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Honey, I'll Be Working Late Tonight.

The Effect of Individual Work Routines on Leisure Time Synchronization of Couples

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Abstract

German time use data for 2001/02 are used to assess the impact of workplace characteristics on the private life of couples. The major aim is to solve the endogeneity resulting from individual preferences for work and leisure to identify the pure effects of the workplace independent from other diluting personal influences in a cross-sectional setting when no appropriate instruments are available. I propose a repeated random assignment of people into pseudo couples as a solution. By this approach, I am able to uncover additional marriage inherent mechanisms that result in a (de-)synchronization of joint time that are still family friendly.

Keywords: Time Use, Time Allocation, Family Economics, Flexibility, Synchronization, Leisure, Endogeneity

JEL Classification: D13, J12, J16, J22

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1 Introduction

Annual hours per worker have drastically fallen over the past century in industrialized countries. The reduction in working hours was motivated by an improvement of health and safety or simply of the quality of life. As a consequence, more time is now available for the enjoyment of leisure. Over the same time period female labor supply increased tremendously which in turn reduced their available time for other than market work related activities. A combination of these two trends means for couples and more generally for families that it has become increasingly more difficult nowadays to enjoy leisure jointly. The progressing globalization further aggravates this problem as lower trade barriers lead to more internationally integrated product markets and thus to more competition. In order for firms to be internationally competitive, it is impossible not to react to these trends and consequently employers seek more flexibility in the labor relations within the limitations of the national legal system.

Over the past decades, the importance of flexible work arrangements grew steadily in Germany. The existing forms are manifold and comprise amongst others part-time work, flexitime or marginal employment. Especially, female part-time employment almost doubled from the beginning of the 1980s until today. In 2008, almost every second employed woman worked part-time. In general, flexible work arrangements are promoted as a means to give workers some freedom to schedule their working hours to better reconcile family and work. Simultaneously, the percentage of shift work rose in Germany from 11% at the beginning of the 1990s to about 17% in 2008. Over the same time span, statutory shop opening hours were relaxed which means that the working schedules of the respective employees were also adjusted accordingly. Thus, the distribution of working hours across a standard workday widened considerably. Now, given these developments, the question remains to be answered in how far flexible work arrangements are indeed effective to reconcile work and family. This paper, therefore, addresses this question and investigates the effect of work arrangements and job attributes on joint leisure of married couples in Germany.

The availability of new data sources on time use has attracted the interest of many researchers in recent years to study the timing of activities within households and thus to get a better understanding of intra-household decision-making processes or more generally, of gender roles. In this context, not only paid work but also unpaid household work and the link between both is closely studied to shed more light on the labor market participation decision of women, which is of great concern to both policy makers and researchers (Becker 1965, Gronau 1977, 1980, Becker 1981, Bird et al. 1984, Gershuny and Sullivan 1998, Hersch and Stratton 2000, Apps 2004, Apps and Rees 1996, 1997, van Klaveren and Maassen van den Brink 2007). In contrast to that, other studies investigate the development of leisure time across the past decades (Bittman and Wajcman 2000, Hallberg 2003, Alesina et al. 2005, Jenkins and Osberg 2005, Aguiar and Hurst 2007). However, the new data sources not only allow for separate analyses of the time aggregates but more importantly to investigate their dependencies. To my knowledge research on the impact of work on the private life has not been addressed so far. Thus, this paper is a contribution for better understanding this link in particular to answer the question whether the highly promoted reconciliation of work and private life is indeed possible.

For an analysis of the influence of work on the private life, it is crucial to solve the endogeneity between hours worked and time enjoyed on non work related activities with the spouse. Individual preferences determine the importance attached to work and consequently to the time spent at the workplace as well as the job attributes that are accepted. This, in turn, influences the time that is left for the enjoyment of

non-market activities with the spouse. In this paper, one of the major aims is to present a way to solve this endogeneity in a cross-sectional setting when no instruments are available so that the "pure" effects of work arrangements on the couple's private life can be identified. Not solving the endogeneity would lead to false conclusions of the effectiveness of measures aimed at increasing temporal flexibility. By this approach other diluting influences resulting from marital preferences that might themselves affect free time can be excluded and thus proper statements can be made. I am therefore able to determine those workplace characteristics that significantly hamper or facilitate the reconciliation of work and private life.

By finding the pure effects, I am furthermore able to uncover mechanisms that lead to a (de-)synchronization of joint free time of the spouses that are not resulting from influences of the workplace itself but are rather inherent to the marriage. In this respect, I find that a coordination of schedules might lead to a mitigation of strong negative effects imposed by shift work but rather result in more de-synchronized schedules for couples with young children at the expense of joint time of the partners. The results of this paper further contribute to another strand of the literature analyzing whether couples actively synchronize their schedules or whether simultaneous time is rather a result from the general organization of activities across an average workday. In contrast to the data used in this paper, most of these studies, however, lack information on whether time is indeed enjoyed together with the spouse (Hamermesh 2000, van Velzen 2001, Hallberg 2003, Lesnard 2004, van Klaveren et al. 2006, van Klaveren and Maassen van den Brink 2007).

The paper is organized as follows: A theoretical model will be presented in the next section that will provide the basis for the subsequent econometric specification. In this section, I will furthermore discuss the endogeneity issue arising in this context. The data set as well as the variables used are further described in Section 3. An overview of the sample analyzed as well as the distribution of the major activity aggregates across a standard workday will be shown and explained. Chapter 4 presents and discusses the estimation results. Finally, Section 5 concludes.

2 Theoretical Framework

2.1 A Model of Joint Leisure

In this section, a simple theoretical model is presented that serves as the basic framework for the empirical investigations of the effect of observable characteristics on a couple's decision for joint leisure. The model is inspired by the life-cycle model of labor supply proposed by MaCurdy (1981). I assume a two-person household consisting of a husband (m) and a wife (f). Children living in the household are included into the vector of household characteristics. Each day is divided into T equally spaced time units $t = \{1, \ldots, T\}$. To keep things simple, I assume that each person can decide at each time unit t to work (n_t) or alternatively to enjoy free time alone ($\ell_t^s,\ s = \{m,\ f\}$) or together with the partner (ℓ_t^j). For each time unit, these variables are taking the value 1 if time is spent on the respective activity and 0 otherwise. For the whole day, each of the spouses faces the following time constraint:

$$T = \sum_{t=1}^{T} \left\{ \ell_t^s + \ell_t^j + n_t^s \right\}, \quad s = \{m, f\}. \tag{1}$$

It follows from equation (1) that n_t^s is defined as $n_t^s = 1 - \ell_t^s - \ell_t^j$.

During each time interval t, each spouse ($s = \{m, f\}$) maximizes his utility according to the following concave utility function:

$$U_t^s = U\left(\ell_t^s, \ell_t^j; C_t^s\right) \tag{2}$$

where I assume for simplicity that the total consumption of the household can be decomposed as $C_t = C_t^m + C_t^f$. Apart from the utility that is derived from individual leisure and from consumption, each person derives additional utility from spending leisure time with the partner (l_t^j).[1] The maximization problem of the couple for each time period t can be expressed as:

$$V_t\left(\ell_t^m, \ell_t^f, \ell_t^j; C_t\right) = \omega^m U_t^m + \omega^f U_t^f, \tag{3}$$

with ω^s denoting the weight of the individual's utility as part of the total household's utility. I assume that $\omega^m + \omega^f = 1$ so that these weights can be interpreted as the individual's bargaining power in the decision making process of the household. Over the whole day, each spouse chooses C_t^s, ℓ_t^s and also ℓ_t^j for each time unit so as to maximize the daily preference function:

$$G\left\{\sum_{t=1}^{T}\left(\omega^m U_t^m\left(\ell_t^m, \ell_t^j; C_t^m\right) + \omega^f U_t^f\left(\ell_t^f, \ell_t^j; C_t^f\right)\right)\right\}. \tag{4}$$

$G(\cdot)$ is assumed to be a monotonically increasing function in all arguments which is strongly separable over each time unit.

The household's utility function as presented by equation (4) is maximized subject to the time constraint and to the household's daily budget constraint which is defined as follows:

$$\sum_{t=1}^{T}\left(C_t^m + C_t^f\right) = \sum_{t=1}^{T}\left(w_t^m n_t^m + w_t^f n_t^f\right) + V \tag{5}$$

where w_t^s denotes the exogenously given hourly wage rate for each spouse ($s = \{f, m\}$) and V other sources of non-labor income of the household.[2] The budget constraint allows wages to differ across the day in order to account for i.e. overtime premia. Each individual decides to work in the labor market during the t-th time unit if the offered market wage exceeds his reservation wage, i.e. if $w_t^s > w_t^{res}$.

