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Togetherness: Spouses' Synchronous Leisure,
and the Impact of Children

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ABSTRACT

This study goes beyond the immense literature on the quantity of labor that households supply to examine the timing of their labor/leisure choices. Using two-year panels from the United States in the 1970s it demonstrates that couples prefer to consume leisure simultaneously: Synchronization is greater than random male-female pairing would predict. In the 1970s the demand for joint leisure among working couples was more responsive to increases in wives' earnings than to husbands', but by the 1990s the responses were identical. Couples react to changes in constraints on them by altering their schedules to preserve joint leisure, and those with higher full incomes consume more of their leisure jointly. Children reduce the jointness of spouses' leisure, with the greatest change in schedules occurring among new mothers.

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I. Introduction -- The Nature of the Issues

Joint decision-making by spouses has become an increasing focus of attention by labor economists and economic demographers. Early approaches treated the husband's labor-supply decision as exogenous to the wife's (Mincer, 1962); and subsequent research, summarized by Killingsworth and Heckman (1986), and recently revived by Zweimüller et al (1996); Hoynes (1996) and Blau (1998), focused on establishing the nature of the complementarity/substitutability of spouses' time use by examining their weekly or annual labor supply or their retirement behavior. Another strand of research has recognized that labor-market and other outcomes reflect power relationships and strategic interactions in households. This realization has led to more general models that consider these interactions (e.g., McElroy and Horney, 1981; Lundberg, 1988), and the literature has used this recognition to infer the relative power and interests of the spouses in different household activities (Thomas, 1994; Lundberg et al, 1997). In all cases, however, the focus has been on quantities consumed -- of leisure or of goods and services -- over some relatively long period of time (a week, a month or a year).

In the case of labor supply the jointness of spouses' work/leisure choices cannot be inferred by concentrating on the quantities that they consume over some interval of time -- on their integrated time use. Given the relatively small fractions of the week that people in developed economies typically work in the market, we could very easily find that husbands' longer weekly hours are associated with wives' longer weekly hours, holding their wage rates constant, even though each one is at home while the other works. Understanding the extent of jointness in time use requires analyzing when each spouse works in the market, i.e., the extent of overlap in the spouses' instantaneous use of time. A couple can consume more leisure jointly when the number of hours that both spouses are at home is greater, not when the partial correlations of their total work times summed over a day, a week or a year are higher. While a theoretical approach to analyzing the supply of individuals' effort has been offered by Winston

(1982), and some empirical analysis of individuals' decisions exists (Hamermesh, 1999), there has been no formal theoretical or empirical analysis of the nature of jointness in time use in the appropriate instantaneous framework.

The most solid fact about women's labor supply in developed economies is that the presence of young children sharply reduces time spent in the market while having different effects on the husband's work time depending on whether the mother remains in the labor force.[1] The impact of a new child on the jointness of spouses' time use, defining jointness appropriately as instantaneous, has not been considered at all. The necessity of caring for a new child is likely to affect spouses' joint time use; and to the extent that it does so it represents a previously unmeasured additional cost of children. Its importance is surely heightened at a time when more couples contain two earners before the birth of a child.[2] Even beyond their effects on couples' joint use of time, changes in total hours worked by each spouse (clearly, mainly the reduction in the wife's hours) may not reflect the true change in the disutility of the wife's market work. The need to provide child care may lead the couple to alter their timing of work in such a way as to change the relative burdens of market work on each spouse even at a fixed supply of hours to the market.

In this study I offer evidence on the nature of the jointness of spouses' labor supply, how it changes with the addition of a new child, and how the new child and children generally alter the burden of work timing differentially on the husband and wife. This examination is relevant to understanding the role of economic incentives in determining labor supply (along this novel dimension of when the effort is offered), to inferring how children alter spousal relations (and the relative power implicit in those relations), and to devising child-care policies that match the temporal patterns of couples' labor-market activity. Section II provides a theoretical motivation underlying the estimation that is performed over the data described in Section III. Section IV analyzes the issues of spouses' jointness in these data, while

Section V considers how the birth of a child and the presence of children affect spouses' joint time use and how the burden of children on the couple's time use is split between the spouses.

II. Joint Decision-Making about Timing Leisure

In order to analyze the instantaneous jointness of spouses' decision-making, we need to specify the household's utility in arguments defined over points in time. Let the basic unit of time be the day, divided arbitrarily into 24 hours. Then it is useful to write the household's maximand as:

$$(1) \qquad V\left([1-L^M_1],...,[1-L^M_{24}],\ [1-L^F_1],...,[1-L^F_{24}],C\right),$$

where $L_s = 1$, $s = 1,...,24$, if the individual works in the market at hour s, C is the household's consumption, and M and F denote the husband and wife respectively. Discovering the basic determinants of V is beyond the scope of this study, although the empirical work does shed light on the relative importance of different arguments and restrictions on V. Throughout the discussion I ignore issues of the degree of jointness in the consumption of goods (which is discussed by Lundberg and Pollak, 1993) and of the split between M and F in the allocation of goods. The household's monetary gains are implicitly spent entirely on the one composite (household) public good. I also assume that each hour is indivisible, with the individual either working the entire hour or enjoying leisure. Equation (1) is maximized subject to the spending constraint:

$$(2) \qquad C = \sum_s \left[w^M_s L^M_s + w^F_s L^F_s \right],$$

where $w^j_s = w^j[1 + \grave{e}_s]$. Each spouse j faces an exogenous wage rate that varies over s around w^j by a percentage $\grave{e}_s$ that is determined by the market supply and demand for labor at hour s and that faces all workers regardless of sex. (Based on casual observation and some evidence, e.g., Kostiuk, 1990, one might reasonably assume that $\grave{e}_s$ is greater in the evening and at night.)

The empirical analysis in this study can be viewed as an attempt to determine what restrictions might reasonably be imposed on (1). The main possibility that I examine can be written generally as:

$$(3) \qquad V\left(U^M([1-L^M_1],...,[1-L^M_{24}]),U^F([1-L^F_1],...,[1-L^F_{24}]),U^J(\tilde{Z}^J_1,...,\tilde{Z}^J_{24}),\ C\right),$$

where $\tilde{Z}^J_s = [1-L^M_s][1-L^F_s]$. The specification in (3) allows bargaining between them to determine each spouse's leisure, since it specifies both U^M and U^F to be arguments of V. The spouses' consumption of leisure is not necessarily separable: Equation (3) also poses the additional possibility that the household's welfare is enhanced if the spouses consume their leisure together, all else equal, since an argument in U^J is positive if neither spouse is working at time s.

Maximizing (3) subject to (2) yields the couple's sequences of market work times, $\{L^M_s\}$ and $\{L^F_s\}$. If the sequences were integrated over the day, they would yield each spouse's daily hours supplied to the market, H^j. Holding each spouse's other (e.g., demographic) characteristics constant, a spouse will be working at hour s if $w^j_s > w^{jr}_s$, the spouse's reservation wage for working at that hour. These reservation wages vary over s and may be determined jointly by the spouses' bargaining. The first object of interest in this study is to infer whether or not the subfunction $U^J \neq 0$, that is, whether the outcome of the spouses' bargaining reflects any interest they may have in being at home together, <u>conditional</u> on their working in the market for given numbers of hours. (Alternatively, one might observe that couples' behavior is joint but implies a preference for being apart.) A test of <u>instantaneous jointness</u> in labor supply would consider whether each spouse's timing of work is independent of the other's at a fixed daily supply of labor. Examining this possibility provides the only true test of the complementarity or substitutability of spouses' leisure, since only through this approach can we examine whether consuming <u>synchronous</u> leisure matters to the couple.

