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ABSTRACT

Nobody to Play With?
The Implications of Leisure Coordination*

We hypothesize that an individual's time use choices are contingent on the time use choices of others because the utility derived from leisure time often benefits from the presence of companionable others inside and outside the household. We develop a model of time use, and demonstrate that its consistency with the behaviour of British working couples in the 1990s. We present evidence of the synchronisation of working hours by spouses and report estimates indicating that propensities to engage in associative activity depend on the availability of Suitable Leisure Companions outside the household. Our results indicate the importance of externalities in the working time decisions of individuals.

JEL Classification: D13, I31, J22

Keywords: time use, leisure, labour supply, work hours

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1. Introduction

The hypothesis of this paper is that an individual's time use choices may be contingent on the time use choices of others, because the utility derived from leisure time often benefits from the presence of companionable others. We develop this idea using a model of time use, and show that it is consistent with the behaviour of British working couples in the 1990s.

Although the labour supply literature has often started from the premise that individuals maximize the utility they derive from their non-work time and their own consumption of market goods, time spent in isolation is, for most people, only pleasurable in small doses. Many of the things that people do in their non-work time (from bowling to choral singing) involve other people, and are distinctly more pleasurable if done with others; indeed many things (such as playing cricket or poker) are impossible without others. However, the huge variety of leisure tastes that people have means that individuals face the problem of locating Suitable Leisure Companions – 'somebody to play with' – and of scheduling simultaneous free time. Consequently, if paid work absorbs more of other people's time, each person will find their own leisure time scheduling and matching problem more difficult to solve (i.e. their leisure hours will be of less utility). As a result, there is an externality to individual labour supply choices that implies the possibility of multiple, sometimes Pareto-inferior, labour market equilibria.

The standard household labour supply model would frame this issue in terms of the leisure time of husbands and wives being complementary goods (see Killingsworth, 1983:32). And as Hamermesh (2002:621), for example, has found for the USA, there is 'clear evidence that couples arrange their work schedules to allow time for leisure that they consume jointly'. We provide new British evidence of such synchronisation of working hours.[1] However we also go further and examine empirically the co-ordination of leisure activities with others outside the household, using direct measures of associational activity as indicators of the availability of Suitable Leisure Companions outside the household. Our results can therefore help to explain the trends in associational life and social capital stressed by Putnam (2000).

We begin with a theoretical model that illustrates why one might expect to observe interdependence of time use choices among individuals (Section 2). This model implies that

one would expect substantial interdependence in labour supply choices and leisure time usage among spouses. We extend the model to argue that the leisure time choices of household members will also depend on the opportunities for associational life that exist outside the household.

Our empirical analysis of the labour supply and associational activities of working couples follows. After discussion of our British Household Panel Survey (BHPS) data (Section 3), we present preliminary evidence indicating that, across British regions, the likelihood of associational activity for persons of a given age group depends on the percentage of persons in other age groups that also engage in that activity (Section 4). We then provide new evidence about the synchronisation and scheduling of spousal work time, and of dependence of an individual's engagement in associational activity on the working time and leisure activity decisions of others, both inside and outside the household (Sections 5 and 6). The implications of our arguments are discussed in Section 7.

2. Leisure coordination and labour supply

Although one can choose to be alone, relatively few leisure activities are intrinsically asocial. Most leisure activities can be arranged on a continuum of 'teamness', and most of them are distinctly more pleasurable if done with others.[2] Playing softball or soccer are activities that make no sense if done alone. Singing to oneself may be something done in the shower, but singing with a choir is generally a different level of experience. Even growing roses or going for a walk or watching television is usually more pleasurable if done with someone else or with a club. Reading a novel is certainly solitary, but many people also like to talk about it afterwards, either formally in a book club or informally with friends over dinner. To list these activities is to underscore the variety of leisure tastes that individuals

[1] Other studies of work time synchronisation, all based on based on time use surveys, include Hallberg (2003, for Sweden), Sullivan (1996, Britain), and van Velzen (2001, Netherlands).

[2] Corneo (2001) contrasted privately consumed leisure time (TV watching) and socially enjoyed leisure (which requires investment in relationships). Our approach differs, since we argue that although solo television watching is certainly feasible, companionship may nonetheless increase the utility derived from the activity, and we want to model more explicitly the constraints involved in locating Suitable Leisure Companions. However, his model is consistent with ours in spirit and implications. Weiss (1996) examined the co-ordination of working hours. His model could be relabelled to explain the co-ordination of leisure hours and is, in this sense, consistent with ours, but he does not consider work and leisure jointly. Winston (1982) is a pioneering study of the timing of economic activities *per se*. Our emphasis on the importance of sociability for choice has some similarities with discussion of 'relational goods' by Uhlaner (1989). Juster has compared the self-reports of satisfaction derived from 25 specific activities (including jobs and types of housework and leisure) and has argued that, in general, 'activities that involve interaction tend to have high process benefit scores' (1985:21). Seventy years

have, which creates the problem of locating 'somebody (similar) to play with', and scheduling the simultaneous free time to do so.

If paid work absorbs more of other people's time, each person will find their own leisure time scheduling and matching problem more difficult to solve. If a general increase in working time means that bird watching clubs close because everybody is too busy to organize outings and chess clubs fold because people don't go anymore, then the marginal utility of the leisure time of bird watchers and chess players will decline. Since both formally organized activities (like bowling leagues) and informal matching (such as the chances of picking up a singles game at the tennis club) depend on how many other like-minded people have free time, at the same time, the marginal utility of leisure time of each person is conditional on how many hours other people are working, and when.

2.1 A model of the division of time between work time, and solo and social leisure time

Traditional labour supply theory starts, in a one period model, with each individual maximizing a utility function, as in equation (1):

$$U = u(C, L) \tag{1}$$

where C represents consumption and L represents non-work time. In this paper, we will work with the more general formulation of a two person household, and use the subscripts m and f to represent the individual partners. Since one can reduce the unitary household model to an individual model by simply deleting either the 'm' or the 'f' terms, nothing is lost and generality is gained by presenting a household model.

Total consumption of goods by the household can be divided into the privately consumed goods of each partner and their joint consumption of household public goods i.e. $C = C_m + C_f + C_p$. There is a large literature, for example Lam (1988), discussing the impact of this division of household income on labour supply but, for present purposes, we do not need to distinguish between types of consumption goods. All that we need to assume is that there is a sharing rule for household goods consumption and that the utility of a couple is positively affected by an increase in aggregate consumption. In this context, if married couples jointly maximize household utility, in a unitary model of decision making, then (1C) represents the appropriate maximand:

$$U = u(C, L_m, L_f). \tag{1C}$$

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ago, Frank Knight (1933:3) also emphasized that the purpose of economic activity was as a prerequisite to the enjoyment of 'the intercourse of friends in 'aimless' camaraderie'.

In this model, the wage rate(s) available in the paid labour market (w) and the total time available for hours of paid work (H) and non-work time (L) are seen as the fundamental constraints.[3] For a couple with unitary decision-making, the constraints are expressed by (2C) and (3C):

$$H_m + L_m = H_f + L_f = T \tag{2C}$$

$$C \leq w_m H_m + w_f H_f. \tag{3C}$$

By contrast with the conventional model, let us now suppose that individuals can spend their non-work time either alone or in social leisure.[4] We denote the non-work hours spent alone as A and the non-work time spent in social leisure as S.

Suppose further that in order to enjoy social leisure, each individual must arrange a leisure match with some other individual (or group of individuals) from among the list of possible contacts that they have at the start of each period. We assume as well that before arranging their social life, individuals have to commit to a specific duration and timing of their work hours.[5] In this model, individuals decide how many hours they want to work, and must start each period by making a commitment to a specific number of work hours, at specific times. This determines household money income, which together with the sharing rule of their household determines the utility from material consumption. However, at the start of the period, the utility to be derived from social life is uncertain because the search process for Suitable Leisure Companions involves uncertainty, since some desired matches may not be feasible. Time spent alone, and not working, is the residual after work and social commitments are honoured.