In optimum and under the assumption that the daily budget constraint is satisfied, the following first order conditions for each individual can easily be derived:

$$\omega^s \frac{\partial U_t^s}{\partial C_t^s} = \lambda \tag{6}$$

$$\omega^s \frac{\partial U_t^s}{\partial \ell_t^s} \geq \lambda\, w_t^s \tag{7}$$

$$\omega^m \frac{\partial U_t^m}{\partial \ell_t^j} + \omega^f \frac{\partial U_t^f}{\partial \ell_t^j} \geq \lambda\left(w_t^m + w_t^f\right) \tag{8}$$

[1] Jenkins and Osberg (2005) find empirical evidence to support this assumption as they find that people who spend time with "suitable leisure companions" derive a higher degree of satisfaction from leisure activities as compared to spending them alone and Sullivan (1996) finds that spending leisure with the partner is most utility enhancing.

[2] In contrast to life-time models, I abstain from any considerations about capital markets where each spouse can borrow or lend at a given real interest rate as the joint leisure decision is modeled during one day.

for $t = 1,\ldots,T$ and $s = \{m, f\}$. λ is the Lagrange-multiplier that is associated with the budget constraint. According to the specification of the maximization problem presented here, it is assumed that the marginal utility of wealth across the whole workday is constant. This property is also known as Frisch function and implies that the shadow price of wealth, λ, is constant for every time interval. This assumption is not very restrictive in this context because the couple's joint leisure decision shall be analyzed for each time interval of an entire day. Equation (6) indicates that each spouse chooses the consumption level such that the weighted marginal utility of consumption equals the marginal utility of income and wealth. The conditions presented by equations (7) and (8) determine the spouse's choice of separate (ℓ_t^s) or joint leisure (ℓ_t^j) during the t-th time interval. The inequality conditions allow for corner solutions so that it is possible that a person enjoys leisure alone during every time unit per day so that he or she does not choose to supply any work or to have any joint time with the partner.

2.2 The Empirical Model

Based on the theoretical model determining the couple's joint leisure, the respective empirical model will now be derived. Following MaCurdy (1981) and Blundell and MaCurdy (1999), I assume that the utility of the whole household (h) during each time interval t can be expressed as

$$V_{ht} = \omega^m \Upsilon^m_{1ht} \left(\ell^m_{ht}\right)^{\alpha_1} + \omega^f \Upsilon^f_{1ht} \left(\ell^f_{ht}\right)^{\alpha_2} + \left(\omega^m + \omega^f\right) \Upsilon^j_{1ht} \left(\ell^j_{ht}\right)^{\alpha_3} + \left(\omega^m + \omega^f\right) \Upsilon_{2ht} \left(C_{ht}\right)^{\alpha_4}, \tag{9}$$

with α_i being time-invariant parameters that are common for all households and that have the following properties: $\alpha_1, \alpha_2, \alpha_3 > 1$ and $0 < \alpha_4 < 1$. Moreover, $\Upsilon^m_{1ht}, \Upsilon^f_{1ht}, \Upsilon^j_{1ht}, \Upsilon_{2ht} > 0$ are functions of those consumer characteristics that affect preferences of the household members. Joint leisure is scarce during a standard workday and shall be analyzed more closely. For that reason, I will concentrate on this decision for the reminder of this section. It is determined for each time interval by taking the first derivative of equation (9) with respect to ℓ^j_{ht} first. The resulting marginal utility of joint leisure is plugged into the theoretical first order conditions as given by equation (8). Taking logs of the resulting equation and solving for $\ln\left(l^j_{ht}\right)$ yields the following interior solution of the household's joint leisure:

$$\ln\left(l^j_{ht}\right) = \frac{1}{\alpha_3 - 1}\left[\ln\lambda_h + \ln\left(w^m_{ht} + w^f_{ht}\right) - \ln\alpha_3 - \ln\Upsilon^j_{1ht}\right]. \tag{10}$$

If it is assumed in accordance to Blundell and MaCurdy (1999) that tastes for joint leisure (Υ^j_{1ht}) are a function of consumer characteristics and can thus be expressed as $\ln\Upsilon^j_{1ht} = X_{ht}\rho^* + u^*_{ht}$, where u^*_{ht} indicates unmeasured characteristics and ρ^* the vector of preference parameters, one can rewrite:

$$\ln\left(l^j_{ht}\right) = F_h + \rho X_{ht} + \delta \ln\left(w^m_{ht} + w^f_{ht}\right) + u_{ht}, \tag{11}$$

with $\delta = \frac{1}{\alpha_3 - 1}$, $F_h = \delta\left(\ln\lambda_h - \ln\alpha_3\right)$, $\rho = \delta\rho^*$, $u_{ht} = \delta u^*_{ht}$. All relevant exogenous control variables are captured by X_t; F_h represents a couple specific time-invariant term that will be discussed in more detail in section 2.3.

Until now, only the decision for the enjoyment of joint leisure during a particular time interval was determined. However, information for the whole day is available, so that the decision of all time intervals

can be added up and the following estimation equation can be formulated:

$$\ln\left(L^J\right) = \mathbf{X}\beta_1 + \mathbf{H}\beta_2 + \mathbf{Z}\beta_3 + \delta_1 \ln\left(w^m,\right) + \delta_2 \ln\left(w^f\right) + \epsilon, \tag{12}$$

where L^J denotes the household's aggregate joint leisure time,[3] and the control variables are decomposed into individual information (**X**), household characteristics (**H**) and information about the workplace and the job (**Z**). The estimated coefficients indicate percentage changes of each person's time spent together with the spouse.[4]

2.3 Methodological Issues

As indicated earlier, F_h represents a couple-specific time-invariant term which cannot be treated as a random factor since it reflects the couple's preference for spending joint time. Since the shadow price (λ_h) attached to the couple's daily "wealth" is part of this term, F_h is consequently correlated with any variable that is used to predict wages or wealth. Such variables which are those that describe workplace characteristics and job attributes are exactly those of interest here. If the couple-specific term was treated as random and thus as being part of the error term, the parameter estimates would consequently be biased. Such a problem is easily solved with panel data or with suitable instruments. Yet, the data analyzed are merely cross-sectional and appropriate instruments are not readily available. It follows that the coefficient estimates obtained from simple OLS estimations are biased and other ways must be found to overcome this problem.

The non-random couple-specific term F_h is determined by each person's general preference for enjoying leisure but also for spending time together with the respective partner. Yet, the individual's preference for spending joint time with the spouse, is likely to also influence his decision to work at the intensive margin. It can thus be argued that some individuals work longer hours or are for instance more likely to accept business travels as their preference for enjoying joint time with the spouse or the family is comparatively low. As a consequence, workplace characteristics are endogenous and the parameter estimates obtained from simple OLS regressions are biased.

The major aim is to find a way to solve the endogeneity problem of the workplace and job attributes induced by preferences in a cross-sectional setting when no instruments are available. Consequently, a method is needed by which the individual's decision to enjoy free time with the partner can be separated from the decision to spend some hours of his available time at the workplace. It is important to make clear, that the endogeneity originates from the fact that some people given their job attributes and workplace characteristics want to enjoy as much time possible with their spouses and others rather want to avoid them. In other words, I will propose a way to randomize the couple-specific term and consequently reduce the endogeneity bias.

In a perfectly controlled world, experiments could be conducted in which husbands and wives could be randomly re-assigned to form new couples. The resulting joint leisure time decision of the "new" spouses could be observed and these results could be considered as counterfactuals (Angrist and Pischke 2009). Since this is not feasible, I conduct a thought experiment instead which is inspired by Angrist

[3] To be clear, joint time comprises both activity aggregates that have been introduced and described earlier, namely joint leisure and joint non-market time.

[4] Some couples choose to not enjoy any joint time with the spouse. In order not to loose the respective information and to allow for corner solutions, I set these observations to 1 minute of joint time. The same procedure is applied to spouses who are not earning any labor income.

and Krueger (1999). In this framework, I will randomly assign a wife from the sample to a husband. The thusly obtained so-called "pseudo" couples represent appropriate control groups for the purpose of this paper because actual and randomly re-assigned couples are facing the same constraints imposed by society (van Klaveren and Maassen van den Brink 2007). The coefficient estimates for both specifications of workplace characteristics and job attributes on explaining joint time are therefore easily comparable (Angrist and Krueger 1999). Potentially omitted or unobserved variables are now uncorrelated with the variables of interest. Randomly assigned couples are by construction not able to coordinate their schedules across the workday and the determinants of time that the pseudo partners *simultaneously* spend outside the workplace can be regarded as being exogenous. The re-assignment process will be iterated 250 times in order to obtain a representative benchmark to compare real couples with that is independent from the assignment itself.

3 The German Time Use Data

The present analysis is based on the German Time Use Data (*Zeitbudgeterhebung*) for the year 2001/02 conducted by the German Federal Statistical Office (Statistisches Bundesamt (2003)). The dataset contains information about the activities that every household member is engaged in during every 10 minute time interval of a day. Respondents were asked to fill in time diaries for three consecutive days. In order to capture the time use pattern in the most accurate and unbiased way possible, the sample is evenly distributed across the whole year. The dataset used here has the advantage over surveys conducted in other countries that diary information is available for *all* household members which is crucial for the purpose of this paper.