The second focus is on the impact of children in the couple's maximization of (3). Assume that the couple's preferences in (3) and the budget constraint (2) led to a maximizing pair of sequences of

leisure $\{1 - L^{M}_{s,\,t-1}\}$ and $\{1 - L^{F}_{s,\,t-1}\}$ in the period t-1 before a child was born. Presumably the couple re-optimizes after the birth, choosing new sequences $\{1 - L^{M}_{s\,t}\}$ and $\{1 - L^{F}_{s\,t}\}$ based on the now relevant costs of child-care and on the couple's preferences for being at home with the new child. Assuming that the inquiry described above demonstrates that couples prefer to consume joint leisure, the first question is how the birth affects their ability to do so. That is, do the additional constraints generated by the baby impose a cost on the couple, all else equal, by forcing them to change these optimizing sequences?

We know from longitudinal studies (e.g., Leibowitz et al, 1992) that the birth of a child disproportionately leads mothers to decrease their workhours and labor-force participation rate, so that presumably the arrival of the new baby raises their reservation wages (at least relative to their husbands'). By comparing the sequences $\{1 - L^{M}_{s\,t}\}$ and $\{1 - L^{F}_{s\,t}\}$ to $\{1 - L^{M}_{s,\,t-1}\}$ and $\{1 - L^{F}_{s,\,t-1}\}$ we can infer how the baby's arrival alters the sequences of $w^{j\,r}_{s}$ for each spouse (since the sequences w^{j}_{s} can be assumed to be unchanged by this event). The issue here is whether, given the well-known changes in spouses' postpartum total workhours, the timing of their workhours changes differentially. All the issues in this second focus reflect an aspect of the cost of children that seems to have escaped notice. To the extent that children induce measurable changes in parents' timing of work/leisure, these changes can be viewed as additional costs of children that may be borne differentially by husbands and wives.

III. Data Needs and Data Availability

The questions presented above impose very strong requirements on the data. Clearly, we need information on when (during the typical day) people work in the market. Moreover, since the focus is on patterns of work over the day, the samples must be large enough to allow the effects of variations in the determinants of work patterns at the many hours of the day when relatively few people are at work to be discernible. With evidence (Hamermesh, 1996) that fewer than 20 (16) percent of full-time male workers and 17 (12) percent of full-time female workers are on the job at any time in the evening (night), large samples of couples with at least one working spouse are clearly needed.

The second set of questions imposes additional restrictions on the data: 1) We observe the same couples' timing of work at two points, t-1 and t, with even more longitudinal observations desirable; 2) For a reasonably large subsample of the couples a birth occurs between these times; and 3) The additional child is fairly young at time t (so that the impact of a birth can be discerned). A useful sample must be large, have information on both spouses, cover numerous couples who experience a birth, and be longitudinal with the time periods fairly close together. Time-budget studies are very sparse, with small cross sections available only for 1965, 1975 and 1985 in the United States, and are similarly sparse and not longitudinal in other countries too. Even if these data sets were longitudinal (as the 1975 U.S. survey was for a tiny subsample of respondents), the samples are far too small to be helpful here. The May 1985, 1991 and 1997 Current Population Surveys (CPS) included supplements that contain questions on the (market) work schedules of all respondents; but while the samples of workers are large, the data are regrettably only cross-sections.[3]

The only data sets that meet all the criteria for use here are the May CPS Supplements from the 1970s. Sample members who stated that they usually worked answered questions: "At what time of day did ... begin (end) work on this job most days last week?" The answers thus presumably reflect the timing of each spouse's market work on the typical (week)day. In those Supplements this information was obtained in each year (from 1973 through 1978). I use responses to these questions to generate sequences of L^j_s for that year. The two-year longitudinal structure of the CPS creates the potential for matching half-samples of workers from each Supplement to half-samples in the adjacent years. Individuals were matched from the 1973 and 1974, 1974 and 1975, 1975 and 1976, and 1977 and 1978 half-samples, based on criteria of age, race, sex and change in educational attainment.[4] Those individuals whose records were matched across the two years were then matched as spouses based upon residence in the same household in adjacent months of May and listing as household head or spouse.[5] Any matched couple in which one spouse was age 60 or over was excluded from the sample, since the purpose is to

focus on market work and its complement and on couples that might have children in the household. These two matching processes and the age restriction created a basic sample from the mid-1970s in which at least one spouse worked in each of the two years.[6]

In addition to the generated sequences of work timing, $\{L^j_{s,\,t-1}\}$ and $\{L^j_{st}\}$, each of the two-year records of each spouse's activity contains the usual CPS demographic and economic measures, including: Race (African-American or not); ethnicity (Hispanic or not); years of schooling completed; potential experience (age - schooling - 6); geographic location, and usual weekly earnings. In the 1970s the May CPS collected information on the presence and number of children in the household under age 18, but not on the age composition of the brood. We thus do not know how many children below school age were in the household at time t. We do know, however, if the number of children increased between t-1 and t, and we take an increase to signify a birth.[7] For the estimation in Section IV and most of Section V I thus divide the couples into four mutually exclusive and exhaustive groups based on the presence and number of children (KID) at t-1 and t:

$$\begin{aligned} &\text{Group I,} && KID_{t-1} = KID_t = 0;\\ &\text{Group II,} && KID_{t-1} < KID_t\ ;\\ &\text{Group III,} && KID_{t-1} > KID_t\ ;\\ &\text{Group IV,} && KID_{t-1} = KID_t > 0. \end{aligned}$$

The analysis in the final part of Section V concentrates on the behavior of couples in Group II, those that experienced a birth between Years t-1 and t.

Table 1 presents descriptive statistics for the entire sample of couples and for those couples where both spouses worked. To save space with little loss of information, rather than presenting each L^j_s I list the fractions of husbands and wives in each Group who are at work at all in the evening (the four hours centered on 7PM through 10PM) or at night (the eight hours centered on 11PM through 6AM). In each half of the table I present statistics describing the four mutually exclusive and exhaustive groups separately and then combined, all for Year t. Couples in Group I, which includes newlyweds, permanently childless couples and "empty-nesters," are older than other couples, as are those in Group

III whose children are leaving home. Also unsurprisingly, couples in Group II are younger than other couples.

A hint of the impact of children on couples' timing of work can be gleaned by comparing the propensities to work evenings and nights among couples in Group II (all of whom added a child) to those of couples in Group III (some of whom became "empty-nesters"). Among working couples both husbands and wives whose child left the household are less likely to be at work at odd hours than are partners in a household that added a child. Among all couples this is true for men, with the reverse result for women reflecting the much lower participation rate of new mothers.

Using these data we can begin to get a feel for the extent of jointness of leisure by examining $\tilde{Z}^J = Ó\tilde{Z}^J_s$, which indicates the number of hours per day that both spouses are not working in the market at the same time (the amount of daily leisure that the couple might be able to consume jointly). Whether they are actually enjoying leisure jointly when $\tilde{Z}^J_s = 1$ is not clear. It might well be that one partner is out carousing while the other is at home; perhaps they are both home in separate parts of the house; or perhaps they are together physically but not engaged in the same activity (Larson and Richards, 1994, Chapter 5). The data do not allow us to distinguish these possibilities. All we can do with these, the only available data that meet the criteria for sample size and longitudinal coverage, is examine the amount of time that the spouses could be together.

The data in the fourth row of each part of Table 1 show that the average couple has at least 15 hours per day at its joint disposal outside of both spouses' working hours, with working couples having at least 13 hours available for joint leisure. Among all couples this substantial chunk of time is significantly less among couples in Group IV than among other couples. This difference again suggests that the presence of children may affect the timing of a couple's leisure. Among couples with both spouses working the only significant difference is between couples with children and those without. The latter are able to schedule their work hours to allow more time for joint leisure.

The indicator $\tilde{Z}^J_s$ shows whether both partners are away from work (and thus have the possibility of consuming leisure jointly) at the same hour of the day. Figure 1 graphs this measure, for all couples and separately for couples with both spouses working in the market. Not surprisingly, given the paucity of evening and night work, the average $\tilde{Z}^J_s$ approaches one at those times of the day. What is interesting in the Figure is how low $\tilde{Z}^J_s$ is at the prime working times of the day among working couples. Very clearly, most members of such couples are either working at roughly the same time, or are away from work, and thus possibly consuming leisure jointly, at the same time.