Total utility experienced during the period will be given by (4C) for a couple with unitary decision-making:

$$U = u(C, A_m, A_f, S_{m0}, S_{m1}, \ldots, S_{mn}, S_{f0}, S_{f1}, \ldots, S_{fn}) \tag{4C}$$

where A represents non-work time spent alone, and S represents social leisure. We use the subscripts m and f to denote the different partners and adopt the convention that the social leisure time each partner spends with each other is denoted as 0 (hence $S_{m0} = S_{f0}$). Other

[3] Clearly, this formulation assumes that work hours are available without quantity constraint at a constant real wage, without progressive taxation. Non-labour income (from capital or transfer payments) is assumed to be zero, and any complications of human capital investment through on the job training are ignored.

[4] We shall ignore issues of time spent in household production in order to focus on the leisure time dimension. Alternatively, one can think of household production choices as being part of H, and the goods produced by household labour as part of C.

[5] To keep things simple, we assume that the process of arranging one's social life takes no time at all, even if its results are uncertain, *ex ante*, at the start of each period (one could call this a 'speed dialling' assumption). We assume below that one of the benefits of living in a couple is joint access to social contacts: each partner now has a contact list equal to $k_m + k_f$.

social matches are subscripted by 1,…,n and 1,…,n' where n and n' are the number of realized social leisure matches for each partner.

Our model is, therefore, a generalization of the traditional model, and the traditional model can be seen as nested within it. In the traditional model, it is only the total amount of non-work time (the sum of social and solo leisure) that matters: the division of that time between time spent with others and time spent alone is irrelevant.[6] A testable implication is that, in any regression in which time-use explanatory variables appear, coefficients on corresponding social leisure time and solo leisure time variables should be identical.

Consider now the solution to the extended model. The problem with wanting to have a social life is that one cannot do it unilaterally: arranging a social life involves a search process which is constrained by the social contacts available to each person, and by the availability of other people. We can denote the list of such social contacts at each point in time as k for an individual person and the contacts of each couple as $k_m + k_f$. One can think of each match with a possible Suitable Leisure Companion from a person's list of contacts as having a given level of utility associated with it but, in order for there to be a match, both parties must agree on its timing, duration and purpose.[7] Social leisure therefore comes in discrete engagements, and it is not certain – at the point in time when the individual must commit to a given number and timing of work hours – which social matches will prove feasible.[8]

Denote the probability that a specific leisure match will be feasible by p_i, where the subscript i indexes the identities of possible Suitable Leisure Companions, and the utility associated with that match as $u(S_i)$.[9] The expected utility of a specific social leisure match is then given by $p_i u(S_i)$. Single individuals will then maximize their expected utility as in (5), while unitary couples will maximize (5C):

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[6] Taken literally, this implies that, with a given amount of consumption goods and work time, a person's utility level would be unaffected were they to be deprived of social leisure altogether.

[7] When utility from a possible contact falls short of the reservation utility of being alone, no match will be sought with those individuals.

[8] One can think of each potential social match as involving some implicit bargaining between the participants as to duration. In this paper we do not need to enquire as to the solution algorithm. It could be Nash bargaining or determined by some other mechanism, such as social norms of protocol. All that is needed for this paper is that the duration cannot be unilaterally determined by *both* parties, which implies that individuals typically cannot equate exactly the marginal utility of social leisure time and their reservation utility of time. This implies that individuals compare the *average* utility per hour of a social leisure time match with their reservation price of time, which can be thought of as the 'I would have liked to have left half an hour ago but, on the whole, I'm glad I attended' phenomenon.

[9] Without loss of generality one could index potential matches by timing, duration, and purpose, as well as by the identity of the other leisure companions.

$$\max \mathrm{E}(U) \;=\; u(C) + \Sigma_i \hat{I}_k \, p_i u(S_i) \;+\; u_A[T - H - \Sigma_i \hat{I}_k \, p_i u(S_i)] \tag{5}$$

$$\begin{aligned} \max \mathrm{E}(U) \;=\; & u(C_f) + u(C_m) + p_{i0}[u_m(S_0) + u_f(S_0)] \\ & + \Sigma_{i \in km+kf} \{ \, p_{im} u_m(S_{im}) + p_{if} u_f(S_{if}) \} \\ & + u_{Am}[T - H_m - p_{i0} u_f(S_{i0}) - \Sigma_{i \in km+kf} \, p_{im} u_m(S_{im}) \,] \\ & + u_{Af}[T - H_f - p_{i0} u_m(S_{i0}) - \Sigma_{i \in km+kf} \, p_{if} u_f(S_{if}) \,] \end{aligned} \tag{5C}$$

where u_{Am} and u_{Af} are the utilities of non-work time spent alone.

To illustrate how our model compares with the traditional model, consider first how an individual's labour supply decision is usually pictured. In the traditional model, the graph summarising the marginal utility of time derived from paid work (i.e. the marginal utility of the consumption goods enabled by paid work) is drawn to represent the assumption that paid work hours are continuously available and can be decided with certainty at the start of each period.[10] Since there are assumed to be only two possible uses of total time, the hours of work decision directly determines hours of leisure time, whose utility is also known with certainty. Both goods consumption and leisure time are assumed to have diminishing marginal utility, so utility is maximized when the marginal utility of time used for work and for leisure is equal, and one can denote the implied optimal labour supply as H^* hours.

In our model, the returns to paid work are represented in exactly the same way as in the traditional model, and as implying the same amount of paid working time (H^*) – our interest is in examining the implications of social and solitary ways of spending non-work time. Since we assume that each period must be started with a decision about working hours, this decision determines total hours of non-work time, and we assume that households will try to maximize the utility to be derived from any given amount of non-work time by comparing the utility to be derived from solo and social leisure time.

Figure 1 presents a diagrammatic treatment of the choice process in our model. It represents the (household's) utility derived from the allocation of time for each individual in a household – we do not replicate the analogous figure that could be drawn for each other household member. (Accordingly, the *m* and *f* subscripts are dropped from now on.) In a unitary model of household labour supply the relevant marginal utility of leisure, and of consumption, are defined by the household's utility function. (In a model of individual labour

supply, the structure of the model is identical, but the relevant utility function is that of the individual.)

<Figure 1 near here>

In order for a decision about total work hours (H^*) to be optimal, the expected marginal utility of all three uses of time (work, solo leisure and social leisure) must be equal for each individual in the household. The optimal ex ante division of time between desired solo and social leisure is pictured in the right hand side of Figure 1. We assume a given set of decisions by *other* people as to their working hours, which determines the probability vector p_i defining the chances that specific leisure matches will be feasible. This determines in turn, for each individual, the marginal utility of social leisure function MU_S. The diminishing marginal utility of solo leisure is represented by the line labelled MU_A.

In order to indicate the uncertainty of the search process for Suitable Leisure Companion(s), dashed lines are used. The marginal utility of social leisure is drawn in discrete steps to represent the idea that because social leisure time must, by definition, involve an agreement with others about the duration of time to be spent together, it will typically come in discrete lumps. Clearly there is a hierarchy in the expected utility to be derived from specific possible leisure matches, and the downward slope of the MU_S function represents the idea that potential social matches can be ordered by their expected utility. Matches at the top of the steps of the MU_S function represent social engagements with highest expected utility, whereas social matches on the bottom steps (where MU_S is below u^*) correspond to engagements that would be rejected as having less expected utility than time spent alone.

The MU_S function is conditional on the labour supply decisions of others, and on the own labour supply decision made at the start of each period. Utility-maximizing couples will want to choose the division of total time which equates (as nearly as possible) the marginal utility that the household derives from working, and from social leisure and solo leisure time. Hence, Figure 1 is drawn to illustrate the equilibrium condition that $MU_{H^*} = MU_{A^*} = MU_{S^*}$.