Here, I restrict the attention to married or cohabiting couples aged between 25 and 55 with a full-time employed husband yet without restricting the employment status of wives.[5] Furthermore, I only consider observations during the standard workweek (Monday - Friday). These restrictions assure that time which can potentially be spent with the spouse outside the workplace is scarce during the workweek which requires the spouses to coordinate their schedules. I keep those couples that report to not be on vacation and since the aim is to analyze joint time enjoyed during an average workday, furthermore those who do not report to be at the same location for at least one time unit during the day are eliminated as spending joint time is impossible in these cases. Furthermore, one diary day will be treated as one observation so that I finally analyze 6966 observations stemming from 1812 households.

For the analysis, I aggregate the more than 200 daily activities into four broad categories, namely pure leisure (L), paid market work (MW), household work (HP) and tertiary time (T) of which only the first three will be more closely studied here.[6] More specifically, pure leisure (L) comprises all activities that nobody can be paid for to do them and that do not have to be undertaken at all. It therefore comprises activities such as organized leisure activities, sports, reading and writing, watching TV as well as listening to the radio. Moreover, household production (HP) captures all those activities for which market substitutes can be purchased so that somebody could be paid for to do them and which satisfy the third-party rule by Reid (1934). Some household activities such as cooking or gardening are enjoyable to some extent so that utility can be derived. Some people might even consider these partially as leisure. These addi-

[5] I exclude couples with two unemployed or two part-time employed partners. Since couples in which only the wives are working full-time are inherently different, I excluded also these.

[6] Commuting or traveling time is added to the activity for which it is used. It can be further noted that an aggregation of the activities into the broad measures is inherently arbitrary. See also Burda et al. (2007).

tional benefits are also termed "process benefits" (Juster 1985), "joint production" (Graham and Green 1984, Kerkhofs and Kooreman 2003) or "activity benefits" (Gørtz 2006) in the literature. Some household activities such as childcare may provide extra benefits beyond their consumption value (Gørtz 2006, Kerkhofs and Kooreman 2003). Thus, I attribute all those childcare activities like playing or reading with the own children to leisure and the remaining tasks like caring, cooking etc. for the child to household production. Market work (MW) is defined as all direct job related activities (primary and second jobs), but also of time spend on internships, qualification and education on or for the job, job search, breaks during the workday and travel time related to work. Finally, tertiary time captures those activities that nobody else can do for us because they are essential i.e. sleeping or personal hygiene. This aggregate is however left unconsidered here.

Before continuing, I want to clarify some wordings that will be used throughout the subsequent sections. I will refer to those activities that the spouses enjoy together with each other during a particular time unit as 'joint' time. The equivalent of that for randomly assigned couples will be termed 'simultaneous' time which occurs if both partners report the same activity aggregate during the same time interval.

For the analysis of determining the influence of workplace characteristics on the couple's choice of free time, I define two different dependent variables here which are (1) the minutes of the jointly or simultaneously enjoyment of leisure and (2) the minutes of joint or simultaneous non-market time. The advantage of the German Time Use Survey is that not only information about the individual activities of each person during each time unit per diary day is provided but also about who it is spent with and where. I therefore define a time unit as being spent together if both partners report to have been with the spouse and if both indicate the same location.

The determinants of the professional life are controlled for by a variety of workplace characteristics and job attributes that describe the work involvement of the person. Apart from that, I control for demographic information on age, the level of education and a dummy describing the person's general perception about time spend with the family, whether the person is generally healthy and whether she is of German citizenship, dummies indicating whether the respondent traveled during the day for more than 2 hours and one for whether he or she reported to have had a non-ordinary day. Further household characteristics are included such as information on the number of children living in the household and dummies for the youngest child being younger or older than 6. Moreover, I include information on whether the household uses child care facilities regularly and if so how intensively. The size of the apartment in m^2 is further controlled for as well as a dummy indicating whether the household is located in the Western part of Germany. In order to account for differences in market and non-market time across the workweek resulting from factors other than those discussed here shall be analyzed, I further add workday dummies.

3.1 Composition of the Sample

In this section, I want to take a closer look at the composition of the sample and the distribution of workplace characteristics and job attributes. Since, the labor force participation decision on the extensive and intensive margin differs substantially for men and women which is a well-established fact in labor economics, I will describe them separately throughout this paper. While by construction all men analyzed here are full-time employed, it can be seen in table 1 more than half of all wives are either part-time or marginally employed and only about 20% work full-time. Traditional gender roles amongst German couples seem to still prevail with men being the major breadwinners of the family and women being the

managers of the household (Bird et al. 1984). Despite the fundamental differences in the labor market attachment, women are observed to be more likely to have a second job.

	all				**both work**			
	male		**female**		**male**		**female**	
	mean	std. dev.	mean	std. dev.	mean	std. dev.	mean	std. dev.
full-time	1.000	(0.000)	0.212	(0.409)	1.000	(0.000)	0.380	(0.486)
part-time employed	0.000	(0.000)	0.349	(0.477)	0.000	(0.000)	0.620	(0.486)
marginally employed	0.000	(0.000)	0.192	(0.394)	0.000	(0.000)	0.000	(0.000)
not employed	0.000	(0.000)	0.247	(0.431)	0.000	(0.000)	0.000	(0.000)
second job	0.146	(0.353)	0.279	(0.449)	0.136	(0.343)	0.153	(0.360)
shift work	0.194	(0.395)	0.084	(0.278)	0.196	(0.397)	0.149	(0.356)
flexitime	0.534	(0.499)	0.268	(0.443)	0.525	(0.499)	0.480	(0.500)
fixed wrk hrs	0.271	(0.445)	0.208	(0.406)	0.277	(0.447)	0.370	(0.483)
agriculture	0.035	(0.183)	0.006	(0.077)	0.032	(0.176)	0.011	(0.104)
industrial sector	0.401	(0.490)	0.044	(0.204)	0.424	(0.494)	0.077	(0.267)
service sector	0.565	(0.496)	0.511	(0.500)	0.544	(0.498)	0.912	(0.284)
public sector	0.323	(0.468)	0.224	(0.417)	0.290	(0.454)	0.397	(0.489)
self employed	0.158	(0.365)	0.085	(0.279)	0.174	(0.379)	0.076	(0.264)
same building	0.057	(0.232)	0.031	(0.174)	0.059	(0.235)	0.056	(0.230)
weekend work	0.780	(0.414)	0.304	(0.460)	0.784	(0.412)	0.538	(0.499)
job in health sector	0.027	(0.163)	0.060	(0.238)	0.029	(0.169)	0.104	(0.306)
social job	0.050	(0.217)	0.077	(0.267)	0.054	(0.225)	0.138	(0.345)
security job	0.068	(0.252)	0.015	(0.120)	0.067	(0.250)	0.026	(0.158)
hourly wage rate	14.834	(59.390)	6.852	(32.151)	13.214	(28.404)	12.364	(42.678)
min. of normal work	2555.142	(574.050)	956.882	(1009.116)	2578.362	(595.962)	1710.898	(730.331)
min. of way to work	52.466	(60.120)	20.767	(35.289)	53.774	(63.668)	32.352	(38.941)
N	3483		3483		1905		1905	

Table 1: Summary Statistics of workplace characteristics.

When we take a closer look, table 1 reveals that men are very likely to be dependently employed but are self-employed in 16% of the cases. Their hourly wages amount to 15 EUR on average. Most of the jobs held by husbands are in the service sector while about 32% of them are public sector jobs. Slightly more than half of the work contracts grant flexitime and about 20% percent of the husbands work shifts. Less than 25% of all men report to not work at all during weekends, neither on a regular nor on a sporadic basis. On average, men in the sample spend about 2555 minutes during a normal workweek which corresponds to about 42.6 hours per week. In order to get to work, men need on average 52 minutes.

In contrast to that, only 20% of all women are full-time employed as indicated above while about one quarter of them does not work at all, so that their workplace conditions are expected to be less influential in explaining the couple's joint time. Apart from the differences in labor market status, their workplace characteristics and jobs attributes differ also in other dimensions from those of men. Self-employment is less common among wives which also holds for shift work. Women who actively participate in the labor market are predominantly employed in the service sector. Weekend work is much less likely than for men. Women are mainly observed in social but also in health related jobs. Strongly downward biased by the high percentage of those who do not work for pay, the table shows that average earnings of women amount to about 7 EUR per hour and they spend about 960 minutes or about 16 hours on average at the workplace during a normal workweek.

