electronic International Journal of Time Use Research

volume 4
number 1
September 2007
ISSN 1860–9937
dx.doi.org/10.13085/eIJTUR.4.1

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electronic ***International Journal of Time Use Research***
2007, Vol. 4, No. 1, 1-29 ***dx.doi.org/10.13085/eIJTUR.4.1.1-29***

Time use and options for retirement in Europe

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Abstract

This paper examines the incentive effects of market and household work on retirement. This is accomplished by documenting the time use in market and household work in selected European countries. The assignment of an economic value to household work assumes substitutability of market and household work of some degree. With continuous lifetime patterns, household work may also replace market work after retirement. We construct replacement rates and option values that include the value of household work for 7 European countries. It is shown that the inclusion of household work in calculations on incentives makes the prospect of retiring more attractive, and that the calculation results correlate with actual retirement ages in Europe. Replacement rates are close to or exceed 100% when household work is accounted for. For men the increase in household work after withdrawing from the labour market is larger in relative terms (double on average). Therefore the effect of accounting for household work in the financial incentive to retire is greater for men.

JEL-Codes: J26, J14, J22, J11
Keywords: Retirement, option value, time use, leisure, household work, option value

We would like to thank Julie Mestdagh, Frank Pellikaan and Erica Schultz for comments on an earlier draft and Kimberley Fischer for delivering to us the international time use data. The usual disclaimer applies. This paper is part of the "Ageing, Health and Retirement" AGIR Project financed by the EU fifth framework programme. A project report Piekkola and Leijola (2003) is published in www.enepri.org.

1 Introduction

Europe is ageing and European inhabitants live longer and retire earlier than in other developed countries. OECD (2003a) shows that for continuing to work, the implicit tax rates embedded in the old-age pension and early retirement schemes are high in most Continental European Countries, but less so in the English-speaking and Nordic countries and that these influence retirement behaviour. OECD (2001a) finds that in most of the 9 countries examined in this study, the standard of living is the same for the employed and the non-employed when work-related expenditures and the popularity of owner-occupied housing are taken into account. On the other hand, the report suggests that retired people would prefer to continue to work if appropriate jobs were available. A natural policy response to the problem of funding social security in the future is not only to create new jobs but also to use financial tools to postpone retirement. In fact, the European Community member states are committed to raising the retirement age (European Commission, 2003). Concerns have been expressed that the increasing wealth of the population is increasing the demand for early retirement (OECD, 2000). The baby-boom generation, who are nearing retirement age at present, may also have different preferences for leisure: work life is no longer considered as a value in itself or as a necessary element of active ageing. In Finland those who choose voluntary early retirement generally enjoy financial, mental and physical wellbeing (Gould and Saurama, 2003, 30). Gustman and Steinmeier (2002) estimate with US data that about two-fifths of those workers retiring now at 62 years of age would not defer their retirement to 64 even if it were the pensionable age.

Time use patterns covering retirement decisions are complex. Time use can be categorised into market work, household work, personal needs (sleeping) and leisure. It is shown that household work substantially increases after early retirement. Hence, the time previously allocated to market work is used for other economically beneficial purposes, and this should be reflected in the calculations on financial retirement incentives. We elaborate three methods on how household work can be integrated into economic incentives. The first clear alternative is to consider retirement as a substitute for market work: thus these two time use options should be added together in a consistent manner. Alternatively, with continuous time use patterns, household work simply replaces market work after retirement. Finally, our analysis may be less relevant if household work is perceived as comparable to only active use of leisure time.

The economic value of household work is included in two measures of the financial retirement incentives presented in this paper. The replacement rate (RR) expresses as a percentage an individual's net pension that accrues from his net income from labour. RR is corrected for the value of household work by accounting for its different quantities during periods of employment and retirement. Traditional figures for RR are shown to be well below those that reflect the value of household work. The replacement rates including the value of household

work are close to 100% in most of the countries considered: Belgium, Denmark, Finland, Germany, the Netherlands, Portugal and the United Kingdom. To calculate the option values, we use replacement rates comparable to Stock and Wise (1990) and more recently to Gruber and Wise (1999). These take into account both the annual pension accrual and the expected duration of receiving these benefits.

Section 2 considers the theoretical background. Section 3 shows the data, methods and time use at age 45-64. Section 4 examines the main results and Section 5 concludes the paper.

2 Theoretical background

2.1 Time Use and Option Values for Retirement

Gary S. Becker first presented an economic theory of the allocation of time (1965). It treats households as active producers of non-marketable commodities such as different leisure activities and household services. It is assumed that an individual's decision on the mix of market and non-market goods to be consumed lays the framework for the allocation of time between work, leisure and home production. Let wE = the (net of tax) wage income with wages w and market work time E, $PW_t \equiv P(a, w_{a-1}E_{a-1}))$ = the level of pension available at age t on retirement at age a, depending on wages w and duration of market work time E before retirement. Pension wealth is the lump-sum equivalent of the total pension income a worker can expect to receive, and takes into account pension level, retirement age and life expectancy in each respective country. In time use, let L = the hours of leisure, H = the hours of household work. The time endowment is normalised to unity, so that labour supply is $E \equiv 1 - L - H$.

First, it is useful to consider the decisions concerning the optimal leisure L and household work H. Wages can have an effect on the pension wealth PW, while the retirement age is fixed. Household decisions today relate to respective time use after retirement through μ_H. If positive, it shows the fixed costs so that household work before retirement is linked to household work after retirement. This is the case with gardening, for instance, as a garden requires upkeep before and after retirement. Household work may also require skills that need constant investment. If you have not learnt to clean the house properly during your work career, you may not be able to do it satisfactorily after retirement either. If μ_H is negative, household work is qualitatively different before and after retirement. An example is post-retirement household work that becomes a substitute for market work in order to give some meaning to the day. Individuals, when working, might consider household work to be an extra obligation. This gives (suppressing time indicator and ignoring time preference)

$$V = u(x(w(1-L-H)+I), L, H, PW(w), \mu_H H), \quad (1)$$

where x= the quantity of goods consumed. Most of the studies starting from Gronau (1977) and Solberg and Wong (1991) model household production $Z(H, x_Z)$, which combines auxil-

iary goods x_Z with home production time, and assume this as a substitute for consumption good $x(w(1-L-H)+I)$. Household good production rather than household work time enters the utility function, which as such implies that leisure time and household work time cannot be aggregated.

(1`) $$V = u\{x(w(1-L-H)+I) + Z(H, x_Z), L, PW(w)\},$$

It is easy to see from (1`) that optimal household work supply is such that $\partial Z / \partial H = \partial Z / \partial x_Z w$, where $\partial Z / \partial x_Z = 1$. Household work time should be dependent on the return to market work *w* only, and not on the allocation of time to other activities. Graham and Green (1984) and Kerkhofs and Kooreman (2003) further include here additional joint leisure $g(H)$, $g'(H) \leq 1$, which modifies the optimal marginal productivity of household work to $\partial Z / \partial H = w(1-g'(H))$. Here, it is worthwhile to study the impact of an increase in wages on time use to see the optimal decision making in a more general setting. The optimal allocation of time between leisure, market work and household work is determined from (1) and budget constraint $x = I + wE$:

(2) $$V_L : -wU_x + U_L = 0;$$

(3) $$V_H : -wU_x + U_H + \mu_H U_{\mu H} = 0.$$

Household work before retirement linked to post-retirement leisure or household work, $\mu_H > 0$, lowers the opportunity cost of household work. This is similar to the household production model above, where household work that gives leisure g(H) lowers the productivity requirement in household good production. Assuming homothetic preferences $xU_x + LU_L + HU_H + \mu_H HU_{\mu H} = 0$ and $xU_{xx} + LU_{Lx} + HU_{Hx} + \mu_H HU_{\mu Hx} = 0$, the relation between the demand for leisure and wages can be written after some manipulation as (see appendix A for details)

(4) $$\frac{dL}{dw} = L_w^c \left(1 - \frac{(\partial PW / \partial w + wE)U_x}{xU} A\right);$$

(5) $$\frac{dH}{dw} = H_w^c \left(1 - \frac{(\partial PW / \partial w + wE)U_x}{xU} A\right);$$

where $A \equiv \frac{LwU_x}{\sigma_L} + \frac{H(wU_x - \mu_H U_{\mu H})}{\sigma_H} + \frac{\mu_H HU_{\mu H}}{\sigma_{\mu H}}$;

$L_w^c \equiv \Delta^{-1} U_x \{V_{HH} - V_{LH}\} < 0$, $H_w^c \equiv \Delta^{-1} U_x \{V_{LL} - V_{HL}\} < 0$; $\Delta \equiv V_{LL}V_{HH} - V_{LH}V_{HL} > 0$,

where V_{HH}, V_{LL} V_{LH} and V_{HH} are the partial derivatives of the first order conditions V_H and V_L with respect to H and L. Here, σ_L is the elasticity of substitution between leisure and market work along an indifference curve, if household work is held as fixed. The derivation uses Hicks proof that in holding the other decision variables as fixed and in a constant-returns-to-

scale function, the elasticity of substitution between consumption and leisure may be written in the simplified form $\sigma_L = U_x U_L / U_{xL} U$. For household work and time allocation after retirement this is $\sigma_H = U_x U_H / U_{xH} U$, $\sigma_{\mu H} = U_x U_{\mu H} / U_{x\mu H} U$. The term A is positive under the natural assumption that the second derivative of utility from consumption is negative. This means that in (4) and (5) the substitution and income effects are of the opposite sign, but the relative strength of these depends on the household work and leisure substitution.

Household work during retirement may provide three functions. First, it is 'work' that needs to be done and men and women share these necessary chores. Household work, in the extreme, may be perceived to be similar to market work. Second, household work provides structure and purpose to the day, which might otherwise be passive and beyond the control of the person. After retirement, household work becomes a substitution for the earlier market work, which may or may not be the case when the individual was still actively employed. Third, some household work is enjoyable leisure – cooking, gardening and is thus comparable to active leisure. We consider each alternative interpretation in turn.

Household and market work as substitutes

In the household production model by Gronau (1977) household work produces a good that is a perfect substitute for a composite good that may be purchased on the market. This takes us back to the traditional model (1'), where wages alone determine the optimal household work supply. Becker (1981) proposes a theory on the division of labour based on comparative advantage to explain why men 'specialise' in market work and women in household work. Becker's notion is based on the idea of partnership and concentrates on the quantities of 'total work', while other time, including leisure, is used to preserve the capital necessary for market and household work. Men have the comparative advantage in market work and/or the hours spent in household work are more valuable for women[1]. In the extreme case, individuals can maintain the desired amount of leisure through specialization $\sigma_L = \infty$ and (5) simplifies to

$$(6) \qquad \frac{dH}{dw} = H_w^c \left[1 - \frac{H(\partial PW / \partial w + wE)U_x}{xU} \left(\frac{wU_x - \mu_H U_{\mu H}}{\sigma_H} + \frac{\mu_H U_{\mu H}}{\sigma_{\mu H}} \right) \right]$$

Traditional competitive markets imply that high-income earners specialise in market work when the substitution effect H_w^c is large and is not offset by income effects, i.e. σ_H is large, indicating low substitution between household work and leisure. (We ignore throughout the analysis the potentially large effects of pension wealth through $\partial PW / \partial w$.) If an individual is time constrained and the level of household work after retirement is based on earlier household production, $\mu_H > 0$, low substitution in the post-retirement period between household work and leisure $\sigma_H < \sigma_{\mu H}$ also lowers the relative significance of the income effect. These are

[1] Bittman and Wajcman (1999) argue that specialisation is not a sign of discrimination against women, as the leisure activities of the spouses can still be the same.

the cases where we expect the change in the household supply to be most appropriate to include in the replacement rates.

Household work gives a meaning to the day of retired

Household work can also provide meaning to the day, especially after retirement when market work is no more done. Many people consider household work to give purpose to the day and more pronounced so after retirement. An OECD report discusses the tendency of people to continue to utilise their leisure time as they had done in the past (OECD, 2000). We can thus assume an insignificant effect on leisure (L_w^c is close to zero) and consider the alternative where market work and the wage level have little effect on current household work, since the substitution effect H_w^c is close to zero. The alternative is that the income effects in (6) are high enough to offset the substitution effect. This is true if $\sigma_H = U_x U_H / U_{xH} U$ is small and $\sigma_H < \sigma_{\mu H}$ (or μ_H =0) or $\sigma_H > \sigma_{\mu H}$ for large and negative μ_H. The latter states that the retirement-period household work is a strong substitute for leisure and the linkage between pre- and post-retirement household work is negative. The more one is already engaged in household work when employed the fewer are the household work opportunities after retirement.

Household work as active leisure

Graham and Green (1984) show empirical evidence that home production and leisure should be at least partly considered as joint activities. The dichotomy between household production and leisure decisions is still maintained, since the substitutability between household work and leisure is not explicit. The third approach is rather to consider household work as valuable time similar to active leisure throughout the individual's lifetime. Household work can then be considered as one form of leisure. Thus the desire to retire is associated with the high level of existing household work, rather than changes in it. Since active leisure and household work are similar activities, after retirement an individual could also increase the time devoted to active leisure instead of household work. It would, therefore, be rather appropriate to give an economic value to the total household work and leisure, i.e. on the combined active non-market time.

In the analysis below, an economic value is assigned to household work, implicitly assuming that household work and leisure are close substitutes. In order to determine the optimal retirement age, we assume a simple utility function, namely that the utility is equal to income: $u_1(x, L, H) = wL + w_H H$ and $u_2\left[kP(a, wL_{a-1}), H\right] = kP(a, w_{a-1}L_{a-1}) + w_H H$, where w_H is the value of household work (assumed to be the same for retired and non-retired), k is the value of total non-market time gained through retirement. The measures of the value of household work have varied according to the production or welfare orientation of the system (Juster and Stafford, 1991). The two alternative measures for assigning a value to household work are the cost of buying the service from the market or choosing to assign a monetary value to the time based on the financial gain achieved by doing the job oneself. Assuming household work and market work to be close substitutes, or the specialisation of spouses to be important, it may be

more appropriate to use the cost of buying the service from the market. In Becker's terminology, this indicates the marginal utility of capital invested in the production of home goods. This also implies that the value of household work is relatively lower for high-income individuals. In the alternative interpretation that household work gives a meaning to the day of retired, it could also have been appropriate to give an economic value only to the household activity after retirement or to measure additional household work gained in retirement period. Here, the value of household work can also be independent of wages. It is the habitual daily content of some quantity of market and household work that counts. If, instead, household work is compared to active leisure time, then market work is time away from this valuable activity. It is the level of current household work, assessed at the net wage level that can give an indication of high retirement propensity. Without further knowledge on how to value active leisure such as hobbies, sports and cultural life, we are, however, hesitant to proceed on these lines and give an economic value only to household work and not to active leisure (when these are close substitutes).

Previous OECD research shows that retirement decisions can be strongly influenced by fiscal incentives (Blöndal and Scarpetta, 1998, OECD, 2003a), which can be separated into two components. The first is the replacement rate — i.e. the proportion of the pre-retirement income that will be received as pension. The higher the replacement rate, the greater the incentive to retire. The second component is the change in pension wealth by working an additional year and thereby contributing to the scheme for the year while forgoing pension benefits for that period. If the pension wealth remains constant in spite of the additional year of employment, then the system is neutral, but if it falls, then the system imposes an implicit tax on working. Let T = the expected age of death at age i, s = the current period, a = the period of retirement, τ = the discount factor (set at 0.03), and z = wage growth. We assume a steady annual wage growth z at three percent (thus $\tau - z$ =0). We assume that k is economically insignificant and receives the value of one. Using normalised values, the lifetime utility function V_s at time s can be expressed as follows:

$$v_s(a) = \sum_{t=s}^{a-1} (1+\tau-z)^{-(t-s)} + pw_t(a), \tag{7}$$

where $pw_s^1(a) = \sum_{t=a}^{T} (1+\tau)^{-(t-s)} nrr$ is pension wealth and $nrr = \frac{P(a, w_{a-1}L_{a-1}) + w_H H(a)}{w_{a-1}L_{a-1} + w_H H_{a-1}}$ is the replacement rate, where $P(a, w_{a-1}L_{a-1})$ represents pensions. The first term is the period-specific utility for continuing employment divided by the value of market and household work. Second term is the normalised periodic utility after retirement. In each period the replacement rate expresses the ratio of the individual's pension and value of household work in retirement to his net earnings and household work if employed. Thus, it indicates in percentage terms the level of the person's income in retirement compared to his income if he continued to work. This receives a value of zero until the minimum entitlement age. The wealth accrual relating to pension wealth is

(8) $$\Delta pw(a) = pw_{t+1}(a) - pw_t(a) .$$

Following Stock and Wise (1990), the option value for an individual is the difference between the expected lifetime utility if he defers his retirement decision until the optimal retirement age and the expected value if he were to retire immediately. If the individual retires immediately, he loses some years' income and higher pension benefits. If he retires later, he loses the forgone leisure time and household work. The option value, giving the opportunity cost of retiring today, is

(9) $$OV_t(a^*) = E_t\left[v(a^*)\right] - v_t(t),$$

where E is the expectation operator and a^* is the optimal age of retirement if the individual decides not to retire at time *t*. Optimal retirement should occur before the age when the option value is no longer positive. Next, we introduce taxes so that the income during employment at an hourly after-tax wage rate is $w \equiv W(1-q)$, where W = earnings per unit of work and q =the tax wedge:

(10) $$q = \frac{(1-\alpha)y + m + (1-m)c/(1+c)}{1+(1-\alpha)y} .$$

Standard tax wedge calculations, inclusive of all taxes, and, assuming that share α of the employer's social security payments is also paid by individuals in the form of lower wages, are applied in this analysis. In the tax wedge formulas, y = employer's social security tax, m = average wage tax rate, c = average consumption tax rate based on pre-tax price of consumption. In contrast to the approach used in Blöndall and Scarpetta (1998), we consider the social security contributions of the employed individuals to affect gross wages in such a way that all taxes are borne by the individual. Thus we have no separate assessment of the present value of future social security payments, since they are already reflected in the level of wages. The most important consequence of this is that social security payments by employers affect not only the cost of employment but also accrued pensions (based on the gross wage level before retirement).

In the empirical analysis different pension systems and the yearly accruals of pensions are accounted for, as are tax treatment and social security payments regarding both wage and pension income. Pension accrual figures for each country are obtained from the statistics service of the United Sates Social Security Administration (SSA, 1999). Descriptions by OECD of the tax systems of its member counties are utilised to account for the effects of taxes on wage and pension income (OECD, 2001b). Detailed descriptions of tax treatments and pension accruals are available on request from authors.

3 Data and time use of 45-64 year-olds

We apply original time-use surveys used to construct the Multinational Time Use Study (MTUS) database (for documentation, see Gauthier et al., 2002). The data have been gathered by administering time-use diary surveys and linking the results to background information on the respondents. We utilize complete data from five countries (Denmark 1987 survey, Finland 2000, Germany 1991, the Netherlands 1995, and the UK 1999), and cross tabulations by employment status, gender, and time-use categories from different sources in Belgium and Portugal.

National statistical offices, or corresponding organisations, have conducted the surveys. For the most part, the respondents to the surveys have kept records of their activities during the day in ten- or fifteen-minute intervals. Individuals usually kept the diary for one weekday and for one weekend day. Weights to correct for the weekday as well as sampling weights are provided with the data and applied in the analyses. From the data sets, individuals aged between 45 and 64 years were selected for the analysis, because they are considered to be the group relevant for examining retirement decisions. The sample sizes vary between 573 diary days for Great Britain and 3 643 dairy days in the case of Germany.

The time used for household work has been calculated separately for the employed and the non-employed at 50-64 years of age, with the difference between the two groups serving as a proxy for the change in time use after retirement. Among the older workers, the household work supply stays relatively similar from one age cohort to another, with the major distinction being the employment status. We do not account for the reduction in household work at the very end of one's lifespan. According to evidence by Piekkola (2006) household work stays at the same level from the age of 65 to 74. The non-employed group includes both the unemployed and those taking care of their own household, i.e. individuals not necessarily retired. It would be difficult in a cross-national comparison to have a homogeneous definition of the early retired, since most of the older unemployed workers are in many countries in an unemployment pension pipeline. There is also little re-entry into employment. (For evidence on the production of household work independent of age cohorts in Finland, see Piekkola, 2006, for evidence on employment re-entry in Finland, Belgium and Germany, see Piekkola and Deschryvere, 2005).

In this study, household work is defined as the activity that is performed without pay, and which is related to the upkeep of the household and the provision of its members. It includes cooking, cleaning, laundry, childcare, gardening, shopping, maintenance-related odd jobs, and related travel. Shopping and gardening could also be considered as leisure activities, constituting on average around 22% of total household work. We ignore neighbourhood help. In Huovinen and Piekkola (2002), retired men appear to spend more time in voluntary or neighbourhood help related work. We use the similarly broad concept for time in market work. This includes 10% of total working time as travel time to and from work, as well as time for any breaks or errands during the workday.

The economic value of an hour devoted to household work is the net hourly wage for similar type of work in each country. Public sector involvement in providing household help to the elderly or handicapped differs substantially across countries, and hiring private help is more common in some countries. Therefore we apply either a wage on household help or the minimum wage (Portugal), whichever is more illustrative of the system.

Table 1
Wage rates for household work (euro per hour) in each country

	Belgium	France	Finland	Germany	Netherlands	Portugal	UK
Wage cost to employer	9.0	11.1	12.8	9.6	7.4	2.1	6.3
Gross wage	7.1	8.4	9.8	8.0	7.0	1.9	6.3
Net wage	3.0	6.8	7.8	6.4	5.9	1.5	6.3

In France if the employer constitutes a household, a tax deduction equivalent to approximately equal to 3 € per hour can be made, while the employee can have a premium or around 0.3 (in order to compensate for the negative utility of working because he is close to the welfare eligibility limit). In the Netherlands employer receives a wage cost subsidy of 0.89 € (7.43 - 1.32 + 0.89 = 7.00). In Germany the figures correspond to a full-time worker. For the UK calculations are based on an individual who works 20 hours per week and 48 weeks per year and that they have no children under 16 years living in the same household, which disqualifies them from the Working Families Tax Credit. It is also assumed that the person has no other income apart from this work, and thus represents the lower quartile of the pay scale for part-time female workers found in the New Earnings Survey for 2000.

Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

We evaluate the replacement rate as the average of three different income levels. These levels are derived from OECD's statistical perception of the average production worker (APW): individuals earning APW wages are fulltime production workers in the manufacturing sector whose earnings represent the average for such employees in the economy (OECD, 2001). Here the manufacturing worker is considered to represent the middle-income earner. A worker with higher income is considered to earn 4/3 of the APW wages while a low-income worker earns 2/3 of the APW wage. The income of women is corrected for their lower supply of market work in all the countries, and they are assigned the corresponding share of the three wage levels. Female working hours, and thus their incomes, are on average 23% lower than men's. Tables 4 and 5 also report the average annual earnings and value of household work once the average household work of the employed and non-employed has been taken into account. Life expectancy by gender is fixed at the expected values in each country at 55 years of age (United Nations, 1995).

Table 2, based on the time-use data, presents a breakdown, of the hours of market work and total work (including household work) per week.

Employed men work on average 9.1 hours a week longer at market work than women. Total work hours, however, are almost equal among the employed men and women, with women supplying 0.9 hours more total work. This lends support to the gender division of work. Also

Bittman and Wajcman (1999) find in a cross-section of countries that men and women have similar quantities of total work and leisure time, although the quality of leisure seems to differ. In a Eurostat (2003) comparison of time use in 13 countries, the market work hours are also longer for men while women supply more household work. Eurostat (2003) also finds that among the employed, women in several countries supply more total work than men. For the 45-64 year olds, we find evidence of this only for Finland, Germany and Portugal, and the difference is significant only in Portugal, 12.3 hours. The obvious reason is that children for this age category have already grown up.

Table 2
Total work by gender and employment status, 45-64 year-olds (hours per week)

	Market work		Total work			
	Employed		Employed		Non-employed	
	Male	Female	Male	Female	Male	Female
Belgium	35.4	30.0	42.9	41.3	23.3	37.6
Denmark	35.4	29.1	46.4	44.9	23.1	25.0
Finland	38.5	30.0	54.8	56.8	26.5	38.5
Germany	27.8	21.4	44.5	45.0	31.9	39.0
Netherlands	42.1	25.5	53.6	51.5	26.8	36.2
Portugal	44.9	35.8	51.2	63.5	14.9	41.8
United Kingdom	46.9	35.4	60.7	57.5	30.4	34.0
Average	38.7	29.6	50.6	51.5	25.3	36.0

Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

Furthermore, there are differences in total work times across the countries: Belgium, Germany and Denmark have the shortest total work hours per week for the employed, while the longest total working hours are among the male workers in Britain and among the female workers in Portugal. Table 3 shows the hours of household work per week.

It is seen that in almost all countries, men on average supply 10 hours less household work a week than women. On average, employed men supply 26.8 hours less household work than market work, whereas for employed women the difference is 7.7 hours. For the employed individuals, household work hours are short for men in Belgium and Portugal, but long for the males in Finland and Germany. The most household work is performed by women in Portugal, and the hours in similar tasks are also long for Dutch women. Shortest household work hours for employed women are found in Belgium and Denmark. A similar pattern is seen among the non-employed, but differences among countries and genders are less pronounced. According to Eurostat (2003), for women the hours spent in household work exceed the market work hours in most European countries. In our data covering older workers, this is true among the employed in only Germany and the Netherlands, and the differences are small (2.2

and 0.5 hours, respectively). The picture is similar in the Eurostat study if one restricts the analysis to employed individuals aged between 45 and 64 and to just the countries included in our study: only employed women living in partnerships in Belgium, the Netherlands and Portugal spend more time in domestic tasks than market work.

Table 3
Household work and female share of household work by employment status, 45-64 year-olds

	Employed		Non-employed		Female share %	
	Male	Female	Male	Female	Employed	Non-employed
Belgium	7.5	11.3	23.3	37.6	60.1 %	61.8 %
Denmark	11.0	15.8	19.1	23.0	59.0 %	54.6 %
Finland	16.4	26.8	25.6	38.0	62.1 %	59.7 %
Germany	16.7	23.6	22.7	26.4	58.6 %	53.7 %
Netherlands	11.5	26.0	26.1	35.7	69.3 %	57.8 %
Portugal	6.3	27.7	14.9	41.8	81.4 %	73.7 %
United Kingdom	13.8	22.1	27.0	31.7	61.5 %	54.0 %
Average	11.9	21.9	22.7	33.5	64.6 %	59.3 %

Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

Gauthier and Smeeding (2003) find that time use in the early years after retiring is rather similar to the pre-retirement period. Piekkola (2006) and Hamermesh (2006), on the other hand, argue that most of the extra time after withdrawal from the labour market is spent on leisure, a fact that is largely ignored here. Women are found to be less orientated to retire early and, hence, tend to continue with the same daily routine as before. (For Finnish studies, see Elovainio et al., 2001, Gould et al., 1991) As proposed, continuity of lifetime patterns may also include the substitution of household work for market work after retirement. Non-employed women supply 66% more household work than the employed. For men the respective average figure is even higher 105%, with the exception of Belgium. One explanation for the greater difference for men, as discussed in Section 2, is the specialisation of genders that develops when individuals are still active in the work life.

The continental European countries and Portugal seem to exhibit greater specialisation by women in household work, and by men in market work. In the Scandinavian countries and the UK, work is more equally shared. Based on the Eurostat report, it is evident that more traditional gender roles with respect to work are exhibited in the eastern European countries undergoing economic and political transition, and the specialisation in market work by men and household work by women is more pronounced there than in the countries included in this study. Specialisation becomes more distinct when younger individuals are included. However, the presence of children in the household increases the total working time for both men and

women (Eurostat, 2003, 7). We also ignore the bias created through specialisation. This leads potentially to overstatement of the increase in household work of men. We simply do not have survey data done on household level from all the countries.

4 Incentives to retire

Similarly to the base analysis in Blöndall and Scarpetta (1998), retirement income from the second and third pillars of pension systems is omitted. Retirement benefits depend on the legal retirement age, and country-specific early retirement benefit systems such as disability or unemployment pensions are ignored here. The replacement rates for each successive year of potential working time until the official retirement age are calculated from the age 55 onwards assuming the pension rules and taxes in effect in the year 2000. The exception is Finland, where the new pension rules becoming valid from 2005 onwards are applied (but not in the correlations of retirement incentive to actual retirement behaviour later). The benefit level also depends on the length of the contribution period, the rate at which an individual earns his pension through contributions, and the minimum and maximum pension levels. A 55-year old individual is assumed to have been working for 25 years so that replacement rates have not yet reached the upper bounds [2]. The following tables show the replacement rates for men and women, which are simply the net pension income of the retiree versus his net income if continuing to work. Taxes on wages and consumption as well as social security payments (those paid by employers assumed to lower wages) are taken into account following (10). An additional element is the value of household work before and after retirement. Since reliable cross-country data for household work at different income levels are hard to obtain and not used here, we rely on average household work for the employed and the retired separately in each country, and these are not assessed at the three income levels. The replacement rate is also shown before the pensionable age, i.e. at the age when the individual is not yet entitled to pension benefits. Various early retirement pipelines are not considered here, so the replacement rates are usually lower as they only include accumulation of old age pensions. Option values take into account pension wealth from the age of pension eligibility (i.e. the replacement rate is set at zero until pensionable age).

The first column in Tables 4 and 5, captioned Full, includes the effects of the value of household work for each country, while the second column, Partial, excludes these effects. The last two rows of each table show net earnings and the value of household work according to employment status and market and household work supply. The last columns on the right show the unweighted average of the figures across the countries. Although these are rough approximations of replacements rates, they are sufficient to show the potentially large impacts

[2] The pension system of each of the seven countries is given in Appendix B. Tax formulas and more detailed description of the pension systems are available upon request from the authors.

of household work on retirement incentives (the pension wealth for each age group and country is shown in Appendix B).

Table 4
Option values and replacement rates for men across the countries, ages 55–70 (thousand €)

Last year of work	Belgium				Denmark				Finland, new				Germany			
	Full		Partial		Full		Partial		Full		Partial		Full		Partial	
	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV
55	94%	6.8	75%	8.2	72%	11.9	48%	11.8	93%	12.4	40%	19.9	93%	12.4	40%	19.9
56	94%	13.6	75%	16.5	77%	23.8	48%	30.4	95%	24.8	44%	39.8	95%	24.8	44%	39.8
57	94%	20.4	75%	24.7	77%	35.7	48%	45.7	97%	37.2	47%	59.7	97%	37.2	47%	59.7
58	94%	27.2	75%	33.0	77%	47.6	48%	60.9	99%	49.6	51%	79.6	99%	49.6	51%	79.6
59	94%	33.9	75%	41.2	77%	59.5	48%	76.1	102%	62.0	54%	99.5	102%	62.0	54%	99.5
60	94%	21.1	75%	33.5	77%	71.4	48%	91.3	104%	74.4	58%	119.4	104%	74.4	58%	119.4
61	94%	8.8	75%	26.2	77%	73.0	48%	100.4	106%	86.9	61%	139.3	106%	86.9	61%	139.3
62	94%	-2.9	75%	19.4	77%	74.9	48%	109.6	108%	94.5	65%	170.4	108%	94.5	65%	170.4
63	94%	-14.1	75%	13.0	77%	77.0	48%	118.9	116%	89.4	78%	180.5	116%	89.4	78%	180.5
64	94%	-24.7	75%	7.1	77%	89.3	48%	141.3	120%	83.7	85%	188.9	120%	83.7	85%	188.9
65	94%	-34.9	75%	1.5	85%	91.0	58%	149.8	124%	77.1	91%	195.6	124%	77.1	91%	195.6
66	94%	-44.5	75%	-3.6	85%	93.1	58%	158.4	128%	69.9	97%	200.6	128%	69.9	97%	200.6
67	94%	-53.7	75%	-8.4	85%	95.4	58%	167.3	131%	62.1	103%	204.1	131%	62.1	103%	204.1
68	94%	-62.4	75%	-12.7	85%	98.0	58%	176.3	135%	53.6	109%	206.2	135%	53.6	109%	206.2
69	94%	-70.6	75%	-16.7	85%	101.5	58%	186.3	139%	41.1	116%	201.3	139%	41.1	116%	201.3
70	94%	-78.5	75%	-20.4	86%	104.6	59%	195.6	140%	28.9	117%	196.4	140%	28.9	117%	196.4
Average	94%	-15.9	75%	10.2	80%	71.7	52%	113.7	115%	59.2	76%	143.8	115%	59.2	76%	143.8
	Y	$w_H H$			Y	$w_H H$			Y	$w_H H$			Y	$w_H H$		
Employed	8.2	2.3			15.2	4.6			8.7	5.7			18.1	4.6		
Retired	3.8	6.2			6.7	7.9			3.6	9.8			9.3	5.4		

It is seen from Tables 4 and 5 that the average partial replacement rate with the exclusion of household work is 71-74 percent for both genders. With the exclusion of household work, these are slightly lower for men than for women. Replacement rates, hence, tend to decrease somewhat with the higher income levels. Recall that women's incomes are lower, since corrected for their lower supply of market work. Greater share of women work part-time and regular working hours are shorter. Replacement rates decreasing with income level are also evident in the OECD estimates. Furthermore, the OECD estimates are somewhat higher with the inclusion of early retirement schemes, see OECD (2005). It is seen that full replacement

rates with the inclusion of household work are much higher. Household work increases the replacement rate, because irrespective of gender, there is some addition to household work in all countries after withdrawal from the labour market. In absolute terms replacement rates are 30 percentage points higher and hence close to 100% for both genders.

Table 4 (cont.)

Last year of work	Netherlands				Portugal				United Kingdom				Average			
	Full		Partial		Full		Partial		Full		Partial		Full		Partial	
	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV
55	71%	24.4	52%	32.0	97%	5.0	79%	5.9	58%	17.1	23%	19.2	83%	12.9	51%	16.7
56	77%	41.5	62%	51.7	99%	10.1	82%	11.8	58%	34.2	23%	38.3	85%	24.7	54%	32.6
57	79%	58.8	64%	71.7	101%	15.1	84%	17.8	59%	51.2	24%	57.5	86%	36.5	55%	48.1
58	81%	76.2	66%	91.9	104%	20.2	87%	23.7	59%	68.3	25%	76.6	88%	48.4	57%	63.6
59	82%	93.9	69%	112.3	106%	25.2	89%	29.6	60%	85.4	25%	95.8	89%	60.3	59%	79.1
60	84%	111.7	71%	133.0	108%	24.7	92%	30.8	60%	87.5	26%	106.4	90%	66.5	61%	90.5
61	86%	129.6	74%	154.0	111%	24.2	95%	31.8	61%	89.8	26%	117.0	91%	71.3	63%	101.1
62	88%	147.8	77%	175.2	113%	23.6	97%	32.7	61%	92.3	27%	127.5	93%	74.9	65%	115.0
63	90%	145.6	80%	178.4	115%	22.9	100%	33.6	62%	94.9	27%	137.8	96%	72.2	69%	120.4
64	92%	143.3	82%	181.1	118%	22.2	103%	34.3	62%	165.4	28%	231.9	98%	80.4	72%	139.1
65	94%	143.4	86%	187.0	120%	20.4	105%	33.8	94%	162.2	68%	234.5	105%	76.6	82%	142.5
66	97%	143.0	91%	191.9	120%	18.8	105%	33.5	94%	159.4	68%	237.2	107%	72.8	84%	145.5
67	101%	142.0	96%	195.7	120%	17.4	105%	33.3	95%	156.9	69%	240.1	108%	68.9	87%	148.0
68	105%	140.4	102%	198.3	120%	16.0	105%	33.2	95%	154.7	70%	243.1	110%	64.9	90%	150.1
69	109%	138.0	108%	199.6	120%	14.8	105%	33.2	96%	152.9	70%	246.3	112%	59.8	92%	150.2
70	114%	134.9	115%	199.5	120%	13.8	105%	33.4	96%	151.4	71%	249.6	113%	54.9	94%	150.1
Average	91%	113.4	81%	147.1	112%	18.4	96%	28.3	73%	107.7	42%	153.7	97%	59.1	71%	105.8
	Y	$w_H H$			Y	$w_H H$			Y	$w_H H$			Y	$w_H H$		
Employed	12.6	3.6			4.1	0.5			22.2	4.4			12.7	3.7		
Retired	6.2	7.7			3.2	1.2			5.2	8.8			5.4	6.7		

Full includes household work, Y = annual net earnings (employed) or pension income (retired), $w_H H$ = value of household work (in thousand euros), RR = replacement rates, OV = option values.
Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

One should, however, note that as indicated by our theoretical approach, the high figures would not be accurate if household work were a substitute for leisure instead of market work. In this case the level of household work, rather than changes in it, affects the economic incentives. However, we have shown evidence of considerable changes in time spent on household work after retirement and the relative value of household work can in some case even exceed

annual pension income. The value of household work doubles for men after retirement (Table 3), who tend to reallocate more of their time towards household work than women. Furthermore, men, while still active in the labour market, contribute ten hours less a week towards household work. Thus, replacement rates for men, on average, become relatively greater. This also explains why the option value calculations indicate that inspite of the higher replacement rate for women, it is more attractive for men to retire.

Table 5
Replacement rates and option values for women across the countries, ages 55–70 (thousand €)

Last year of work	Belgium				Denmark				Finland, new				Germany			
	Full		Partial		Full		Partial		Full		Partial		Full		Partial	
	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV
55	124%	3.6	87%	6.9	87%	10.0	57%	12.9	104%	11.6	36%	15.8	104%	11.6	36%	15.8
56	124%	7.2	87%	13.7	87%	20.0	57%	25.9	106%	23.1	39%	31.6	106%	23.1	39%	31.6
57	124%	10.8	87%	20.6	87%	30.0	57%	38.8	107%	34.7	42%	47.5	107%	34.7	42%	47.5
58	124%	14.4	87%	27.4	87%	40.0	57%	51.7	109%	46.2	46%	63.3	109%	46.2	46%	63.3
59	124%	18.0	87%	34.3	87%	50.0	57%	64.6	110%	57.8	49%	79.1	110%	57.8	49%	79.1
60	124%	-2.4	87%	23.3	87%	59.9	57%	77.6	111%	69.3	52%	94.9	111%	69.3	52%	94.9
61	124%	-22.1	87%	12.8	87%	63.5	57%	85.1	113%	80.9	55%	110.8	113%	80.9	55%	110.8
62	124%	-41.1	87%	2.9	87%	67.2	57%	92.7	114%	104.7	58%	137.4	114%	104.7	58%	137.4
63	124%	-59.5	87%	-6.6	87%	71.1	57%	100.5	120%	110.2	71%	147.8	120%	110.2	71%	147.8
64	124%	-77.2	87%	-15.6	87%	86.0	57%	122.1	122%	114.3	76%	157.1	122%	114.3	76%	157.1
65	124%	-94.3	87%	-24.1	94%	89.4	69%	129.1	124%	117.1	82%	165.2	124%	117.1	82%	165.2
66	124%	-110.8	87%	-32.2	94%	93.1	69%	136.9	127%	118.8	87%	172.3	127%	118.8	87%	172.3
67	124%	-126.7	87%	-39.8	95%	96.9	70%	144.2	129%	119.3	93%	178.4	129%	119.3	93%	178.4
68	124%	-142.1	87%	-47.0	95%	100.8	70%	151.7	132%	118.8	99%	183.5	132%	118.8	99%	183.5
69	124%	-156.9	87%	-53.8	95%	105.6	70%	159.6	134%	111.2	104%	182.5	134%	111.2	104%	182.5
70	124%	-171.2	87%	-60.3	70%	109.8	55%	167.4	135%	103.7	106%	181.5	135%	103.7	106%	181.5
Average	124%	-59.4	87%	-8.6	88%	68.3	61%	97.5	119%	83.9	68%	121.8	119%	83.9	68%	121.8
	Y	$w_H H$			Y	$w_H H$			Y	$w_H H$			Y	$w_H H$		
Employed	6.9	2.8			12.9	7.0			7.2	9.2			12.7	6.5		
Retired	5.7	6.1			6.7	9.9			2.6	14.4			6.7	7.3		

Next, consider the option values and respective curves for retirement at age 55 shown in Figure 1. The future retirement age is compared with the advantage of retiring at 55. It is noteworthy that the optimal time for retirement would not substantially change with a different

base year; the most important change is the maximal option value that is based on the number of years during which earnings are accumulated before retiring.

Table 5 (cont.)