The issue we want to stress is the problem of arranging a social life. Our model summarizes this problem in terms of the probability of finding a feasible leisure match with some other specific Suitable Leisure Companion(s), the statistic p_i. That probability depends on the amount of time potentially available, i.e. when neither party to the potential match is

[10] For our present purposes, we can assume either a constant money wage per hour with diminishing marginal utility to additions to material consumption, and/or that the marginal productivity (and wage) of each worker decline with greater working hours.

committed to working. Since the timing and the duration of their mutual engagement cannot overlap with the working time of either party, p_i is clearly negatively associated with both own work hours (H), and the work hours of Suitable Leisure Companion i that do not overlap with the own work hours (H_{in}).[11] Together H and H_{in} characterise the time available for a match:

$$p_i = g(H + H_{in}) \tag{6}$$

where $g'(H) < 0$, and $g'(H_{in}) < 0$.

Longer work hours, or less co-ordinated work hours, by other people both imply a decline in p_i (the probability of a specific match being successful) and hence a decline in the expected utility of specific leisure matches $p_i u(S_i)$. For present purposes, we can assume that the marginal utility derived from the consumption enabled by own working hours (MU_H) remains unchanged. However, if the probability of arranging good leisure matches falls, then the marginal utility of social leisure time (MU_S) will decline. This is represented in Figure 1 by the downward shift to the new schedule labelled $MU_{S'}$.[12]

Given the equilibrium condition $MU_{H^*} = MU_{A^*} = MU_{S^*}$, and the decline in the marginal utility of social leisure time (MU_S), our model predicts that one's own hours of work increase from H^* to H^{**}. This implies that, in Figure 1, the marginal utility of solo leisure schedule (MU_A) shifts to the right, but its shape remains the same (since nothing has happened that would affect the pleasures of a marginal hour of solitary leisure).

Our model does not presume that social leisure always generates more utility than solo leisure, just that it *sometimes* does. (Since it is easy to observe people voluntarily choosing social leisure, this hypothesis seems obvious to us.) Given that proposition, our model predicts unambiguously that an individual's working time will increase and social leisure time will decrease, when social leisure time becomes harder to arrange, as others work more hours, or work more inconvenient hours. However, we do not have clear predictions

[11] Since some people are in 'on-call' work situations or have jobs with involuntary overtime or rotating shifts, one should really think of 'hours available for work', rather than 'hours actually worked' in analysing scheduling issues. Equation (6) writes the probability of a successful leisure match as dependent only on the time available to each potential pair of leisure companions. This ignores any capital or other inputs required for a specific leisure activity (e.g. squash court availability) and the consequent possibility of short run congestion effects in leisure industries. If leisure activities require capital inputs and if there were a general decline in working hours, greater congestion in leisure facilities would be likely to produce both some substitution of activities and capital inflow. Strictly speaking, (6) represents the probability of a specific (marginal) leisure match. We leave the specification of a full model of the leisure production function, and the supply of leisure facilities, to further work.

[12] There is no necessary reason to assume that all potential leisure matches are affected by a general increase in the work hours, or work scheduling, of others. All that matters is that the marginal leisure match is affected. Hence Figure 1 is drawn so that $MU_S = MU_{S'}$ over an initial range.

about the absolute or relative amount of solo leisure. Total time is equal to working time plus solo leisure plus social leisure ($T = H + A + S$), and when the expected utility of a leisure match ($p_i u(S_i)$) falls, working time increases ($H^{**} > H^*$) and social leisure time falls ($S^{**} < S^*$). The time spent in leisure alone is the time which is left over after the satisfaction of work and social commitments: $A^{**} = T - H^{**} - S^{**}$ and $A^* = T - H^* - S^*$. However, we cannot predict whether solo leisure time increases or decreases, relatively or absolutely, until we know the size of $H^{**} - H^*$ and $S^{**} - S^*$.

Our model is more general than that of Hamermesh (2002), who examined the time use decisions of couples concerning work and non-work time, since we are trying to model social leisure spent within and outside the household. Hamermesh concluded that time spent together is a normal good for couples that will increase as full income (hourly wages) increases. This is not a necessary implication of our framework. Although we know that the sum of the pure income effects on market work time, solo leisure, and social leisure, must be zero (since total time must be allocated to one of these three activities), the model of (5) and (5C) is written with such generality that one cannot use it to predict which goods are normal, and which inferior.

Moreover, if hourly wages increase, total working hours may increase or decrease, depending on whether income or substitution effects dominate. Whether or not the proportionate importance of social leisure, $S/(A+S)$, increases or not as total non-work time, $A+S$, increases or decreases cannot be determined by theory alone. In terms of Figure 1, we know that both the MU_A and MU_S schedules are downward sloping, but we need to know their relative slopes, and the slope of MU_H, in order to know if synchronized leisure is a normal good.

There is nothing new in the idea that, as one's own hours of work increase, the total time available for leisure falls. When solitary leisure becomes scarcer, the marginal utility of non-work time spent alone will, *ceteris paribus*, increase. However, we argue that labour supply decisions also reflect the impact of working hours on social life, i.e. that longer work hours will diminish the probability of finding feasible and desirable leisure matches, which implies a decline in the utility derived from social leisure. The net change in utility from non-work time is the sum of these two effects.

The novel point that we wish to stress is that, *ceteris paribus*, when *other* persons increase their hours of paid work, the probability of a feasible and desirable leisure match with oneself falls, which decreases the personal utility of non-work time. In addition, for any given level of total hours of labour supply by each person, greater mismatch between the

timing of hours of work will reduce the probability of a social leisure time match being feasible and will lower the utility of non-work time. By reducing the utility of non-work time, both effects increase desired hours of paid work. Thus in general the desired supply of labour of each person will be conditional on their expectations of the labour supply decisions of others.

In (5C), the third term is the utility derived from spouses spending time together. As many working couples will attest, finding the time to do that may not be a trivial exercise, an issue which we examine empirically in Section 5. The subsequent terms of (5C) refer to the leisure matches that individuals make outside the household. These are the focus of Sections 4 and 6.

2.2 Interdependencies in time use within the household

A primary candidate for a Suitable Leisure Companion is one's spouse. Indeed, most people would argue that the joint enjoyment of non-work time, and the pleasure of one another's company, is a prime reason why people get married in the first place. However, the economic perspective on marriage has typically emphasized something quite different, namely the linkage of individuals through the material benefits of marriage in joint consumption of household public goods (Lam, 1988) and the gains from trade arising from a division of labour between household and market production (e.g. Becker, 1991; Weiss, 1997; Ermisch, 2003). Both these economic perspectives imply interdependence in time use decisions among spouses, albeit from different motivations. But both link the behaviour of spouses through the aggregate budget constraint on the consumption of material goods (which depends on the aggregate hours of work of both partners), and ignore the possibility that couples might want to spend time together.

Our hypothesis is that the time-use decisions of individuals are contingent on the time use choices of others, because many leisure activities are not nearly as much fun if one does them alone. However, our problem is to distinguish this hypothesis from other sources of time use interdependence. The economic perspective on marriage already predicts that the aggregate non-work time of each partner in intact households is linked via the household budget constraint, which conditions the household's potential consumption of local public goods and its division of consumption of private goods. Similarly, although our hypothesis predicts that marital dissolution (through either death or divorce) will alter the availability of a Suitable Leisure Companion, and thereby alter the marginal utility of leisure, such an event will also affect the time usage of the surviving spouse through the associated change in the household

budget constraint. The income effect of household dissolution is the net impact of loss of money income and the change in household economies of scale in aggregate consumption. That income effect on the behaviour of the surviving spouse may be positive or negative for aggregate non-work time, or for specific usages of such time.

Since one might reasonably expect that individuals with similar (unobservable) preferences in either or both of leisure time usage or material consumption are more likely to match up as marriage partners, we expect to observe a correlation across spouses in the *type* of non-work activity they engage in – but this is not really the point we want to make. Rather, our argument is that, conditional on preferences for *type* of activity and the aggregate amount of work and leisure time, individual spouses may derive utility from spending non-work time together. Hence we expect to observe a synchronisation in the *timing* of working hours, for any given *level* of working hours. (I.e. if one presumes that individuals have some scope for decision making over the timing of work hours and that couples communicate, they can coordinate to increase p_{m0} and p_{f0}.)

3. The data and key variables

3.1 The British Household Panel Survey and the analysis sample

Our research is based on data from waves 1 to 9 of the BHPS (Taylor et al., 2002), covering survey years 1991–1999. The BHPS is a good resource for our analysis given its extensive range of time-use variables in addition to standard household survey variables, and we can use the repeated observations on panel respondents to control for unobserved individual effects.