The last four columns of table 1 show those workplace and job attributes of couples of which both partners work for pay. Compared to all couples, husbands are less likely to have a second job, they have a higher probability of being employed in the industrial sector and in private economy jobs, such men

	all				**both work**			
	male		**female**		**male**		**female**	
	mean	std. dev.	mean	std. dev.	mean	std. dev.	mean	std. dev.
demographic indicators								
age	43.034	(6.427)	40.608	(6.209)	43.567	(6.269)	41.178	(6.202)
low skilled	0.018	(0.132)	0.042	(0.200)	0.017	(0.129)	0.032	(0.175)
medium skilled	0.511	(0.500)	0.714	(0.452)	0.514	(0.500)	0.672	(0.469)
high skilled	0.468	(0.499)	0.239	(0.427)	0.466	(0.499)	0.294	(0.456)
good health	0.761	(0.427)	0.771	(0.421)	0.736	(0.441)	0.776	(0.417)
german citizen	0.984	(0.127)	0.986	(0.117)	0.979	(0.145)	0.991	(0.097)
not enough time for family	0.450	(0.498)	0.249	(0.433)	0.440	(0.497)	0.318	(0.466)
travel	0.198	(0.398)	0.156	(0.363)	0.207	(0.406)	0.171	(0.376)
extraordinary day	0.493	(0.500)	0.514	(0.500)	0.489	(0.500)	0.535	(0.499)
household information								
west	0.817	(0.387)	0.817	(0.387)	0.760	(0.427)	0.760	(0.427)
# of kids	1.671	(1.006)	1.671	(1.006)	1.449	(0.968)	1.449	(0.968)
kid younger than 6	0.243	(0.429)	0.243	(0.429)	0.164	(0.371)	0.164	(0.371)
kid aged 6-17	0.508	(0.500)	0.508	(0.500)	0.501	(0.500)	0.501	(0.500)
reg. child care (y/n)	0.234	(0.423)	0.234	(0.423)	0.203	(0.402)	0.203	(0.402)
min. of child care	106.500	(88.594)	106.500	(88.594)	105.815	(90.344)	105.815	(90.344)
size of apartment	119.588	(42.109)	119.588	(42.109)	118.661	(41.838)	118.661	(41.838)
N	3483		3483		1905		1905	

Table 2: Summary Statistics of household and personal characteristics.

are more often self-employed but also to earn lower hourly wages as compared to all men and to work slightly longer hours during the standard workweek. Wives on the other hand, in two-earner households work in about 62% on a part-time basis and work almost entirely in the service sector. Shift work occurs only in 15% of the cases and women in such couples are less likely to be self-employed or have a second job. Sporadic or even regular weekend work is observed in 55% of the cases and about 40% of wives in two-earner households have a job in the public sector. Hourly wage rates do not differ drastically from men's while women provide on average only 29 hours of work during a normal workweek.

A further overview of the composition of the sample is given in table 2. Generally, it can be noted that almost all respondents have the German citizenship. Husbands are older on average than wives and are also better educated. Men and women are equally healthy and 80% of these households are located in the Western part of Germany. Couples have on average more than 1 child and the youngest child living in the household is more likely to be older than 6 years of age. About 23% of all households regularily use childcare facilities. Since men are the major breadwinners of the family, they report more often to not have enough time for their families.

Husbands and wives in two-earners households are a little older than the average. Table 2 further shows that women are better educated than the average wife yet not as well as men. Due to the generally higher work involvement, women in such households report a little bit more often not to have enough time with their families. Such households are less likely to be found in the Western part of Germany. Compared with the average household, less children are present and if so, the youngest child is less likely to be younger than 6 as compared with all households. Child care facilities are regularly used in only 20% of the households.

3.2 Time Dimension

Of particular interest is the time dimension so that I will now describe the distributions of market work, pure leisure and non-market time over the standard workday in more detail so as to better understand the limitations underlying the decision for joint free time. As mentioned earlier, many factors determine the respective distributions, i.e. laws, institutions, the biological rhythm[7] but also religious beliefs just to name some. The work time occupies a large fraction of the available non-sleeping hours during a standard workday and consequently, confines the time that can potentially be spent on other activities.

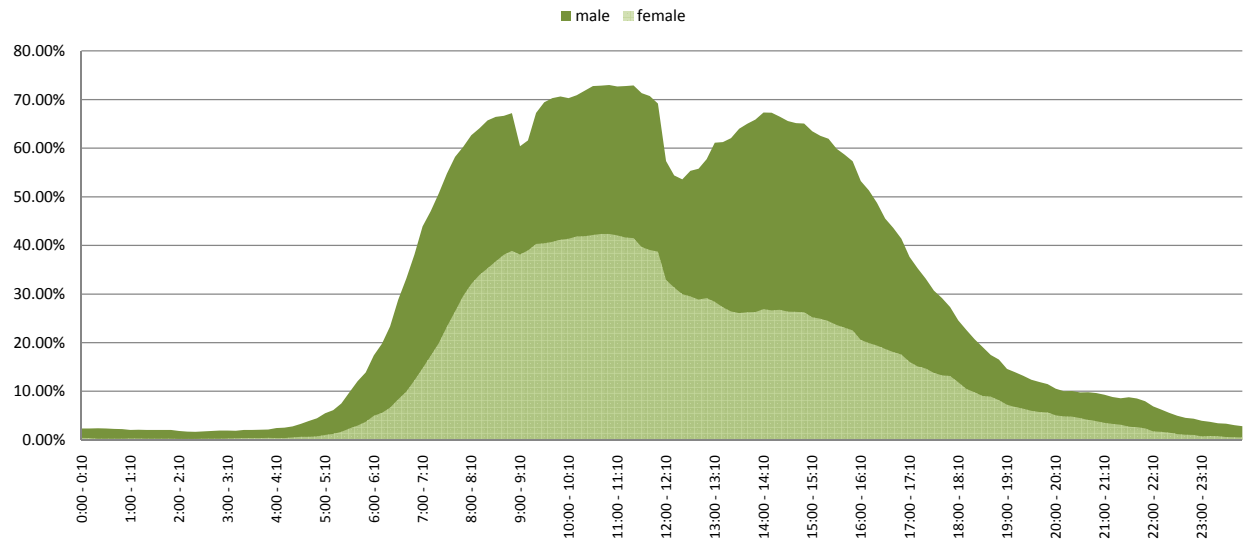

Figure 1: Distribution of work.

Figure 1 shows the distribution of market work of men and women across the workday. One can generally say that the distributions of working hours by sex are relatively wide-spread so that the average workday starts slowly at about 5 am and is likely to finish at about 7 pm with some mass in the later evening hours. Due to the high non-employment rate of the women analyzed here at the extensive margin and the very low fraction of full-time employment at the intensive margin, the distributions for men and women differ drastically. If women are employed, they are more likely to work in the morning hours before noon as during these hours it is generally easier to use childcare facilities. After noon, the distribution of work decreases evenly but it is rather low. Men, on the contrary, are by construction all full-time employed so that apart from a pronounced lunch-time slump I find a rather uniform distribution during the peak working hours which phases out slowly in the evening hours.

These distributions show, that most of the daylight hours of a standard workday in Germany are devoted to market work. The general effects on the private life are immediate and imply that joint time on other than work related activities is mainly restricted to the evening hours which is verified by figures 2 and 3. Let us first look at the distribution of the narrower aggregate, pure leisure, first. As depicted by the lightest-colored area in figure 2, pure leisure is in general mainly concentrated to the evening hours after work independent of gender and is most probable between 8 pm and 10 pm. The figure furthermore presents the distribution of time that both partners spend on pure leisure simultaneously but not necessarily with each other as well as jointly spent time. Since joint and simultaneous leisure requires

[7] The most important rhythm in chronobiology is the circadian rhythm which lasts for about 24 hours and shows physiological processes in all organisms.