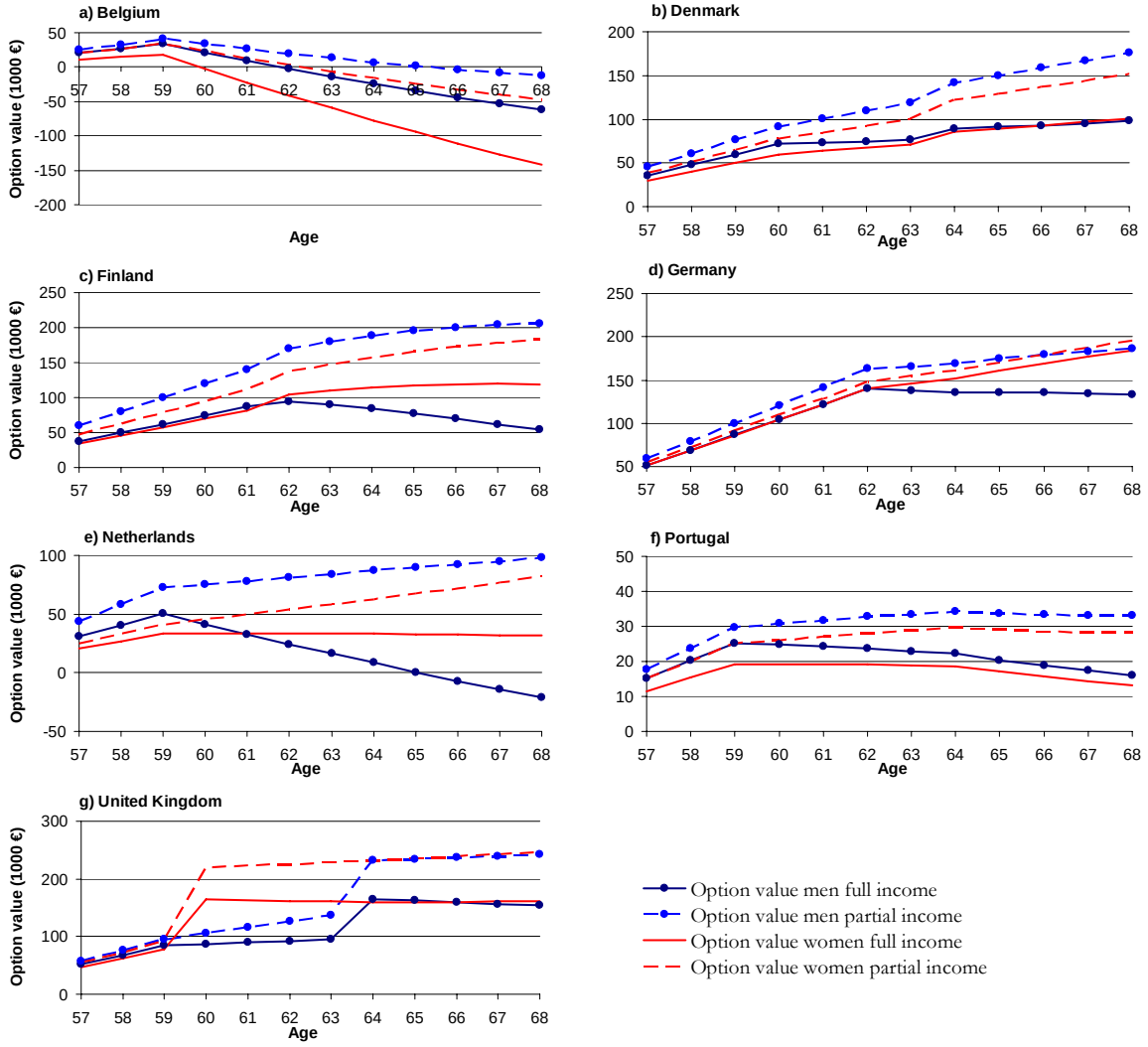
Last year of work	Netherlands				Portugal				United Kingdom				Average			
	Full		Partial		Full		Partial		Full		Partial		Full		Partial	
	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV	RR	OV
55	74%	30.2	54%	31.2	103%	3.8	77%	5.0	60%	15.7	22%	18.3	94%	12.4	53%	15.1
56	80%	47.2	64%	49.2	104%	7.7	80%	10.0	60%	31.5	22%	36.5	95%	22.8	56%	28.4
57	82%	64.4	66%	67.5	106%	11.5	83%	15.0	60%	47.2	23%	54.8	96%	33.3	57%	41.6
58	83%	81.9	68%	85.9	108%	15.3	85%	20.0	61%	62.9	23%	73.0	97%	43.9	59%	54.9
59	85%	99.5	71%	104.6	110%	19.2	88%	25.0	61%	78.7	24%	91.3	98%	54.4	61%	68.3
60	86%	117.3	74%	123.4	112%	19.2	90%	26.1	61%	163.9	25%	220.2	99%	71.0	62%	94.4
61	88%	135.4	76%	142.5	114%	19.2	93%	27.1	92%	162.5	62%	223.0	104%	74.3	69%	101.7
62	90%	153.7	79%	161.9	115%	19.1	95%	28.0	92%	161.3	62%	225.9	105%	81.4	71%	112.3
63	92%	159.6	82%	168.4	117%	18.8	98%	28.8	92%	160.5	63%	229.0	107%	81.5	76%	116.5
64	94%	165.3	85%	174.6	119%	18.5	101%	29.6	93%	160.0	63%	232.2	109%	83.0	78%	122.4
65	96%	174.1	89%	184.1	121%	17.0	103%	29.1	93%	159.8	72%	235.6	111%	82.9	83%	126.3
66	99%	182.3	94%	193.0	121%	15.6	103%	28.7	94%	160.0	73%	239.1	112%	82.5	86%	130.0
67	103%	190.0	99%	201.3	121%	14.3	103%	28.4	94%	160.4	73%	242.8	114%	81.9	88%	133.4
68	107%	197.0	105%	208.9	121%	13.1	103%	28.2	94%	161.2	74%	246.6	115%	81.1	91%	136.5
69	111%	203.3	112%	215.8	121%	12.0	103%	28.1	95%	162.2	74%	250.6	116%	78.4	94%	137.9
70	115%	208.8	118%	221.8	121%	11.0	103%	28.1	95%	163.5	75%	254.7	114%	75.6	93%	139.3
Average	93%	138.1	84%	145.9	115%	14.7	94%	24.1	81%	125.7	52%	179.6	105%	65.0	74%	97.4
	Y	$w_H H$			Y	$w_H H$			Y	$w_H H$			Y	$w_H H$		
Employed	8.3	8.0			3.2	2.2			17.5	7.3			9.8	6.1		
Retired	3.0	10.9			3.2	1.2			3.9	10.4			4.6	8.6		

Full includes household work, Y = annual net earnings (employed) or pension income (retired), $w_H H$ = value of household work (in thousand euros), RR = replacement rates, OV = option values.
Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

The pattern of option values is again shown in Figure 1 with and without household work for each country separately. The peak option value shows the point of maximum benefit of not retiring today (at age 55). With the exception of Denmark, UK, Finland and females in Germany, the full option value starts to recede at some point at the age of 60-65 and reaches a zero value – the point of indifference between retirement or non-retirement – in some countries before the legal retirement age. In the partial approach, retirement deferment is less attractive, as the implied higher pension level is not offset by the fewer years available for

drawing the benefits. It is seen from Tables 4 and 5 and Figure 1 that the economic incentives in the partial approach, which overlooks household work, explain the reasons for the actual average retirement before the legal retirement age rather poorly. The partial approach that totally omits the value of non-paid work time does not support retirement before the age of 70 in any of the countries given the 3% discount rate and the assumed 3% annual wage growth. Figure 1 clearly shows that with the exception of high-income earners in Belgium, option values are positive until the age of 70 (and beyond). Although the goal of the system frequently is to postpone retirement beyond the pensionable age, the low average retirement ages do not appear to support this finding (see OECD, 2005).

Figure 1
Option values



Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

The following tables show the correlation between retirement incentives and the average retirement age (Table 6) and the employment rates at 55-64 years at the three education levels (Table 7). The retirement incentives include the full and partial replacement rates at the legal 65-year retirement age, the age at which the option value is zero (point of indifference) and the age at which the option value is the highest. The age at which the option value takes the value of zero is the point of indifference whether to retire at age 55 or the current age. If the optimal retirement age is higher than 70 years, we set it at this limit (as was the case in 29 instances out of a total of 42). We apply the old (existing) pension scheme for Finland. The retirement incentives considered here are assessed for three income levels, which also yield the average retirement incentives shown in Tables 4 and 5.

Table 6
Correlation of average retirement age and retirement incentives

	Replacement Rate at 65 years		Point of Indifference	Max Option Value
	Full	Partial	Full	Full
Men 0.67 APW	0.625	0.501	-0.368	-0.305
Men APW	0.651	0.685	-0.340	-0.074
Men 1.67 APW	0.080	0.241	-0.167	0.108
Women 0.67 APW	0.484	0.467	-0.118	-0.456
Women APW	0.126	0.459	-0.208	0.028
Women 1.67 APW	-0.073	0.119	-0.225	0.014
Men + Women 0.67 APW	0.512	0.473	-0.200	-0.379
Men + Women APW	0.390	0.572	-0.289	-0.036
Men + Women 1.67 APW	-0.038	0.158	-0.165	0.061

Optimal age of retirement is set at 70 years if higher (in 29 cases of total 42). Using the (old) existing pension scheme in Finland. Point of difference is the age at which option value is set at zero.
Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

As can be seen from Table 6, the average retirement age is clearly correlated to full and partial replacement rates at the middle (APW) and low-income levels (0.67APW). Middle-income and low-income earners also form the majority of the retirees in determining the average age of retirement. The partial and full approaches yield fairly similar correlations, albeit Figure 1 showed that the full approach relates better to the age of retirement. It is also seen here that at the middle and low income levels, the full replacement rate is a somewhat better measure for men than the partial replacement rate. It is seen that the age of point of difference or the age for maximal option value are mostly negatively related to average retirement age. The optimal retirement age implied by option values does not well explain the actual retirement behaviour.

In Table 7 we examine the correlations to the employment rate at various income levels for the 55-64 year-olds rather than the correlation to the average retirement age. Employment rates at three education levels from OECD (2003b) proxy employment rates at three income categories. This makes use of the fact that the education level and incomes are strongly positively correlated.

Table 7
Correlation of retirement incentives and employment rate by education level and OLS estimates

		Replacement Rate at 65 years		Point of Indifference	Max Option Value
		Full	Partial	Full	Full
Men	< Upper Secondary	0.656	0.473	-0.096	-0.037
Men	Upper Sec., Post Sec.	-0.262	-0.126	0.020	0.334
Men	Tertiary	-0.406	-0.266	-0.160	0.400
Women	< Upper Secondary	0.271	0.342	0.530	0.188
Women	Upper Sec., Post Sec.	-0.725	-0.263	0.729	0.856
Women	Tertiary	-0.783	-0.770	0.491	0.747
Men + Women	< Upper Secondary	0.254	0.290	0.212	0.121
Men + Women	Upper Sec., Post Sec.	-0.614	-0.243	0.529	0.599
Men + Women	Tertiary	-0.674	-0.568	0.303	0.568
Mean		1.02	0.73	67.7	67.7
Coefficient (Replacement Rate or Optimal Age of Retirement)		-28.4 (2.8)	-8.3 (1.0)	1.59 (3.0)	0.07 (2.2)
Secondary Education		8.6 (4.9)	10.3 (5.3)	10.4 (2.2)	9.1 (5.5)
Tertiary Education		21.5 (4.4)	24.1 (5.2)	23.0 (4.8)	18.9 (1.9)
Constant		68.9 (6.0)	44.6 (6.0)	-69.0 (1.9)	34.8 (10.1)
R^2		0.46	0.37	0.43	0.42

Optimal age of retirement is set at 70 years if higher (in 29 cases of total 42). Using the (old) existing pension scheme in Finland. Mean employment rate is 50%. In regression primary education is the reference group. Point of difference is the age at which option value is set at zero.
Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

It can be seen that the employment rate is negatively correlated with full and partial replacement rates for individuals with at least upper secondary education. However, for the low educated individuals, the economic incentives become the opposite. The age for point of difference or the age for maximal option value did not explain very well the country differences in the average retirement age. Table 7 shows that these are associated more clearly to employment rates by educational (income) levels. Clearly, the age for maximal option value and partly the age for point of difference are associated positively with employment rates for indi-

viduals other than the low educated. It is likely that the poor labour market situation of the low educed workers explains the low incentive effects.

We have also used OLS regression to explain employment rates with retirement incentives using retirement incentive observations for all three income levels (yielding 42 observations) and including in the estimation education dummies. It can be seen from the lower part of Table 7 that a 30 percent decrease in the *full* replacement rate (from an average of 1 to 0.7) induces a 10 percent increase in the employment rate of the 55-64 year age bracket. The employment effects of option values are also significant but not very large. Reforming the pension system so as to postpone by one year the point at which the option value reaches zero induces a higher employment rate of 1.6. Similarly, a 30 percent increase in the maximal option value (80 thousand euros on average) raises the employment rate by 1.7.

Overall, it is likely that countries with a low replacement rate such as Denmark and the UK have the best possibility of achieving the objective of retirement deferment. But even in these countries, private pension schemes are important (the UK) or private pension savings are heavily tax subsidised (Denmark), thus the inclusion of private sector financial incentives can alter the results.

5 Conclusion

This analysis started with the question of how does household work affect the labour supply and the demand for leisure with specific application to retirement. Life–long allocation of time between market work and household work is examined across seven countries. An important finding of the study is that older employed men and women in most countries contribute equally to the total work. This shows the relevance of considering the reallocation of total work between market work and household work between spouses over a lifetime, although specialisation by gender is largely ignored here. We also offer an alternative explanation based on habitual behaviour of replacing market work with household work after retirement. This approach is also in line with the continuity of lifetime patterns with regard to leisure.

Accounting for the value of household work yields on average 40 percent higher replacement rates (almost 100 percent), and respectively lower option values for retirement. A 30 percent decrease in the full replacement rate induces an increase in the employment rate of the 55-64 age group by 10 percent. The analysis shows that the domestic situation is as important in the retirement decision for men as for women. For men the increase in household work after withdrawal from the labour market is larger in relative terms (double on average). The effect of accounting for household work in the financial incentive to retire is greater for men as they initially start from a situation of 10 hours less household work. Spillovers between genders occur through the substitutability of household and market work. Recent studies find that male retirement decisions are most sensitive to the labour market decisions of their spouses (Coile and Gruber, 2001; Dahl et al., 2002; Johnson and Favreault, 2001). The increase in

household work for men and the small increase for women show that time allocation between genders becomes more homogenous during terms of non-employment.

In countries where the relative increase in the supply of household work after retirement is larger for men than for women, earlier retirement is more attractive to men. This is, in fact, evident in all the countries except in the UK. It is also clear that retirement policies should adapt to country characteristics:

1. Central Europe, characterised with relatively short market work hours (Germany, Belgium) and average household work hours (Germany), does not have similar difficulties in combining work and domestic life. However, the replacement rates are usually high and labour force participation of older German women is strikingly low (OECD, 2003a).
2. In small countries (such as Finland, Netherlands, Portugal) and the UK, men have long market as well as domestic work hours (except for household work in Portugal) while women have long household work hours. It is clear that wellbeing at work and the successful combining of the work and domestic life are very important. The pension system in the Netherlands is not very incentive compatible.
3. Household work supply is low in Denmark, otherwise its regime is similar to the other Nordic countries, and to Belgium. Combining working and domestic life is easier and household work does not influence the retirement incentives to the same degree. In Belgium also household work does not also exert pressure on individuals to withdraw from the labour force, as it stays relatively at the same level after retirement.

It seems clear that in making retirement decisions people consider other incentives in addition to its financial aspects. Although significant, these do not predict the very early average retirement age. In addition to household work, individual characteristics, such as the individual's health and his own perception of life expectancy, arguably also have a strong effect on the retirement behaviour of the elderly. Human capital also explains a large portion of time-use patterns, and the better education level of the current older workers seems to be related to the rise since 2000 in the labour force participation rate among older cohorts. At a minimum, this study indicates that incentive calculations may fail seriously if the value of non-work time is not properly taken into account.

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Appendix A
Household work, market work and leisure

The effect of an increase in pension wealth and substitution effect of wages on leisure demand are from the first-order conditions (2) and (3)

(a.1) $$\frac{\partial L}{\partial w} = L_w^c \left(1 + \frac{(\partial PW / \partial w + wE)U_{xx}}{U_x} \right);$$

(a.2) $$\frac{\partial H}{\partial w} = H_w^c \left(1 + \frac{(\partial PW / \partial w + wE)U_{xx}}{U_x} \right).$$

where $L_w^c \equiv \Delta^{-1} U_x (V_{HH} - V_{LH})$, $H_w^c \equiv \Delta^{-1} U_x (V_{LL} - V_{LH})$, V_{HH}, V_{LL}, V_{LH} and V_{HH} are the partial derivatives of the first order conditions V_H and V_L with respect to H and L. Using the homothetic preference property $xU_x + LU_L + HU_H + \mu_H HU_{\mu H} = 0$ and $xU_{xx} + LU_{Lx} + HU_{Hx} + \mu_H HU_{\mu Hx} = 0$, homothetic properties $1/\sigma_L \equiv U_{xL} U / U_x U_L$, $1/\sigma_H \equiv U_{xH} U / U_x U_H$, $1/\sigma_{\mu H} \equiv U_{x\mu H} U / U_x U_{\mu H}$ and the first-order-conditions $wU_x = U_L = U_H + \mu_H U_{\mu H}$, the term in the brackets can be written as

(a.3) $$\frac{(\partial PW / \partial w + wE)U_{xx}}{U_x} = -\frac{(\partial PW / \partial w + wE)U_x}{xU} \left[\frac{LwU_x}{\sigma_L} + \frac{H(wU_x - \mu_H U_{\mu H})}{\sigma_H} + \frac{\mu_H H}{\sigma_{\mu H}} \right].$$

(a.1). (a.2) and (a.3) give (4) and (5) in the text.

Appendix B
Country-specific analysis and pension wealth

Belgium

The eligibility requirement for social security benefits from early retirement was raised in 1997 from a minimum of 20 years of contributions to 35 years to become effect in 2005 (European Commission, 2003). The age at which a private sector worker is entitled to an occupational pension was raised from the 50 to 60 in 2002, which is the pensionable age assumed in this study (i.e., the required 26 years of work experience in 2000 is also fulfilled). (Reid, 2002).

In Belgium, the additional household work after withdrawal from the labour market is estimated to be worth 5000 € a year for men and 4250 € a year for women (Tables 5, 6). Excluding household work yields replacement rates comparable to those in Gruber and Wise (1999). It is noteworthy that the somewhat lower replacement rates in our study are explained by the social security payments of employers, which are assumed to lower the gross wage and, hence, pension income. The incentives for accumulating pension wealth appear small and the optimal retirement age (the intersection point to the horizontal axis) is achieved at the age of 59.5 years for women and 61 years for men. Individuals, therefore, are indifferent to retiring at 55 years or at the optimal age. This matches the average age of 59 years for withdrawing from the labour force.

Average replacement rates between the ages of 55 and 70 inclusive of the value of household work are 94% for men and 124% for women (Tables 5 and 6), which are considerably higher than those with no household income. The retirement incentive becomes strong after the eligible age of 60. The inclusion of the value of household work advances the optimal retirement age by four years for men and by three years for women.

Denmark

In Denmark, the universal flat-rate old age pension benefit, which is financed from general tax revenue, is available at the age of 65. The minimum age for receiving tax-favoured pension benefits is 67, but other programs facilitate early retirement. A private pension scheme is gradually taking over the public pension system, and roughly one half of workers are currently enrolled in the new system. In both the old and new systems, pensions independent of income levels appear to have helped Denmark to face the future demographic transition. The previous early-retirement plan that facilitated the withdrawal of the unemployed is being phased out, and is omitted from this analysis. From 2018 on, the pensionable age for women, currently 56.6, will be raised gradually to 61.5, to match that of men. In our calculations the pensionable age is fixed at 61 years for both genders.

In Denmark, the change in household work after retirement is, on average, worth around 3400 € per annum for men and 3000 € for women. Figure 2 shows that there still is not much devia-

tion in the option value curves regardless whether or not household work is included. The replacement rates before the legal age of retirement of 65 years are lower than in other countries (63 percent for men and 77 percent for women). It is clearly more optimal to retire at 68 years than at 61 years despite Denmark's shorter-than-average life expectancy. Thus, in economic terms, the optimal retirement age is after 68 years. The system also includes the option of additional pension income if retirement is deferred until 68 years. In fact, calculations presume the possibility of working indefinitely and the optimal option is never to retire. The average retirement age is indeed one of the highest in Europe, 62.4 years for men and 61.5 years for women. This can well be explained by the public pension system, which encourages delayed withdrawal from work. Reallocation of household work after retirement is also sufficiently low not to change the incentives dramatically.

Finland

A new pension system has been launched in Finland, and will gradually start to affect pensions in 2005. In this study, it is assumed to have been fully operational since 2000. Pension accrual starts at the age of 18. Pension is based on the entire working career and not merely the last ten years of each employment relationship, as is the case in the current system (duration of work experience is still fixed at 25 years at the age of 55, as in other countries). The annual accrual rate is 1.5 for the 18-53 year age bracket, 1.9 for the 53-62 age group and 4.5 for the age group 63-68. The new system is partly financed by a 30% increase in the social security payment of employees from the age of 54 onwards. The unemployment pipeline at the age of 60 still enables effective retirement at that age. Here, the pensionable age is set at 62 years. The new system also allows the pension level to be corrected for changes in the life expectancy of the population, but this option is not taken into account in our study. Estimates suggest that the pension reform would lead to an average 15 per cent increase in their levels (Central Pension Security Institute, 2002). The possible longer working careers are included in this estimate, but no correction for life expectancy adjustment is made.

It is noteworthy that household work has the important effect of lowering option values, especially for men. The increase in household work in Finland after withdrawal from the labour market is 9 hours for men and 11 hours for women, and its marginal value is one of the highest of the countries studied, as the hourly net wage is 7.8 €. The difference between the net earned income and pension income is around 5000 €. This is almost totally compensated for by an equal increase in the value of household work. Thus, it is not surprising that the curves for optimal retirement differ widely, depending on the value of household work.

It is optimal for men to postpone retirement until 68 years, compared to only 55 years when household work is excluded. The incentives based on the high accrual rate of 7.5 percent from 62 to 63 years and 4.5 percent per year from 63 to 68 years keep the option-value curve relatively flat. However, with full income the curves slope downwards. In addition, pension wealth at 62 years is approximately 13.000 € higher for men and 14.800 € for women in the new system which is to become effective in 2005 than in the previous regime, as replacement rates based on full incomes are 5 percentage points higher. But it is by no means clear that

individuals plan to defer retirement later, since the initial level of pension wealth may be even higher in the reformed system.

Germany

Workers in Germany may retire at the age of 60, 63 or 65. depending on the fulfilment of certain qualifying conditions (see www.bfa.de for a general description of the pension system). Legislation enacted in 1989 and effective in 1992 increased the pensionable age from the 60-year cut-off for females and 63 for males to 65, starting from the 2001. In our calculations, the pensionable age is taken to be 63 years for both genders.

Similarly to other countries, German workers lose approximately half of their net wage income after retirement. Household work does not substantially increase after retirement, and is valued at only 1300 € for men and 700 € for women. This explains the similarity of the curvatures with and without household work. The replacement rate at the age of 62 for the year 2000 is calculated by authorities to be 70.8% with an average annual pension of 17.457 € (Federal Statistical Office of Germany; Federal Ministry of Labour). In our calculations, the average replacement rate is somewhat higher: 77-86% at the age of 62 or around 10 percentage points higher with the inclusion of household work. It is seen that, if the unemployment pension pipeline is not taken into account, the German system can encourage postponing retirement until 65 years of age or beyond for women. The major factor is to keep working until the age of 63 as pensions cannot be withdrawn earlier. Viewed only in terms of the economic incentive, retirement can occur for men at any time between 62-67 years, but is delayed further for women who gain the least from additional household income. The main reason for retirement deferment is the pension reduction of 3.6% per year if retirement occurs before 65 and the 6% increase per year generated by the postponement.

The Netherlands

In the Netherlands, the basic Social Security old age pension is available at the age of 65. However, the early retirement VUT program was developed in the early 1980s to allow the option of earlier retirement. A 60-year old worker with at least 10 years of uninterrupted employment can retire with a very high replacement rate. The 60-year age limit inhibits retirement earlier, albeit the disability pension scheme is often available at an earlier age. The government plans to phase out the present system gradually. In our calculations the pensionable age is assumed to be 60. The replacement rate is set at 70 percent for middle incomes and above, while it is assumed that the public flat pension rate is more favourable to women at average wage levels and for those at low incomes, perceived to be 67 percent of the average.

The value for additional household work after retirement is relatively low, 4400 € for men and 2900 € for women. Still, given the low initial level of household work, it has quite a large effect on option values. The public pension system with a flat pension implies a replacement rate of around 87 percent (46 percent for men and 48 percent for women if household work excluded, see Tables 5 and 6). It is clear that the incentives to postpone retirement are relatively high for low-income earners, particularly women who, due to lower earnings, are as-

sumed to draw pensions from the public system. The optimal retirement age is close to the pensionable age.