IV. Is There Jointness in Couples' Work Timing?

While Figure 1 is interesting, it merely shows that there is substantial overlap in men's and women's timing of leisure and work. It says nothing about whether the overlap in spouses' leisure is any different from what would be observed if we generated such measures artificially by creating pairs of randomly matched men and women and examined the timing of their activities. To test for the existence of jointness we need to show that the actual distribution of work timing is different from what it would be if spouses' work timing were independent. If spouses' timing of leisure were independent at hour s, the fraction of couples with both spouses at work at that hour would just be the product of the mean fractions of husbands and wives at work at that hour, $\hat{Z}^J_s = L^M_s L^F_s$. The t-statistic describing the difference between the actual fraction of couples with both partners at work at hour s, Z^J_s, and the predicted fraction of couples with both partners at work, $\hat{Z}^J_s$, provides a simple test of whether spouses' timing is independent.

In order to save space, in Table 2 I list the values of the t-statistic testing the equality of Z^J_s and $\hat{Z}^J_s$ for selected hours only, for 8353 couples with both spouses working in Year t-1 and 8143 couples with both spouses working in Year t. The differences between predicted and actual fractions at work at night, when relatively few people are at work, are typically less than 0.01. Thus even with these large

samples the t-statistics do not allow rejecting the hypothesis of independence at these unusual hours, although the differences $Z^J_s - \hat{Z}^J_s$ are positive and thus consistent with jointness in timing decisions. At most hours of the day, however, the hypothesis that we can predict the fraction of couples in which both spouses are at work knowing only the fraction of men and women generally who are at work at that hour is strongly rejected. At times when most market work is accomplished, when one spouse is at work (not at work) the other spouse is disproportionately likely to be at work (not at work) too.

All of this evidence suggests that couples attempt to time their market work to provide themselves the opportunity to be together when they are not working. If, however, jointness is something that people desire, we should observe that couples with higher full incomes consume more of it -- jointness should be a normal good. To examine this idea, for working couples with each spouse usually working at least 6 hours per day (implicitly at least 30 hours per week) I estimate the impact on $\tilde{Z}^J$ of each spouse's earnings, holding constant each spouse's hours of market work and demographic characteristics.[8] I thus focus on the relative impacts of the full earnings of the husband and wife on their joint timing of work.

Because this is an extremely important issue, I present the estimates both for the sample discussed in Section III and also for another sample drawn from the May 1991 and May 1997 CPS that include the Work Schedule Supplements. The data are quite comparable, including the age restrictions, except that the 1990s data cannot be included as part of a panel (which is why I ignore them elsewhere in this study). They allow us to compare the absolute sizes of the impacts of full earnings on the demand for jointness and the relative impacts of increases in each spouse's full earnings and how these have changed over time.[9]

The estimates are presented in Table 3, with Columns (2) and (6) showing the basic results.[10] Before examining the impacts of earnings, consider the effects of extra hours of work on hours of joint leisure. The sum of the impacts of a one-unit increase in each of the spouses' workhours on their joint

leisure time is $\left[\partial\tilde{Z}^J/\partial H^M + \partial\tilde{Z}^J/\partial H^F\right]$. This sum exceeds 1 in absolute value in both sets of data, suggesting that the spouses are unable to time marginal increases in market work in perfect synchrony. It is also interesting to note that in both samples $\partial\tilde{Z}^J/\partial H^M$ is essentially equal to $\partial\tilde{Z}^J/\partial H^F$ -- jointness is reduced as much by an increase in the wife's market work as by an equal increase in the husband's, even though working wives work fewer hours in the market than their husbands.

The most important result in this table is the estimated impact of each spouse's earnings, which, since the workhours of each are held constant, can be viewed as the spouses' full earnings. I thus interpret the coefficients (and the bracketed elasticities) on w^M and w^F in Columns (2) and (6) of Table 3 as partly reflecting income effects: With higher full earnings the spouses will be better able to indulge their desires for joint leisure. Jointness may also have a price in terms of a lower hourly wage that one spouse might receive because he/she chooses to consume leisure at the same time as his/her spouse, and this means that the estimated $\partial\tilde{Z}^J/\partial w^j$ also reflect a negative price effect. With this interpretation the parameter estimates imply that the income effect dominates any price effect: Given each partner's workhours and demographic characteristics, couples with higher full incomes buy the opportunity to consume leisure together. The elasticities are not large (0.013 for husbands, 0.031 for wives in the 1970s, 0.030 for husbands and 0.028 for wives in 1991), but they are significantly positive.[11]

There is no reason to believe that the price effects on the demand for jointness differ for equal increases in each w^j, so that we can interpret the relative magnitudes of the estimated $\partial\tilde{Z}^J/\partial w^j$ as reflecting how equal increases in each spouse's full earnings affect the couple's demand for jointness at constant prices. The equations presented in Columns (3) and (6) of Table 3 constrain the effects of husband's and wife's earnings on their joint leisure to be identical. This constraint is soundly rejected for the 1970s sample: Raising the wife's earnings by $1 has a larger effect on the jointness of their leisure than does raising the husband's. While evidence against the notion that couples pool their income is

accumulating rapidly (Thomas, 1994; Lundberg et al, 1997; Inchauste, 1997), those studies all examine spending on items that might be viewed as specific to children. The evidence for the 1970s suggests that, even in their demand for an activity that is ipso facto joint, husbands and wives responded differently, so that a change in the relative earnings of the spouses affected the couple's consumption.[12]

The result disappears in the data for the 1990s: The constraint implied in Column (7) cannot be rejected, and the elasticities in Column (6) are almost identical. Even though working wives in the 1990s sample still worked the same 0.7 hours less per day in the market than their husbands, an increase in their full earnings generated the same change in the couple's joint leisure (given each spouse's workhours) as did an increase in their husband's full earnings. Indeed, if we follow the literatures by assuming that hours supply elasticities are more positive for wives than for husbands (Pencavel, 1986; Killingsworth and Heckman, 1986), we can infer that by the 1990s the total effect (direct and indirect through the spouses' total workhours) on $\tilde{Z}^J$ of an increase in the wife's full earnings was less positive than that of an increase in her husband's full earnings.

Unless one believes that the relative price of jointness in response to higher women's wages fell over the twenty-year period, the equalization of the responses to husbands' and wives' full earnings might suggest that men's preferences for joint leisure rose to equal those of their working spouses. Alternatively, the extent of marital sorting along the dimension of preferences for jointness may have changed over this twenty-year period in such a way as to alter the mix of married couples in these CPS samples. Without much additional information we cannot distinguish between these possibilities, or between them and others.

Columns (4) and (8) of Table 3 include one-digit indicators of industry affiliation for both husband and wife. Although their inclusion does not stem from the consumer model in Section II, one might view them as testing whether any correlated demand-side constraints could be generating the results. Alternatively, their inclusion may allow us to account for possible discrimination in the kinds of

work environments available to women. Regardless, the estimated effects of both the H^i and the w^i do not change qualitatively from the basic estimates in Columns (2) and (6).

The evidence in this section suggests strongly that the subfunction U^j in (3) is not identically zero. Whether one spouse is engaged in market work at a particular time of day provides information on whether the other spouse is engaged in market work at that time. The most appropriate notion of complementarity in the context of time use is as an instantaneous phenomenon: Is spouses' time used in such a way as to indicate that they are better off having the opportunity to consume leisure together? Examining their instantaneous use of time, we can infer that their time use is complementary in this sense. A desire for togetherness is implicit in couples' decisions about the timing of each spouse's supply of effort to the labor market; and couples use some of their income to purchase the "good," synchronous leisure.

V. The Impact of Infants on Work Schedules

The birth of a child may affect each spouse's work schedule; and, if either of these is affected, so too may their joint leisure. In this section I first examine generally how the jointness of couples' leisure changes over a year and how it is affected by a birth. I then analyze how the differential impacts of a birth, a child exiting the household, or even the presence of children, affect the work schedules of husbands and wives.