Our empirical analysis focuses on working couples. Although the hypothesis about the impact on leisure time choices of the availability of Suitable Leisure Companions outside the household also applies to single people, we focus on couples here for brevity's sake. (Our empirical modelling can be seen, therefore, as a relatively stiff test of the hypothesis concerning the impact of extra-household externalities, as they will have to reveal themselves in addition to the expected spousal interaction effects.) More specifically, we considered respondents with a full interview, living with a partner (married or cohabiting), with both partners aged 18–59 years, and both in paid employment at the time of the interview (neither partner self-employed). Pooling the data from the nine waves resulted in an unbalanced panel of almost 10,000 couple-year observations from just under 2,500 couples. This sample is more than twice as large as any time use survey sample used in previous analysis of work-

time synchronisation. (Hallberg, 2003, for example, used information on about 1000 Swedish couples.)

3.2 Key variables

For information about couple's synchronisation and scheduling of paid work hours, we used the BHPS question that asks: 'At what time of the day do you usually work? Is it: 1 mornings only; 2 afternoons only; 3 during the day; 4 evenings only; 5 at night; 6 both lunch/evenings; 7 other times/day; 8 rotating shifts; 9 varies/no pattern; 10 other; or 11 daytimes & evenings'.[13,14]

This variable is used in Section 5 to examine the propensities of a husband and wife to be working at the same time of day, defined to mean that each spouse reported the same code. We also used the variable to construct measures of the prevalence of unsocial work hours worked in the region in which the respondent lives. For each of the 18 geographic regions identified in the BHPS, we calculated the pooled-data proportion of employed men reporting that they usually worked rotating shifts or work time varied (codes 8 and 9 above). An analogous variable was created for women. We think of the unsocial hours variables as controlling for the structure of local labour market demand, i.e. the local prevalence of firms whose operations are more profitable if capital can be kept occupied at all hours of the day or whose markets need servicing at unsocial hours. We expect that the greater the prevalence of unsocial hours, the less likely that husbands and wives can synchronize their work times, and the less likely their propensities to be active in associative activities.

For our measures of associative activity, we concentrate on reported activity in a sports club, and in a social group or working men's club. At waves 1, 3, 4, 5, 7 and 9, BHPS respondents were asked if they were *active* in any of the organisations listed on a showcard and then, if so, which one. (In a separate question, respondents were asked if they were a *member* of any of the organisations listed and then, if so, which one.) The showcard listed the following organisations, with percentages of individuals in the analysis sample that were

[13] From waves 2 to 4, this question was not asked of employees still in the same job as in the previous year. For these waves, responses were imputed from the previous waves' values. A new category (11 daytimes and evenings) was recoded at wave 5 from the category 'other', and formally incorporated into the questionnaire from wave 6 onwards.

[14] Our work synchronisation measure is less detailed than the one provided in the US Current Population Survey data used by Hamermesh (2002) or in time use surveys (Hallberg, 2003; Sullivan, 1996; van Velzen, 2001). In these cases, the data enable one to say whether, at each hour during the day, two spouses were working or not. The time use survey samples are smaller than those from population surveys like the CPS and BHPS, but have the advantage that one can investigate whether spouses who synchronise work and leisure hours spend that time with each other. See Hallberg (2003) and Sullivan (1996).

active shown in parentheses: social group or working men's club (12 percent), sports club (24 percent), political party (1 percent), trade union (7 percent), professional organisation (3 percent), environmental group (2 percent), parents association (8 percent), tenants or residents association (4 percent), religious group (9 percent), voluntary service group (3 percent), and a number of other groups (each less than 2 percent). We focus our empirical work on sports clubs and social groups, the two organisations with the greatest prevalence of activity, to reduce potential problems of sampling variability, particularly when disaggregated by region and age group (see below). Parallel analyses that used the corresponding membership variables produced very similar results.

The associative variables were also used to construct measures of the extra-household availability of Suitable Leisure Companions for each relevant activity, separately for husbands and wives and for three age groups (18–30, 31–50, 51–59 years). These measures were used as explanatory variables in our models of propensities to engage in associative activity (see Section 6). For each of the 18 British regions, and for each of the three age groups, we calculated the number of persons in that age group who reported themselves to be active, expressed as a proportion of all sample respondents in that age group (i.e. including singles as well as couples, and regardless of employment status) in the pooled nine-wave data set.[15]

Our measure of work hours refers to hours usually worked (including overtime hours), on a weekly basis. Because the BHPS does not ask about hourly wage rates, we derived these from usual gross pay (converted from a monthly basis to a weekly basis), divided by usual weekly work hours, and assumed that overtime was paid at time-and-a-half. (Results based on an alternative hourly wage variable, derived assuming no overtime premium, differed little and so are not reported.)

3.3 Control variables

To save space, we report regression estimates only for variables of principal interest (full results are available on request). Control variables used, but with effects not reported, were: the respondent's age, the number of children in household aged less than 16 years and whether the youngest child was aged less than six years, whether the respondent was

[15] For organisations other than sports club and social clubs, i.e. those for which the underlying prevalence of membership or activity was relatively low, the sample sizes available at the regional level were often tiny. Since our measures of associative activity and unsocial hours were each calculated at the regional level, we are using a coarse filter. Although it would have been preferable to have had measures of both at the neighbourhood level –

cohabiting rather than legally married, the respondent's educational qualifications (five categories), and the survey year. To account for potential differences in labour demand (in addition to the unsocial hours variables already mentioned), we also controlled for industry of main job (distinguishing between the ten major Standard Industrial Classification groups), and the unemployment rate in the local labour market (the so-called travel-to-work-area). To account for differences in opportunities for individuals to socialise in their work place, we controlled for differences in the number of employees working at the respondent's workplace ('firm size').

4. Preliminary evidence on extra-household interdependence

Because different households are typically not linked through the budget constraint – either through the household production or consumption of material goods – a check for linkages between households in leisure time usage is, in some senses, the cleanest test of our hypothesis. However, before turning to the regression methods of Sections 5 and 6, it is useful to enquire whether simpler methods of analyzing the data provide evidence consistent with our basic perspective. We are arguing that each person's time use choices are typically contingent on the time use choices of others, because the marginal utility of each individual's leisure depends on the choices made by others. In particular, we argue that each person's likelihood of participating in associational life depends on what others in their local area have chosen to do, both because one cannot join a club or association that does not exist for lack of membership and because the more members these organizations have, the more attractive they are to prospective members. If there is this positive externality, one can expect to observe feedback effects on the local level of participation and membership: regions where a larger fraction of people participate in associational life will be regions where clubs and associations are more easily available, and more attractive to others. Conversely, fewer people will want to participate in areas where associational life is more poorly developed.

Our strategy for examining this hypothesis is to use measures of the prevalence of associative activity among different age groups as indicators of the relative health of associational life in a local area and of the opportunities available. If there were no externalities from the club or association participation for one age group (in the sense described in the last paragraph), there would be no reason to expect activity or membership

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the closest BHPS approximation is the local authority – we did not use these because of the sampling variability

among different age groups to be either higher or lower in the same local areas. However, if there are externalities, one would expect club membership and activity among those other groups to be positively associated with the associational life of the age group in question. In this section we check this hypothesis, using data for three age groups: 18–30, 31–50, and 51–59 years.

As Section 3 noted, the BHPS asked respondents both whether they were active in, or members of, a sports club or a social or working men's club. Among respondents aged 18–59 years, there was a substantial level of involvement – together with considerable variation across the 18 British regions. Nationally, 24 percent of respondents reported that they were active in a sports club, with a range from 17 percent in Tyne and Wear to just under 30 percent in Yorkshire and Humberside (other than West and South Yorkshire) and Scotland. Activity in a social group or working men's club was reported by 12 percent of respondents nationwide, but by only 4 percent in inner London, compared to 16 percent in Tyne and Wear.