Portugal

Portugal has raised the pensionable age for women from 62 to 65 over the period 1994 to 1999. In reality, an early retirement scheme enables the withdrawal from the labour market at 62 yeas, which is assumed to be the pensionable age here. The country's replacement rate is one of the highest in this study exceeding unity at 63 even without household work. In addition, household work is greatly increased after withdrawal from work. On the other hand, the hourly value of household work, 1.5 €, is very low compared with the average 5 € for all countries. The wage rate applied here is the mandatory minimum wage for domestic services; these, however, may, be lower than actual wages paid to domestic help. The additional household work after withdrawal from work is valued at 680 € for men and 1100 € for women. Despite high replacement rates, the overall effect induces the individual to continue working throughout his or her career, since the expected value for additional household work after retirement remains low. Again, these findings support the country's average pattern of later withdrawal at 66 years.

The United Kingdom

The pensionable age in the UK is currently 65 for men and 60 for women. Through legislation enacted in 1995, the minimum for women will be raised gradually for over a ten-year period to 65, starting with those who reach 60 years in 2010, until it is uniform for all in 2020 (O'Connell, 2002). In our calculations we have assumed the pensionable age to be 60 years, because the existence of various early retirement arrangements is promoting the average retirement age at 62 for men and 61 for women.

In the United Kingdom, the value for additional household work after retirement is 4300 € for men and 3200 € for women. We consider for the UK only the State Earnings Related Pension Scheme (SERPS), covering about 25% of the labour force. Private pension schemes constitute over half of the total retirement income in the country (Gruber and Wise, 1999, 415). SERPS is currently being remodelled, and the original replacement rate target of 25% of the average earnings of the 20 best employment years is gradually being changed to 20% of the lifetime average. The pension accrual rates are determined according to these target replacements, and we assume here the accrual rate applicable under the new scheme.

It is seen that the low full replacement rates, 73% for men and 81% for women, offer incentive to postpone retirement. With a low level on any tax difference, an individual is relatively indifferent with respect to the timing of optimal retirement, given the pensionable age of 60 for women and 65 for men.

Appendix B1
Pension wealth for women across the countries, ages 55–70 (thousand €)

Last year of work	Belgium		Denmark		Finland		Germany		Netherlands		Portugal		UK		Average	
	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial
55	266.19	216.66	133.88	80.23	222.21	101.99	196.65	152.59	258.39	151.57	45.39	35.99	201.08	86.48	189.11	117.93
56	266.19	216.66	133.88	80.23	227.77	110.97	200.72	158.29	261.32	155.02	47.91	37.19	202.92	88.69	191.53	121.01
57	266.19	216.66	133.88	80.23	233.34	119.96	204.94	164.20	262.27	156.14	50.43	38.39	204.76	90.91	193.69	123.79
58	266.19	216.66	133.88	80.23	238.91	128.94	209.31	170.34	263.66	157.78	52.95	39.59	206.60	93.13	195.93	126.67
59	266.19	216.66	133.88	80.23	244.47	137.92	213.85	176.70	265.05	159.41	55.47	40.79	208.44	95.34	198.19	129.58
60	266.19	216.66	133.88	80.23	250.04	146.91	218.57	183.29	266.43	161.04	56.89	41.99	210.28	97.56	200.33	132.53
61	246.56	200.68	133.88	80.23	255.61	155.89	223.45	190.14	248.92	151.19	54.74	40.14	197.15	92.74	194.33	130.15
62	227.50	185.17	123.53	74.03	261.18	164.88	228.52	197.24	231.75	141.45	52.51	38.21	184.19	87.81	187.03	126.97
63	209.00	170.11	113.48	68.01	261.94	185.02	233.78	204.61	214.94	131.81	50.21	36.21	171.42	82.78	179.25	125.51
64	191.04	155.49	103.73	62.17	250.09	184.27	218.67	194.00	198.48	122.29	47.86	34.14	158.82	77.67	166.96	118.58
65	173.60	141.30	104.08	69.30	237.46	181.73	203.41	182.88	182.34	112.87	45.19	32.01	214.05	156.29	165.73	125.20
66	156.67	127.52	93.93	62.54	224.11	177.49	190.64	174.94	165.70	102.56	41.86	29.09	195.63	143.36	152.65	116.79
67	140.23	114.14	84.07	55.98	210.05	171.63	177.34	165.98	149.53	92.56	38.67	26.25	177.55	130.59	139.64	108.16
68	132.89	108.62	74.50	49.61	195.35	164.22	163.46	155.92	133.84	82.85	35.60	23.50	159.82	117.98	127.92	100.38
69	117.15	95.79	65.21	43.42	180.03	155.34	148.92	144.66	118.61	73.42	32.64	20.82	142.43	105.51	115.00	91.28
70	101.86	83.33	56.80	38.21	160.68	139.51	133.66	132.13	103.82	64.26	29.81	18.23	125.37	93.20	101.71	81.27
Average	205.85	167.63	109.78	67.81	228.33	151.67	197.87	171.74	207.82	126.01	46.13	33.28	185.03	102.50	168.69	117.24

Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

Appendix B2
Pension wealth for men across the countries, ages 55–70 (thousand €)

Last year of work	Belgium		Denmark		Finland		Germany		Netherlands		Portugal		UK		Average	
	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial
55	394.15	292.64	99.12	83.57	91.11	80.44	133.52	138.84	105.87	72.89	51.77	53.33	182.99	70.49	151.22	113.17
56	394.15	292.64	99.12	83.57	99.14	87.53	138.50	144.02	108.25	72.89	53.50	55.11	184.33	72.29	153.86	115.44
57	394.15	292.64	99.12	83.57	107.16	94.61	143.67	149.40	109.03	72.89	55.22	56.88	185.67	74.10	156.29	117.73
58	394.15	292.64	99.12	83.57	115.19	101.70	149.04	154.98	110.15	72.89	56.95	58.66	187.00	75.91	158.80	120.05
59	394.15	292.64	99.12	83.57	123.22	108.78	154.60	160.77	111.28	72.89	58.68	60.44	188.34	77.71	161.34	122.40
60	394.15	292.64	99.12	83.57	131.24	115.87	160.38	166.77	112.41	72.89	60.40	62.22	189.68	79.52	163.91	124.78
61	370.14	278.59	99.12	83.57	139.27	122.95	166.37	173.00	106.83	68.58	58.34	60.10	260.57	194.44	171.52	140.18
62	346.83	261.17	92.65	78.11	147.29	130.04	172.58	179.46	101.32	64.40	56.19	57.87	244.69	183.18	165.94	136.32
63	324.20	244.26	86.37	72.82	167.58	147.95	179.03	186.16	95.87	60.35	53.94	55.56	229.15	172.08	162.30	134.17
64	302.22	227.84	80.28	67.68	169.49	149.64	173.12	180.03	90.49	56.41	51.61	53.16	213.94	161.14	154.45	127.98
65	280.89	211.90	85.20	76.40	170.08	150.15	166.91	173.57	85.17	52.59	49.19	50.67	199.06	150.35	148.07	123.66
66	260.17	196.43	78.62	70.49	169.41	149.56	163.88	170.41	79.15	48.87	45.57	46.93	184.50	139.71	140.19	117.49
67	240.06	181.40	72.36	65.28	167.54	147.92	160.29	166.68	73.32	45.27	42.04	43.31	170.24	129.23	132.27	111.30
68	220.54	166.81	66.14	59.67	164.54	145.26	156.09	162.31	67.65	41.77	38.63	39.78	156.29	118.90	124.27	104.93
69	201.59	152.65	60.10	54.22	160.44	141.65	151.23	157.26	62.15	38.37	35.31	36.37	142.64	108.72	116.21	98.46
70	183.18	138.90	54.86	49.23	149.38	131.88	145.67	151.48	56.81	35.08	32.08	33.05	129.28	98.68	107.32	91.18
Average	318.42	238.49	85.65	73.68	142.00	125.37	157.18	163.45	92.23	59.31	49.96	51.46	190.52	119.15	148.00	118.70

Source: Raw data base of Multinational Time Use Study (MTUS), own calculations.

electronic ***International Journal of Time Use Research***
2007, Vol. 4, No. 1, 30-46 ***dx.doi.org/10.13085/eIJTUR.4.1.30-46***

Cultural voraciousness − A new measure of the pace of leisure in a context of 'harriedness'

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Abstract

A new measure of 'voraciousness' in leisure activities is introduced as an indicator of the pace of leisure, facilitating a theoretical linkage between the literature on time pressure, busyness and harriedness in late modernity, and the literature on cultural consumption. On the methodological side it is shown that time use diaries can provide at least as good a measure of the pace of leisure as survey based measures. Respondents with a high score on the voraciousness measure ('harried' respondents) are not less likely to complete their diaries than less harried respondents. In accord with the findings from the literature on cultural omnivorousness, the most voracious groups are those with high levels of social status and human capital. However, these associations are not due to these groups having either higher income or greater quantities of available leisure time. The pace of leisure activities must therefore be due to other factors, for example, could a fast pace of out-of-home leisure participation be conceived of as a new marker of status distinction?

JEL-Codes: C42, D12, E21
Keywords: Time pressure, harriedness, leisure, busyness, time-use diaries, cultural omnivorousness

I would like to thank my collaborator in research on cultural voraciousness, Dr. Tally Katz-Gerro, and an anonymous reviewer for their helpful suggestions on improving this paper.

1 Introduction

Recent accounts of increasing 'busyness' in the working lives of individuals in contemporary industrialized societies (Zuzanek and Mannell, 1998; Darier, 1998; Social Research, 2005; Southerton and Tomlinson, 2005) have been echoed in the literature on leisure by the notion of increasing 'harriedness' (Zuzanek et al., 1998). In his discussion of the 'harried leisure class' Staffan Linder was one of the first to identify the change that has occurred over time in the association of work, leisure and class (Linder, 1970; Sullivan and Gershuny, 2001). At the turn of the nineteenth century, when Veblen (1994[1899]) was writing about conspicuous consumption among the rising professional classes, the distribution of leisure time was markedly different from today. As an example, we can compare the perhaps apocryphal image of the 'bankers' lunch – a long, alcoholic midday indulgence – with the image of the present-day investment banker or stockbroker, frenetically busy on several telephones for the entire day and much of the night. The current and growing association between high (earned) income and time scarcity has already been well documented (e.g., Jacobs and Gerson, 2004; Gershuny, 2000; Sullivan and Gershuny, 2004). Evidence of the working hours of better-qualified and high-income earners suggests that as qualification levels rise, so do hours of work (Robinson and Godbey, 1999; Gershuny, 2000). One solution which has been suggested for the increasing scarcity of time among certain groups is an increase in intensity of activities, at work and at leisure alike. This increase in intensity involves more activities being done simultaneously, but it may also involve shorter spells being spent on each activity, so that the sequence becomes more crowded, but also more fragmented, leading to ever heavier feelings of time pressure (e.g., Shaw, 1998; Bittman and Wajcman, 2000; Bittman, 2002; Mattingly and Bianchi, 2003). Individuals feel pressured to reduce process time in their public and their private lives, and they respond, among other things, by increasingly compressing, fragmenting, and compartmentalizing time (Southerton, 2003).

The impact of this increase in intensity of time use both in work and leisure activities is generally regarded in the literature as having a negative effect on well-being, and feelings of time pressure have long been shown to be positively associated with stress (Zuzanek and Mannell, 1998; Garhammer, 2002). Even in research which also reports a positive association between feelings of time pressure and enjoyment of life (e.g. Garhammer, 2002), a slower pace has usually been advocated as being more beneficial in terms of the quality of life (see also Darier, 1998; Grossin, 2000). Feelings of stress and harriedness are of course experienced differentially by different sub-groups of the population such as by men and women (e.g. Peters and Raaijmakers, 1998), and according to different socio-economic statuses (Garhammer, 1998; Zuzanek et al., 1998). As referred to above, the increasing association between high income and time pressure (the 'income-rich, time-poor' phenomenon) is by now well-recognized. Indeed, there is recent evidence that the feeling of time pressure and being overworked is particularly pronounced among those who in actuality may have a potentially large amount of

discretionary free time: this is the case for dual-earner couples, especially those without children. According to Goodin et al. (2005), these are the groups under the greatest "time-pressure illusion".

In this paper I introduce and describe a new measure of leisure participation which, in order to create a link to the literature on 'harriedness', takes account both of the range and the weekly frequency of participation in out-of-home leisure activities. It may be described as a measure of the 'pace' of leisure. Out-of-home leisure activities in particular are chosen because they express active leisure behaviors that take both time and money to engage in, and consequently provide a link to socio-economic and time resources which may be pertinent in the assessment of the socio-economic correlates of 'harriedness' in the late modern period.

2 Cultural voraciousness

The proposed measure is theoretically complementary to the concept of cultural omnivorousness, familiar from the literature on cultural consumption. Omnivorousness, since its original definition by Peterson and Kern (1996), has been characterized as being based on the breadth of cultural tastes and on the way cultural capital increasingly involves an appreciation of a wide range of cultural forms including the fine arts, popular culture, and folk culture: that is, including highbrow, middlebrow, and lowbrow cultural tastes. A number of works have measured omnivorousness, mainly according to cultural tastes (particularly musical genres: Peterson and Kern, 1996; Bryson, 1997; Emmison, 2003, but also reading: Van Rees et al., 1999) or, less often, according to cultural behaviour (particularly leisure activities: Lopez Sintas and Alvarez, 2002; Holbrook et al., 2002, but also eating habits: Warde et al., 1999). Cultural omnivorousess as it is usually defined is therefore a measure of breadth in cultural tastes, but it does not measure the pace of participation in leisure activities. The proposed new measure (termed 'voraciousness' in keeping with the metaphor) combines an assessment of individual's leisure participation in respect both of the range of out-of-home leisure activities (to reflect the breath of activities) and of the frequency of participation in them (to characterize the pace of leisure participation). In this paper both time use diary and survey data are used to report on measurement issues and the socio-economic correlates of voraciousness. By focusing in this way on the pace and nature of leisure participation, it is possible to make connections between the literature on the changing pace of life and leisure in late modernity (Linder, 1970; Garhammer, 1998; Gershuny, 2000), including concepts like busyness and harriedness, and the literature on the consumption of leisure activities.

Issues of measurement

In the construction of the voraciousness measure a number of measurement issues are relevant. Although questionnaire measures of activity participation are the most familiar means of data-collection on leisure participation, time use measures are also becoming increasingly applied (e.g. Garhammer, 1998; Robinson and Godbey, 1999). However, there has been some

criticism of time-use diaries as data collection instruments in the area of free time and leisure activities. One of the most common arguments is that, while time use diaries may be able to accurately record activities which are done frequently and regularly, they may be unreliable when it comes to less frequently performed activities. There is also an ongoing debate about whether time-use diaries under-represent 'busy' respondents (see Round Table Discussion on non-response bias in time-use surveys in Leisure & Society, 1998).

It is therefore interesting to be able to compare the measure of voraciousness based on a time use diary source with that based on the more standard questions on leisure participation found in questionnaire-based surveys. The data set used in this paper is particularly well-suited to address these questions since it allows a comparison of diary and questionnaire measures of leisure participation constructed from a time use diary on the one hand and from survey questions on the other (both instruments delivered to the same individuals). A further advantage of the particular diary used here is that it was kept for a week rather than for a single day (the more common data-collection procedure in time use diary methdology). It therefore permits analysis of a wider and more representative range of activities, encompassing those done less frequently (e.g., once a week instead of once a day). This is a valuable feature in the analysis of leisure, particularly leisure activities outside the home (since many such activities fall into the category of less frequent activities), and goes some way towards meeting the criticism that less frequent leisure activities are likely to be under-represented in a time use diary.

3 The data

'Home OnLine' was a panel study undertaken by the Institute for Social and Economic Research at the University of Essex, England, of adult individuals in households in Britain.[1] The first wave was conducted between October and December (inclusive) of 1998, and was selected according to a qualified form of randomization, which ensures inclusion of geographically clustered areas with representation of different social strata similar to that of the population. Selection of households was random within these areas, with an overrepresentation of homes with personal computers. Counterweights were included in the dataset to reproduce the expected sample without overrepresentation of households with computers. Two methods were used to collect the data. Firstly, interviews were conducted with all adult members (aged 16 or older) of the household. In addition, interviewed respondents were provided with a week-long diary in which they were asked to record, from a list of activity categories, what they did every quarter hour on each day of that week. The activities recorded in the diary were based on (but were not identical to) the standardized categories used in the Multi-national Time Use Study (MTUS),[2] a cross-national archive of time use diary studies held at the Uni-

[1] The original data collection was funded by British Telecommunications plc.
[2] For further details of the MTUS see http://www.timeuse.org/mtus/.

versity of Oxford. Diaries were returned by post; in return, respondents received a gift voucher.

Sample size and response rates

The original sample comprised 1000 households, containing 2034 adult individuals. Of these, 1093 responded to the interview and completed the diary and 668 responded to the interview only, a total response rate of 87 percent. From this data set we selected a subset of respondents aged between 16 and 65 who were identified in the interview as either the head of household or the partner of the head of household. This yielded a sample of 1317 individuals and couples in households.[3]

Construction of diary and questionnaire-based measures of voraciousness

The first advantage of this data set is that it contains information on participation in leisure activities both from questionnaire and time use diaries, making possible a choice and a comparison of measures. Two questionnaire measures of voraciousness were derived from a question in the interview schedule asking respondents how frequently they engaged in particular leisure activities.[4] The out-of-home leisure activities selected for the measure were: going to the cinema/concerts/the theatre; leisure group participation; eating/drinking out; watching sports; and doing sports/keeping fit/walking. The first questionnaire measure was constructed by summing the number of these activities done on 'most days', and 'at least once a week'. The second measure *also* included those activities reported as being done 'at least once a month'. Both measures had a scale of 0 (none) to 5 (all).

The diary measure of voraciousness was based on time use diary information, and was designed to be as compatible as possible with the questionnaire measures. Respondents to the diary recorded their participation in different leisure activities throughout the week in quarter-hour slots. The diary measure simply counted the number of *different* out-of-home leisure activities done in the diary week, giving a range from 0 (none) to 4 (all). The out-of-home leisure activities selected for the diary measure were: going to concerts/the cinema; walking; eating/drinking out; and doing sports.[5] Like the questionnaire measures it was therefore a measure both of the *range* (since it involves counting how many different activities are participated in) and of the *frequency* (since in order to be recorded during a specific week an activity has to be done on average at least weekly) of participation in different out-of-home leisure activities.

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3 A randomly selected sample of one adult individual per household was also constructed, and all analyses were performed for both these samples. The results for the individual sample were identical to those for the sample of individual and couple households; given the greater numbers in the latter, only those results are presented.

4 The response categories were: most days; at least once a week; at least once a month; several times a year; once a year or less; never/almost never.

5 The diary's leisure categories were not precisely comparable with the questionnaire's leisure categories.

4 Diary/questionnaire measures comparison

The first step was to compare the time-use and questionnaire measures of voraciousness from the Home OnLine data. In particular, it is important to examine the basis for the criticisms of time use diary data as a source for information on less frequent leisure activities. In Table 1, the first questionnaire measure of voraciousness is based on the number of different out-of-home activities reported from the survey as being done at least once a week. The second questionnaire measure also contains those activities that are reported on the survey question as being done "at least once a month". On average one-quarter of these activities will appear in a weekly diary. Assuming that the diary gives an accurate record of activity participation we would therefore expect the diary estimate to have a higher distribution and mean than the first questionnaire measure, but a lower distribution and mean than the second questionnaire measure. Since both the distribution and mean of the diary measure sit squarely between those of the two questionnaire measures, we can conclude that time use diaries are indeed effective in measuring leisure participation, even for activities done monthly.

Table 1
Distributions and means of the time use diary and questionnaire measures of voraciousness: Britain 1998

Number of different out-of-home leisure activities/week	Questionnaire measure (1)		Weekly diary measure		Questionnaire measure (2)	
	N	(%)	N	(%)	N	(%)
None	135	(19.7)	103	(15.0)	57	(8.3)
One	304	(44.2)	232	(33.7)	179	(26.0)
Two	186	(27.1)	227	(32.9)	247	(35.8)
Three	60	(8.7)	102	(14.8)	150	(21.8)
Four	2	(0.3)	24	(3.5)	49	(7.1)
Five	1	(0.1)	-	-	7	(1.0)
N=100%	688[+]		688[+]		688[+]	
Mean	1.26		1.58		1.96	
Correlation coefficient (Spearman's rho) with weekly diary measure	.363				.350	

[+] The analyses are based on a sample of 1317 respondents. However, the N in this analysis is a result of the sample weighting which corrects for both the original over-sampling of households with a personal computer and for differential patterns of non-response.
Source: Home OnLine, Britain, 1998 (first wave).

In assessing the overall efficacy of the measures based on the diaries and the questionnaires it is reasonable to conclude that the time-use diary instrument (recorded over a week of activi-

ties) may be the more accurate in recording the true range of different weekly activities, since in the diary activities were recorded simultaneously (or nearly simultaneously) with their actual performance, while in the questionnaire respondents were asked to recall the frequency with which they participated in particular activities. It has been shown that diary estimates of time spent in different activities, where people record their participation in those activities with at least some degree of contemporaneity (i.e., in their diaries), differ from estimates based upon responses to retrospective questions. It can safely be assumed that diary estimates are in fact the more accurate, since they do not involve the same problems of retrospective recall or respondents' estimations of their 'usual' behavior (see Juster, 1985; Robinson, 1985; Kalfs, 1993). In addition, general under-reporting of activities in surveys by comparison to time-use diary data has been commented on before in the methodological literature on time use diaries: see Dow and Juster, 1985. And indeed, comparison of the measures reported here suggested under-reporting by women to the survey question about the number of different leisure activities (see Table 3 and associated discussion below).