A. The Impact on Jointness

Consider how a change in family structure, in the form of an infant added to the household, affects the ability of spouses to satisfy their desire to enjoy leisure time together. Implicitly we are asking how household production is altered and how that change interacts with the spouses' subfunction U^j to generate changes in the observed jointness of leisure. To examine the dynamics of jointness, for each particular group (among the four groups defined in Section III) I calculate the 2x2 matrix of transition probabilities:

$$\begin{array}{c} \\ L^j_{st-1} \end{array} \begin{array}{c} L^j_{st} \\ 1 \quad 0 \\ \end{array} \begin{array}{c} 1 \\ 0 \end{array} \begin{bmatrix} \\ \ddot{o}^j_s \end{bmatrix} \tag{4}$$

indicating the fraction of spouses $\ddot{o}^j_s$ (j = M or F) in each group that moves from working or not at hour s in Year t-1 to working or not at that hour in Year t. For example, the upper-left entry in this matrix is the probability of working in Year t at hour s given having worked in Year t-1 at that hour. Define the 4x4 transition matrix:

$$\hat{\ddot{O}}^J_s = \begin{bmatrix} \ddot{o}^M_s \end{bmatrix} \otimes \begin{bmatrix} \ddot{o}^F_s \end{bmatrix}. \tag{5}$$

$\hat{\ddot{O}}^J_s$ is what we would expect to observe in a population of couples at hour s if their maximizing choices of consumption and leisure did not have a motive of instantaneous jointness. We did not observe this independence in the cross-section data of the previous Section, but the issue here is whether jointness is apparent in the dynamics of spouses' work/leisure timing.

We can test for the dynamics of couples' joint work timing by comparing the predicted transition matrix in (5) to the 4x4 transition matrix:

$$\ddot{O}^J_s = \begin{bmatrix} \ddot{o}^{MF}_s \end{bmatrix}, \tag{6}$$

where each $\ddot{o}^{MF}_{s}$ is the fraction of the sample with spouse j working (not working) at time t-1 and working (not working) at t, and spouse j' working (not working) at time t-1 and working (not working) at t. The matrix $\ddot{O}^{J}_{s}$ reflects the actual fractions of couples observed at each of the 16 outcomes that are possible at each hour s. This comparison allows us to test for the impact of changing family composition on dynamic jointness; e.g., for couples with a new child we can examine how the differences between the actual $\ddot{O}^{J}_{s}$ and the expected $\hat{\ddot{O}}^{J}_{s}$ differ compared to other couples.

The difficulty with testing for the impact of demographic change by comparing these matrices is that it implies computing the differences between 16 terms in each of 24 pairs of matrices. Aside from the obvious fact that usefully presenting this welter of information is difficult, many of the cells in the $\ddot{O}^{J}_{s}$ and $\hat{\ddot{O}}^{J}_{s}$ are very sparsely populated. As an alternative I summarize the most useful information from these matrices by calculating the percentage of couples in each group who are engaged in the same activity (work or not work) at hour s in Year t-1 and are engaged in the same activity again in Year t compared to the expected percentages. This approach does not restrict couples' activities to remain unchanged over the twelve months; but it treats couples as consuming jointly so long as both spouses are engaged in the same activity at hour s in both years. I thus calculate:

(7) $$\text{ø}_{11s} = \ddot{o}^{MF}_{11s} + \ddot{o}^{MF}_{14s} + \ddot{o}^{MF}_{41s} + \ddot{o}^{MF}_{44s},$$

and $\hat{\text{ø}}_{11s}$, the sum of the analogous four terms in $\hat{\ddot{O}}^{J}_{s}$. Analogous sums ø_{22s} and $\hat{\text{ø}}_{22s}$ describing the actual and expected fractions of couples where one partner is working at s in each year and the other is not, can be calculated. Similarly, off-diagonal terms, which show the actual and expected fractions of couples in which time use is not joint in one year but is in the other, can be calculated to complete the 2x2 matrices Ø_{s} and $\hat{\text{Ø}}_{s}$.

Estimates of the elements of Ø_{s} and $\hat{\text{Ø}}_{s}$ are shown in Table 4 for selected hours of the workday. Both ø_{11s} and $\hat{\text{ø}}_{11s}$ are close to one (and to each other) at 3AM (since few spouses are likely to change

their pattern of not working at this unusual time). At other hours of the day, however, the terms other than ϕ_{11s} and $\hat{\phi}_{11s}$ are no longer small, reflecting either actual changes in patterns of couples' work timing over a twelve-month period, or perhaps measurement (reporting) errors that are not perfectly correlated between spouses. Comparing the actual and predicted matrices, the importance of jointness comes through even in the pattern of couples' changing work timing: In each group and at each hour of the day (except for Group III at 3AM and Group IV at 3PM), $\phi_{11s} > \hat{\phi}_{11s}$. If we observe that couples are more likely to time their market work jointly in one year, we are more likely to observe them timing market work jointly in the next year.[13]

Intergroup differences in the sizes of the $\phi_{11s} - \hat{\phi}_{11s}$ provide tests of the impact of a birth on the jointness of spouses' time use. While the entries in Table 4 show that the $\phi_{11s} - \hat{\phi}_{11s}$ are generally positive, their sizes show the extent to which couples are able to continue coordinating their schedules to enjoy leisure jointly. If a new child reduces couples' abilities to consume leisure together, this difference will be less positive in Group II than in other groups of couples. Because this test uses longitudinal data to difference out any heterogeneity among the couples classified by group (other than changes that occurred between Years t-1 and t that did not result from the birth), it provides the cleanest available measure for testing for the effect of children on couples' timing of work and leisure.

The differences $\phi_{11s} - \hat{\phi}_{11s}$ are graphed in Figure 2a for all couples in each Group at each hour s and in Figure 2b for couples in which both spouses worked in both Years t-1 and t. As was implicit in Table 4, the small fractions of individuals at work at unusual times make these differences quite small at those times. During prime working hours, however, the differences are large, with more persistence of jointness than is predicted by the jointness of behavior in Year t-1. Most important, the differences $\phi_{11s} - \hat{\phi}_{11s}$ differ in size among the groups of couples classified by the changing presence of children. Among both working couples and others they are largest among those that have no children. The

persistence of jointness differs little among couples distinguished by whether a child enters or leaves the household. The recentness of a birth has little impact on the jointness of spouses' timing of leisure among working or other couples beyond the negative impact of having children present. The results on changing jointness in Figure 2b indicate that the main difference in the persistence of jointness is between couples with children present and those without.

Table 5 presents the t-statistics testing the hypothesis that $ø_{11s} = \hat{ø}_{11s}$ at each of a few selected hours s. There are no significant differences in persistence between what we observe and what we would observe under random assignment among all couples in Groups II-IV. Only among couples without children is there evidence of significant persistence. Once we restrict the sample to couples with both partners working in both years, however, we find evidence of persistence among couples in which the (positive) number of children remained unchanged between Years t-1 and t. That we observe this difference, and smaller but typically insignificant differences between observed and expected persistence among couples that add or lose a child, suggests that changes in family structure decrease the persistence of work timing.

