekly earnings range wife	155-230		294	385-481		119
% husbands with BA or higher	21%			21%		
% wives with BA or higher	14%			20%		

**Table 2: Time in Childcare, Housework and Leisure on Survey Day (Hrs)**

	<b>Wives employed Part Time, Husbands employed Full Time</b>			<b>Wives employed Full Time Husbands employed Full Time</b>		
	<b>Mean</b>	<b>SD</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>N</b>
% of husbands doing any childcare on survey day	67%	47%	347	76%	43%	144
% wives doing any childcare on survey day	98%	14%	347	94%	24%	144
% husbands doing any housework on survey day	77%	42%	347	76%	43%	144
% wives doing any housework on survey day	99%	11%	347	98%	14%	144
Daily childcare on survey day, husband	0.774	1.230	347	1.013	1.44641	144
Daily childcare on survey day, wife	2.886	1.993	347	2.634	2.4866	144
Daily housework on survey day, husband	1.107	1.672	347	0.932	1.15981	144
Daily housework on survey day, wife	3.549	2.212	347	2.365	1.70353	144
Daily leisure on survey day, husband	3.671	2.448	347	3.209	2.26146	144
Daily leisure on survey day, wife	4.290	2.402	347	3.248	2.24879	144

**Table 3: Model Related Variables on Survey Day (Hrs)**

	<b>Wives employed Part Time, Husbands employed Full Time</b>			<b>Wives employed Full Time Husbands employed Full Time</b>		
	<b>Mean</b>	<b>SD</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>N</b>
Time alone, husband	1.795	2.091	347	2.078	2.209	144
Time alone, wife	7.610	3.930	347	5.737	4.280	144
Time together	5.015	3.084	347	4.120	2.908	144
Childcare while alone, husband	0.270	0.782	330	0.423	0.748	139
Childcare while alone, wife	1.870	1.554	345	1.831	2.159	144
Childcare while together, husb	0.530	0.796	339	0.618	1.233	141
Childcare while together, wife	1.051	1.179	339	0.820	0.986	141
Leisure while alone, husb	0.871	1.077	330	0.902	1.115	139
Leisure while alone, wife	2.149	1.855	345	1.392	1.493	144
Leisure while together, husb	2.909	2.123	339	2.389	1.950	141
Leisure while together, wife	2.204	1.694	339	1.896	1.755	141
Housework while alone, husb	0.320	0.783	330	0.371	0.800	139
Housework while alone, wife	2.371	1.976	345	1.516	1.634	144
Housework while together, husb	0.822	1.299	339	0.586	0.868	141
Housework while together, wife	1.220	1.292	339	0.868	0.862	141
Proportion of childcare while alone to total time alone, husb	0.106	0.204	330	0.152	0.228	139
Proportion of childcare while together to total time together, husb	0.099	0.141	339	0.139	0.182	141
Proportion of childcare while alone to total time alone, wife	0.248	0.186	345	0.287	0.207	144
Proportion of childcare while together to total time together, wife	0.194	0.162	339	0.189	0.199	141
Proportion of housework while alone to total time alone, husb	0.131	0.206	330	0.149	0.226	139
Proportion of housework while together to total time together, husb	0.153	0.193	339	0.131	0.168	141
Proportion of housework while alone to total time alone, wife	0.290	0.183	345	0.260	0.190	144
Proportion of housework while together to total time together, wife	0.236	0.199	339	0.214	0.175	141