The conclusion that time use diaries record as many different leisure activities as more conventional questionnaire instruments still leaves open the question of differential diary completion by busy and less busy respondents. In other words, whether busy respondents are less likely to complete their diaries leading to an underestimation of the extent of harriedness (or, in this case, voraciousness in leisure) calculated from diary data (see Round Table Discussion in Leisure and Society, 1998). In order to address this issue, it is necessary to distinguish between respondents who completed a diary with those who responded only to the survey questionnaire.

Table 2 shows that when the distribution and means of the voraciousness measures are recalculated comparing those people who responded to the survey questionnaire only with all those who filled in a diary, the distributions are extremely similar (weighting this time only for over-representation of those with personal computers in the sample). So it seems that there is very little difference in the reporting of voraciousness (or the *pace* of consumption of leisure) between the diary and survey questionnaire respondents (compare results from Table 1 – shown in brackets).

Van den Broek and Breedveld also include a measure of the 'diversity' of the leisure repertoire calculated from both diary and questionnaire information in a report of time use in the Netherlands from the Dutch series of time use surveys between 1985-2000 (Van den Broek and Breedveld, 2004). Their time use measure (which included PC usage) was calculated from the weekly diary activities, while the questionnaire measure (which included both PC and internet usage) was calculated from questions about which leisure activities were participated in. Analyses of these measures are presented only at the population level, and they show an overall decline in diversity from 1985-2000 over the time diary week, but an increase in the reported *annual* repertoire of activities. No discussion of differential response is included and no break-downs are given for different groups of the population, but the authors suggest that this divergence over time in the time use and questionnaire measures may signal a move from

a more involved participation in leisure activities in the earlier period towards a "passer-by" status in the later, characterized by greater annual diversity in the leisure repertoire but a more restricted range of weekly activities.

Table 2
Comparison of diary and questionnaire respondents on measure of voraciousness: Britain 1998 (Table 1 results shown in brackets)

	Questionnaire measure 1: (weighted for PC+ only)		Diary measure: (weighted for PC+ only)		Questionnaire measure 2: (weighted for PC+ only)	
0	16.9	(19.7)	16.4	(15.0)	7.7	(8.3)
1	48.5	(44.2)	33.7	(33.7)	28.1	(26.0)
2	26.9	(27.1)	32.3	(32.9)	37.0	(35.8)
3	6.3	(8.7)	14.4	(14.8)	20.3	(21.8)
4	1.4	(0.3)	3.3	(3.5)	6.8	(7.1)
5	0.0	(0.1)			.1	(1.0)
Mean	1.27	(1.26)	1.55	(1.58)	1.91	(1.96)
N =100%	425 (questionnaire only respondents)		653 (all diary respondents)		425 (questionnaire only respondents)	

+ PC = personal computer
Source: Home OnLine, Britain, 1998 (first wave).

Diary/questionnaire measures: gender difference

Despite the overall similarity of the diary and survey measures of voraciousness, and in support of the documented contention that questionnaire-derived measures may lead to under-reporting by comparison with diary-derived measures, there is a suggestion of differential reporting by sex between the diary and questionnaire measures of voraciousness from the Home OnLine data (see Table 3). While there is no difference evident in voraciousness recorded for the week between men and women from the time-use diary information (this being true both in the simple T-test and in the multiple analyses of variance controlling for social status and family structure shown in Tables 4 and 5), there is a statistically significant difference by sex for the first questionnaire measure (which remains statistically significant in multiple analysis of variance when controlling for measures of social status and family structure), with men reporting on average a greater number of different out-of-home leisure activities participated in per week. In addition, there is a difference in the same direction which is just over the conventional limit of statistical significance for the second questionnaire measure (P=.07). It is not clear to what extent these differences can be attributed to differential reporting by men and women in response to questionnaire items on the usual frequency of different

leisure activities; if we *are* seeing an example of differential reporting, then it is interesting to speculate why men might be more inclined to over-report, or women to under-report, the frequency with which they participate in different out-of-home leisure activities. If we accept the diary measure as the more accurate (since it does not rely on retrospective recall of activity participation) the implication is that men and women may be reporting their leisure activity information differentially in the survey questions on leisure; with women under-reporting their participation in out-of-home leisure activities. We can only speculate on the reasons for this – but one possible explanation that accords with the literature is that women feel more under pressure from work and family responsibilities and therefore do not recall their leisure activities so well, perhaps because of a stronger overall sense of harriedness.

Table 3
Means of diary and questionnaire measures of voraciousness by sex: Britain 1998

		Mean	Std. Error	N+
Diary measure	Male	1.61	.0572	296
	Female	1.56	.0533	391
Questionnaire measure (1)	Male	1.36**	.0527	296
	Female	1.19	.0439	391
Questionnaire measure (2)	Male	2.05*	.0647	296
	Female	1.90	.0538	391

+ Although the weighted data is used here, the differences by gender are not an effect of sample weighting since the same phenomenon is evident when using the unweighted data.
** Difference statistically significant at P=.013; * Significance level P=.07
Source: Home OnLine, Britain, 1998 (first wave).

Performance of measures of voraciousness: substantive findings

It remains to show how the measure of voraciousness performs in relation to standard socio-economic variables. In other words, what is the relationship between the voraciousness in leisure participation and measures of social status, or human capital? For the reasons given above, in which various advantages of using time use diary information as opposed to retrospective recall questions are outlined, the measure of voraciousness based on time use diaries was used in the following analyses.

Firstly, multiple analyses of variance (Table 4) demonstrate statistically significant differences in the measure of voraciousness by highest qualification level, social status of job and

type of newspaper read while holding constant the effects of sex and of family structure.[6] There are strong positive associations evident between the diary measure of voraciousness and these variables (all relationships statistically significant at the P=.003 level or above), even when controlling for the effects of family structure and of sex. In other words, those in the highest status or human capital groups report the greatest number of different out-of-home leisure activities per week, when holding constant the effects of family structure and sex. These findings confirm that the measure of voraciousness used here shows similar characteristics to some of the behaviorally based measures of omnivorousness reported in the literature on cultural omnivorousness (e.g., López Sintas and Garcia Álvarez, 2002). This connection is clear in the association reported in the literature between high levels of status and human capital with cultural omnivorousness, and the same association with voraciousness reported in this paper. However, voraciousness (a measure of the *pace* of leisure) should be conceptually distinguished from the meaning of omnivorousness as it was originally conceived, namely as a measure of the *breadth of cultural tastes*.

In addition, with regard to the family structure variable, adults living alone are the most voraciousness (i.e. participate in the greatest number of different out-of-home leisure activities). Among those in couples, young couples (aged under 36) without children participated in the highest number of different out-of-home leisure activities (i.e. were the most voracious) and those with children aged under 12 in the household participated in the lowest number. These results accord with findings on leisure participation more generally, in which those under greater pressure of time are less involved in active leisure. They also correspond again with findings from the literature on omnivorousness, in which it is younger people without families who in general display the widest range of cultural participation (e.g. Warde et al., 1999; Van Eijck, 2001; López Sintas and Garcia Álvarez, 2002). The effect of sex in the analysis was not statistically significant.

Finally, in order to connect to the literature on harriedness, time and money are brought into the equation. It could be hypothesized, for example, that the pace of participation in out-of-home leisure activities was primarily a function of time or of money. The observed association between high levels of social status/human capital and voraciousness may simply be the outcome of the fact that people with high levels of social status have more money to spend on leisure, or more time for it. The first of these propositions (that people with higher levels of social status have in general more money) is almost certainly true; the second (that they have more time) is more doubtful, considering the increasingly reported association between high levels of employment income and long hours of work (e.g., Sullivan and Gershuny, 2004). However, both propositions could be tested through these data, to see whether the observed

[6] The measure of family structure was based on life-cycle stages, including aspects of age and the presence and age of dependent children in the household. The categories are: living alone, aged under 36; living with spouse, aged under 36 with no dependent children; living with spouse, over age 36 with no dependent children; living with spouse, dependent children aged under 12 in the house; living with spouse, dependent children aged 12 or more in the house; other.

associations between high levels of social status/human capital and voraciousness can be attributed to time, or to money.

Table 4
Multiple analysis of variance models showing effect of social status and cultural capital variables on the measure of voraciousness: Britain 1998

	Model 1: Social status of job	Model 2: Highest qualification level	Model 3: Type of newspaper read
Social status of job (employees only)	P = .003 beta = .170		
Predicted means (adjusted):			
Management	1.79		
Intermediate	1.78		
Small employer/low supervisor	1.55		
Semi/unskilled routine	1.37		
Highest qualification level		P = .001 beta = .160	
Predicted means (adjusted):			
Degree, nursing		1.83	
A-level, higher vocational		1.61	
GCSE, lower vocational		1.59	
None		1.37	
Type of newspaper read			P = .000 beta = .180
Predicted means (adjusted):			
Quality			1.98
Medium			1.70
Tabloid			1.39
None			1.51
Family structure	P = .005	P = .013	P = .000
Sex	not significant	not significant	not significant
Model R^2	.07	.06	.06
N +	466	687	687

+ The analyses are based on a sample of 1317 respondents. However, the N in this analysis is a result of the sample weighting which corrects for both the original over-sampling of households with a personal computer and for differential patterns of non-response.
Source: Home OnLine, Britain, 1998 (first wave).

A second set of multivariate models was designed to test these suggestions (see Table 5). In fact, the relationship of voraciousness with all three independent variables (social status of job, level of highest qualification, and type of newspaper read) is in general seen to remain highly statistically significant even when controlling for the effects of time and income as covariates in analysis (Table 5). In other words, those with the highest levels of social status/human capital report on average the highest number of different out-of-home leisure activities even when holding constant available leisure time, and income. The only cases where this was not so were for the models in which net monthly pay was the covariate, and highest qualification level and type of newspaper read were the independent variables. However, in these cases, two arguments support the overall conclusion. First, the predicted means for these models, adjusted for the control variables, showed a relationship with voraciousness in the expected direction. That is, higher levels of social status and human capital were associated with a higher mean number of different out-of-home leisure activities in a clear monotonic sequence. Second, in identical analyses performed with the questionnaire-derived dependent variable measure of voraciousness, the direction of the predicted means was exactly the same, but, because of the larger sample numbers for this variable (due to non-response on the time-use diary), these variables were statistically significant at P= .015 and .000 respectively.

The conclusion is that those with high levels of social status and human capital have less time for leisure but still engage in a greater number of different out-of-home leisure activities per week. We can assume that what characterizes these groups in general is shorter periods of leisure, which are also more diverse in terms of the range of different out-of-home activities participated in. This conclusion is supported by a further refinement of the analysis in which the total amount of time spent *only* on the same four out-of-home leisure activities used to calculate the measure of voraciousness was entered as a covariate into the same multiple analysis of variance. In this analysis, which assessed the mean of the voraciousness measure while holding constant the total amount of time spent in these four activities, the effects of social status of job, highest qualification level, and type of newspaper read still remained statistically significant. The implication is that the higher levels of voraciousness for those with higher levels of social status and human capital is independent of the total amount of time spent on these activities, and therefore that the pace of leisure (at least for active, out-of-home leisure activities) is indeed faster for these sub-groups of the population. Further analyses and theoretical discussion may be found in Sullivan and Katz-Gerro (2007).

Table 5

Multiple analysis of variance models showing effect of social status variables on voraciousness, controlling for measures of time and money: Britain 1998

	Covariate=**net monthly income** (employees only)	Covariate=**hours worked per week** (employees only)	Covariate=**total leisure time**
Social status of job	P = .004 beta = .220	P = .000 beta = .200	P = .000 beta = .200
Predicted means (adjusted):			
Management	1.78	1.81	1.83
Intermediate	1.86	1.77	1.74
Small employer/low supervisor	1.62	1.57	1.55
Semi/unskilled routine	1.28	1.30	1.33
Family structure	P = .001 beta = .260	P = .002 beta = .200	ns
Sex	ns	ns	ns
Covariate	ns	ns	P=.000
Model R^2	.11	.08	.12
Highest qualification level	ns (beta = .130)	P = .033 beta = .140	P = .000 beta = .200
Predicted means (adjusted):			
Degree, nursing qualification	1.82	1.85	1.89
A-level, higher vocational	1.64	1.64	1.65
GCSE, lower vocational	1.55	1.58	1.59
None	1.48	1.44	1.30
Family structure	P = .008 beta = .230	P = .02 beta = .17	ns
Sex	ns	ns	ns
Covariate	ns	ns	P = .000
Model R^2	.07	.06	.09
Type of newspaper read	ns (beta = .120)	P = .000 beta = .200	P = .000 beta = .170
Predicted means (adjusted):			
Quality	1.82	2.06	1.98
Medium	1.73	1.70	1.68
Tabloid	1.48	1.39	1.38
None	1.60	1.60	1.54
Family structure	P = .004 beta = .240	P = .004 beta = .190	P = .001 beta = .170
Sex	ns	ns	ns
Covariate	ns	ns	P = .000
Model R^2	.07	.08	.09

Source: Home OnLine, Britain, 1998 (first wave).

5 Discussion and conclusion

The new measure of voraciousness in leisure proves to be a useful discriminator between subgroups of the population relating to social status and human capital. In analysis it shows similar characteristics to cultural omnivorousness, in that groups of higher social status are more voracious in their leisure consumption. However, since voraciousness is a measure of the pace and diversity of leisure (rather than of the breadth of tastes) it permits a theoretical linkage to the literature on time pressure, busyness and harriedness in late modernity. The data also permitted a comparison of the measure of voraciousness based on time use diaries with equivalent measures based on responses to a questionnaire survey, and it was shown that time use diaries can provide at least as good a measure of the pace of leisure as survey based measures. Therefore in the area of leisure as well as in the area of paid employment (see Juster et al., 2003) there is support for the idea that time use diaries perform similarly to survey data in the recording of activities. It seems that respondents with a high score on the voraciousness measure (and therefore with a high pace of leisure activities – the 'harried' respondents) are not less likely to complete their diaries than less harried respondents, supporting the idea that harriedness in leisure participation does not negatively influence diary response (see Round Table Discussion, 1998). There are also certain advantages to data collected from time use diaries because of the contemporaneousness of the recording of activities, as opposed to reliance on retrospective recall. Relatedly, there is an indication that, in accord with previously documented under-reporting in survey data compared to time use diaries (Dow and Juster, 1985), women may under-report their leisure participation in survey questionnaires. It may be this phenomenon can be attributed to the greater sense of time-pressuredness that women experience compared to men (e.g. Peters and Raaijmakers, 1998; Southerton, 2003), and that we are seeing here an effect of ex-post-facto perceptions of leisure time reflected in responses to retrospective recall questions.

The substantive results indicate that, in accord with the findings from the literature on cultural omnivorousness, the most voracious groups are those with high levels of social status and human capital. However, it was shown that these associations are not due to these groups having either higher income (which on average they do) or greater quantities of available leisure time (which, at least in modern industrialized economies, they do not). It seems that the voraciousness of groups with high social status and human capital must therefore be explained by other factors.

The twentieth century saw the increasing importance of non-traditional dimensions of status and self-identity; among them patterns of cultural consumption. Following Bourdieu, the sociological literature has increasingly emphasized the importance of consumption in the late modern period in shaping the contours of social locations and social relations (Bourdieu, 1984; Featherstone, 1995; Slater, 1997), and its significance for individual self-identity (for example, Bauman, 1987; Friedman, 1994; Gabriel and Lang 1995). The literature on the conditions of late modernity suggests an increase in individual reflexivity, particularly among the

groups referred to here, which includes an increasing desire for a diversity of experiences (Giddens, 1991; Beck et al., 1994). From the literature on time pressure and stress in western societies Garhammer (1998, 2002) refers to the desire not to miss anything, to experience everything as quickly as possible, as a consequence of the 'social acceleration' (Rosa, 2003) of late modern society. Robinson and Godbey also refer to ever-increasing feelings of time pressure among managerial and professional groups in the USA as arising primarily through an increasing emphasis on the 'consumption of experiences': doing more, doing them more quickly, and doing more simultaneously (Robinson and Godbey, 1999).

Voraciousness in leisure might also be conceived of as a new marker of status distinction. It has been suggested, for example, that busyness in employment may be regarded as a "badge of honour" by the new "superordinate working class" (Gershuny, 2005). It might also be hypothesized that voraciousness may be seen in the same way. According to this hypothesis, the 'tasting' of many different out-of-home leisure activities with a fast turnover would imply a kind of "multi-cultural capital" (Bryson, 1997) of leisure. Of course it may not prove possible to distinguish completely between these possible explanations since in reality the meanings of consumption are multiple, shifting and overlapping (Douglas and Isherwood 1996). In the end, since it is known that busyness, harriedness and time pressure in general are related positively to stress (Zuzanek and Mannell, 1998; Garhammer, 2002), the implication is that the quality of life is likely to be adversely affected for those at the higher end of the social status scale not just by their longer hours on average of employment (Robinson and Godbey, 1999; Gershuny, 2000), but also by their (self-chosen) pace of leisure participation in the free time that they do have available.

In respect of future research, it will be important to draw out the possible theoretical links between voraciousness, busyness in general and processes of social distinction. In addition, while it has been shown that voraciousness shares many of the same relationships with aspects of human, economic, and cultural capital reported from the literature on cultural omnivorousness, it is also important to show how omnivorousness and voraciousness are themselves related. It is possible to conceive, for example, of consumers with a wide range of musical tastes (cultural omnivores) who only attend concerts in their out-of-home leisure, and who are therefore not voracious leisure consumers. Unfortunately, the Home OnLine data are not suited for constructing a measure of omnivorousness, since they contain no direct information on cultural tastes. Indeed, large-scale data including a combination of time-use data with details about cultural tastes, or highly specific information about cultural activities, are extremely rare, if not non-existent.

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electronic ***International Journal of Time Use Research***
2007, Vol. 4, No. 1, 47-68 ***dx.doi.org/10.13085/eIJTUR.4.1.47-68***

Stress, time use and gender

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Abstract

This paper studies the gender aspect of stress within a Scandinavian welfare state regime with high employment rates for both women and men. By applying an economic model, an extended model and a stress-level model, we find that higher incomes lead to stress among women, somewhat confirming findings for Australia, Germany, Canada, Korea, and the US. The number of working hours on the labour market, however, has no impact on stress. In terms of employed women, household work acts as de-stressors, whereas rush hour pressure, which is introduced for the first time here, acts as stressors. Moreover, the wife's contribution to household work almost increases the husband's feeling of being "always" stressed, while the husband's contribution implies that the wife is nearly less stressed. These results underline the importance of including financial as well as cross-partner information when analysing the presence of stress.

JEL-Codes: D31, I31, J22
Keywords: Stress, time allocation, leisure, gender

We thank the participants of the 2004 IATUR conference in Rome and of the Gender and Workplace conference 17-18 November, 2004, in Copenhagen, Lars Pico Geerdsen, Ph.D., and Professor, Nabanita D. Gupta, Ph.D. for helpful comments on earlier versions of this manuscript. All remaining errors are the responsibility of the authors.

1 Introduction

The gender aspect of stress within a welfare state framework, where high employment rates for women and family-friendly working conditions such as a high supply of and heavily subsidized child care institutions, generous leave arrangements and flexible working hours are supposed to go hand in hand, calls for studying the impact of both financial and work-related factors on the likelihood of gender-related stress.

Despite a vast psychological and sociological literature on stress and life styles, most of it explains stress only by individual characteristics and job-related conditions (see Alber and Köhler (2004) for an overview). The minority of economists, who are addressing stress, focus on time pressure resulting from higher incomes to be earned and spent within a 24-hour time constraint. In this paper, we replicate an economic model proposed by Hamermesh and Lee (2007) to explain the variation in self-reported stress, although in this paper, stress does not explicitly refer to time-pressure. This model includes information on household income and the spouses' use of time together with some socio-demographic information. We also apply an extended model, however, that includes working life conditions to adjust for workplace characteristics on one hand, and a multinomial model on the other hand, the latter to explain different levels of stress within a logistic framework.

The analyses rely on information from administrative registers, questionnaires, and diaries from the Danish Time-Use Survey, 2001.

The paper is organized as follows: chapter 2 gives background information about the stress issue, chapter 3 presents the different theories, chapter 4 describes the data and methods applied, and the results are in chapter 5. The last chapter discusses the findings and presents conclusions.

2 Background

From an economist's point of view, stress is the mere effect of the scarcity of time. That is, the richer people are in terms of money, the more goods-intensive is their leisure time, and the harder they try to use their time economically. The basic problem is that all people face the same fixed time constraint – the 24-hour day – and that time and money (or goods) are not perfect substitutes (Bonke et al., 2004a). By assuming maximisation behaviour, we can predict how income and time resources affect the likelihood of an individual being stressed, with the shadow price of time as the important determinant (Hamermesh and Lee, 2007).

Within psychology and sociology, different life events are often the given explanations for the presence of stress and bad health (Surtees and Wainwright, 1998). The PERI Life Event Scale lists 102 discrete, limited "life events" that require change or adaptations associated with the

experience of stress and other disorders. These events are classified according to 11 life domains: school, work, love and marriage, children, family, residence, crime and legal matters, finances, social activities, health and miscellaneous (Dohrenwend et al., 1988). The highest ranked life events were work-related, a finding confirmed by Cox and Mackay (1981), who also found work in general cited as the major source of problems and stress, followed by work-home related problems.

However, psychologists assume that chronic stressors such as working conditions either have a negative impact on people's experience of stress or allow the release of stress during specific events. Furthermore, interactions between stressors occur, suggesting that stress because of work may spill over into home life (Bacharach et al., 1991) and vice versa (Quick et al., 1992). A survey of the Canadian Mental Health Association (1984) found that 56 percent of the respondents felt "some" or "a great deal of" interference between their jobs and their private lives; in particular, the amount of time that the job required and the irregularity of working hours affected family life and leisure activities. Hochschild (1997), on the other hand, argues that the workplace offers freedom from the anarchism and irregularity which dominate family life, for which reason modern women prefer working life to family life. Although Kiecolt (2003) has questioned this thesis on larger scale empirical grounds, it nevertheless points to the importance of a possible dilemma of work-life balance characterising double-earner families, suggesting the likelihood of concomitant time pressures and stress.