An alternative, temporally aggregated approach to inferring the impact of children on jointness examines the persistence of the total possible amount of daily joint leisure, $\tilde{Z}^J$, between Years t-1 and t and how it is affected by membership in the four Groups defined in Section III. The estimating equation is the same as that presented in Column (2) of Table 3, but it is based on the entire sample of 21,943 couples, the majority of which have one nonworking spouse in at least one of the two years for whom no information on weekly earnings is available. The equation includes as controls all the demographic indicators in Table 3, as well as hours worked by each spouse in each year and main effects in the group indicators GII, GIII and GIV. The estimates of the crucial parameters are:

$$(8)\qquad \underset{}{\tilde{Z}^J_t} = \underset{(.010)}{.469}\tilde{Z}^J_{t-1} \; \underset{(.016)}{-.032}GII*\tilde{Z}^J_{t-1} \; \underset{(.014)}{-.024}GIII*\tilde{Z}^J_{t-1} \; \underset{(.010)}{-.007}GIV*\tilde{Z}^J_{t-1},$$

where their standard errors are listed in parentheses below the coefficients of the main effect of $\tilde{Z}^{J}_{t-1}$ and its interactions with the group indicators. The estimates indicate that there is substantial persistence in the overall jointness of spouses' potential leisure among couples without children (the coefficient on the main effect of $\tilde{Z}^{J}_{t-1}$). That persistence is, however, significantly less, even holding each spouse's workhours in each year constant, among couples with children as compared to those without; and the biggest drop in persistence, other things equal, is among those couples that add a child to the household.

B. The Burden on Spouses' Schedules

The tests presented thus far in this section demonstrate both that the dynamics of work timing depend in part on the jointness of spouses' behavior, and that they are affected by the presence of children, particularly by changes in household composition. They do not, however, specifically shed any light on the most studied aspect of time use, the labor-force behavior of married women. Having established that spouses' time use is affected by a desire to consume leisure jointly, the data allow us to examine such well-known phenomena as whether changes in instantaneous labor supply across years are affected by intervening demographic change; whether new mothers and fathers alter their work timing differently, whether changes in work timing are affected by prior jointness, and how all of these are affected by the market value of each spouse's time. Since much of the focus is on the impact of a new infant, and since we know that the presence of a young child affects decisions about hours and participation, we distinguish in the rest of this section between couples with a first birth and those having a higher-order birth, designated here as Groups IIA and IIB respectively.

Define the measure:

$$(8) \qquad DIFF^{j} = \Sigma\left\{[1 - L^{j}_{s,t-1}]L^{j}_{s,t} + L^{j}_{s,t-1}[1 - L^{j}_{s,t}]\right\}, \; j = M, F \; .$$

$DIFF^{j}$ ranges between 0, for a person who kept exactly the same schedule in both years, and 24, for a person who worked (consumed leisure) in Year t at each hour s when he/she had consumed leisure

(worked) in Year t-1. The measure shows the extent to which a person changed the timing of his/her labor-market activity over the year. DIFF might be quite large even if the person's total market workhours remained unchanged. For example, for a worker who switched from 8 hours per day during daytime to 8 hours per day at night we would observe no change in any integrative measure of workhours, but DIFF would be 16.

The statistics describing $DIFF^j$ by group are shown in Table 6, first for all couples, then for those couples with both spouses working in both years. Among all couples the year-to-year changes in schedules are fairly small, with on average over 21 hours each day being allocated the same way in the two years by husbands, and over 22 hours per day allocated the same way by wives. We can compare the changing timing of spouses' work/leisure in couples with no children to that of other couples to infer the extent of the disruptions that having children in the household, and having a new child, produce in each spouse's work timing. The large value of $DIFF^F$ among women who have a new baby, especially a first child, partly reflects their high propensity to drop out of the labor force. Much of the effect, however, is also due to the tremendous changes in timing of market work by women who remain in the labor force in both years. The statistics in Table 6 also show that in all groups except those having a first birth husbands make greater changes in their work/leisure timing than do their wives. The opposite is true, however, if the sample is restricted to working couples: Among working couples wives' schedules change more than their husbands' regardless of the presence of children or their flow into or out of the household.

These descriptive statistics are suggestive but not conclusive: They fail to hold constant for each partner's education and potential labor-force experience, both of which will partly determine the stability of their labor-force attachment and perhaps also their timing of work/leisure. Most important, they do not adjust for each partner's total hours of market work, which seems especially important given the apparent differences between working couples and other couples. We cannot infer whether childbirth

and the presence of children cause more disruption to husbands' or to wives' schedules beyond the effects on integrated workhours unless we also account for other demographic and economic factors.

Because of these difficulties and the clearly different results for working couples I estimate equations describing the determinants of $DIFF^j$ for each spouse and do so separately for working couples and others. Each equation includes the standard CPS human capital measures as well as indicator variables describing the person's race, whether or not he/she is Hispanic, and the couple's geographic location. I exclude from the sample couples where a child leaves the household.[14] The category excluded from the vector of family-status indicators, and thus the category to which the other effects must be compared, is couples with no children. Because $DIFF^j = 0$ for many of the people in the sample, has a few very large values, and takes on only integer values, I estimate Poisson regressions to describe its determinants.[15]

Table 7 presents the results of the estimation for husbands and wives where at least one spouse (typically the wife) was out of the labor market in Year t-1 and/or Year t, while Table 8 presents estimates based only on those couples in which both the husband and wife had positive hours of market work in both Years t-1 and t. Because the first pair of columns in each table holds constant demographic and human capital measures along with each person's weekly hours of work in Years t-1 and t, it shows how the timing of work/leisure is affected net of any effects on the spouse's labor-force attachment and hours supplied.

Among couples that are less attached to the labor force (nearly all of them where the wife does not work in one or both years), the results in Table 7 show that the birth of a child (except for the impact of a first birth on the wife's schedule) leads to smaller net effects on both spouses' schedules than on those of otherwise similar couples with no children. A first birth raises $DIFF^F$, but a higher-order birth has an almost equally large negative effect. That the effect of a first birth is essentially zero among men in Table 7 implies that, among couples with the wife less attached to the labor force, the entire net

change in work schedules in response to the birth is by the wife. Among strongly-attached couples, the results in Table 8 indicate that having a new child, or even having children in the household, leads couples to larger year-to-year changes in both husbands' and wives' schedules than we observe among couples without children (the group excluded from the vector of indicator variables).

Couples react differently to first births than to subsequent ones. The evidence in both Tables 7 and 8 indicates that, accounting for demographics and for hours worked in the previous and current years, a first birth disrupts the new mother's schedule much more than it does the new father's. It is well known that many couples are observed choosing to have the wife spend more time at home with a new child. The results here go beyond that: The arrival of a first child generates greater instability in schedules of otherwise identical wives than in those of their husbands. Even when wives retain their attachment to the labor force, and even accounting for the amount of time they spend in market work, the birth of a first child leads them to alter their schedules more than do their husbands. Childbirth imposes extra labor-market costs on new mothers beyond those that are measured by changes in their labor-force participation and their total workhours. Intriguingly, however, subsequent births affect both spouses in the same direction and to almost the same degree. The distinguishing event between the spouses is the first birth.

The estimates presented in the third and fourth columns of Tables 7 and 8 measure whether the effects on $DIFF^j$ of a first birth, a subsequent birth or merely of having children present differ across workers whose total supply of hours to the labor market differs, conditional on their labor-force participation. Adding the coefficients on each pair of interaction terms (two for each category of children present) shows that they are generally negative for husbands in Table 7. This implies that among these couples husbands who work more hours maintain their work schedules more rigidly after the birth of a child, or when children are present at home, than do husbands whose market effort is less. On the other hand, the sums of the pairs of interaction terms are positive for wives in these couples.

Those wives who worked more before or after the birth alter their schedules more than other new mothers. That the sums of coefficients on all three pairs of interactions have opposite signs for women and men is further evidence of specialization, in this case in the dimension of scheduling activities, among such "traditional" couples.

Consider now the results for couples with both spouses working in both years, shown in the second pair of columns of Table 8. For wives the sums of coefficients are positive, although not significantly so for first births. Among husbands, however, they are negative for first births and among couples with an unchanging number of children, and positive for higher-order births (but insignificantly different from zero in all cases). Even in these "modern" couples life events have different impacts on spouses' schedules, with wives who work longer hours bearing a greater cost of childbirth in the form of disruptions in their work schedules than do husbands who work longer hours.