**Table 4: Response of childcare and housework during joint non-work time to changes in schedule overlap**

	FE	FE	FE	FE	OLS	OLS	OLS	OLS
	Childcare by Husband while together	Housework by Husband while together	Childcare by Wife while together	Housework by Wife while together	Childcare by Husband while together	Housework by Husband while together	Childcare by Wife while together	Housework by Wife while together
Time alone by Husband (hrs)	-0.111 (0.044)**	-0.041 (0.048)	-0.007 (0.035)	-0.073 (0.047)	0.026 (0.024)	0.113 (0.045)**	-0.019 (0.024)	0.042 (0.038)
Time alone by Wife (hrs)	-0.029 (0.033)	0.021 (0.036)	-0.05 (0.026)*	-0.019 (0.035)	-0.01 (0.012)	0.009 (0.02)	-0.006 (0.016)	0.03 (0.019)
Time together (hrs)	0.085 (0.034)**	0.167 (0.037)***	0.174 (0.027)***	0.214 (0.036)***	0.095 (0.022)***	0.206 (0.059)***	0.2 (0.030)***	0.247 (0.050)***
Time alone husband * Wife works FT	0.135 (0.088)	0.047 (0.097)	-0.038 (0.071)	-0.064 (0.094)	-0.023 (0.048)	-0.124 (0.053)**	0.015 (0.036)	-0.073 (0.048)
Time alone wife * Wife works FT	0.161 (0.059)***	-0.132 (0.064)**	0.041 (0.047)	-0.117 (0.062)*	0.006 (0.028)	-0.007 (0.031)	-0.012 (0.024)	-0.033 (0.029)
Time together * Wife works FT	0.263 (0.061)***	-0.198 (0.067)***	-0.171 (0.049)***	-0.198 (0.065)***	0.119 (0.162)	-0.065 (0.082)	-0.103 (0.055)*	-0.132 (0.072)*
Wife works FT					-0.206 (0.829)	0.311 (0.52)	0.473 (0.378)	0.734 (0.444)
Constant	-0.125 (0.335)	0.31 (0.367)	0.664 (0.269)**	0.824 (0.355)**	-5.111 (1.496)***	-0.273 (1.602)	0.912 (1.439)	-0.003 (1.796)
Observations	480	480	480	480	384	384	384	384
Number of group(famid)	297	297	297	297				
R-squared	0.29	0.16	0.36	0.31	0.32	0.27	0.57	0.3

Standard errors in parentheses. OLS standard errors clustered at household level. OLS controls are each spouse's linear and quadratic age and range of income, wife has a BA or higher, husband has a BA or higher, number of children 0-1, 2-4 and 5-9

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 5: Response of total daily childcare and housework to changes in schedule overlap**

	<b>FE</b>	<b>FE</b>	<b>FE</b>	<b>FE</b>	<b>OLS</b>	<b>OLS</b>	<b>OLS</b>	<b>OLS</b>
	Daily childcare husband	Daily housework husband	Daily childcare wife	Daily housework wife	Daily childcare husband	Daily housework husband	Daily childcare wife	Daily housework wife
Time alone by Husband (hrs)	-0.005 (0.049)	0.148 (0.054)***	0.02 (0.068)	-0.202 (0.085)**	0.256 (0.073)***	0.342 (0.074)***	0.076 (0.05)	-0.057 (0.054)
Time alone by Wife (hrs)	-0.065 (0.036)*	0.012 (0.04)	0.179 (0.050)***	0.243 (0.063)***	-0.019 (0.017)	0.008 (0.023)	0.233 (0.030)***	0.366 (0.032)***
Time together (hrs)	0.019 (0.038)	0.101 (0.042)**	0.153 (0.053)***	0.132 (0.066)**	0.082 (0.030)***	0.209 (0.070)***	0.172 (0.041)***	0.242 (0.058)***
Time alone husband * Wife works FT	0.158 (0.098)^	0.198 (0.108)*	-0.05 (0.135)	0.07 (0.17)	-0.073 (0.098)	-0.093 (0.121)	-0.085 (0.071)	0.033 (0.075)
Time alone wife * Wife works FT	0.195 (0.065)***	-0.133 (0.072)*	0.102 (0.09)	-0.065 (0.113)	-0.007 (0.033)	-0.017 (0.039)	0.048 (0.071)	-0.043 (0.074)
Time together * Wife works FT	0.308 (0.068)***	-0.136 (0.076)*	-0.015 (0.094)	-0.17 (0.119)	0.106 (0.166)	-0.044 (0.098)	-0.054 (0.083)	-0.099 (0.088)
Wife works FT					0.188 (0.888)	0.086 (0.69)	0.591 (0.69)	0.235 (0.728)
Constant	0.423 (0.369)	0.478 (0.409)	0.659 (0.511)	1.509 (0.642)**	-7.115 (1.732)***	-0.709 (2.089)	2.438 (2.317)	-1.618 (2.434)
Observations	491	491	491	491	392	392	392	392
Number of group(famid)	299	299	299	299				
R-squared	0.19	0.18	0.15	0.2	0.39	0.33	0.51	0.43

Standard errors in parentheses. OLS standard errors clustered at household level. OLS controls are each spouse's linear and quadratic age and range of income, wife has a BA or higher, husband has a BA or higher, number of children 0-1, 2-4 and 5-9

^ significant at 11%; \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 6: Response of total daily childcare and housework to changes in own and spouse's work hours**