The work-life balance dilemma assumes two competing spheres resulting from the daily 24-hour restriction. However, some people may experience working life and family life as complementary activities, implying that success in one sphere has positive implications for satisfaction in the other. Bonke et al. (2007), who find a positive correlation between job satisfaction and leisure satisfaction, confirm this hypothesis.

There are different approaches to measuring stress within the literature on stress (Cooper and Dewe, 2004), among which two stand out as principally different from each other. One method focuses on different symptoms of sickness and behavioural problems such as loss of weight or appetite, frequent infections, high sickness absenteeism, strains and headache, memory and concentration problems, irritability or anger, disaffection and involvement in conflicts. By applying different scores for these characteristics and using a weighting procedure, this method creates a so-called objective stress-index. The other method focuses on the general experience of stress among people, scaling this self-reported information (i.e., "nearly never stressed", "sometimes stressed", "nearly always stressed"), and measuring the stress according to different situations and different periods of time (Bonke, 2002).

2.1 Non-parametric statistics

Today, the stress problem appears to be widespread in most industrialized countries (Alber and Köhler, 2004; Hamermesh and Lee, 2007). In Australia, Germany, Korea, and Canada, the proportion of men within dual-earner couples, who are reporting to be always or often stressed/under time pressure (excluding the "sometimes" stressed), is between 38 and 80 per-

cent. Among women, the proportion is between 42 and 84 percent, with Austrians and Germans at the lower end and Koreans and Canadians at the upper end of the stress distribution. In Denmark, more than one out of two men (60.4 percent) and three out of four women (75.7 percent) report being sometimes or nearly always stressed. The last category of "nearly always" stressed, taken separately, comprises of 7.5 percent men and 8.7 percent women (Table 1). If comparing the partners of dual-earner couples with single-earner couples, we find no significant differences in their stress levels (not shown here), a finding similar to the one in Australia, Germany, Canada, and the US., whereas the dual-earner status increases the Koreans' stress levels considerably (see Hamermesh and Lee, 2007). The total workloads, paid work and household work, taken together, are in both cases close to each other for women and men, except in Korea, where women in dual-earner couples experience a much heavier workload than women in single-earner couples (Hamermesh and Lee, 2007). In most countries, these findings indicate that a change in labour market attachment from single-earner status to dual-earner status either implies that one kind of work substitutes another equally stressful kind of work, or that some selection processes are at work.

Table 1
Distributions and interdependence of partners' stress, individuals in couples

Distributions, percentages		
	Two employed spouses	
	Men	Women
Denmark (2001)		
Not stressed	39.6	24.2
Sometimes stressed	52.9	67.0
Stressed	7.5	8.7
N	376	

Interdependence of partners' distribution, chi-squared	
	One or two employed spouses
Denmark (2001)	34.36***
Australia[1] (2001)	157.91**
Germany[1] (2002)	417.77**
Korea[1] (1999)	689.87**

[1] For two employed spouses in Denmark: 22.63***
*: significant at 0.1 level. **: significant at 0.05 level ***: significant at 0.01 level.
Source: Bonke (2002); 1Hamermesh and Lee (2007).

Table 1 shows that stress among dual-earner partners correlates with highly significant chi-square values. This correlation holds true not only for Denmark but also for Australia, Germany, and Korea (Hamermesh and Lee, 2007). Whether this relationship is due to the same tastes, non-measurable variables or some other reasons remains an open-ended question. It nonetheless stresses the importance of including both cross-partner and common household information into the models we apply in this paper.

It is clear that the feeling of stress has become more widespread in Denmark. From one out of three adults reporting some level of stress in 1987, nearly one out of two did the same in 2000 (Danish Health and Morbidity Survey, 1994 and 2000). However, we do not know whether the same trend would appear when applying the objective measure because no repeated studies of this kind have taken place.

All this descriptive information raises the questions of (a) understanding the stress phenomenon (i.e. the theoretical issue addressed in a short and formalized version) and (b) exploring the underlying reasons (i.e. the empirical issues) when taking the effect of different kind of data into consideration. The following chapters study and propose answers to these questions. For the non-mathematical trained reader we suggest to go straight to chapter 4.

3 Theory

From an economic perspective, stress is about managing the time constraints of a 24-hour day. In other words, we are all potentially stressed or, to quote Hamermesh and Lee (2007, 2), "Time stress should (thus) be interpreted as strain or tension that is generated by feelings that the available time is insufficient to accomplish the desired activities".

As stress is supposed to derive from the feeling of insufficient time available for everyday life, it follows that Becker's (1965) household production function might be an appropriate theoretical outset for the understanding of this issue, see Hamermesh and Lee (2007) for a detailed discussion. That is, households are producing commodities, Z_i, by combining home-time, T-H, and goods, X, so the household production function becomes:

(1) $$Z_i = Z_i (T_i, X_i), i = 1,2$$

The household utility function is assumed to be of the form:

(2) $$U(Z_1, Z_2) + V(H_m, H_f)$$

where the subscripts m and f denote the husband and wife, and the H_i denote market work. The assumptions are that time spent on market work implies disutility, and that U and V are additive and separable. Moreover, we assume $V_j < 0$ and $V_{jj} < 0$ and $U_i > 0$ and $U_{ii} < 0$, and more crucially, we assume no internal distribution of consumption between the spouses, meaning that we follow a unitary model of household decision making.

The household production function here is characterized by fixed coefficients:

(3) $T_i = t_i Z_i$ and $X_i = b_i Z_i$, i=1,2

With p as goods prices, the household's income spent on X_i is:

(4) $\sum p_i X_i = H_m w_m + H_f w_f + I,$

where I is unearned income and w_j are the spouse's wage rates. This equation implies that the household has the following goods constraint and total time constraint:

(5) $\sum T_i = T - H_m - H_f$

The household will then maximize

(6) $U(.) + V(.) + \mu (w_m H_m + w_f H_f + I - p_1 b_1 Z_1 - p_2 b_2 Z_2)$
$+ \lambda (T - H_m - H_f - t_1 Z_1 - t_2 Z_2)$

where μ and λ are the Lagrangean multipliers on the goods constraint and the time constraint, respectively. Hamermesh and Lee (2007) also assume that time pressure is positively related to the shadow price of time, λ, and that the husband's market work hours are fixed. The implication is that the shadow price of time increases with unearned income, $\delta\lambda/\delta I > 0$, if the value of home time increases more than the value of time in the market in response to an increase in unearned income:

(7) $w_f U_{11} U_{22} < V_{22} [p_2 b_2 t_2 U_{11} + p_1 b_1 t_1 U_{22}].$

Moreover, if (7) holds, changes in wage rates have the same effect as a rising unearned income, which the first order conditions show

(8) $\delta\lambda/\delta w_m = H_m (\delta\lambda/\delta I)$

(9) $\delta\lambda/\delta w_f = \mu + H_f (\delta\lambda/\delta I)$

Thus, increasing wages for the husband and wife and a higher unearned income will increase the problem of the time constraint, i.e. the available time is felt insufficient to meet the desired and, probably, more good-intensive activities. On the other hand, anything making home activities more efficient, i.e. equivalent to an increase in effective time ($\delta\lambda/\delta T < 0$), will reduce the time constraint problem (Hamermesh and Lee, 2007).

The assumption that men's working hours are fixed is important because the predictions do not necessarily hold if it is relaxed. In other words, an income effect may outweigh the male wage effect on the shadow price of time and even bring into question the positive effect of unearned income on time pressure. Moreover, as most Danish women are on the labour market working nearly the same number of hours as Danish men, the two spouses come up with very similar labour supply elasticities, thereby challenging the predictive power of the model. Another problem that Hamermesh and Lee (2007) mention is that the unitary model of household decisions is appropriate to apply only if the household is maximizing utility by firstly determining the hours of market work and the amount of commodities to be produced, and only secondly by deciding how the spouses are to share these commodities. This two-step problem, however, might not be great here because most spouses in Denmark are working

full-time, and declare that they are pooling their financial resources (Bonke and Uldall-Poulsen, 2007).

Finally, we have to relax the general assumption in the economic model that the tightness of the time constraint is proxy for the level of self-reported time stress across individuals because the productivity of time obviously varies between people. Ruuskanen (2004) thus introduces multi-tasking in household work as a productivity measure showing that there is a negative relationship between the number of activities performed at the same time and being rushed during the day. However, the relationship between being rushed or stressed and multi-tasking points to the ambiguity of any causal explanations for these relationships. Another productivity measure is health, which Hamermesh and Lee (2007) consider to be one of the most important determinant stressors for both market work and household work.

Among other factors moderating the stress effect of financial resources are workplace conditions and people's response to these conditions. Following Cox et al. (2000), the Engineering approach conceptualises occupational stress as an aversive or noxious characteristic of the work environment. The assumption is that the environment somehow demands such efforts and strengths that people cannot cope efficiently enough to escape stress and other negative reactions. Another similar approach treats stress as a generalised and non-specific physiological response syndrome, i.e. an internal process that, given an alarm and some possible resistance, ends up with the exhaustion of stress. As opposed to the engineering approach, this approach focuses on internal reactions, leaving external stress factors out of consideration. Finally, a third approach tries to bridge the other two by explicitly focusing on the interaction between people and their work environment. This approach suggests that stress depends not only on the worker's attitudes and abilities to meet the job demands but also on the ability of the job environment to meet the worker's needs for using his or her knowledge and skills on the job. To test this theory empirically we, therefore, need to include both job characteristics as well as individual information (Chen and Spector, 1991).

Furthermore, individual characteristics, including attitudes and coping efforts, are important for predicting stress (de Rijk et al., 1998), as are possible compensating factors in domestic life such as a good family and well-functioning social networks. The integration of non-working related conditions or the home-work interface phenomenon is thus important for the determination of the likelihood of being stressed.

In the following empirical analyses, we include all these different phenomena. However, we take the outset in the economic model that Hamermesh and Lee (2007) developed, although it explicitly refers to time-pressure alone. We chose this model because we believe that time-use and economic rewards are the main determinants for explaining the variance of stress, and the factors found within psychological and sociological theories are moderators of the hazard-stress-harm relationship (Cox et al., 2000).

4 Data and methods

4.1 Data

The data used come from the Danish Time-Use Survey, which includes approximately 3,600 people (16 to 74 years old) as representative of the Danish population. The design of the 2001 survey follows the guidelines of an expert group on time-use surveys in Eurostat (2000). In addition to a questionnaire-based interview, each person received two diaries – one for a weekday and one for a weekend day – and each spouse likewise received two diaries for the same days. The respondents completed the time-use diaries, noting the primary and secondary activity information for each 10-minute interval of the actual day.

The questionnaire includes information about working hours, household work, incomes, family background, attachment to the labour market, and job-characteristics, while the diary covers only working hours and household work. Information on marital status, urbanization and income stem from register information, Statistics Denmark. Of special interest for this analysis are the questions in the questionnaire on so-called subjective stress: *Q79: How often do you feel stressed? (Nearly never stressed/Sometimes stressed/Nearly always stressed), and Q80: Under which circumstances? (When shopping/At work /At home/To and from work/In other situations/Always).* These questions have been taken as proxies for time-pressure, although other elements of stress might as well contribute to stress. In the following analyses, we define stress as sometimes and/or nearly always stressed (Q79) including stress stemming from all situations (Q80).

As we restricted the data set only to spouses in couples with two-employed individuals, our sample comprises 630 respondents (335 females and 295 males).

4.2 Description of variables

The variables in the empirical analyses fall into three main groups: economic variables, including some socio-economic variables for controlling reasons, and working-life variables. Table 2 presents the means and standard deviations of these variables separately for men and women.

The *economic variables* refer to working hours and income. The number of paid working hours, including overtime not compensated for in terms of hours, hours spent on extra jobs, and hours spent on household work (shopping, housework, do-it-yourself work, and child care) constitute the time-use information. As Table 2 shows, the average number of paid working hours is higher for men than for women (42-43 hours weekly v. 36 hours). The household work is, on the other hand, mostly women's tasks, as they spend 16 hours a week on average, compared to only 10 hours for men, when relying on questionnaire information. If we apply diary information, the household work increases for both sexes, as do the variations, although not in relative terms. For paid work the number of hours decreases for both men and

women going from questionnaire information to diary information, while the variances increase considerably.

Table 2
Means and standard deviations (), individuals in two-employed couples, 2001

	Questionnaire information		Register and diary information	
	Men	Women	Men	Women
1. Economic variables:				
Working hours (weekly)	42.9	36.3	37.5	29.1
	(10.9)	(6.6)	(17.3)	(16.3)
Household work (# hours per week)	10.4	16.5	18.3	29.9
	(7.0)	(8.7)	(14.2)	(15.0)
Rush hour (<1.5-hour break. Percent)	..	..	27.2	50.9
Health (very good or good. Percent)	87.8	86.8	..	..
Household income (disposable/month	28.1	28.4	27.5	28.4
DKK 1,000)	(8.8)	(8.8)		
Wage-rates, DKK	0.180	0.142	0.199	0.155
2. Other variables, percent:				
Partnership (married)	..	..	77.8	81.9
Urbanization (Metropolitan area)	..	..	30.9	31.0
Children (-6 years)	22.3	23.3	..	..
Children (7- years)	20.2	22.9	..	..
3. Partner:				
Working hours (weekly)	35.2	37.6	29.6	37.6
	(10.9)	(17.0)	(16.1)	(16.3)
Household work (# hours per week)	15.4	10.5	27.7	18.7
	(8.9)	(7.2)	(14.7)	(12.8)
4. Working-life variables, percent:				
Flexibility of working time (flexibility)	59.0	43.2	..	..
Working weekend	21.3	25.2	..	..
Working evening or night	22.6	22.4	..	..
Occupational sector (public occupation)	25.1	51.1	..	..
Regular leisure activity (yes)	53.7	58.3	..	..
N	376	446	324	348

Source: Danish Time Use Survey, 2001.

As Hamermesh (1999), Hersch and Stratton (1997), and Bonke et al. (2004b) have shown, not only the household workload but also the timing of this work is important for women's and men's pay. For that reason, we also use the diary information to introduce a variable measuring the time breaks between household work and paid work in the morning and between paid work and household work in the afternoon, both breaks exclusive of commuting time. The assumption is that large breaks indicate flexible household work, so that this work interferes less with market work and thus suggests a smaller time constraint. Not surprisingly, more women (51 percent) than men (27 percent) have less than a 1.5-hour break.

We use the disposable household income as proxy for consumption possibilities, with an average of DKK 27,000-28,000 per month. This income is independent of the data-source used. The spouse's wage rates, which we include as proxies for their productivity levels, vary considerably with the data source. If gross monthly earned income reported within the questionnaire is divided by the ordinary number of working hours deriving from the same source, men and women earn around DKK 180 and 142 per hour, respectively, whereas earned income stemming from the tax registers divided by the same working hours yields wages of DKK 199 and 155. The discrepancy, however, might partially be explained by different number of cases in the two calculations in Table 2.

As the spouses are supposed to face the same overall financial conditions and their time restrictions have a mutual influence on their behaviour, we include information about both partners' paid work and household work. Table 2 shows that this cross-partner information is closely related, whether going from the husband to the wife or from the wife to the husband. The only exception is men's number of working hours, which wives report to be fewer than the numbers husbands report themselves in the questionnaire, while no deviance is found when relying on diaries filled in separately by each spouse. In terms of household work, however, both men and women report fewer hours in the questionnaire than the diary actually shows, while the reporting on their spouse's household work matches the spouse's own reporting.

For these reasons, and because questionnaire information is found less reliable than diary information (Bonke, 2005), we only apply the latter in our analyses. The only exception is when calculating wage-rates, where personal income is divided by working hours found in the questionnaire. We make this exception because most agreements on pay refer to normal working hours, apart from day-to-day variations in working time. In terms of income, register information is usually more reliable than questionnaire information, so we apply the register information in this case.

The controlling variables include partnership, urbanization, and the presence of children at different age groups. Forming a more permanent partnership (i.e. marriage as opposed to a consensual union) is assumed to decrease the likelihood of being stressed, as is living in a non- or less urbanized area as opposed to the Copenhagen metropolitan area including suburbs. The presence of children and their relative age are assumed to influence the level of stress because children require time and goods simultaneously, with goods probably substitut-

ing for time as the child gets older. This assumption implies that children increase the time pressure either one way or the other. The number of households with preschool children (0-6-year-olds) amounts to 22-24 percent, and households with only school children (7- year-olds) to another 20-23 percent.

The time-use survey includes a number of *working life variables* that possibly have an impact on self-reported stress, e.g. the flexibility in working conditions, the time of the day and the week that people are working, and the occupational setting. If we distinguish between men and women with normal flexitime (i.e. the allowed variations in their working schedule) on one hand, and those with no kind of flexible working hours on the other, the first group comprises 59 percent men and 43 percent women (Table 2). Men and women regularly working at least two hours in the evening (between 6 and 10 p.m.) or during the night (between 10 p.m. and 6 a.m.) are 23 percent and 22 percent, whereas 21 percent and 25 percent work regularly on Saturdays or Sundays.

Another working life variable concerns being occupied within either the public or private sector. This information tries to capture different degrees of family-friendly working conditions, with the public sector usually found the most attractive (Datta Gupta and Smith, 2002). About 50 percent of women work in the public sector, whereas only 25 percent of men do.

We also include participation in regular leisure time activities as a de-stressor. The assumption is that this kind of time use allows people to put their minds and energy outside the workplace, with a relaxing effect that does not necessarily reduce the time pressure, it, however, introduces a stress-reducing coping strategy (de Rijk et al., 1998). About one out of every two men and women participate in regular leisure time activities.

4.3 Procedure

The statistical analyses apply a model with the same dependent "stress" variable: "not stressed", "sometimes" stressed and "nearly always" stressed. In the first analysis, we collapse the first two categories, i.e., the dependent variable gets the value of 1 if the person reports being "sometimes" or "nearly always" stressed and 0 for "not stressed" (Table 3). The collapsing allows us to use a probit-model. In the second analysis, we apply a multi-nominal logit-model, taking the logarithm to the relationship between the likelihoods of belonging to one of the three stress-categories, distinguishing first between the "sometimes" stressed and the "not stressed", and second between the "nearly always" stressed and the "sometimes" stressed (Table 4). An ordered probit model could as well have been applied, but was found less appropriate here because of the specific focus on the stress-level effects.

5 Results

5.1 The economic model

The estimations in Table 3 are similar to those of Hamermesh and Lee (2007) and include economic variables such as the respondent's working hours, household work and health status, household income, and the partner's working time and household work. Moreover, Table 3 includes some socioeconomic variables such as marital status, urbanization, and the presence of preschool and school children. We did the analyses separately for men and women because, as will become clear, different stress-factors affect men and women differently. Moreover, if we apply the same model on a dataset that simultaneously includes women and men in dual-earner households, we will find that women are likely to be significantly more "nearly always" or "sometimes" stressed than men (not shown).

The findings for women in Table 3 confirm the prediction of the model. Thus, the command over market goods – expressed as higher incomes – leads to stress among women, which is also found for Australia, Germany, Canada, Korea, and the US coming up with similar coefficients on time-pressure.

We also analysed whether the distribution of income between the spouses contributes to the explanation of self-perceived stress. We did so by including the respondent's personal income and adjusting for household income, assuming that fixed income constitutes only a small amount of money. The results (not shown here), however, show no such effect, and we interpret them as confirming the unitary model, where every DKK is shared and thus has the same value for both spouses.

The number of working hours has no significant effect on perceived stress among men and women, and some of the coefficients are negative, which is opposite to the findings for Australia, Germany, Canada, Korea, and the US. The household work also shows negative coefficients, and these relationships are significant for women, and it also holds for the different household tasks – shopping, house work, DIY, and child care – taken separately. Again, this is opposite to our expectations and to most of the findings in Hamermesh and Lee (2007). Moreover, it questions the "spill-over" theory (Bacharach et al., 1991), which argues that job-related and non-job-related stress are highly correlated. The reason for the negative and significant coefficient for household work among women might be that they still have preferences for doing this work due to a more family-oriented perspective, and that these preferences overrule the effect of work-overloads.

Table 3
Probit estimates of the determinants of stress (sometimes stressed or stressed), individuals in two-employed couples, 2001

	Model 1		Model 2	
	Men	Women	Men	Women
1. Economic variables:				
Working hours (weekly)[2]	-.0046	-.0008	-.0042	.0004
	(.0054)	(.0058)	(.0056)	(.0059)
Household work (# hours per week)[2]	-.0015	-.0098	-.0004	-.0105 *
	(.0066)	(.0063)	(.0068)	(.0063)
Rush hour (<1.5-hour break)[2]	.1527	.2588	.1636	.2603
	(.1663)	(.1607)	(.1710)	(.1653)
Health (very good or good)[1]	-.6912 ***	-.4480 **	-.6703 ***	-.4413 *
	(.2351)	(.2264)	(.2385)	(.2285)
Household income (disposable)[3]	.0044	.0207 **	.0056	.0201 **
	(.0066)	(.0082)	(.0068)	(.0084)
2. Other variables:				
Marital status[3]	-.3720 **	-.0766	-.3590 **	-.0816
	(.1774)	(.1901)	(.1791)	(.1915)
Urbanization[3]	.1846	.2400	.2217	.2769 *
	(.1598)	(.1652)	(.1627)	(.1732)
Children (-6 years)[1]	-.0730	.0644	-.0425	-.0713
	(.1964)	(.2040)	(.2017)	(.2065)
Children (7- years)[1]	-.0976	.3191 *	0.0925	.3071 *
	(.1865)	(.1774)	(.1883)	(.1786)
3. Partner:				
Working hours (weekly)[2]	.0027	-.0003	.0025	-.0001
	(.0055)	(.0053)	(.0056)	(.0053)
Household work (# hours per week)[2]	.0041	-.0044	.0036	-.0053
	(.0063)	(.0069)	(.0064)	(.0070)
4. Working-life variables:				
Flexibility of working time (flexibility)[1]	..	..	-.2000	.0336
			(.1525)	(.1600)
Working weekend[1]	..	..	.0729	-.0804
			(.2184)	(.2096)
Working evening or night[1]	..	..	.0025	-.0688
			(.2152)	(.2026)

Table 3 (cont.)