Since the BHPS asks respondents separately about membership and activity, we had a double index of the strength of associational life at the local level, and since these two measures were highly correlated for each type of association, we have some confidence that they both measure the same underlying propensity. Moreover, because social group membership or activity was not particularly well correlated across regions with sports club membership or activity, there is reason to believe that regional differences are not simply due to differences in some sort of generalized local proclivity to associational life.

Since our hypothesis is that individuals are more likely to participate in these types of groups in areas where many others already do, we expect to see a positive association between the proportion of middle-aged respondents who reported activity and the percentage of youth and older age groups who reported such activity. Figure 2*a* plots the association between regional-average sports club activity rates among those aged 31–50 years and regional-average sports club activity rates among those aged 18–30, whereas Figure 2*b* plots the corresponding rates for activity in a social group or working men's club. In both charts, the regional data indicate a positive correlation between associative activity of one age group and another, a finding that is consistent with our externality hypothesis. Corresponding charts for membership rates (rather than activity rates) showed similar patterns.

<Figures 2*a* and 2*b* near here>

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issue.

5. The synchronisation of usual daily working time by British working couples

The proportion of the couples in our sample that usually worked at the same time of the day, 51 percent, was greater than would be expected from a random match of a husband's and a wife's work times (see Table 1, column 1). A Pearson test for the independence of spousal work times had a test statistic $F(63.26, 153014) = 4.55$ with p-value = 0.0000. (The test was based on a cross tabulation of spousal work times, and made appropriate adjustment for the repeated observations on couples.) Arguably, however, this synchronisation could simply reflect an 'effect due to the inherent constraints on daily time-use imposed, for instance, by the regularity of office hours, school hours, and the hours of darkness, and leading to some *necessary* time co-ordination' (Sullivan, 1996:85, emphasis in original).

To control for this effect, we used two methods. First we employed a matching procedure to replace each of the sample's working husbands with a working single man with otherwise similar characteristics, and each working wife with a working single woman, thereby generating a sample of 'pseudo-couples'.[16] The work times of the members of each pseudo-couple should reflect the inherent constraints on their time, and provide a baseline against which synchronisation among real couples may be assessed. We found that 46 percent of pseudo-couples had synchronised work times (Table 1, column 3). The degree of synchronisation among real couples is some five percent larger, suggesting that there is a significant albeit small coordination of work timing over and above that implied by inherent constraints of daily life. In our second, more non-parametric, approach, we paired every husband with every wife in the sample and computed the prevalence of synchronisation in spousal work times. Among the 11,758,971 pairs, the rate was 46 percent. (The proportion was virtually the same when each panel survey year was considered separately.) Again we conclude that there exists genuine synchronisation of work times among working couples.

<Table 1 near here>

Table 1 also shows how synchronisation of spousal work times varied with husband's work time, and with the number of children. Observe first from columns 2 and 4 that the marginal distributions for both real and pseudo-couples were very similar, which is an

[16] Each single person used in the matching exercise was in employment and aged 18–59 (as in the sample of couples). We used a propensity score matching procedure (1:1, without replacement), with the matching variables being age (linear spline with eight knots), work hours (cubic), educational qualifications, number of children in age groups 0–2, 3–4, 5–11, 12–15, 16–18, and BHPS survey year. Creation of baselines using pseudo-couples generated by matching procedures has also been done by Sullivan (1996) and Hallberg (2003).

indication that the matching procedure worked well. Some 72 percent of husbands usually worked 'during the day', and just over 18 percent worked unsocial hours ('rotating shifts' or 'varies/no pattern'). For two-thirds of the real husbands who usually worked during the day, their wife's work time was also usually during the day. For all other husbands, the chances of his and her work times coinciding was substantially less than the average. In particular, only about one in ten husbands working unsocial hours had a wife also working unsocial hours. The degree of synchronisation among real couples is greater than that for pseudo-couples for all categories of working time.

Spousal work time synchronisation is likely to be strongly influenced by whether or not the couple has children. Particularly if children are young and family money income is low, working at different times of the day may be seen as a way of saving the expense of baby sitters, by enabling one parent to cover child care responsibilities while the other is at work. (Alternatively, parents may forsake some synchronisation in their work times, so that each of them can spend quality time with the children.) Evidence consistent with these hypotheses is shown in the lower panel of Table 1. This shows a clear gradient in the prevalence of spousal work time synchronisation. Among childless real couples, 60 percent of husbands usually worked at the same time as their wives but, among couples with one child, the proportion was only 48 percent. With two children or three children, the fractions were lower still: 39 percent and 29 percent. In households with three or more children, the degree of synchronisation in working time was less among real couples than among pseudo-couples, as we would expect.

Table 2 reports the correlates of work time synchronisation using random effects probit regressions, with separate models for couples with and without children. In each model, the dependent variable is equal to one if a couple usually worked at the same time of the day and zero otherwise. The explanatory variables on which we focus are, following research such as Hamermesh (2002), the hourly wage rates and work hours of the husband and wife, plus measures of the prevalence of the working of unsocial hours by men and women in the region in which the couple lived. We used the panel data to control for unobserved individual effects, assumed to be uncorrelated with the other regressors.[17]

The associations between the synchronisation probability and each spouse's wage rate, holding each spouse's work hours constant, are not clear cut. As Hamermesh (2002) has

[17] We did not use fixed effects estimators in this paper because key explanatory variables such as the regional measures of unsocial hours were derived from pooled-data averaging. Hence they did not vary across the panel, and would not be able to be identified in a fixed effects model.

argued, one might expect two opposing influences. On the one hand, higher wages *ceteris paribus* may act like an increase in full earnings, and one might expect the income effect to raise the work time synchronisation probability (a leisure-as-normal-good argument).[18] On the other hand, a compensating differentials perspective would argue for a negative association between wage rates and work time synchronisation, since husbands and wives who wish to play together may be willing to accept a wage penalty in order to do so, or employers may need to pay husbands and wives more in order to induce them to work at different times.

<Table 2 near here>

There was a strong positive and statistically significant association between the wife's wage rate and the synchronisation propensity: the elasticity of the probability of synchronisation with respect to her wage is 35 per cent for childless couples and 22 percent for couples with children (elasticities evaluated at the means). By contrast, there was a statistically significant association between the husband's wage rate and the work time synchronisation probability only among couples with children. The elasticity was 20 percent in this case, and thus 50 percent smaller that the corresponding elasticity for the wife's wage rate. One might interpret the insignificant association between husband's wage and synchronisation among childless couples as either reflecting evidence of the compensating differential effect offsetting the leisure-as-normal good effect, or it might just be that the unitary model of household decision-making is less relevant when there are no children (see footnote 18).

Holding wages constant, the more hours the wife worked, the more likely that spousal work times were synchronised, for both childless couples and parents. The probability that husband and wife work at the same time was, as might be expected, strongly associated with whether or not the husband worked during the day (which is by far the most popular work time). However, conditional on that, there was no association between a husband's total working hours and synchronisation. Perhaps because we have a relatively crude proxy for the structure of labour demand, differences in the prevalence of working at unsocial hours in the region in which the couple lived appear to have no statistically significant association with work time synchronisation propensities.

[18] The effect may not be so clear outside the confines of the unitary model of couple decision-making. In this case, a husband may choose to spend his higher wage on time out on personal goods (time with 'mates') rather than communal ones (joint leisure).

Finally, among couples with children, there were marked differences in work time synchronisation according to the number of children and the presence of a young child. Other things being equal, each additional child reduced the probability of synchronisation by about six percentage points, and having a child aged less than six reduced the probability by about 11 percentage points. These are large effects given that the sample fraction of spouses working at the same time was 42 percent, but they are consistent with previous findings that having dependent children increased the chances of working mothers working at 'unusual' hours (and a different time from their husbands). See Hamermesh (1996) for Germany and the USA, and van Velzen (2001) for the Netherlands.

Like Hamermesh (2002, Table 4), who used US Current Population Survey data for the 1970s and 1980s, we found significant positive effects on synchronisation of a higher wife's wage rate. He also found an effect for the husband's wage, though we found this only among couples with children. However, Hamermesh also reported that husband's work hours were positively associated with synchronisation, whereas we found no effect (once we controlled for whether the husband worked during the day). Thus there appear to be some differences between the USA and 1990s Britain that could be investigated further in future work.