The unifying result in these estimates is that a first birth disrupts the schedules of new mothers more than it does new fathers (holding their total workhours constant), regardless of the spouses' commitment to market work. While some couples may be "traditional" in their attachment to the labor market, and others may be "modern," in all cases it is the wife's schedule that changes net of any change in total market workhours after a first birth. The only distinction between these two types of couples is in their response to higher-order births, which generate similar disruptions to both spouses' schedules among modern couples, but which disrupt wives' schedules much more than husbands' in traditional couples.

The final issues in examining the impact of childbirth on couples' work/leisure timing are how the prenatal jointness of the timing of spouses' activities affects their time use and how the differences in their full earnings alter the burden of adjusting their schedules in response to the birth. Couples in which both partners have a strong attachment to market work offer the best population for examining the net dynamic impact of jointness per se, since for them there is no problem of corner solutions in total

hours of labor supply. Regrettably, couples in which a child was born between Year t-1 and Year t and in which both spouses were in the labor force in both years are relatively few in this sample from the 1970s. Nonetheless, given the rapid growth in the percentage of such couples since these data were collected, this small sample presents the only way of addressing an increasingly important issue.[16]

The left-hand three columns of Table 9 present coefficients from Poisson regressions describing $DIFF^F$, while the right-hand columns present the results of similar regressions describing $DIFF^M$ for such couples. Included in each regression are measures of each spouse's market hours of work in Years t-1 and t, an indicator of whether the birth was second- or higher-order, each spouse's weekly earnings, and a set of demographic indicators. A major result of this exercise is the negative impact of prior jointness, measured by the variable $\tilde{Z}^J_{t-1}$, on the size of the schedule changes, $DIFF^j$. Both the wife and husband change their timing of work and leisure less the more closely coordinated their work/leisure timing was in the year before the child's birth.[17] This finding does not result from differences among couples in integrated workhours, nor is it due to differences in their market wages. It may reflect pure heterogeneity in their ability or desire to rearrange their time use. Greater prior jointness has a much bigger effect in reducing $DIFF^M$ than $DIFF^F$: The stability of husbands' work schedules benefits more from couples' preferences for joint leisure than does their wives'. This finding parallels the sex differences that were noted in Table 3 for the 1970s cross-sections.

The own-wage terms in these equations reflect both a negative income effect on the demand for the disamenity, disruption in schedule, and a negative price effect. The terms in spouse's earnings have the same negative income effect, but the cross-price effects on disruption in schedule should be positive. The restriction that the cross-wage effects on $DIFF^F$ and $DIFF^M$ are more positive than the own-wage effects is satisfied in these estimates. The results imply the reasonable conclusion that a rise in one spouse's opportunity cost causes the couple to meet the demands for caring for the new child by making relatively larger adjustments in the schedule of the other.

The own-wage effect is significantly negative among husbands but essentially zero among wives. One possibility is that the use of time by high-wage wives had been constrained by the menu of schedule choices, and that the birth provides the shock that encourages them to undertake major alterations in their schedules. Since the data set does not provide information on the job changes that often accompany schedule changes, this possibility is regrettably not testable.

The final equation in each triad of columns adds $DIFF^j$ to the equation describing $DIFF^j$. None of the previous results is altered qualitatively by the addition of these variables representing the change in the other spouse's schedule.[18] The parameter estimates demonstrate that among couples where one spouse changes his/her schedule after a birth the other is more likely to change her/his schedule, holding constant each spouse's total market hours and earnings. This result too is consistent with heterogeneity in couples' preferences (or ability) to reschedule their activities in response to this demographic event. By implication each spouse's timing of work/leisure is a dynamic complement with the other's.[19]

VI. Conclusions and Implications

Evidence from the United States in the 1970s and the 1990s shows that spouses prefer to consume leisure together, all else equal: Included in the household utility function (or, taking a household bargaining approach, in each spouse's utility) is a subfunction that reflects increases in spouses' satisfaction if, all else equal, their leisure is synchronous. Spouses schedule their market workhours to allow joint leisure more than would randomly paired men and women. At the same number of total daily hours of leisure couples with higher full incomes consume more of their leisure jointly than do otherwise identical couples; and at a fixed total hours supplied by each spouse, greater changes in one spouse's schedule are associated with greater changes in the other's. I cannot identify whether the ultimate cause of this demand for jointness arises, as I have modeled it, from the couple's preferences or, alternatively, from the technology of household production. Indeed, distinguishing these possibilities is a fruitful avenue for future research, one that may become possible as more extensive data become available. The

results imply regardless that when we model any form of household behavior we cannot ignore the spouses' demonstrated desire to consume leisure together.

This pretty picture is altered by the (self-imposed) constraint of children. A new child reduces, but does not eliminate the jointness of couples' consumption of leisure. The birth of a child is accompanied by the household's rational adjustments in the partners' work/leisure schedules, changes that reflect the opportunity costs of their time. A new child, and the presence of children, has different effects on the work/leisure schedules of the husband and wife. A first birth leads mothers to alter their work schedules more than do other women, while fathers change their schedules less than their wives. Subsequent births, however, have similar effects on both fathers and mothers. Taken together, the results demonstrate the existence of an additional cost of having children, one that, like most of the other costs, is borne disproportionately by mothers.

The instantaneous approach to the study of couples' time use and labor-force behavior helps us to understand aspects of behavior that might otherwise be explained only by "cultural differences." A Moroccan wedding is a two-day feast in which the women and men celebrate simultaneously but separately.[20] Until the mid-20th century many Englishmen spent their leisure hours in the company of other men in the local public house. With rising full incomes the latter phenomenon is much diminished; and one would expect economic growth to cause the former to approach industrialized societies' norm of mixed (joint) celebrations. It might even be that the apparent decline in commitment to an entire community (Putnam, 1995) is partly caused as incomes rise by substitution toward a good with a possibly higher income elasticity, spouses' joint leisure.

Togetherness in a marriage means that spouses have the opportunity to consume leisure jointly and contemporaneously within a day. While the much-analyzed joint decision-making about <u>how much</u> each spouse will work is central to the study of labor-force behavior, the hitherto unstudied issue of <u>when</u> each spouse will work is also crucial. The timing of each spouse's activities reflects their relative

power, the market prices of their time, their total resources and their desires for joint leisure. By analyzing how couples' togetherness is affected by differences among and changes in their circumstances, we can extend the hoary literature on the impacts of incentives on the quantity of hours supplied to the market to infer how they affect the timing of work. Aside from demonstrating the role of incentives along this different dimension, this approach should be applied fruitfully inter alia to the analysis of child-care policies and to the study of levels and changes in inequality of households' welfare.

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Table 1. Descriptive Statistics, Couples in 1970s CPS Panels*

	Group									
	I		II		III		IV			
	$Kid_{t-1}=Kid_t=0$		$Kid_{t-1}<Kid_t$		$Kid_{t-1}>Kid_t$		$Kid_{t-1}=Kid_t>0$		All	
	All Couples									
	M	F	M	F	M	F	M	F	M	F
Work 7-10PM	.098	.032	.132	.037	.104	.047	.115	.041	.111	.041
Work 11-6AM	.075	.025	.103	.026	.089	.035	.088	.032	.088	.032
Age	46.8 (.15)	44.7 (.16)	35.0 (.24)	32.3 (.23)	46.0 (.14)	43.3 (.14)	38.7 (.08)	36.1 (.08)	41.5 (.08)	38.9 (.08)
$\tilde{Z}^J$	15.14 (.05)		15.21 (.08)		14.97 (.07)		14.87 (.03)		14.98 (.02)	
N =	5874		1717		2585		11767		21943	
	Couples Working at Time t									
Work 7-10PM	.107	.057	.134	.136	.117	.102	.125	.112	.119	.094
Work 11-6AM	.083	.041	.112	.082	.092	.075	.093	.090	.091	.072
Age	43.4 (.25)	41.1 (.25)	37.3 (.49)	34.5 (.47)	45.5 (.22)	42.6 (.21)	38.9 (.13)	36.4 (.13)	41.1 (.11)	38.6 (.11)
$\tilde{Z}^J$	13.65 (.05)		13.15 (.13)		13.06 (.09)		13.04 (.05)		13.24 (.03)	
N =	2638		403		1018		4084		8143	

*Standard errors of means in parentheses.