	Model 1		Model 2	
	Men	Women	Men	Women
Occupational sector (private occupation)[1]	..	..	-.1616	.1228
			(.1697)	(.1518)
Regular leisure activity (yes)[1]	..	..	-.0018	.0950
			(.1465)	(.1494)
Intercept	.8110	.3108	.8611 *	.2221
	(.4349)	(.4743)	(.4541)	(.5056)
Likelihood Ratio (Chi^2/DF/Pr>Chi^2)	16.8393	30.2100	19.3122	31.1654
	11	11	16	16
	.1127	.0015	.2528	.0128
N	323	348	322	346

[1]: Questionnaire information.
[2]: Diary information.
[3]: Register information.
*: significant at 0,1 level. **: significant at 0,05 level ***: significant at 0,01 level.
Note: The coefficients are the effects of a unit increase in the variable on the probability of being sometimes stressed or stressed compared to not stressed. The parentheses show standard errors.
Source: Danish Time Use Survey, 2001.

In the model, however, we included some calculated rush-hour information. The reasoning is that the *timing* of activities might affect the occurrence of self-perceived stress more than the performance of the activities themselves. Thus, the timing is measured here as the length of the break between household work and paid work in the morning and between paid work and household work in the evening, exclusive of commuting time. If then, this break is short – less than 1.5 hours for both – we assume that the person is being rushed or is under time pressure (see also Bonke et al., 2004b, who apply the same variables in a numeric form within a wage regression framework).

In contrast to the negative impact of household work on women's stress levels, the presence of rush-hour implies positive coefficients for both sexes, and for women the coefficients are almost significant. Therefore, the timing of household work not only has a greater impact on perceived stress for women than the amount of time women spend on this activity, but also makes any effect on the number of working hours into a negative sign. This result indicates a work-life balance dilemma and shows that this dilemma is more pronounced and stressful for women. If this is caused by different household tasks performed by women and men before leaving home in the morning or after returning home from work, is an open-ended question.

Because the inclusion of the wage-variable, cf. the model in chapter 2, would imply an over-determination of the model separate analyses (not shown) were done including this variable

but excluding the number of working hours on the labour market. However, neither of the models came up with significant results for this variable, although positive coefficients were found for men and negative for women indicating that the substitution effect is smaller than the income effect for women.

The productivity measure applied here is self-reported health status, which in all the analyses occurs as a positive and significant determinant of self-reported stress. As Hamermesh and Lee mention, self-reported information on both sides of the equation might yield some problems. Other studies, however, show that self-reported health and objective stress are correlated, and that excluding health from the analyses increases the effect of household income on stress, originating from a positive correlation between health and income. For these reasons we believe we only face a minor problem here.

No significant effects of the partner's behaviour are found. However, the coefficient for the husband's contribution to household work is, as expected, negatively correlated to the wife's level of stress, and the wife's household work is positively correlated to the husband's level of stress, which also holds for her number of working hours (Table 3).

Finally, the results show that marriage reduces men's stress levels, while living in the metropolitan area increases women's stress levels more than men's, although the latter effects are not significant. The presence of preschool children does neither affect the mother's nor the father's reported level of stress. However, having school-age children significantly increases the mother's stress level. Whether these findings match those for Australia, Germany, Canada, Korea, and the US is a moot point, as Hamermesh and Lee (2007) included no coefficients for these variables in their paper.

5.2 The extended model

The extended model – model 2 – shows that there are no significant effects on the level of stress by including working life information. Only flexible working hours are not far from being significant for men's stress level, whereas this is not the case for women perhaps because flexible working hours are not necessarily implemented in the same way in predominantly female-dominated workplaces as in predominantly male-dominated workplaces. Even though we adjust for occupational sector (i.e. public or private), an important factor in determining the great gender segregation on the Danish labour market, the results stand. It is clear that working in the public sector is not far from reducing the presence of self-reported stress among women, confirming the general belief that this sector usually has family-friendly working conditions.

The remaining working life conditions – working on weekends, in the evenings, or at night – are not significant.

Moreover, participation in regular leisure time activities has no effect on perceived stress. As the effects of household income, paid work, household work, and health on perceived stress are nearly unaffected by the inclusion of working life conditions and leisure time activities,

we see this result as supporting the economic model when applied to women with time, income, and productivity being the most important determinants of stress.

5.3 The stress-level model

In the models that we have already discussed, we studied the likelihood of being "nearly always" stressed or "sometimes" stressed, relative to not being stressed. Here, we go a step further by distinguishing between the two levels of stress in order to study whether different explanations occur. For example, being "nearly always" stressed may threaten a person's health in the long run, whereas being "sometimes" stressed 'only' affects people's immediate well-being.

We apply a multinomial logit-model where the estimation uses a maximum likelihood procedure. The categories are unordered, and the dependent variable has three categories, in which two different sets of coefficients appear. One set shows the log likelihood of being "sometimes" stressed relative to not being stressed, and the other set shows the log likelihood of being "nearly always" stressed relative to not being stressed. For all the models, we include the variables from the previously discussed extended models, allowing the simultaneous inclusion of economic information, partner information, controlling variables, and work-life information.

Table 4 shows that only in terms of men the number of weekly working hours almost affects being "nearly always" stressed, whereas such effect on the likelihood of being "sometimes" stressed neither occurs for men nor women. One explanation could be that especially men who work many hours constitute a selected group. A selection bias may also explain why women become stressed – "sometimes" and "always" – during rush-hour, while men are not significantly getting stressed during rush-hour. Thus, it might be that "rushed" men are somehow more family-friendly than other men, so that the extra burden does not affect self-perceived stress in general. In terms of women, family-friendliness might have nothing to do with being rushed, as women per se are expected to feel more responsible for family affairs.

The cross-partner information on time use shows no significant effect, neither on paid nor unpaid work. However, the wife's work nearly affects the husband's always feeling stressed, and the husband's work on her feeling "sometimes" stressed is also close to being significant.

The economic model exercised in Table 3 showed that the household income had a positive impact on women's perceived stress. When we distinguish between the different stress-levels, as in Table 4, the household income has almost an impact on women's being "always" stressed, whereas the other effects are smaller and far from being significant. This result underlines the importance not only of including economic satisfaction information but also of properly categorising stress when we analyse the effects of household income.

Table 4
Regressions – multinomial logit-model – of the determinant of stress (sometimes stressed/not stressed and stressed/not stressed), individuals in two-employed couples, 2001

Model 2	Men		Women	
	Sometimes stressed/ not stressed	Stressed/ not stressed	Sometimes stressed/ not stressed	Stressed/ not stressed
1. Economic variables:				
Working hours (weekly)[2]	-.0024	-.0110	.0071	.0016
	(.0182)	(.0096)	(.0227)	(.0111)
Household work (# hours per week)[2]	-.0113	-.0026	-.0214	-.0172
	(.0236)	(.0115)	(.0236)	(.0116)
Rush hour morning and afternoon (<1.5-hour break)[2]	-.2576	.2169	1.129*	.6306**
	(.5639)	(.2891)	(.6230)	(.3173)
Health (very good or good)[1]	-.7652	-.9164**	-2.355***	-1.160**
	(.7030)	(.4209)	(.7191)	(.5369)
Household income (disposable)[3]	-.0023	.0001	-.0034	.0195
	(.0196)	(.0114)	(.0334)	(.0149)
2. Other variables:				
Marital status[3]	-.7221	-.3528	.3017	-.2215
	(.5076)	(.3082)	(.7570)	(.3592)
Urbanization[3]	1.6814***	.1109	1.389**	.4691
	(.4913)	(.2822)	(.5886)	(.3503)
Children (-6 years)[1]	-.6280	-.0985	1.097*	.7691*
	(.6966)	(.3400)	(.6523)	(.4099)
Children (7- years)[1]	-.6462	.2898	-.6300	.6428*
	(.6573)	(.3181)	(.8478)	(.3396)
3. Partner:				
Working hours (weekly)[2]	.0140	.0132	.0268	.0102
	(.0177)	(.0096)	(.0195)	(.0099)
Household work (# hours per week)[2]	.0232	.0144	.0218	-.0132
	(.0215)	(.0110)	(.0235)	(.0129)
4. Working-life variables:				
Flexibility of working time (flexibility)[1]	-.2013	-.4739*	.0022	.1016
	(.4784)	(.2601)	(.5671)	(.3059)
Working weekend[1]	.4851	.0589	-.3778	.1379
	(.6870)	(.3709)	(.7797)	(.3991)
Working evening or night[1]	.3148	.0938	.2543	-.2047
	(.6443)	(.3691)	(.6662)	(.3915)

Table 4 (cont.)

Model 2	Men		Women	
	Sometimes stressed/ not stressed	Stressed/ not stressed	Sometimes stressed/ not stressed	Stressed/ not stressed
Occupational sector (private occupation)[1]	.2230	-.3958	.2168	.0262
	(.5191)	(.2875)	(.5463)	(.2885)
Regular leisure activity (yes)[1]	-.0568	-.0241	-.5537	.1114
	(.4609)	(.2485)	(.5291)	(.2856)
Intercept	-15.839	12.555	-15.368	13.248
	(-14.009)	(.7840)	(-18.633)	(.9799)
N	322	322	346	346

[1]: Questionnaire information.
[2]: Diary information.
[3]: Register information.
*: significant at 0,1 level. **: significant at 0,05 level ***: significant at 0,01 level.
Note: The coefficients are the effects of a unit increase in the variable on the pro bability of being sometimes stressed or stressed compared to not stressed.
The parentheses show standard errors.
Source: Danish Time Use Survey, 2001.

Health conditions continue to affect the feeling of stress for both genders, although with no significant impact on the "sometimes" stressed situation for men. Only women are affected at both levels of stress – "sometimes" and "always" – of their health conditions.

Among the control variables, marriage still works as a de-stressor for men who feel "sometimes" stressed, although not significantly. Living in the metropolitan area affects both men and women's feeling "sometimes" stressed. In contrast to the finding in Table 3, where the feeling "sometimes" stressed and "almost" stressed were collapsed, we now find that preschool children have a significant impact on the mother's feeling "sometimes" or "nearly always" stressed. As the having of infants implies generous leave opportunities in Denmark, we also calculated the effects separately for this group and for the 1-6-year-old group, but the results did not change. For men with preschoolers, we found a negative and significant effect on being stressed (data not shown).

Finally, only one working life variable matters for perceived stress in the models we apply here: flexible working hours, which has a negative impact on men's feeling "always" stressed but not on "sometimes" stressed. Therefore, by distinguishing between different stress levels for men, we can qualify the findings (Table 4) that flexible working hours work as de-stressors for men.

The last determinant is participation in regular leisure time activities. Results for this variable show that the likelihood of being "sometimes" stressed decreases, but not significantly, for women, whereas it has no impact on the likelihood of their being "always" stressed. This

finding indicates that being engaged in some non-work activities make stress less likely – even though it increases the number of definite and time-consuming activities – because it allows women to put focus elsewhere.

If we apply a Wald-test on the different variables included in the stress-level model in order to examine whether we can omit any without reducing the explanatory power of the model, we find that women's health, rush-hours, urbanization, and the presence of school-age children are important for the models ability to explain stress. For men, only health and urbanization matter (Table 5).

Table 5
Test of explanatory variables in the multinomial logit-models on stress in table 4

Model 2	Men			Women		
	DF	Chi^2	$Pr>Chi^2$	DF	Chi^2	$Pr>Chi^2$
1. Economic variables:						
Working hours (weekly)	2	1.36	.5056	2	0.10	0.9468
Household work (# hours per week)	2	0.24	.8875	2	2.34	0.3563
Rush hour morning and afternoon (# of minutes)	2	1.08	.5825	2	5.18	0.0578
Health (very good or good)	2	4.77	.0919	2	10.73	0.0045
Household income (disposable)	2	0.02	.9925	2	2.10	0.6035
2. Other variables:						
Marital status	2	2.47	.2905	2	0.86	0.8053
Urbanization	2	12.35	.0021	2	5.61	0.0622
Children (-6 years)	2	1.15	.5637	2	4.24	0.1494
Children (7- years)	2	2.51	.2853	2	5.65	0.0859
3. Partner:						
Working hours (weekly)	2	2.07	.3550	2	2.17	0.2834
Household work (# hours per week)	2	2.26	.3234	2	3.23	0.2044
4. Working-life variables:						
Flexibility of working time (flexibility)	2	3.35	.1869	2	0.14	0.9443
Working weekend	2	0.50	.7773	2	0.59	0.8443
Working evening or night	2	0.25	.8836	2	0.78	0.7666
Occupational sector (private occupation)	2	269	.2602	2	0.16	0.9453
Regular leisure activity (yes)	2	0.02	.9906	2	1.96	0.3278
Likelihood Ratio	610	547.73	.9662	658	473.28	1.0000
N		322			346	

Source: Danish Time Use Survey, 2001.

6 Conclusions

That stress is a widespread problem in modern societies is well-documented (Cooper and Dewe, 2004) and now also confirmed through a large time-use survey conducted in Denmark. However, an economic model with income and time as the main elements for explaining stress among working people is a recent development. Hamermesh and Lee's (2007) model, the basis for the present analyses, allowed us to compare the effects of the same determinants of self-reported stress/time-pressure in four other industrialized countries.

Thus, the command over market goods, expressed as higher incomes, leads to stress among women. For Australia, Germany, Canada, Korea, and the US most of the similar coefficients are significant, also for men.

We also studied the crucial assumption in the economic model – that the spouses are pooling their incomes – by including the respondents' personal income and by adjusting for household income. The result indicates that the unitary model is at work in Denmark, when applied on the stress issue.

Another finding showed that the number of working hours has no significant effect on perceived stress among men and women as opposed to the findings for Australia, Germany, Canada, Korea, and the US. Moreover, household work came up with negative coefficients, and for women these relationships were even significant, when working-life conditions were included in the calculation, i.e. the extended model. This finding contradicted not only our expectations but also most of the findings in Hamermesh and Lee (2007).

In the extended models, the length of the break between household work and paid work and vice versa, exclusive of commuting time, was also included. The result was that positive coefficients for this rush-hour variable were found for women. This finding confirms the existence of a gendered work-life balance dilemma.

No significant effects of the partner's behaviour are found, although the coefficient for the husband's contribution to household work is, as expected, negatively correlated to the wife's level of stress, and the wife's household work is positively correlated to the husband's level of stress, which also holds for her number of working hours.

The most important determinant of stress in all the models was self-reported health, which we used as proxy for productivity. For both women and men, good health reduces stress, as Hamermesh and Lee (2007) also report. However, including working life information does not contribute to the explanation of feeling stressed neither among men nor among women, although this was expected.

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electronic ***International Journal of Time Use Research***
2007, Vol. 4, No. 1, 69-92 ***dx.doi.org/10.13085/eIJTUR.1.1.69-92***

Gender and time allocation differences in Taganrog, Russia

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Abstract

Data from a time-use survey made in 1997 and 1998 for the city of Taganrog, Russia, is used to analyse the socio-economic determinants of allocation of time and the gender division of housework among married/cohabiting couples. The main objective of this essay is to identify and assess the impact of a range of socio-economic factors expected to influence the gender division of labour and the time devoted to household activities. The reasons why men and women allocate time differently may be ascribed to efficiency aspects, relative bargaining power, normative and/or discriminatory factors. The results of our estimations suggest that variables such as having children (age 0-12), household income and share of labour income affect the time women spend on housework to a larger extent than men. Furthermore, male education seems to affect both men and women, whereas the education of women has little importance. Thus it seems probable that efficiency factors alone do not suffice to explain the gender differences in time allocation. Our results are to a large extent in line with previous research and do not indicate that Russia differs from Western experience more than Western countries differ among themselves. Gender differences in time allocation show the same pattern over countries and regions even if societies may differ in many other aspects.

JEL-Codes: D13, J16, J22, P39
Keywords: Time allocation, housework, gender, transition, Russia

I would like to acknowledge the project “A labour market in the making” which was funded by the Swedish Council for Social Research (SFR 98-0220:1) and headed by Katarina Katz, Department of Economics, University of Gothenburg and Natalia Rimashevskaya, Institute for Socio-Economic Population studies. I would also like to thank Katarina Katz and Dominique Anxo.

1 Introduction

In this paper, data from a time use survey undertaken in 1997 and 1998 in the city of Taganrog, Russia, is used to analyse the socio-economic determinants of the gender allocation of time with specific focus on the gender division of housework among spouses. The main objective is to identify and measure the extent of gender differences and interpret these findings in the light of time allocation theories. Time is an important issue for the economist, as it is one of the resources in the production of market and household goods. However, it is a scarce resource that men and women often allocate differently and there is considerable evidence of intra-household differences between genders (see, e.g. Anxo et al., 2002; Anxo and Carlin, 2004; Gershuny, 2003; Thomas, 1990). The reasons for these gender differences are varied and might be related to efficiency considerations, values, norms and preferences, differences in bargaining power, and/or discrimination in the labour market.

To explore intra-household differences within an area such as housework is relevant not only because housework is a time-intensive activity, but also because of its considerable economic value. In 1992, the value of home production was estimated to account for 40-50 per cent of the total production in Western countries, and in less-advanced economies this fraction is presumably even higher (Bonke, 1992). Nevertheless, in several analyses, time spent doing housework is still regarded as leisure time only (see, e.g. Apps, 2003). If comparative advantage and efficiency factors are not the sole determinants explaining the prevailing gender division of housework, the consequences for the economy, in terms of optimal resource allocation may be substantial. Disregarding housework or considering housework to be leisure limits our understanding of labour supply behaviour, earnings development and relative prices. In sum, to reduce household activities to leisure depreciates the social value of the labour devoted to housework and thus also the economic importance of home-produced goods and services for households' welfare. Thereby the status of the person performing the housework may also decrease, thus affecting the relative position within the marriage.

Time-use studies had a long tradition in the Soviet Union. A high rate of female labour participation was combined with a large gender difference in time spent on housework and childcare. In 1988, according to a survey of workers and employees in manufacturing and mining (Goskomostat SSSR, 1989), women spent 3 hours and 13 minutes on housework during a workday while men spent 58 minutes.[1]

By international standards, female employment rates were high in the USSR. Several studies have emphasized that women may be worse off than men on the labour market in transition countries (see, e.g. Funk and Mueller, 1993). This may be due to, e.g. gender differences in lay-offs, fiscal cuts in childcare, substitution of household production for previously subsi-

[1] Cited in Katz and Sand (2005).

dised/free services, discrimination and the prestige of having a housewife. In Russia today people may be employed without earning anything due to wage arrears, or they may receive their earnings in non-monetary goods. They may have a job but may not be working due to underemployment, or they may be officially unemployed but have an informal job.

As far as income is concerned, earnings from formal employment constitute only a part of household total income (Manning, 1998). Another important income source is the production of home grown food. Working at a plot (a dacha) in order to sell but primarily to supply one's own household has become commonplace; household own food production amounts to around 40 per cent of Russia's agricultural output (Seeth et al., 1998). Clarke et al. (2000) stress, however, that the rich do not have the time to work on a plot and the poor do not have the money, thus the dacha is not a means of survival for the poorest.

In the Soviet Union, not only the government but also various enterprises provided social services and were responsible for the payment of a range of benefits. Especially in larger enterprises, it was common for housing, health care, childcare and pre-schooling to be provided by the employer for a nominal fee or free of charge (Gimpelson and Lippoldt, 2001). Now, the Russian government has relieved enterprises of many formal social responsibilities and the government has also induced campaigns to convince enterprises to reduce their social assets (McAuley, 1998). Although many enterprises have continued to provide some services throughout the transition, by the end of the 1990's most enterprises had divested at least some of their social infrastructure. As a result of the reduction of services (provided by the state and enterprises) during the transition period, the supply of public- and enterprise-based services have been significantly reduced, especially childcare facilities (Gimpelson and Lippoldt, 2001). The situation on the labour market usually affects time allocation and due to intra-household differences, the resulting effect is likely to vary between genders. Thus, differences in time allocation between spouses may be exacerbated in transition countries.

The innovative contribution of this essay is, to some extent, related to the data set. The data contains information from a city situated in a transition country that has never been used to specifically analyse the socio-economic determinant of the gender division of housework and childcare.[2] Furthermore, the advantage of this data set is that the information on individuals' time-use is collected for the 24 hours prior to the survey. The survey is then spread out over the year, taking into account the potential seasonal differences in time allocation over the year. Moreover, the estimations provided below will to some extent follow Anxo and Carlin (2004), Beblo (1999) and Hersh and Stratton (1994), who estimate both time spent and the gender share on aggregated housework in some Western countries (France, Germany, Sweden and the US), enabling us to compare the Russian situation to other industrialized countries. Usually, only time spent on housework is analysed, but the gender share is of greatest interest because it not only reflects the prevailing gender division of housework, but also reveals that households that differ substantially in time spent on household activities may nevertheless

[2] An exception is Katz and Sand (2005).

share and specialise proportionally the same way. In addition, the present study includes both estimations based on aggregate housework and on a separate range of household activities. Since men and women differ notably in what kind of household activities they perform, the dis-aggregation will bring about better information on gender differences.