6. Interdependence in associative activity propensities?

To model husbands' and wives' propensities for associative activity, we estimated multivariate probit regression models for each couple $i = 1,\ldots, N$, of the form

$$\begin{aligned} y_{im}^{*} &= \beta_m' X_{im} + \varepsilon_{im}, m = 1, \ldots, 4 \\ y_{im} &= 1 \text{ if } y_{im}^{*} > 0, \text{ and 0 otherwise} \end{aligned} \qquad (7)$$

where the ε_{im} are error terms distributed as multivariate normal, each with a mean of zero, and variance-covariance matrix V, where V has values of 1 on the leading diagonal and correlations $r_{jk} = r_{kj}$ as off-diagonal elements.[19] The four equations characterise, for each couple, the propensities of the husband and of the wife to be active in a social group or working men's club, and in a sports club.

[19] The multivariate probit models were estimated using the method of simulated maximum likelihood with the GHK simulator: see Cappellari and Jenkins (2003) for details. The panel structure of the dataset, implying repeated observations on couples, means that the i.i.d. assumption underpinning standard maximum likelihood methods is violated. We therefore used the method of maximum pseudo-likelihood described by Gourieroux and Monfort (1996), an approach providing consistent parameter estimates, and adjusted standard errors using a robust variance estimator that treated each couple as a cluster.

Joint estimation of the four equations reflects the jointness of within-couple choices, as assumed by the theoretical model proposed in Section 2. That model also implies that, in any equation characterising the probability of a given associative activity for one partner in a couple, variables summarising the other partner's associative activities and both partners' work hours are endogenous. These variables were excluded from the explanatory variable vector for each equation (X_{im}), and their effects are captured by the cross-equation correlations. We placed no prior restrictions on the correlation structure but our theoretical model leads us to expect a positive correlation between the equations for husbands and wives for the same activity (reflecting a desire to 'play together'), though of course this may also reflect selection into marriage (people marry those with whom they would like to spend their free time).

The explanatory variables on which we focus are our measures of extra-household availability of Suitable Leisure Companions, namely the regional-mean activity rates for each of three age groups. We estimated (7) separately for each of three groups of couples, defined in terms of the age of the husband (18–30, 31–50, and 51–59 years). In the model for a given age group, we used as regressors the regional-mean activity rates of the *other two* age groups in order to minimise any potential tautological connections between an individual's activity propensity and the propensities among those of the same age group.[20] Our model leads us to expect positive coefficients on these variables.

The equations for each partner also included controls for own educational qualifications, wage rate, firm size and industry of main job, and couple-specific variables: the number of children aged less than 16, presence of a child aged less than six, whether the couple were cohabiting rather than legally married, the local unemployment rate, the regional prevalence of unsocial work hours, and survey year. Our explanatory variables encompass most of those used in conventional models of participation in sport and recreation (see for example Gratton and Taylor, 2000, chapter 5), but our inclusion of variables aiming to summarise the availability of Suitable Leisure Companions is innovative.

The estimates of the models for age groups 18–30, 31–50, and 51–59, are reported in Tables 3-5. Average activity rates in a social club and working men's club were greater among husbands than among wives, but were higher among the older age groups than younger age groups. Average activity rates in a sports club were also greater for husbands than wives, but declined with age.

The estimates provide some evidence consistent with our core hypothesis. Young husbands were more likely to be active in a social group or working men's club if there was a higher rate of activity among middle-aged persons (Table 3, column 1). Also, middle aged husbands were more likely to be active if there was more activity among people aged 18–30, or among people aged 51–59 (Table 4, column 1). We did not get similar results for husband's sports club activity: there were no statistically significant associations with the regional-mean activity variables (Tables 3-5, column 3). The results for wives differ from those for husbands in that the evidence supportive of the externality hypothesis concerns the probability of sports club activity rather than social group or working men's club activity. Higher chances of sports club activity among young and middle-aged women were associated with greater sports club activity among people aged 51–59, though the relevant coefficients are less statistically significant than those for husbands (Tables 4 and 5, column 4).[21]

<Tables 3, 4, and 5 near here>

Section 2 noted that our model also applies to single people, and some evidence consistent with our interdependence hypothesis was also found in similar models estimated using samples of employed single householders (results available on request). Men aged 31–50 were more likely to be active in a sports club the greater the activity rate among people aged 51–59, and women aged 31–50 were more likely to be active in a social group the greater the activity rate among people aged 18–30.

The cross-equation correlation structure had a similar pattern for all three age groups, one that is consistent with our core hypothesis. Other things being equal, the propensities to be active in a social group or working men's club for a husband and for a wife have a strong positive and statistically significant correlation ($r_{21} \approx 0.6$). Similarly, the propensities to be active in a sports club for a husband and for a wife are also strongly correlated ($r_{43} \approx 0.5$). As expected also, the propensity for a husband to be engaged in one of the activities is positively correlated with his propensity to be engaged in the other activity ($r_{31} \approx 0.3$). The corresponding correlation for wives is also positive though noticeably smaller ($r_{42} \approx 0.1$), and

[20] Statistical identification in this sort of situation has been analysed by Manski (1993) as an example of a more general 'reflection problem'.

[21] We reran all the regressions for each age group also including the regional-mean activity rate of the relevant age group in addition to the rates for the other two groups. Results changed little. The most noticeable change was that the coefficient on the own age group variable was invariably positive, as expected, and often statistically significant. However, given the earlier arguments about the reflection problem, we do not place any emphasis on these results. Our results were also robust to potential 'Moulton' effects. Moulton (1990) argued that, in linear regressions for individuals that used cross-individual averages as explanatory variables, standard error estimates for those variables may be biased downwards if their calculation ignored potential correlations

precisely estimated only for the middle-aged group. The cross-activity cross-partner correlations (r_{41}, r_{32}) are positive and small, but not statistically significant. Taken together, these results are consistent with the hypothesis that husbands and wives try to spend time together but, as is often the case, we cannot distinguish causation from these correlations. One hypothesis is that couples do similar things in order to spend time together, while the alternative hypothesis is that people who do similar things and spend time together tend to get married. Our results are consistent with both arguments.

The estimates for the control variables are of secondary interest and, as it happened, virtually all had statistically insignificant associations with activity propensities. One exception was that husbands and wives with university degrees were consistently less likely to be active in a social group or working men's club (in all age groups), and husbands and wives with no educational qualifications were consistently less likely to be active in a sports club (middle and older age groups). We interpret these results as evidence of a class bias in associative activity. Putnam (2000) has argued strongly that associational life and education are positively correlated.

7. Discussion: the implications of leisure coordination

Why might it matter if the hypothesis of this paper is true – that an individual's time use choices are typically contingent on the time use choices of others, because the utility derived from leisure time often benefits from the presence of companionable others? One set of answers concerns the welfare effects of economy-wide increases in work hours.

Within the OECD, there are significant differences in the trend and level of average work hours. For example, from 1980 to 2000, average working hours per adult (ages 15–64) rose by 234 hours in the USA to 1476 hours, but fell by 170 hours in Germany to 973, and by 210 hours in France to 957: see Osberg (2003*a*). Compared to the USA, this difference amounts to 9.7 more hours of work per adult per week for Germany, and 9.9 more hours of work per adult per week for France. These differences in average working hours are due in part to inter-country differences in probability of employment (i.e. differences at the extensive margin of labour supply), in part to differences in common entitlements to paid vacations and public holidays, and in part to differences in the hours of work of employees.

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across individuals within the groups used for the aggregation. We re-estimated the models with region as the cluster variable rather than the couple. Results were remarkably similar to those reported in Tables 3–5.

However, whatever their origins, they are large enough to motivate a concern over their larger social implications.

It has long been acknowledged that one reason why GDP per capita is a poor measure of economic well being is because it does not recognize the opportunity cost in lost leisure time to individuals of increases in average money income which stem from longer average work hours. If, in addition, an increase in the average work hours of everyone else has an adverse externality on the marginal utility of each person's leisure, then aggregate well-being falls by more than the cost of foregone wages when average working time rises.