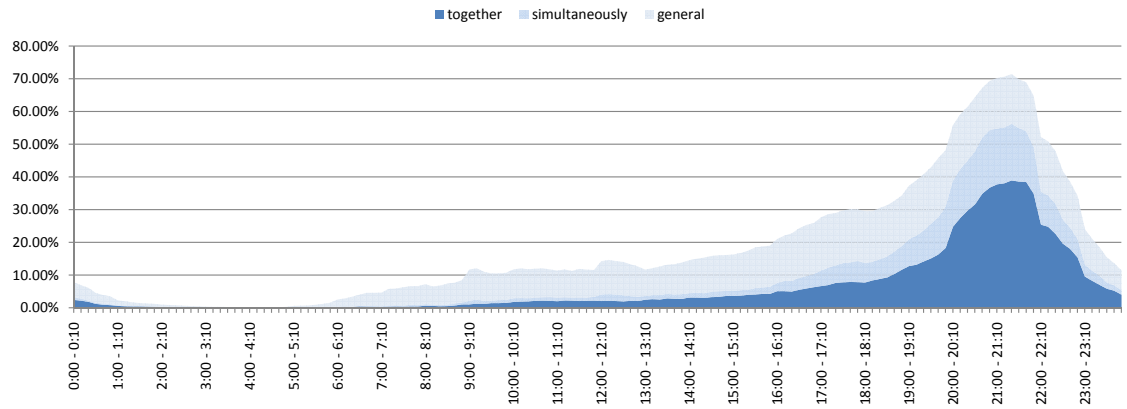

Figure 2: Distribution of pure leisure

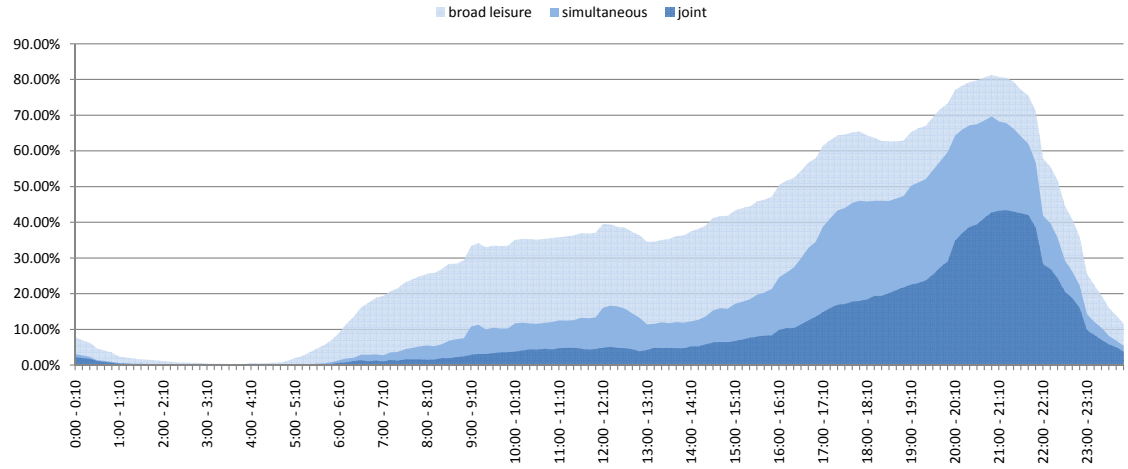

Figure 3: Distribution of non-market time

that both partners enjoy leisure at the same time unit it follows that these two distributions are highly centered around a short time interval in the late evening.

To make the distinction between joint and simultaneous leisure even clearer, table 8 summarizes the respective hourly percentages of these aggregates for a standard workday. The last column of this table shows the fraction of simultaneous time that both partners indeed enjoy with each other. During peak leisure time, a maximum of about 70% of pure simultaneous leisure of the spouses is indeed enjoyed jointly. This fraction is even higher late at night and in the early morning hours. A recent strand of the literature analyzes whether couples actively synchronize their schedules or whether simultaneous time is just a result from the general organization of activities across an average workday. In contrast to the data used in this paper, these studies lack information on whether time is indeed enjoyed together with the spouse so that joint time is generally proxied by simultaneous leisure which, as is revealed by figure 2 greatly overestimates the true amount of joint time and thus upward biases any results obtained on this basis (Hamermesh 2000, van Velzen 2001, Hallberg 2003, Lesnard 2004, van Klaveren et al. 2006, van Klaveren and Maassen van den Brink 2007).

It can be argued, that pure leisure is a residual aggregate that is enjoyed only after all other necessary and more pressing tasks are done. As a broader measure of free time, I therefore defined non-market time as leisure and household activities. The distribution of this aggregate is shown in figure 3. By doing so, more general statements can be made on family related free time that also comprises activities

with and for other family members. The inclusion of household work widely spreads out the gender-independent distribution of non-market time as compared to pure leisure because household production is still highly dominated by women in Germany. The general distribution of non-market time is consequently not limited to particular hours during the day explained by the fact that women often perceive household production as a substitute for paid market work. Combining these facts explains that household production is likely to be observed during daylight hours yet the distribution of non-market time reaches its peak between 5 pm and 10 pm.

	all		**both work**		**husband only**	
	leisure	non-market time	leisure	non-market time	leisure	non-market time
real couples:						
together	86.810	135.261	83.892	128.533	90.903	143.953
	(88.558)	(120.976)	(88.207)	(118.265)	(89.407)	(124.475)
simultaneous	134.361	275.001	127.055	250.242	142.935	306.028
	(98.168)	(161.062)	(97.134)	(152.336)	(97.775)	(166.678)
pseudo couples:						
random	98.401	238.220	94.496	223.908	103.395	256.418
	(72.536)	(139.976)	(71.531)	(131.723)	(73.670)	(147.667)
N	6966	6966	3810	3810	3046	3046

Standard deviations in brackets.

Table 3: Average minutes of joint or simultaneous leisure and non-market time.

I am however interested in joint non-market time which limits the respective time frame to the evening hours just like for pure leisure which is shown by the dark shaded area in figure 3. The distribution of joint non-market time closely resembles the one of joint pure leisure yet with more mass in the left-hand tail. To make this point clearer, table 3 shows that real couples enjoy on average about 87 minutes jointly on pure leisure activities and more than 2 hours on joint non-market time during the standard workday. As mentioned earlier, the spouses spend only some fraction of their simultaneous leisure, namely on average 65% (=86.810/134.361) indeed with each other and only about 49% of their simultaneous non-market time. Table 3 furthermore shows the common time on both free time aggregates for randomly assigned couples and shows that they have a little less than 100 minutes of common leisure and more than double that amount of time of simultaneous non-market time. This table underlines the earlier statement that simultaneous time largely overstates the true amount of joint time which even strongly exceed simultaneous time of randomly assigned couples. Two-earner households are clearly more restricted in the timing of their free time because the schedules of both partners must be synchronized so that time can be enjoyed with each other which requires a higher degree of coordination. Table 3 supports this hypothesis as couples of which both partners are working for pay can enjoy on average about 7 minutes less leisure and 15 minutes less of joint non-market time.

4 Results

4.1 Estimation Results

Based on the theoretical model introduced in section 2, I will now analyze the determinants of workplace characteristics and job attributes on the couple's joint time. The model will thus be estimated according to the following equation:

$$\ln\left(L^j\right) = \mathbf{X}\beta_1 + \mathbf{H}\beta_2 + \mathbf{Z}\beta_3 + \delta_1 \ln\left(w^m,\right) + \delta_2 \ln\left(w^f\right) + \epsilon. \tag{13}$$

Since the labor supply decision is entirely different for men and women, I will estimate the determinants on joint time by sex. But due to the endogeneity of workplace characteristics as discussed in section 2.3, simple OLS estimates will produce biased coefficient estimates which might result in potentially wrong conclusions drawn from naive investigations. In this case, one can only talk about establishing correlations between the regressors and the dependent variable. Yet, random assignment into pseudo couples accounts for this problem by randomizing the couple specific effect. In this specification, one can speak of an identification of *pure effects* that are independent of any diluting influences induced by individual preferences for spending joint time together with the own spouse. In order to find pure effects that are representative, random assignment into pseudo couples will be iterated 250 times and all the relevant regressions will also be repeated that often. The resulting average effects serve as a benchmark to shed more light on the influence of workplace characteristics on private life independent from coupling. Having this in mind, the effects of workplace characteristics and job attributes in general as well as the consequences on reconciling work and private life will now be discussed in more detail.

As mentioned earlier, the influences of the characteristics of the workplace on the couple's private life will be investigated using two different measures, namely (1) the narrower definition of pure joint or simultaneous leisure and (2) the broader aggregate of joint or simultaneous non-market time which is defined as the sum of pure leisure and household production.[8] Different conclusion can be drawn from these specifications: while joint pure leisure rather refers to time that only the spouses spend on enjoyable activities, joint non-market time furthermore includes activities that are spent with and for the whole family. The inclusion of household production into the broader aggregate accounts for the fact that some household activities are more enjoyable if they are undertaken with other household members and additional utility might be derived from it. Yet, to a certain extent, these tasks need to be performed if either no market substitute is available or can be afforded by the household. As mentioned earlier, leisure does not need to be undertaken at all so that some couples choose to not enjoy any of it with each other during the workweek because other tasks have a higher priority and leisure is rather enjoyed during the weekend.

First estimation results determining the influences of workplace characteristics and job attributes on pure leisure and on non-market time for actual and randomly assigned couples are presented in table 4 for men and women separately. I find that measures aimed directly at increasing temporal flexibility of the worker and thus reconciling the balance between work and private life are not found to have a significant and positive impact. Flexitime arrangements are found to be negatively correlated with both activity aggregates for "real" wives as compared to women working with fixed schedules. So I find,

[8] As I noted earlier, time that the partners spent together with each other is some fraction of the time that both spent on leisure simultaneously without necessarily doing so jointly (see also table 8). Estimates on simultaneous time are similar to those presented on joint time and are available from the author on request.

that women working flexitime have more than 20% less joint leisure and joint non-market time than those with fixed working schedules. Accounting for endogeneity by regarding randomly assigned wives shows that this negative effect is confirmed yet it is insignificant and ranges between 3-5%. Taking these results together suggests that this limited form of flexibility rather leads to a de-synchronization of the spouses' joint time. This can be explained by the fact women seem to use flexitime in order to organize household and family tasks and activities in general that are at the expense of the spouses joint time but, following this line of reasoning, are family friendly. Other employment forms that grant a higher degree of temporal flexibility of working schedules are predominantly used by women, namely marginal employment and part-time work where the latter one is the reference group for women here. Marginal employment allows women with young children to work some restricted amount of time during the day without however neglecting their family duties. When endogeneity is accounted for, I find a positive though insignificant effect on both activity aggregates as compared to part-time employed women. Full-time work, in contrast, leads to less leisure but more importantly is found to reduce non-market time by about 16% for randomly assigned wives. So from the first impression, in contrast to the promotion of policy makers, it does not seem that measures designed to increase temporal flexibility in order to facilitate the reconciliation of work and private life, as defined here, are effective.