Table 2. t-statistics Describing the Jointness of Work Timing among Working Couples, CPS Matched Samples 1973-78

Year:	t-1	t
Hour:		
Midnight	0.92	0.89
3AM	0.35	0.86
6AM	1.44	1.08
9AM	4.26	4.64
Noon	5.48	4.36
3PM	4.80	3.88
6PM	1.72	1.38
9PM	1.53	1.30
N=	8353	8143

Table 3. Determinants of Hours of Joint Leisure Time, 7129 Working Couples, 1970s, 3605 Working Couples, 1990s[*]

	1970s				1990s			
	Mean (s.d. of means)	(2)	(3)	(4)	Mean (s.d. of means)	(6)	(7)	(8)
H^M	9.107	-.538	-.544	-.564	9.530	-.698	-.699	-.695
	(.016)	(.022)	(.022)	(.022)	(.042)	(.018)	(.018)	(.018)
H^F	8.443	-.597	-.597	-.601	8.851	-.700	-.699	-.701
	(.017)	(.021)	(.021)	(.021)	(.039)	(.019)	(.019)	(.019)
$w^M/100$	2.689	.064	.132	.076	6.720	.055	.064	.058
	(.016)	(.023)	(.018)	(.023)	(.072)	(.011)	(.008)	(.011)
		[.013]		[.016]		[.030]		
[.031]								
$w^F/100$	1.462	.276	.132	.237	4.487	.079	.064	.064
	(.010)	(.037)	(.018)	(.037)	(.049)	(.016)	(.008)	(.016)
		[.031]		[.026]		[.028]		[.023]
$\tilde{Z}^J$	13.161				12.487			
	(.033)				(.061)			
Industry Controls		No	No	Yes		No	No	Yes
Adjusted R^2		.191	.188	.207		.494	.494	.505

[*]The samples include all couples in which each spouse worked at least 6 hours per day (implicitly at least 30 hours per week). Each equation also includes continuous measures of each spouse's age and indicators of each spouse's race and ethnicity, location, and calendar year. Estimated elasticities are in brackets.

Table 4. Ψ Matrices of Couples' Timing of Work Transitions

		Group I		Group II		Group III		Group IV		All	
		$Kid_{t-1}=Kid_t=0$		$Kid_{t-1}<Kid_t$		$Kid_{t-1}>Kid_t$		$Kid_{t-1}=Kid_t>0$			
Hour:											
3AM	$\hat{\Psi}_s$	.938	.019	.924	.023	.912	.028	.910	.031	.919	.026
		.021	.022	.034	.020	.029	.032	.033	.027	.029	.026
	Ψ_s	.942	.018	.927	.020	.911	.027	.912	.029	.921	.025
		.020	.020	.034	.019	.028	.033	.033	.026	.029	.025
9AM	$\hat{\Psi}_s$	.361	.142	.216	.194	.284	.137	.257	.129	.287	.138
		.132	.365	.138	.452	.151	.427	.148	.466	.144	.431
	Ψ_s	.388	.110	.219	.183	.287	.125	.258	.112	.293	.119
		.129	.373	.143	.454	.147	.441	.148	.482	.142	.446
3PM	$\hat{\Psi}_s$	.333	.153	.205	.189	.265	.147	.231	.138	.264	.147
		.145	.370	.149	.457	.164	.424	.158	.473	.155	.435
	Ψ_s	.359	.126	.214	.204	.268	.134	.229	.127	.267	.134
		.142	.373	.146	.436	.169	.429	.159	.484	.155	.444
9PM	$\hat{\Psi}_s$	.863	.039	.816	.057	.846	.050	.829	.055	.839	.051
		.047	.051	.065	.063	.055	.050	.060	.055	.056	.054
	Ψ_s	.876	.040	.823	.052	.852	.050	.832	.053	.846	.049
		.041	.044	.061	.065	.053	.044	.060	.055	.054	.051
N=		5874		1717		2585		11767		21943	

Table 5. t-Statistics Testing the Persistence of Jointness

	Group				
	I	**II**	**III**	**IV**	
	$Kid_{t-1}=Kid_t=0$	**$Kid_{t-1}<Kid_t$**	**$Kid_{t-1}>Kid_t$**	**$Kid_{t-1}=Kid_t>0$**	**All**
	All Couples				
Hour:					
3AM	1.03	.51	-.04	.70	1.15
9AM	4.16	.27	.25	.22	1.96
3PM	4.14	.95	.36	-.44	1.25
9PM	2.93	.76	.94	.86	2.59
	Couples with Strong Labor-Force Attachment				
3AM	1.27	.34	.11	.95	38.49
9AM	4.61	.79	.96	1.65	30.00
3PM	4.13	1.02	1.79	3.05	26.68
9PM	3.39	.57	1.00	1.23	35.98

Table 6. Changes in Timing, All Couples and Working Couples, by Family Status*

	All couples		Working Couples	
Group	**M**	**F**	**M**	**F**
I. $Kid_{t-1}=Kid_t=0$	2.725	1.788	1.835	1.950
	(.058)	(.045)	(.074)	(.069)
IIA. $0=Kid_{t-1}<Kid_t$	3.184	3.299	2.230	5.390
	(.187)	(.162)	(.264)	(.249)
IIB. $0<Kid_{t-1}<Kid_t$	3.376	1.807	2.582	4.123
	(.149)	(.112)	(.291)	(.294)
III. $Kid_{t-1}>Kid_t$	2.974	1.984	1.964	2.652
	(.092)	(.072)	(.130)	(.137)
IV. $Kid_{t-1}=Kid_t>0$	3.086	1.818	2.304	2.712
	(.044)	(.032)	(.075)	(.069)
All	2.993	1.874	2.110	2.595
	(.032)	(.024)	(.048)	(.046)

*Standard deviations of means in parentheses.

Table 7. Poisson Estimates of the Determinants of DIFF, Couples with Looser Labor-Force Attachment[*]

	M	F	M	F
Ind. Variable:				
$0=Kid_{t-1}<Kid_t$	.007	.204	.235	-.331
	(.028)	(.042)	(.062)	(.064)
$0<Kid_{t-1}<Kid_t$	-.054	-.141	.369	-.955
	(.022)	(.040)	(.051)	(.058)
$0<Kid_{t-1}=Kid_t$	-.056	-.023	.359	-.699
	(.013)	(.020)	(.025)	(.029)
H_t	-.062	.208	-.070	.101
	(.001)	(.002)	(.002)	(.004)
H_{t-1}	.006	.039	.052	.077
	(.001)	(.002)	(.002)	(.004)
$(0=Kid_{t-1}<Kid_t)*H_t$			.033	.055
			(.007)	(.009)
$(0<Kid_{t-1}<Kid_t)*H_t$			.025	.141
			(.005)	(.010)
$(0<Kid_{t-1}=Kid_t)*H_t$			.008	.145
			(.003)	(.004)
$(0=Kid_{t-1}<Kid_t)*H_{t-1}$			-.061	.059
			(.007)	(.010)
$(0<Kid_{t-1}<Kid_t)*H_{t-1}$			-.081	.027
			(.005)	(.010)
$(0<Kid_{t-1}=Kid_t)*H_{t-1}$			-.065	-.051
			(.003)	(.004)
Pseudo-R^2	.042	.283	.047	.305

[*]Each equation is based on 12,707 couples in which one spouse did not work in at least one of the two years. It includes continuous measures of education and potential labor-force experience (and its square), and indicators of race, ethnicity, location, and calendar year.