	<b>FE</b>	<b>FE</b>	<b>FE</b>	<b>FE</b>	<b>OLS</b>	<b>OLS</b>	<b>OLS</b>	<b>OLS</b>
	Daily childcare husband	Daily housework husband	Daily childcare wife	Daily housework wife	Daily childcare husband	Daily housework husband	Daily childcare wife	Daily housework wife
Daily work hours husband	-0.049 (0.024)**	-0.118 (0.026)***	0.024 (0.034)	0.071 (0.041)*	-0.115 (0.027)***	-0.212 (0.047)***	0.039 (0.024)	0.068 (0.041)
Daily work hours wife	0.034 (0.03)	0.008 (0.032)	-0.126 (0.042)***	-0.282 (0.051)***	0.057 (0.026)**	0.042 (0.025)*	-0.154 (0.027)***	-0.367 (0.028)***
Daily work hours husband * Wife works FT	-0.098 (0.057)*	-0.097 (0.061)	-0.01 (0.08)	0.17 (0.097)*	-0.015 (0.082)	0.005 (0.07)	0.076 (0.064)	0.009 (0.067)
Daily work hours wife * Wife works FT	-0.163 (0.066)**	0.208 (0.070)***	-0.055 (0.092)	0.094 (0.112)	0.001 (0.045)	-0.019 (0.039)	-0.081 (0.051)	0.119 (0.059)**
Wife works FT					0.489 (0.987)	-0.424 (0.762)	0.126 (0.743)	-0.964 (0.687)
Constant	1.706 (0.213)***	2.012 (0.228)***	3.152 (0.297)***	2.933 (0.362)***	-5.795 (1.825)***	2.358 (2.345)	4.891 (2.640)*	3.186 (2.694)
Observations	491	491	491	491	392	392	392	392
Number of group(famid)	299	299	299	299				
R-squared	0.12	0.18	0.07	0.18	0.32	0.31	0.47	0.42

Standard errors in parentheses. OLS standard errors clustered at household level. OLS controls are each spouse's linear and quadratic age and range of income, wife has a BA or higher, husband has a BA or higher, number of children 0-1, 2-4 and 5-9

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%



**Table 7: Response of childcare and housework during time home alone to changes in schedule overlap**

	FE	FE	FE	FE	OLS	OLS	OLS	OLS
	Childcare by Husband while alone	Housework by Husband while alone	Childcare by Wife while alone	Housework by Wife while alone	Childcare by Husband while alone	Housework by Husband while alone	Childcare by Wife while alone	Housework by Wife while alone
Time alone by Husband (hrs)	0.1 (0.030)***	0.188 (0.032)***	0.087 (0.065)	-0.092 (0.086)	0.235 (0.065)***	0.227 (0.048)***	0.096 (0.044)**	-0.099 (0.035)***
Time alone by Wife (hrs)	-0.044 (0.023)*	-0.011 (0.024)	0.23 (0.042)***	0.264 (0.054)***	-0.014 (0.011)	-0.002 (0.01)	0.235 (0.024)***	0.339 (0.027)***
Time together (hrs)	-0.069 (0.024)***	-0.069 (0.025)***	0.018 (0.047)	-0.073 (0.062)	-0.012 (0.016)	-0.001 (0.02)	-0.028 (0.028)	-0.004 (0.024)
Time alone husband * Wife works FT	0.029 (0.061)	0.155 (0.064)**	-0.073 (0.117)	0.094 (0.153)	-0.051 (0.08)	0.036 (0.098)	-0.101 (0.058)*	0.107 (0.055)*
Time alone wife * Wife works FT	0.047 (0.043)	-0.006 (0.046)	0.06 (0.075)	0.049 (0.098)	-0.01 (0.016)	-0.011 (0.016)	0.062 (0.066)	-0.013 (0.069)
Time together * Wife works FT	0.053 (0.044)	0.061 (0.046)	0.117 (0.08)	0.016 (0.105)	-0.014 (0.021)	0.025 (0.035)	0.045 (0.049)	0.031 (0.038)
Wife works FT					0.412 (0.249)*	-0.27 (0.361)	0.134 (0.507)	-0.485 (0.509)
Constant	0.594 (0.234)**	0.212 (0.246)	-0.215 (0.441)	0.6 (0.577)	-2.874 (0.995)***	-0.012 (1.257)	1.289 (1.809)	-1.193 (1.616)
Observations	469	469	489	489	376	376	392	392
Number of group(famid)	293	293	299	299				
R-squared	0.19	0.38	0.27	0.31	0.45	0.47	0.52	0.62

Standard errors in parentheses. OLS standard errors clustered at household level. OLS controls are each spouse's linear and quadratic age and range of income, wife has a BA or higher, husband has a BA or higher, number of children 0-1, 2-4 and 5-9

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%