It could furthermore be argued that employees in the service sector have a lower routine of their working schedules and it could be used in order to be able to spend more time with spouse and family. Here, I find no significant correlations nor effects but the sign of the coefficient is informative. Average pure effects indicate that men enjoy about 4-7% less time with family and spouse than men working in other sectors while the opposite holds for women. These differences might be explained by the composition of these job so that women in the service sector seem to generally have jobs that allow them to enjoy more leisure and non-market time. The coefficient estimates obtained for actual couples tell the opposite story and can be interpreted as identifying typical family related mechanisms. In this respect it can be argued that women schedule their working hours in such a way that informal childcare is provided for example by the partner which is consequently at the expense of joint time of the spouses but also time spent with other family members. However, these influences are low and insignificant. For people holding a second job strong negative correlations are obtained for real couples only but when endogeneity is accounted for hardly any effect can be identified for men on either activity aggregate. It can also be argued that people take up a second job only when informal childcare by the partner is assured which in turn reduces the time that the spouses can spend with each other on pure leisure or on non-market activities likewise which strengthens the previous effect. According to this line of reasoning, however, second jobs are family friendly even if it is at the expense of the time that the spouses can spend with each other. Thus, the differentiation into pure effects (identified by random assignment) and simple correlations (results for actual couples) is crucial as it helps to uncover marriage related mechanisms on top of the pure effects of the workplace itself.

Those workplace characteristics that put the strongest restriction on the time available for other than market work activities explain the influence on private life most. Consequently, shift work, the occurrence of work during the weekend and a longer way to work significantly reduce time spent on joint leisure and on joint non-market time.[9] Shift work leads to a considerable reduction in both free time aggregates for men and women likewise but the effect on non-market time can only be identified by ran-

[9] Note that the time that each person needs to get to work is an average reported by the worker and is not derived from the time use information so that no simultaneity bias occurs here.

	leisure				**non-market time**			
	men		women		men		women	
	real	random	real	random	real	random	real	random
not working			0.373	-0.222			-0.104	-0.054
			(0.575)	(0.192)			(0.398)	(0.095)
marginally empl.			0.531	0.017			0.009	0.041
			(0.586)	(0.200)			(0.414)	(0.104)
full-time			-0.064	-0.057			-0.031	-0.159*
			(0.110)	(0.045)			(0.099)	(0.028)
shift work	-0.200*	-0.372*	-0.235*	-0.277*	-0.125	-0.116*	-0.210	-0.183*
	(0.098)	(0.043)	(0.143)	(0.069)	(0.088)	(0.035)	(0.131)	(0.037)
flexitime	-0.063	-0.027	-0.198*	-0.045	0.025	-0.039	-0.164*	-0.029
	(0.083)	(0.032)	(0.106)	(0.044)	(0.072)	(0.028)	(0.096)	(0.025)
service sector	-0.025	-0.065*	-0.079	0.070	0.043	-0.044	-0.055	0.125*
	(0.076)	(0.031)	(0.160)	(0.081)	(0.067)	(0.029)	(0.140)	(0.045)
public sector	0.141*	0.121*	0.288*	0.185*	0.087	0.099*	0.256*	0.103*
	(0.080)	(0.040)	(0.101)	(0.052)	(0.069)	(0.027)	(0.090)	(0.023)
self empl.	-0.211*	-0.216*	0.101	-0.030	-0.254*	-0.333*	-0.049	-0.069*
	(0.125)	(0.057)	(0.130)	(0.048)	(0.107)	(0.039)	(0.119)	(0.032)
second job	-0.302*	-0.008	-0.306*	-0.164*	-0.271*	-0.022	-0.182	-0.088*
	(0.095)	(0.045)	(0.131)	(0.059)	(0.084)	(0.035)	(0.115)	(0.030)
same building	-0.202	-0.092	0.081	0.001	-0.208	-0.139*	0.067	0.004
	(0.168)	(0.095)	(0.213)	(0.098)	(0.150)	(0.071)	(0.197)	(0.049)
weekend work	-0.182*	-0.176*	-0.209*	-0.122*	-0.220*	-0.135*	-0.120	-0.088*
	(0.078)	(0.040)	(0.094)	(0.045)	(0.066)	(0.020)	(0.085)	(0.022)
job in health sector	0.050	0.129	-0.164	0.009	0.029	0.127*	-0.127	0.028
	(0.227)	(0.121)	(0.158)	(0.075)	(0.189)	(0.076)	(0.142)	(0.033)
social job	0.212	0.031	-0.023	-0.036	0.134	0.011	-0.033	-0.018
	(0.145)	(0.069)	(0.142)	(0.058)	(0.118)	(0.060)	(0.125)	(0.031)
security job	0.071	-0.027	-0.483	0.118	-0.024	-0.001	-0.386	0.015
	(0.136)	(0.071)	(0.313)	(0.095)	(0.121)	(0.052)	(0.293)	(0.058)
log hourly wages	0.047	0.069*	-0.073	-0.109*	0.023	0.081*	0.031	-0.070*
	(0.083)	(0.031)	(0.084)	(0.039)	(0.076)	(0.035)	(0.077)	(0.021)
log normal wrk. hrs.	-0.055	-0.068*	0.101	0.008	-0.096*	-0.095*	-0.003	0.003
	(0.059)	(0.023)	(0.069)	(0.025)	(0.042)	(0.022)	(0.049)	(0.016)
log min. of way to work	-0.121*	-0.091*	-0.121*	-0.090*	-0.151*	-0.143*	-0.129*	-0.098*
	(0.020)	(0.009)	(0.022)	(0.011)	(0.018)	(0.006)	(0.020)	(0.005)
N	3483	3483	3483	3483	3483	3483	3483	3483
R^2	0.064	0.106	0.060	0.083	0.089	0.210	0.072	0.302

Robust standard errors in parentheses. Bootstrapped standard errors for randomly assigned couples.
* indicates significance levels at 10% or better.

Table 4: General estimation results for men and women.

dom assignment. Furthermore, spouses who work either sporadically or regularly during weekends are found to have less free time with spouse and family which ranges from 12-22% for actual couples and from 9-18% for randomly assigned ones. This variable could be interpreted as approximating the general work involvement of the person which suggests that a higher degree of weekend work is related to a stronger feeling of responsibility for the job which is at the expense of private life. A longer way to work has only a minor yet robustly negative impact on private life so that a 10% increase in the time needed to get to work reduces leisure and non-market time by about 1%.

Self-employed must be distinguished from workers in dependent employment as they generally bear a greater responsibility for their work which is further reflected by a higher work involvement at the expense of the family as confirmed by table 4 by a negative effect for both men and women. The negative influence is however only significant for men. In contrast to that, employees in the public sector have generally more routine in their working schedules and are bear a lower degree of responsibility as com-

pared to employees in the private economy which is further reflected by the general positive effect on free time for men and women likewise. It shall also be mentioned that wages have opposing influences on men and women. While the positive income effect dominates over the substitution effect for men leading to significantly more non-market time when wages rise and also to slightly more leisure, the negative substitution effect dominates for women resulting in less free time. However, these findings must be regarded with caution as the differences in these findings are explained by the differences in hours worked on average as depicted in table 1.

Differentiation by Household Type

Next, I will elaborate further on the effect of workplace characteristics and job attributes for different subsamples starting with influences depending on the household type. Results for men are presented in table 5 with columns 2-5 describing estimates for husbands being the only income earners and columns 6-9 show influences for men in two earner households. The table reveals that only relatively few workplace or job attributes have a significant impact on determining the actual couple's free time in particular husbands being the only income earner. A random assignment into pseudo couples help to uncover the effects and underlying marriage inherent mechanisms which mainly confirm previous results discussed so far.

When men are the only income earners of the family only those workplace characteristics have a remarkable effect on determining free time that strongly confine potential non-work time. This can be explained by the fact that wives in such households can more flexibly adjust their schedules to their husbands'. In general, the main results from section 4.1 are however confirmed. As such, I find that shift work, self-employment, weekend work and a longer way to the workplace can be identified to significantly reduce leisure. It is interesting to note that the remarkable negative impact of shift work can only be identified by random assignment. No effect is however obtained on the determination of non-market time which suggests that pure leisure rather constitutes a residual aggregate that can only be enjoyed when all other more necessary tasks are done. Non-market time, on the other hand, is found to be significantly reduced only by the occurrence of weekend work and a longer way to work. Employment in the public sector has the same positive effect on non-market time that was uncovered earlier in the paper. The provision of informal childcare within married couples that facilitate taking-up a second job in order to earn some additional income at the expense of joint leisure and non-market time is further underlined here. It shall also be noted that the dominance of the positive income effect to a wage increase is confirmed.