Table 8. Poisson Estimates of the Determinants of DIFF, Both Spouses Working Both Years*

	M	F	M	F
Ind. Variable:				
$0=Kid_{t-1}<Kid_t$	.070	.235	.549	.147
	(.043)	(.032)	(.325)	(.131)
$0<Kid_{t-1}<Kid_t$	.221	.221	-.118	-.244
	(.042)	(.036)	(.325)	(.123)
$0<Kid_{t-1}=Kid_t$	.168	.181	.346	-.044
	(.020)	(.020)	(.138)	(.073)
H_t	-.038	-.163	-.007	-.199
	(.007)	(.002)	(.012)	(.004)
H_{t-1}	-.026	.090	-.046	.093
	(.007)	(.003)	(.012)	(.007)
$(0=Kid_{t-1}<Kid_t)*H_t$			-.148	.026
			(.042)	(.010)
$(0<Kid_{t-1}<Kid_t)*H_t$			-.030	.056
			(.033)	(.009)
$(0<Kid_{t-1}=Kid_t)*H_t$			- .042	.055
			(.015)	(.004)
$(0=Kid_{t-1}<Kid_t)*H_{t-1}$			.093	-.011
			(.037)	(.015)
$(0<Kid_{t-1}<Kid_t)*H_{t-1}$			.067	.026
			(.033)	(.013)
$(0<Kid_{t-1}=Kid_t)*H_{t-1}$			.022	-.007
			(.015)	(.008)
Pseudo-R^2	.022	.185	.022	.189

*Each equation is based on 6651 couples in which both spouses worked in both years, and includes continuous measures of education and potential labor-force experience (and its square), and indicators of race, ethnicity, location, and calendar year.

Table 9. The Impact of Wages and Prior Jointness on Postpartum Schedule Changes ($DIFF^j_t$), 543 Couples with Both Spouses Working Both Years*

	Wives			Husbands		
Ind. Variable:						
$w^F_{t-1}/100$	-.002	.013	.001	-.011	.120	.132
	(.029)	(.029)	(.029)	(.046)	(.043)	(.043)
$w^M_{t-1}/100$	.014	.013	.020	-.164	-.154	-.170
	(.017)	(.017)	(.017)	(.030)	(.031)	(.032)
H^F_{t-1}	.109	.095	.103	-.077	-.176	-.200
	(.008)	(.009)	(.010)	(.015)	(.014)	(.015)
H^F_t	-.162	-.162	-.162	-.018	-.020	.0001
	(.006)	(.006)	(.006)	(.007)	(.007)	(.008)
H^M_{t-1}	-.012	-.023	-.020	.030	-.083	-.082
	(.016)	(.016)	(.016)	(.022)	(.021)	(.021)
H^M_t	.007	.010	.012	-.080	-.040	-.042
	(.017)	(.017)	(.016)	(.025)	(.024)	(.024)
$\tilde{Z}^J_{t-1}$		-.024	-.017		-.221	-.217
		(.008)	(.008)		(.009)	(.009)
$DIFF^j_t$			.011			.032
			(.005)			(.007)
Pseudo-R^2	.282	.284	.285	.033	.173	.178

*Each equation here also includes indicators of race, ethnicity, location, whether this is a first birth, and calendar year.

FOOTNOTES

[1]The result for "traditional" couples goes back at least to Durand (1948). Recent work distinguishing between "traditional" and "modern" couples is Lundberg and Rose (1998).

[2]The popular press contains many descriptions of how couples cope with problems of timing work and young children (e.g., Wall Street Journal, February 25, 1998, p. B1; New York Times, April 26, 1998, Section 3, p. 11).

[3]Younghwan Song has pointed out that the National Survey of Families and Households covered nearly 10,000 randomly selected households in 1987-88 and 1992-94. Unfortunately, the number of usable couples out of this data set is one-fourth that from the data sets used here. Accordingly, while the NSFH is well worth examining in further work, it cannot substitute for these longitudinal data.

[4] Data for 1976 and 1977 could not be matched because of changes in some of the coding.

[5]The matching procedure makes it highly likely that the same two people observed in Year t-1 are in the observation in Year t. In the unlikely event that the residence was occupied in Year t by a couple in which **both** husband and wife were the same age and race and had the same educational attainment as their counterparts who lived there in Year t-1, we would mistakenly include these two couples as a single couple observed longitudinally. These measurement errors would bias the results against finding any evidence of dynamic jointness in the demand for leisure.

[6]This matching procedure means that we delete the small number of couples who divorce between Years t-1 and t. There is weak evidence that the probability of subsequent divorce is inversely related to the jointness of activities (measured by spouses' subjective response that they do things together, Hill, 1988), but the fraction of marriages that end in divorce each year is sufficiently small that any biases caused by this selection are unlikely to generate major effects on the results here. The matching procedure also means that we are selecting on couples who choose to marry, so that we cannot get at any potential problems of nonrandomness in the decision to marry in relation to each person's innate preferences for jointness.

[7]The only errors in this indicator of a birth arise if the couple adopted a child, acquired custody of one spouse's child, or became foster parents. Since the overwhelming majority of adoptions are of infants, for purposes of analyzing spouses' responses to childbirth adoption will probably have the same behavioral impact. Foster parenting is a problem, and to the extent the fostering is of older children and is more widespread, the categories that we use to distinguish between new parents of very young children and other couples are blurred. This type of measurement error also biases downward any estimates of behavioral differences between new parents and other couples.

[8]If we include all working couples the results are quite similar, except for a substantially lower coefficient on wife's hours.

[9] Data on numbers of children are defined differently in the 1970s and 1991 data, and are not available in the 1997 data. Because of that I exclude indicators of family structure from the estimates, although I reestimated the equations for the 1970s without these variables with no qualitatively important change in the conclusions in the text. The results for both decades also do not change qualitatively if we control for both spouses' educational attainment.

[10]A regional difference exists in the demand for jointness. In the "Rust Belt," defined here as the New England, Mid-Atlantic and East North Central subregions, joint leisure was a significant 0.4 hours per day lower in both the 1970s and the 1990s among otherwise identical couples than in the rest of the United States. Whether this reflects differences in tastes or differences in the (unmeasured) constraints on couples' choices is not clear.

[11]An additional test of the validity of this approach asks how well one could have predicted $\tilde{Z}^{J}_{90s}$ with knowledge of the structure of the relationship in the 1970s and the means of the determinants of $\tilde{Z}^{J}_{90s}$. Using the PCE deflator to adjust 1990s wages, and the coefficients in Columns (2) and (6), this decomposition shows that only 26 percent of the change in $\tilde{Z}^{J}$ between the 1970s and the 1990s was explicable by changes in the independent variables. Most of the change resulted from changes in the coefficients.

[12]Neither this evidence nor the estimated impact of total hours on the demand for jointness is affected qualitatively if the samples are restricted to couples in which both spouses are under age 40.

[13]The one-year interval between t-1 and t may be insufficient to observe all adjustments in the extent of jointness. If so, however, any effects that we find must understate the eventual impact of a birth on the couple's jointness. One should also note that too long an interval between t-1 and t would miss out on the maximum effect of the birth. Clearly, the ideal data set would include frequent observations that allow us to trace the rise and then decline of any impact on jointness.

[14]The results are essentially unchanged if couples whose child leaves the household are included in the sample.

[15]The parameter estimates change little if the equations are estimated in a more complex fashion (as negative binomials) or more simply (using least squares). In some of the negative binomial estimates, however, the extremely high t-statistics are substantially reduced, although all the inferences that are drawn in the text remain based on statistically significant estimates. They also are altered little, and not in qualitatively important ways, if we include the other spouse's current and lagged total workhours in the equations.

[16]Among married couples with children under age six 36.6 percent of mothers worked for pay in 1975, while 63.6 percent were working for pay in 1997 (Statistical Abstract of the United States, 1975, 1998).

[17]This result is robust to respecifying the equations to delete the spouses' current hours of work.

[18]Alternative estimates that use predicted values of the $DIFF^{j'}$ did not qualitatively change the results.

[19]The analogy here is to the dynamic complementarity (substitutability) of inputs in production (Hamermesh, 1993, Chapter 6).

[20]Report of Deborah White on the wedding of her daughter in Tétouan, Morocco, July 15-16, 1998.