Our model also suggests that there may be multiple equilibria in labour supply, some of which generate lower aggregate utility. In Figure 2, for example, we presented two possible equilibria in individual hours of paid labour supply (H^* and H^{**}), each conditional on the average working time of others. The 'high work' equilibrium (H^{**}) has unambiguously lower total utility. Societies which are better able to co-ordinate the level and timing of paid working hours may be better off in aggregate, because they enable their citizens to enjoy more satisfying social lives. To be specific, our externality hypothesis suggests that North Americans may work more hours than Europeans partly because they are more likely to have 'nobody to play with' – because other North Americans are also working more hours – and that they are worse off as a result.

Moreover, our model draws an explicit, micro-behavioural link between decreasing social contacts and rising hours of work. If authors such as Putnam (1993, 2000) and the OECD (2001) are correct in stressing the dependence of social capital on associational life and the importance of social capital for social and economic development, the costs of a high-work/low-social life equilibrium may be substantial – in terms of market income as well as in utility. Knack and Keefer (1997) are representative of an empirical literature which argues that localities with an active civic society and associational life (and more generally a dense network of social ties among individuals, and a high level of trust) have higher growth rates of GDP per capita. This relationship has been argued to be due to a number of possible influences: for example lower transactions costs in capital, labour and product markets, more effective governance, lower costs of crime, labour conflict and political uncertainty, better health outcomes and so on (see Osberg, 2003*b*). Whatever the channel of influence, it suggests that, although working longer hours may accelerate growth in GDP per capita in the short run, both income and social life may suffer in the longer run.

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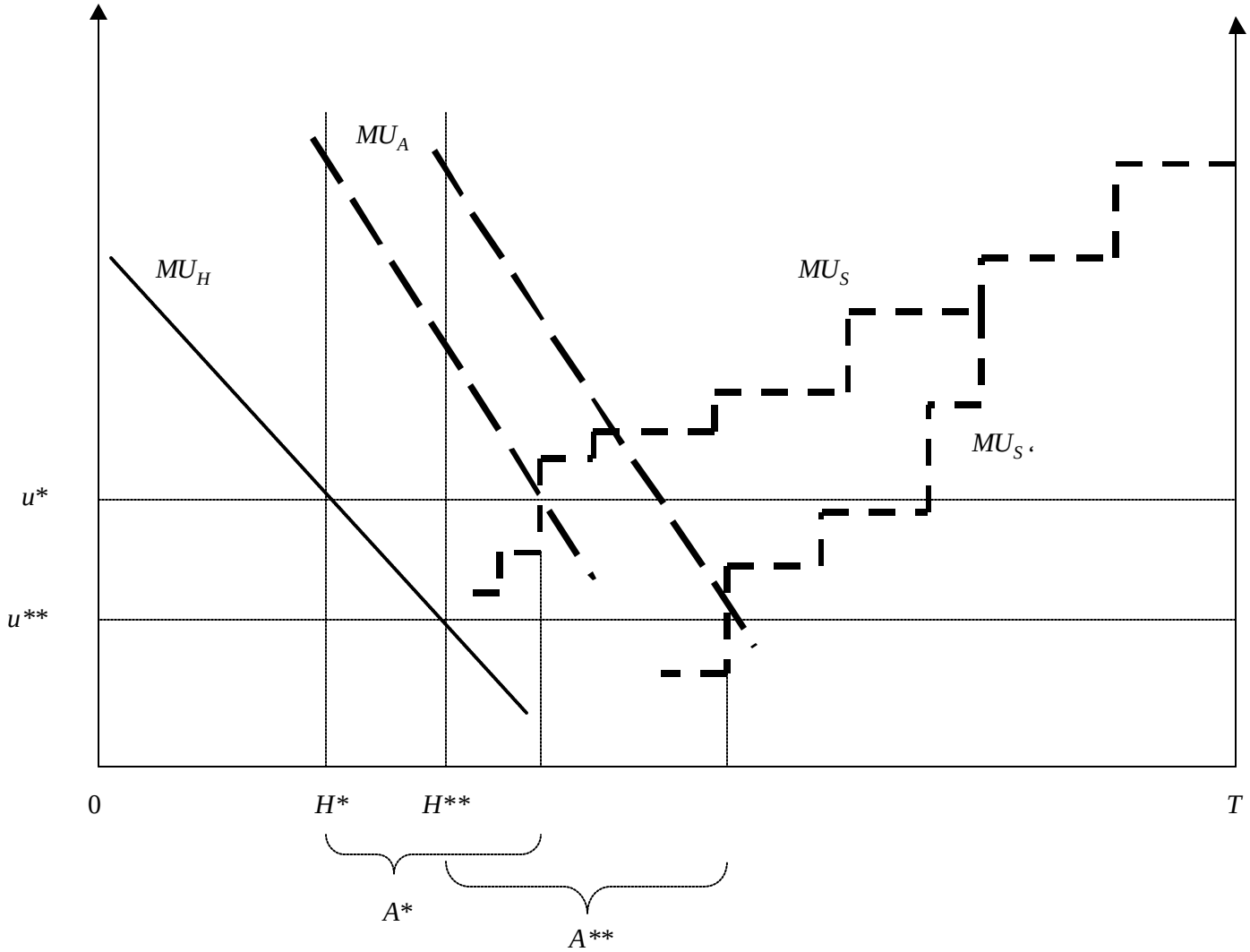
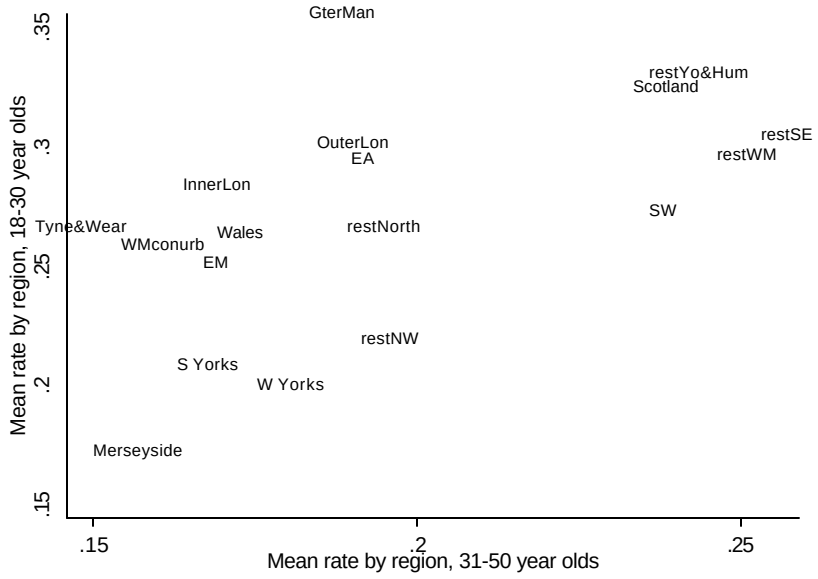
Figure 1. The choice of work hours and leisure hours when decisions depend on the work hours of others



Note: MU_H, MU_A, and MU_S are the marginal utilities of time spent in work, leisure alone, and social leisure, respectively.