Two-earner households are different as the working schedules of both spouses must be coordinated and consequently the available time for non work activities is strongly restricted. Accordingly, workplace characteristics play a more important role in determining the couple's free time and are thus driving the general results obtained for all husbands as described earlier in this section. The major results from table 4 for all men can be confirmed, namely that shift work, self-employment, weekend work and a longer way to the workplace reduce both activity aggregates while working in the public sector and higher hourly wages have a positive effect on free time. While shift work was found to only influence leisure in the case of the husband being the only income earner, I find now that when free time is even scarcer that also family time strongly negatively affected. Since free time is more restricted with both spouses working for pay, a second job is found to have a stronger influence than in the previous case due to a higher degree of coordination required to synchronize the mutual schedules of the spouses.

	only husband				**both work**			
	narrow		broad		narrow		broad	
	real	random	real	random	real	random	real	random
shift work	-0.165	-0.349*	0.023	0.007	-0.225	-0.384*	-0.245*	-0.204*
	(0.148)	(0.116)	(0.129)	(0.062)	(0.138)	(0.113)	(0.126)	(0.078)
flexitime	-0.060	-0.040	0.026	-0.040	-0.022	-0.023	0.042	-0.049
	(0.125)	(0.088)	(0.106)	(0.048)	(0.115)	(0.087)	(0.102)	(0.056)
service sector	-0.027	-0.066	0.083	-0.044	-0.029	-0.052	-0.011	-0.037
	(0.111)	(0.085)	(0.096)	(0.051)	(0.107)	(0.083)	(0.095)	(0.056)
public sector	0.234*	0.115	0.141	0.093*	0.033	0.125	0.050	0.092*
	(0.114)	(0.088)	(0.096)	(0.048)	(0.117)	(0.086)	(0.102)	(0.056)
self empl.	-0.274	-0.216*	-0.173	-0.332	-0.236	-0.194	-0.325*	-0.311*
	(0.199)	(0.140)	(0.162)	(0.095)	(0.171)	(0.133)	(0.153)	(0.098)
second job	-0.255*	0.001	-0.226*	-0.023	-0.358*	-0.032	-0.323*	-0.041
	(0.135)	(0.104)	(0.117)	(0.061)	(0.137)	(0.103)	(0.124)	(0.070)
same building	-0.111	-0.077	-0.151	-0.123	-0.259	-0.084	-0.291	-0.164
	(0.270)	(0.200)	(0.221)	(0.136)	(0.227)	(0.188)	(0.211)	(0.140)
weekend work	0.013	-0.179*	-0.115	-0.123*	-0.310*	-0.182*	-0.300*	-0.141*
	(0.114)	(0.083)	(0.095)	(0.042)	(0.110)	(0.082)	(0.094)	(0.050)
job in health sector	0.379	0.129	0.177	0.121	-0.246	0.097	-0.133	0.086
	(0.346)	(0.246)	(0.272)	(0.151)	(0.312)	(0.232)	(0.270)	(0.162)
social job	0.054	0.049	0.101	0.074	0.357*	0.023	0.193	0.009
	(0.226)	(0.165)	(0.163)	(0.088)	(0.193)	(0.169)	(0.167)	(0.112)
security job	-0.089	-0.007	0.069	0.049	0.172	-0.030	-0.138	-0.028
	(0.200)	(0.159)	(0.162)	(0.082)	(0.192)	(0.154)	(0.180)	(0.105)
log hourly wages	-0.014	0.127	-0.000	0.139*	0.045	0.120	0.017	0.147*
	(0.136)	(0.081)	(0.120)	(0.062)	(0.147)	(0.089)	(0.145)	(0.071)
log normal wrk. hrs.	-0.040	-0.103*	-0.082	-0.136*	-0.072	-0.080	-0.107	-0.139*
	(0.087)	(0.057)	(0.077)	(0.042)	(0.097)	(0.065)	(0.089)	(0.046)
log min. of way to work	-0.144*	-0.107*	-0.161*	-0.160*	-0.111*	-0.085*	-0.142*	-0.134*
	(0.030)	(0.023)	(0.025)	(0.013)	(0.029)	(0.022)	(0.026)	(0.015)
N	1523	1519	1523	1519	1905	1909	1905	1909
R^2	0.070	0.072	0.082	0.202	0.080	0.060	0.109	0.130

Robust standard errors in parentheses. Bootstrapped standard errors for randomly assigned couples.
* indicates significance levels at 10% or better.

Table 5: Estimation results for men depending on the household type

Presence of Children

I found earlier that a coordination of the schedules is important particularly when time is scarce in order to spend some time with the partner and the family. When children are in the household, time is likely to be de-synchronized in order to provide some sort of informal childcare.[10] In this section, I want to further analyze the effect of workplace characteristics and job attributes on the couple's free time depending on the age of the youngest child living in the household. More precisely I will look at differences in influences of households with the youngest child being younger or older than 10 years of age. I assume that children under the age of 10 need more care and attention of their parents then older ones. Since the labor supply decision for women with children is a particular one, I will focus on the influences for men here. Estimation results for men are presented in table 6. Due to the comparatively low number of observations and the fact that the explanatory variables do not change over the workday, only very few workplace characteristics are found to have a significant impact on determining free time.

The table reveals that just like before, employees in the public sector are found to enjoy pure leisure or non-market time significantly more (10-29% for real and 14-17% for randomly assigned husbands) as

[10] See also van Klaveren et al. (2006).

	leisure				**non-market time**			
	0-9		10-17		0-9		10-17	
	real	random	real	random	real	random	real	random
shift work	-0.254*	-0.336*	-0.277	-0.420*	-0.167	-0.066	-0.193	-0.124*
	(0.152)	(0.061)	(0.179)	(0.087)	(0.131)	(0.051)	(0.167)	(0.058)
flexitime	-0.217	-0.035	0.106	-0.040	-0.075	-0.052	0.239*	-0.042
	(0.133)	(0.060)	(0.152)	(0.058)	(0.107)	(0.036)	(0.137)	(0.044)
service sector	-0.109	0.039	-0.047	-0.088*	0.013	0.045	-0.051	-0.041
	(0.118)	(0.047)	(0.138)	(0.049)	(0.099)	(0.046)	(0.121)	(0.042)
public sector	0.289*	0.143*	0.183	0.177*	0.140	0.103*	0.176	0.142*
	(0.126)	(0.052)	(0.142)	(0.049)	(0.103)	(0.033)	(0.124)	(0.047)
self empl.	-0.244	-0.332*	-0.238	-0.184*	-0.215	-0.391*	-0.396*	-0.313*
	(0.185)	(0.084)	(0.227)	(0.103)	(0.157)	(0.068)	(0.202)	(0.114)
second job	-0.473*	-0.149*	-0.125	0.059	-0.375*	-0.107*	-0.158	0.012
	(0.147)	(0.077)	(0.164)	(0.066)	(0.124)	(0.058)	(0.138)	(0.048)
same building	-0.205	-0.211	-0.326	-0.058	-0.076	-0.147	-0.455	-0.217
	(0.273)	(0.134)	(0.313)	(0.133)	(0.230)	(0.093)	(0.291)	(0.176)
weekend work	-0.087	-0.097*	-0.120	-0.128*	-0.200*	-0.100*	-0.153	-0.108*
	(0.127)	(0.054)	(0.143)	(0.058)	(0.099)	(0.036)	(0.126)	(0.048)
job in health sector	0.486*	0.221*	-0.146	0.361*	0.475*	0.264*	-0.140	0.314*
	(0.277)	(0.118)	(0.500)	(0.178)	(0.183)	(0.073)	(0.479)	(0.169)
social job	0.492*	-0.014	0.032	0.091	0.402*	-0.006	-0.061	-0.038
	(0.257)	(0.170)	(0.227)	(0.089)	(0.156)	(0.142)	(0.192)	(0.077)
security job	0.046	-0.137	0.207	0.029	0.110	-0.099	0.040	0.030
	(0.222)	(0.101)	(0.240)	(0.140)	(0.186)	(0.064)	(0.221)	(0.072)
log hourly wages	0.154	-0.009	-0.010	0.109*	0.060	0.033	0.009	0.143*
	(0.128)	(0.058)	(0.140)	(0.056)	(0.120)	(0.040)	(0.136)	(0.064)
log normal wrk. hrs.	-0.068	-0.016	-0.137*	-0.075*	-0.108	-0.036	-0.135*	-0.131*
	(0.097)	(0.062)	(0.074)	(0.046)	(0.066)	(0.046)	(0.071)	(0.034)
log min. of way to work	-0.105*	-0.074*	-0.099*	-0.098*	-0.142*	-0.140*	-0.124*	-0.142*
	(0.032)	(0.015)	(0.036)	(0.017)	(0.026)	(0.010)	(0.033)	(0.012)
N	1405	1405	1213	1213	1405	1405	1213	1213
R^2	0.087	0.115	0.076	0.132	0.093	0.244	0.105	0.218

Robust standard errors in parentheses. Bootstrapped standard errors for randomly assigned couples.
* indicates significance levels at 10% or better.

Table 6: Estimation results for men depending in the age of the youngest child living in the household

compared to those men having jobs in the private economy independent of the age of the youngest child. This influence can however only be identified when endogeneity is accounted for so that other diluting influences on joint time induced by preferences for spending time with the spouse are neglected. In contrast to that, shift workers, self-employed, people working during weekends and those having longer ways to the workplace can enjoy free time to significantly lower degrees. Shift work is only found to have a significant impact on pure leisure activities and reduces it by about 25% in the case of real husbands and amounts to less 30%-40% of pure leisure for randomly assigned husbands. One can argue here that shift work is rather family friendly as such working schedules might again assure some kind of informal child care so that always one partner is at home to take care of children at the clear expense of time that the spouses can spend with each other on pure leisure activities. Similarly, a second job is only taken up when children are taken care of which further strengthens the importance of informal child care, in particular for children under the age of 10. Here again, the influence of a second job cannot be identified by random assignment but rather unveil household inherent mechanisms which are significant only in the case of the youngest child being under the age of 10 which underlines the earlier hypothesis of informal childcare provision.

Self-employed have significantly less free time with spouses and family yet it must be noted that the effect is particularly pronounced for the determination of non-market time for older children. It seems

as if such fathers seem to rather have priorities to enjoy leisure time with the spouse after work yet no joint household activities due to their higher work involvement. For younger children, the negative influence could only be identified by random assignment. The occurrence of weekend work only has a significant influence on explaining non-market time. Wages do not have a strong influence on free time and the earlier found dominance of the income effect is only confirmed on explaining non-market time for fathers of older children. Husbands who devote more of their available time to market work can potentially enjoy less leisure and non-market time together with the spouse yet it shall be mentioned that the impact is only significant for older children and predominantly affects non-market time.[11] Flexitime arrangements aimed at granting some degree of flexibility so that the reconciliation of work and private life is facilitated are not found to have a significant influence. For younger children, I find a negative correlation for real husbands which might hint a similar mechanism as described earlier namely that such arrangements are indeed family friendly yet at the expense of joint time of the spouses. This argumentation is further underlined by the fact that hardly any impact is obtained for randomly assigned husbands. Older children need less care and attention of their parents and thus, I find that flexitime has the opposite influence on actual couples which could be interpreted as evidence that in contrast to parents with younger children, spouses seem to actively synchronize their free time so as to spend the maximal amount of time with each other and rather seem to de-synchronize their schedules in the case of younger children.

4.2 Testing for Additional Marriage Induced Effects

By the creation of pseudo couples, I randomized the couple-specific effect (F_h) that was derived from the theoretical model presented in section 2. Thus, I separated the individual's decision to spend a certain amount of his daily available time at the workplace from the decision to spend non-work time with the partner. By doing so, I approach the endogeneity of workplace characteristics and job attributes in order to identify their so-called "pure" effects that are independent from any other diluting couple-specific influences due to marital preferences that do not directly stem from the workplace characteristic itself but rather from the way people make use of it which also affects free time. In this section, I want to formally find out, what marriage adds on top of the pure effects of the workplace identified by randomizing the coupling process. More precisely, I want to find out which of these effects are mitigated or intensified given marital preferences or whether marriage provides additional benefits to the household beyond the pure effects. In order to do so, I will test in how far the coefficients obtained for actual and randomly assigned spouses differ. Only if the difference of the coefficient estimates is statistically significant, statements can be made about the additional marriage-related influence. P-values of these tests for each coefficient are presented in table 7; p-values smaller than 0.10 indicate that coefficient estimates differ significantly between actual and randomly assigned spouses and these cases are highlighted in the table. Equality of the coefficients can only be rejected in very few cases. This finding strengthens the methodological correctness of randomization to approach the endogeneity problem of workplace characteristics when the influence on free time of couples shall be determined.

Let us now take a closer look at those estimation results that significantly differ for actual and randomly assigned couples as they are informative and help us unveil marriage inherent mechanisms. The equality of the coefficient of shift work between real and randomly assigned husbands on pure leisure

[11] It shall be noted here again that no simultaneity bias arises here because this information is not derived from the diaries but are reported as average hours worked during a standard workday.

	pure leisure		**non-market time**	
	male	female	male	female
not working	-	0.3069	-	0.8876
marginally empl.	-	0.3444	-	0.9448
full-time	-	0.9657	-	0.1374
shift work	0.0314	0.7369	0.8763	0.8271
flexitime	0.5035	0.1086	0.4056	0.1069
service sector	0.4893	0.3649	0.1485	0.2109
public sector	0.7605	0.3541	0.9487	0.1249
self empl.	0.9692	0.2788	0.3766	0.9241
second job	0.0066	0.1911	0.0012	0.3391
same building	0.4586	0.7078	0.4984	0.7761
weekend work	0.8521	0.3681	0.1896	0.7238
job in health sector	0.6763	0.1658	0.5839	0.2824
social job	0.1837	0.9419	0.2827	0.9080
security job	0.4066	0.0314	0.8761	0.1705
log hourly wages	0.7734	0.6909	0.4404	0.2311
log normal hrs. work.	0.8153	0.1842	0.9834	0.9157
log min. of way to work	0.1214	0.2223	0.5682	0.1851

Highlighted numbers represent significant differences between the estimated coefficients of real and random husbands or wives at the significance level of 10%.

Table 7: P-values of coefficient tests across equations.

can be rejected. A comparison of the size of the respective coefficients as shown in table 4 reveals that the influence in the case of real couples is less pronounced than the pure effect identified by random assignment. It can be argued that since actual couples are able to coordinate their schedules which thus mitigates the drastic negative influence on private life imposed by such jobs. Moreover, significant differences of a second job for real and randomly assigned husbands are obtained for both activity aggregates and in the case of wives equality can be rejected only for pure leisure. This finding strengthens the earlier made hypothesis that it is more likely that a second job is accepted only if it can be assured that one of the partners can take care of dependent children at the expense of joint free time of the spouses. Here, a de-synchronization of joint time occurs which is at the benefit of the family as a whole. Equality between real and randomly assigned couples can be rejected also for flexitime arrangements of women for the determination of pure leisure. This supports the argumentation that such arrangements are made use of in order to better organize activities across the workday even at the expense of joint time with the spouse.

It follows that these tests strengthen the earlier made claims that married couples are able to synchronize their schedules and are thus able to reconcile family and work even if it is at the expense of joint time of the spouses. A negative sign of the coefficient estimate must therefore be regarded with caution as further marriage inherent mechanisms might be underlying that indeed facilitate the balance between work and private life.

5 Conclusion and Discussion

An increasing competition between firms in the growing product market and a more pronounced interconnection with international enterprises have shaped labor relations during the past decades. In this respect, political decision makers in many European countries have acknowledged the need to soften labor market rigidities stemming from strict regulations in order to render the labor market more functional and but also to increase the labor market participation of women. In this context, flexible work arrangements such as flexitime, part-time work or marginal employment are promoted as a means to reconcile work and private life. I have shown in this paper that these measures aimed at increasing the temporal work flexibility are not found to be effective in the sense that the spouses can enjoy more of their limited free time with each other. In general, those workplace characteristics have the strongest effect on a couples' jointly spent free time that limit the available time most.

More importantly, by solving the endogeneity issue of the workplace characteristics and job attributes, I am able to uncover their pure effects on a couples' private life. Those workplace characteristics can be identified that significantly hamper the work-life balance (shift work, a second job, weekend work, self employment) or, on the contrary, that allow for a better reconciliation of both (employment in the private sector). Given the identification of the pure effects of the workplace on the private life, I am furthermore able to identify marriage inherent mechanisms that act on top of those pure effects and which need to be regarded separately. In this context, I find that a coordination of schedules among actual spouses leads to a mitigation of the strong negative pure effect imposed by shift work on the one hand. In contrast to that, couples particularly with young children rather de-synchronize their schedules in order to assure informal child care by one of the spouses allowing the other to e.g. hold a second job. Although these characteristics are found to be at the expense of joint time of the spouses, they are nevertheless very family friendly as it is assured that one of the parents is at home to take care of dependent children.

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Appendix

hour	together	simult.	fraction
1	1.28%	1.69%	75.42%
2	0.26%	0.35%	75.29%
3	0.06%	0.10%	67.50%
4	0.03%	0.03%	100.00%
5	0.00%	0.00%	-
6	0.09%	0.11%	84.09%
7	0.25%	0.43%	58.99%
8	0.35%	0.73%	48.03%
9	0.48%	1.08%	44.67%
10	0.99%	1.97%	50.37%
11	1.47%	2.45%	59.96%
12	1.52%	2.58%	58.91%
13	1.47%	3.07%	47.89%
14	2.07%	3.34%	62.12%
15	2.63%	4.06%	64.80%
16	3.40%	5.32%	63.89%
17	4.79%	8.56%	55.98%
18	6.88%	12.67%	54.32%
19	9.62%	16.46%	58.45%
20	16.46%	27.91%	58.97%
21	32.58%	49.07%	66.40%
22	35.44%	50.68%	69.92%
23	17.87%	24.83%	71.97%
24	5.57%	7.69%	72.40%

– "fraction" refers to the fraction of time spent together with the spouse (column 2) relative to simultaneous leisure time of the partners (column 3).

Table 8: Percentage of leisure spend with the partner, simultaneously and fraction of joint and simultaneous leisure.

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