Figure 2. Activity rates in associative activities, regional averages by age group

(a) Active in a sports club



(b) Active in a social group or working men's club

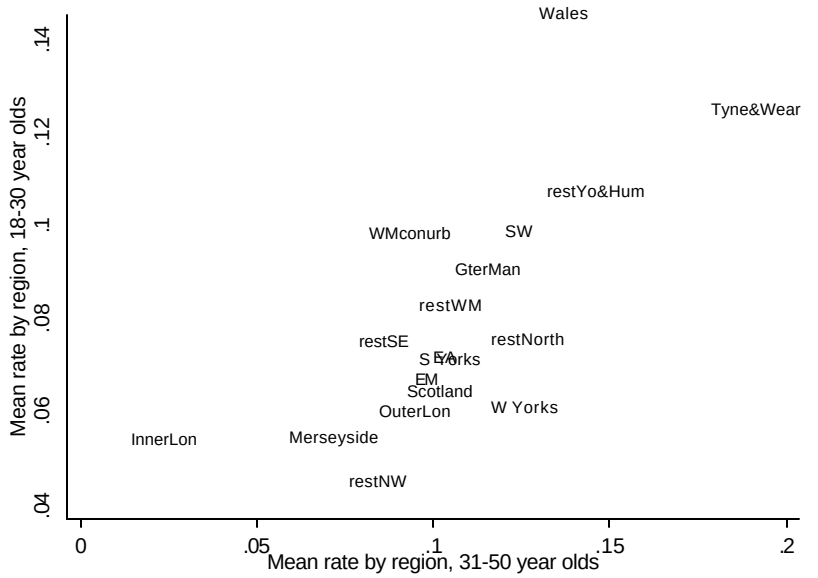


Table 1. Synchronisation of spouses' work times*, by husband's usual work time and number of children

	Real couples		Pseudo-couples	
	Percentage with synchronised work times (row %) (1)	Percentage in category (col %) (2)	Percentage with synchronised work times (row %) (3)	Percentage in category (col %) (4)
All working couples	51.2	100.0	46.4	100.0
Usual time of day for paid work (husband)				
Mornings only	25.8	1.4	6.9	2.5
Afternoons only	0	0.3	0	0.2
During the day	67.1	71.8	62.5	72.0
Evenings only	4.3	0.5	1.5	0.5
At night	5.4	2.1	2.2	2.5
Both lunchtimes/evenings	23.8	0.2	0	0.4
Other times of the day	0	0.3	0	0.3
Rotating shifts	9.2	13.4	7.3	11.4
Varies or no pattern	9.6	4.7	2.0	5.5
Other	13.5	4.9	5.1	4.5
Daytimes and evenings	16.6	0.3	0	0.3
Number of children aged <16 years in household				
None	60.0	51.9	52.2	52.5
1	48.3	21.2	45.1	21.1
2	38.8	20.5	36.6	20.4
3	28.8	5.4	34.6	5.3
4	26.2	0.9	29.7	0.8

* Synchronisation occurred where the usual time of work reported by the husband and wife coincided. Numbers of cases with 5+ children were too small to tabulate. Data weighted using BHPS cross-section respondent weights. Real couples: unweighted N = 2420 husbands (9857 husband-wave observations). Pseudo couples: unweighted N = 2388 husbands (9480 husband-wave observations). Creation of pseudo-couples based on matching described in main text.

Table 2. The probability that a husband and wife work at same of the day, by whether household has children

Regressor	No children Aged < 16		Children aged < 16	
	Marginal effect	|t-ratio|	Marginal effect	|t-ratio|
Husband's wage rate (£/week)	−0.004	(1.00)	0.009	(2.16)
Wife's wage rate (£/week)	0.033	(6.30)	0.015	(4.74)
Husband's work hours (hours/week)	−0.001	(0.79)	0.000	(0.02)
Wife's work hours (hours/week)	0.010	(7.16)	0.019	(13.8)
Husband worked during the day	0.895	(24.7)	0.612	(21.6)
Proportion of men working unsocial hours (region)	0.798	(0.93)	0.144	(0.17)
Proportion of women working unsocial hours (region)	−0.978	(0.92)	−1.228	(1.02)
Youngest child aged < 6 years			−0.012	(3.29)
Number of children			−0.067	(3.20)
Mean of dependent variable	0.61		0.42	
Log-likelihood	−1,797		−1,698	
N (couple-waves)	4,922		4,375	
N (couples)	1,560		1,230	

Random effects probit estimates. Marginal effects evaluated at the mean values of the regressors; |t-ratio| is asymptotic t-ratio for the underlying coefficient. Regressions also included controls for: husband's age and educational qualifications, cohabiting rather than married, survey year (dummy variables), local unemployment rate, industry of husband's main job (dummy variables for the ten major SIC groups), and firm size (eight categories).

Table 3. The probabilities of associative activity for husbands and wives (husbands aged 18–30)

Regressor	Pr(active in a social group or working men's club)				Pr(active in a sports club)			
	Husbands (1)		Wives (2)		Husbands (3)		Wives (4)	
	Coeff.	|t-ratio|	Coeff.	|t-ratio|	Coeff.	|t-ratio|	Coeff.	|t-ratio|
Mean regional social group activity rate								
31–50 years	6.577	(2.69)	1.550	(0.64)				
51–59 years	−1.214	(0.97)	−2.470	(1.72)				
Mean regional sports club activity rate								
31–50 years					0.240	(0.16)	0.278	(0.16)
51–59 years					−0.773	(0.50)	2.485	(1.43)
Cross-equation correlations								
r_{21}	0.597	(9.58)						
r_{31}	0.254	(4.67)						
r_{41}	0.077	(1.24)						
r_{32}	0.074	(1.04)						
r_{42}	0.101	(1.33)						
r_{43}	0.485	(10.89)						
Mean of dependent variable	0.11		0.05		0.36		0.22	
Log pseudo-likelihood	−2,254							
N (couple-waves)	1,453							

Multivariate probit estimates, derived by simulated maximum likelihood (number of random draws = 45), with standard errors adjusted to account for repeated observations per couple across waves. Each regression also included controls for respondent's age, wage rate, educational qualifications, industry of main job (dummy variables for the ten major SIC groups), firm size (eight categories), and the number of children aged < 16, whether the youngest child was aged < 6, whether couple cohabiting rather than married, regional prevalence of unsocial work hours, and survey year (dummy variables).

Table 4. The probabilities of associative activity for husbands and wives (husbands aged 31–50)

Regressor	Pr(active in a social group or working men's club)				Pr(active in a sports club)			
	Husbands (1)		Wives (2)		Husbands (3)		Wives (4)	
	Coeff.	|t-ratio|	Coeff.	|t-ratio|	Coeff.	|t-ratio|	Coeff.	|t-ratio|
Mean regional social group activity rate								
18–30 years	5.221	(3.40)	2.368	(1.41)				
51–59 years	1.458	(1.81)	0.137	(0.13)				
Mean regional sports club activity rate								
18–30 years					0.847	(0.79)	1.907	(1.84)
51–59 years					–0.927	(0.77)	2.222	(1.67)
Cross-equation correlations								
r_{21}	0.581	(15.44)						
r_{31}	0.197	(5.04)						
r_{41}	0.057	(1.29)						
r_{32}	0.068	(1.46)						
r_{42}	0.126	(2.47)						
r_{43}	0.482	(14.91)						
Mean of dependent variable	0.16		0.08		0.30		0.16	
Log pseudo-likelihood	–6,305							
N (couple-waves)	3,893							

Multivariate probit estimates, derived by simulated maximum likelihood (number of random draws = 75), with standard errors adjusted to account for repeated observations per couple across waves. Each regression also included the controls listed in the note to Table 3.

Table 5. The probabilities of associative activity for husbands and wives (husbands aged 51–59)

Regressor	Pr(active in a social group or working men's club)				Pr(active in a sports club)			
	Husbands (1)		Wives (2)		Husbands (3)		Wives (4)	
	Coeff.	|t-ratio|	Coeff.	|t-ratio|	Coeff.	|t-ratio|	Coeff.	|t-ratio|
Mean regional social group activity rate								
18–30 years	1.651	(0.35)	−3.643	(0.76)				
31–50 years	2.775	(0.55)	1.405	(0.37)				
Mean regional sports club activity rate								
18–30 years					2.208	(0.93)	1.254	(0.47)
31–50 years					3.826	(1.51)	5.074	(1.74)
Cross-equation correlations								
r_{21}	0.632	(9.31)						
r_{31}	0.152	(2.01)						
r_{41}	0.094	(1.01)						
r_{32}	0.015	(0.16)						
r_{42}	0.119	(1.07)						
r_{43}	0.407	(4.99)						
Mean of dependent variable	0.19		0.11		0.23		0.11	
Log pseudo-likelihood	–1,304							
N (couple-waves)	877							

Multivariate probit estimates, derived by simulated maximum likelihood (number of random draws = 35), with standard errors adjusted to account for repeated observations per couple across waves. Each regression also included the controls listed in the note to Table 3.

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