This essay is structured as follows: In Section 2, alternative time allocation theories are presented. In Section 3, a review of empirical studies on time allocated to housework is provided. In Section 4, the data, some descriptive statistics and the econometric model are presented. The results of the estimations are presented in Section 5. Finally, the last chapter provides some conclusive remarks and summarizes the main findings of this study

2 Time allocation theory

The first modern time allocation theory, NHE, new home economics, was developed by Becker (1965) and extended by Gronau (1977). Becker acknowledged that the consumer maximizes utility subject, not only to a budget constraint, but also to a *time* constraint. According to Becker, market goods and services can only generate utility if they are combined with a consumer's time; thus in order to have a meal, time is needed to buy food, prepare the meal and then to dine. Gronau (1977) emphasized the difference between non-market work and leisure, and pointed out that not working in the labour market did not necessarily mean spending time on leisure. The difference in time allocation patterns between spouses is explained by the difference in relative productivity. Wage is assumed to be the shadow price of time. In Gronau's model a distinction is made between market work, leisure and housework and the person maximizes utility *Z*, which is a combination of goods and services (X) and leisure time (L):

Maximize:

$$Z = Z(X, L) \qquad \text{where: } X = X_M + X_H$$

The goods can be bought in the market or produced at home, X_M denotes commodities bought in the market and X_H is the values of goods and services produced at home. Home goods are produced by work at home, *H* (subject to decreasing marginal utility):

$$X_H = f(H)$$

The maximization of *Z* is bound by two constraints, the budget constraint and the time constraint:

$$X_M = WN + V$$
$$L + H + N = T$$

W is the hourly wage rate, N denotes hours spent on market work, *V* other income and *T* total time. The necessary conditions for an interior optimum are that the marginal household productivities equal the marginal rate of substitution between goods and leisure time and this equals the shadow price of time, *W**, and if the person works in the market it equals the real wage rate, *W*:

$$\frac{\delta Z / \delta L}{\delta Z / \delta X} = f' = W^* = W$$

Becker later specified his model (1991) and argued that the specialisation of labour and hence allocation of time will occur in all efficient households with more than one person. Output is maximized when the marginal products in the household sector equals the marginal products in the market sector for those who supply time to both sectors; the division of housework and market work is optimal when the partner more efficient in household production spends time on this while the other partner spends time on market work. Thus, comparative advantage can be defined as the relations between the ratios of the marginal products in the market and in the household between the members of the household. Furthermore, Becker suggests that spouses gain from specialization even if the differences in efficiency are very small. The gain comes from increasing returns to investment in human capital that raise productivity. Hence, the traditional gender-based specialisation is a result of rational specialisation, the underlying assumption being that productivity in market work and housework increases with the time spent on the activity. As NHE implies that equilibrium allocation maximizes the utility of the altruist (generally the man) subject to the family's constraint, it is also called the altruist model.

However, according to Browning et al. (1994), the empirical support for the altruist model is rather weak; after all, the household is not one consumer but a collection of different individuals. A multi-person household cannot be treated as a single decision maker. Instead the household allocation should be regarded as the outcome of bargaining between its members, otherwise it contradicts the neoclassical point of departure according to which every individual has his or her own preferences. As an example of this critique, Mc Elroy and Horney (1981) present a game theoretical approach and model the household decision as a Nash-bargaining decision on the assumption that bargaining over x (where x_0 is a public household good, x_1 and x_2 are market goods consumed by the husband and the wife respectively, x_3 and x_4 is the quantity of leisure by the husband and the wife respectively) achieves the Nash solution to a two-person, nonzero-sum game. The couple, m and f, chooses x to maximize the utility gain product function, a special case of the Nash production function:

$$N = \left[U^m(x) - V_0^m(p_m^{'}, I_m, ; \alpha_m)\right]' \left[U^f(x) - V_0^f(p_f^{'}, I_f ; \alpha_f\right]$$

Each term in brackets is the gain from marriage over the next best alternative, being single; U^k is the individual utility function of the k-th individual and V_0^k is interpreted as the threat

point and represents the utility he or she could obtain outside the marriage, (p_m and p_f are market prices, I_m and I_f are the non-wage income, α is a shift parameter and may for example be the female /male ratio in the marriage market). Men often have a stronger bargaining position as they have higher wages, and their post-divorce state is likely to be financially better. This suggests that men will often tend to gain more from marriage and thus perform less housework than women. Furthermore, as men often earn more than women, men can more easily use market goods instead of home-produced goods, which taken together leads to gender differences in time allocation.

However, the theory of NHE has also been criticised for not considering social and institutional factors that generate differences in power in the interaction between family members (see, among others, Phipps and Burton, 1995). Juster and Stafford (1991) stress the role of early socialisation patterns for boys and girls and suggest that this may partly account for differences in labour market activities between adult men and women and thus for time allocation as well.[3] In addition, Apps (1982) focuses on discrimination due to social and institutional barriers that crowd women into low-wage occupations. Hersch and Stratton (1994) suggest that gender differences in housework cause differences in wages and not the other way around.

This discussion suggests that efficiency is only one of several aspects affecting gender differences in time allocation. Distortions on the labour market such as discrimination, gender wage gap, norms, bargaining power and efficiency may also have an impact on the gender division of labour. According to the NHE theory, comparative advantages (relative efficiency) will determine the allocation. According to the bargaining theory, the relative power within the marriage, which is affected by the relative income and/or a higher threat point, etc., will decide the intra-allocation of time. It may also be the case that norms and discrimination will have the greatest impact.

Thus, we assume that the individuals in the household maximize utility functions restricted by a budget and a time constraint. The time can be used for household work, market work or leisure. In this essay we focus on housework time and share of housework. In the estimations below, the impact of the explanatory variables will be analysed in light of the theories mentioned above. However, we will not be able to test the theories against each other, but will use them as complements in an attempt to enhance our understanding of differences in time allocation. Even though the bargaining, efficiency and norms may affect people in the same way, the interpretation of the impact of different determinants may differ.

[3] According to Gershuny (2003), time allocation is likely to change over the life cycle by age, experience and changes in family circumstances thorough the life course. Hours of market work are probably highest in an individual's middle years and schooling will naturally be highest when people are young. Leisure is likely to be concentrated to early and later phases of life.

3 Previous empirical studies

This section reviews previous empirical studies on time allocated to household work. Malathy (1994) studies the determinants of the amount of time women allocate to different household activities in Madras, India. The major determinant turned out to be women's level of education. A study analysing the situation in Switzerland showed that time spent by men on housework and children is largely invariant to changes in socio-economic factors whereas time spent by women on housework and childcare depend on several social, economic and demographic factors (Sousa-Poza et al., 2001). Anxo and Carlin (2004) find that in France, the larger the husband's share of labour income, the lower his part of housework time. However, the larger the wife's market hours, the lower his housework time, but the higher his part of housework time. In Germany (Beblo, 1999), the market hours of the wife and the years of education of both spouses had a positive effect on the husband's share of housework. Household income and labour income share had a negative effect. In the US, Hersch and Stratton (1994) find that a high education of the husband and the wife had a positive effect on the husband's share of housework. Children age 7-12 also had a positive effect on the share, whereas children aged 13-17 had a negative effect. Similar to the results in France and Germany, household income and labour income share of the husband had a negative impact on the husband's share of housework in the US.[4] In Sweden, Anxo, Flood and Kocoglu (2002) find that the higher the share of husbands' labour income, the longer the time the wife spends on housework, and vice versa. The spouse's educational attainment does not affect the division of housework (it should be noted, however, that childcare is estimated separately and is not included in house work). Children have a significant impact on the wife's housework time only when they are very small, 0-3 years. The husband's share of housework remains almost unaffected by children.

3.1 Some previous studies on Russia

In Russia, not only time spent on market work, but also time spent on housework is likely to have changed during the transition. The fall in income during the transition has had a negative impact on consumption and it has probably altered the likelihood of taking on a secondary job and/or investing more labour on home production. The withdrawal of the state brought about expensive childcare and increased unemployment. Furthermore, there has been an increase in informal production and non-monetary payment; the widening of income distribution and increasing inequality are likely to have affected the relative value of home-produced goods compared to market goods. On the other hand, the time needed for shopping has been reduced, due to less queuing. All these changes are likely to affect time allocation.

Regarding time allocation during the Soviet era, there is some information on time allocation in a Taganrog study from 1989, although according to Katz (2001), it must be interpreted with

[4] It should be noted that sampling methods, econometric methods and definition of housework varies between studies.

care.[5] On average men spent 21 hours and women 36 hours per week on housework. Among the working population, men spent 3 hours more on market work (including travel time), and 13 hour less on housework than women did (including activities with children, gardening, maintenance and repairs). Repair and maintenance is the only principally male undertaking.

Regarding changes in the allocation of time in Russia, (Vernon, 2004 based on the RLMS survey, women increased the time spent on childcare by about 1.5 hours/week between 1992 and 1998. The time spent by men on childcare was approximately the same in 1998 as in 1992. In 1992, women performed 41.5 per cent of all market work and 72 per cent of all housework. In 1998 women performed 43.5 per cent of the market work and 78 per cent of the housework. However, total hours of work declined for both men and women, especially the time spent on housework. Overall, both women and men increased the time spent on leisure during this period.

According to Gvozdeva and Gvozdeva (2003) who also analysed the data from the RLSM survey, the weekly time spent on paid work in urban areas in 1998 for employed men, was 37.1 hours, and for employed women was 34.9 hours. The weekly time spent on unpaid work was 5.4 hours for employed men and 21.7 hours for employed women.[6]

4 Data, descriptive statistics and the econometric model

In the 1960's, Russian researchers chose Taganrog as representing a typical middle-sized Soviet town (Katz, 2001), and a number of surveys have been carried out there. According to Katz (2001), it was legitimate to make generalizations from this sample during the Soviet period. Now, however, society is less uniform, especially regarding wages and income, and regional differences in Russia are large. The data should be viewed as an indication only.

The data set analysed in this paper comes from a survey performed in Taganrog in 1997/1998. It is based on a household survey carried out on a stratified (as regards living area), random sample of 1000 households where all adults were asked about time use. The survey contains a list of specific activities and the respondents fill in how much time they used on a particular activity the previous day, thus a retrospective diary is used. The fact that the respondents only need to remember the previous day's activities is a clear advantage compared to other time surveys such as the RLMS where the respondents report time spent on various activities during the entire previous week. Furthermore, in the Taganrog survey the interviews were spread out over four waves, one in each quarter of the year. Hence, seasonal differences are taken into account; this is important, for example, for activities such as plot work. A problem with

[5] Respondents were asked "How many hours did you spend doing x?"

[6] As mentioned above, in the RLMS survey, the respondents are asked about the time spent the previous week. This is a relatively long period, and it may be hard to remember it correctly.

time allocation data is that daily variations in time allocation affect the estimates, especially as there is only one interview. However, according to Anxo and Carlin (2004), having only one interview is less severe a problem for housework than for market work, as nil observations is less likely in the former. Another problem arises because people often do several things at the same time. Different persons may not treat joint activities in the same way and some kinds of "work" can be regarded as pleasure or even leisure for one person, but regarded as work for the other.

In the estimates below, the impact of various socio-economic variables on the dependent variables total housework, male and female share of total housework and different types of housework, will be compared between genders. To be able to interpret the differences across gender, total housework will also be divided into four smaller categories, making it possible not only to compare between gender, but also between various types of housework.

- Childcare (is divided into two kinds of activities, the first is "care for" which entails activities such as feeding, dressing and putting children to bed, etc. The other is "activities with" which entails playing, reading, helping children with homework, etc.).
- Traditional housework (cooking, dishwashing, canning and bottling, cleaning, laundry and shopping).
- Work at the household plot.
- Other housework (repair and maintenance of furniture, houses, dachas, clothes and shoes, cars, electronics and white goods, wood chopping and haircutting).

Furthermore, male total housework time and the male share of total housework time will be estimated, since the total time devoted to housework for different households may differ substantially, even if the share of time is similar. When taking both time spent and share into consideration, we are likely to get a more precise picture of the time allocation and the bargaining process. Furthermore, by estimating both time ands share we will be able to detect whether an increase in, for example, male share is due to fewer hours spent by the woman or by more hours spent by the man on total housework. However, the analysis of the gender share will only be performed for aggregated housework, since for the smaller categories, both spouses in many couples report zero hours.

The following explanatory variables have been retained: age, being retired, educational attainment (own and spouse's), number of children and age of the youngest child, the presence of a multi-generational household, weekday, ownership of a house, total household income for the last month prior to the interview, the male share of labour income, respectively female (i.e. labour income of the man or the woman divided by the household's total income), time spent on market work by the spouse and age differences between the spouses (age of the man – age of the woman) .

Higher age is likely to be related to longer work experience both at home and in the market, and thus with higher productivity. Age may also be linked to more traditional values regard-

ing the gender division of tasks and is likely to affect the time spent with children. Thus, the variable age captures both the effects that are due to the fact of being older, i.e. longer work experience, working less in the market, having older children and grandchildren, etc., but also the effects of having other values than younger people (cohort effect). To be retired is likely to affect the time spent on unpaid work and also to affect the gender division of labour between spouses. In the multigenerational household, the older generation may provide some childcare. Educational attainment is expected to affect time spent on housework through a wage effect. On the other hand, higher education may be related to egalitarian values leading to more equal sharing of housework and market work.

We assume that children are exogenous determinants of the time allocated to housework. Activities related to children are time-intensive. The number of children and the age of the youngest child are likely to affect time spent on childcare, and also the time spent on traditional housework, as more cooking and laundry are needed when the household grows. Children are grouped into four different age groups, depending of the age of the youngest. The need for care and supervision is likely to differ between ages and older children may help out and even decrease adults' household work.

Furthermore, in Russia multigenerational living is rather common.[7] This may affect work at home in several ways. If members of the older generation work or receive a pension, the total household income increases. If they do not work, their share of unpaid work at home is likely to increase, as they may provide childcare, plot work, etc., thereby allowing younger household members more time to allocate to market work. There may also be some economics of scale regarding cooking, cleaning etc. However, expenditures also increase with more people in the household, as does time needed for unpaid work.

The variable weekday is also included since time spent on housework may differ between weekdays (Monday-Friday) and weekends (Saturday and Sunday), as employed people generally work during the week. The variable ownership of a house is included as ownership may bring about extra work (repair, maintenance, gardening, etc). To own a house in Taganrog may have a negative correlation to income, though many houses in Taganrog are rather poorly maintained.

Total household income for the month preceding the interview and the variable labour income share will also be used in the analysis, since not only the level of income but also the relative income is likely to be important for time allocation.[8] The male/ female share of labour income may be a proxy reflecting both comparative advantage for market work and bargaining power. A high household income may induce more substitutions of home-produced goods and services for market-produced and for machines that facilitate housework. Still, a high income may also be positively related to a larger residence, which is likely to bring about more unpaid work, especially repair and maintenance work.

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7 40 per cent of the households in the survey from Taganrog are multigenerational.

8 Unfortunately we do not have the wage variable.

Market work of the spouse is also assumed to be an exogenous variable. This is not in accordance with the original assumptions made by Becker, where hours spent on market work and home production are determined jointly, on the basis of the relative shadow price of both spouses. In the estimations below, only the market work of the *spouse* is included.[9] Hence, we assume that market work of the spouse is exogenously determined, i.e. that both spouses in a first stage decide upon the time they want to devote to market work and thereafter decide upon the time they want to spend on housework given hours spent on market work.[10] Finally, differences in age and educational attainment of the spouses are included as they may affect bargaining power, efficiency and values. Large age differences may cause unequal sharing as a relatively large age differential probably reflects differences in human capital, endowment and relative productivity.

4.1 Descriptive statistics

The sub-sample analysed in this paper will include all married and cohabiting men and women above the age of 17. There is no upper age limit as there is no pension age in the informal labour market (the formal pension age is 55 for women and 60 for men), but also because we want to assess to what extent ages affect housework. In our sample, originally consisting of 2,869 observations, we are left with 681 married and cohabiting couples, i.e. 681 women and 681 men, totally 1362 observations. In the table below, descriptive statistics are provided.

As shown in the table, men are on average slightly older than the women, the mean age differences being around 2 years. Around 32 % of male and 36% of female respondents indicate they are retired. Among the males who are retired, 22% are under age 60 while 10 % of the women who are retired are under age 55, i.e. younger than the statutory retirement age. Regarding education, the gender differences are small, however more men than women have high and low educations. Few people have a low education compared to France and Sweden, for example (Anxo, Flood, Kocoglu Y, 2002). On average men earn more than twice as much as women, but women work only 3.6 hours, while men work 5.9 hours in the market. Conversely, women spend 6.8 hours on housework, while men only spend 3.5 hours. Women do more traditional housework and spend more time with children, whereas men spend more time on other household activities such as repair and maintenance, though only slightly more time at plot work than women. Forty per cent of couples live in a multigenerational household, and relatively few couples (17 per cent), own the house they live in.

[9] Transport time is included in market work.

[10] The fact that we do not include own market work is related to the time constraint.

Table 1
Descriptive statistics

Variable	Mean for women	Std.Dev. women	Mean for men	Std.Dev. men
Age	45.95	14.80	48.01	15.07
Age Difference	2.07	4.12	2.07	4.12
Retirement (d)	.36	.48	.32	.47
Multigeneration (d)	.40	.49	.40	.49
Weekday (d)	.74	.44	.74	.44
Number of children	.75	*.87*	.75	*.87*
Number of children**	1.38	.65	1.38	.65
Child age 0-3 (d)	.13	.34	.13	.34
Child age 4-6 (d)	.08	.27	.08	.27
Child age 7-12 (d)	.20	.40	.20	.40
Child age 13-17(d)	.12	.33	.12	.33
Education high (d) *	.22	.42	.25	.43
Education medium (d)	.64	.48	.59	.49
Education medium (d)	.14	.35	.16	.37
Education high spouse (d)	.25	.43	*.22*	.42
Education med. spouse (d)	.59	.49	.64	.48
Education low spouse (d)	.16	.37	.14	.35
Labour income share	.17	.25	.39	.356
Household income/1000	1.215	.80	1.215	.80
House-owner (d)	.17	.37	.17	.37
Market work	3.56	4.69	5.87	5.61
Market work, spouse	5.87	5.61	3.56	4.69
Plot work	.38	1.27	.55	1.71
Traditional housework	4.53	2.54	1.14	1.63
Childcare	1.49	2.68	.66	1.57
Housework total	6.84	4.03	3.47	3.47
Other work	.44	1.12	1.11	2.17
Share of total housework	.70	.25	.30	.25
Share of childcare**	.70	.33	.30	.33
Number of observations	681		681	

(d) =dummy 0-1
* High education means graduation from higher education, generally 15 years. Middle education means unfinished university education, upper secondary school of various kinds, generally 10-14 years. Low education means vocational school (that is not an upper secondary school), comprehensive school, primary school or less, generally less than 10 years in school.
** if children in household, N = 360 women and 360 men.
Source: Own calculations.

As far as the female share is concerned, women do 41 per cent of the plot work, 80 per cent of the traditional housework, 69 per cent of the childcare, and 28 per cent of the other work. Altogether, women do around 70 per cent of the housework and 38 per cent of the market work. The corresponding figures from France and Sweden are 70 and 30 per cent, and 60 and 40 per cent, respectively (Anxo, Flood, Kocoglu, 2002). According to Sousa-Poza et al. (2001), women do 65 per cent of the housework in Switzerland. When combining market work with housework, women do approximately 53 per cent of total work in Taganrog. This suggests that women and men work on average the same amount of hours (although women work a little more), and women work more at home than on the market.[11]

According to Katz (2001), in Taganrog in 1989, women spent on average 36 hours and men 21 hours a week on housework, suggesting that women did approximately 63 percent of the housework. Comparing this with western countries implies that women have increased their share of housework which is in line with the figures from RLMS, according to which women did 71.8 per cent of the housework in 1992, but 78 per cent in 1998. Women's share of housework is high according to RLMS which may be due to the difficulty of remembering household time for an entire week. It should also be noted that the RLMS surveys are made late in the year and do not control for seasonal variations.

4.2 The econometric model

In our model we assume that household members maximize utility subject to a budget and a time constraint. As mentioned above, we furthermore assume that number of children and hours spent on market work are decided first, and that decisions about time spent on housework are conditional on this allocation. Thus our model is sequential. This is because it is likely that working hours and income level are decided initially, depending on the labour market, choices of living standard, values etc, and that hours spent on housework are decided subsequently. Anxo and Carlin (2004) suggest that one way of justifying the sequential model is by viewing the household as optimising within a life-cycle context where hours of work and number of children during the lifetime are chosen based on the expected development of wages, human capital and wealth accumulation over the life cycle.

Since several individuals do not report participation in certain kinds of household activities, a Generalized Tobit (Tobit Type II) is used. The generalized Tobit model entails a structural equation (preferred hours supply function), an index function (participation in housework), a threshold equation linking preferred and observed hours and finally a stochastic specification. Thus in the Tobit Type II, the decision whether or not to participate in a certain activity is separated from the decision of how much to participate.

[11] As regards household appliances, 589 out of 681 households have washing machines in the family, 636 have refrigerators, but only 34 have fans, microwaves, air conditioners or other home electronics items used for housework. 315 have telephones, 18 computers, 516 vacuum cleaners. These figures suggest that the households are reasonably well-equipped.

1. Structural equation: $y_i^* = x_{1i}'B_1 + \varepsilon_i$
2. Index equation: $d_i^* = x_{2i}'B_2 + v_i$
3. Threshold index equation: $d_i = 1 \; if \; d_i^* > 0$

   $d_i = 0 \; otherwise$
4. Threshold structural equation: $y_i = y_i^* \; if \; d_i = 1$

   $y_i = 0 \; otherwise$
5. Stochastic equation: $\varepsilon_i, v_1 \sim N(0,0, \sigma^2, 1, \rho)$

y_i^* stands for the non-observed, latent endogenous variable, preferred hours of household work and y_i denotes the corresponding observed variable, measured hours of household work. x_{2i} and x_{1i} are vectors of explanatory variables, which are assumed to be uncorrelated with the error terms ε_i, v_1. B_1, B_2 are vectors of parameters. d_i^* is a latent variable that represents binary censoring and d_i is the observed value (1 if the individual reports housework, otherwise 0). Note that the stochastic specification allows for the error terms to be correlated with the correlation coefficient ρ. (Flood and Gråsjö, 2001).

We use separate equations for each activity, i.e. one for total housework, one for share of housework, one for childcare, one for plot work, one for traditional housework, and finally, one for other housework, explaining the probability of the activity. As the estimated parameters have no natural interpretation, only marginal effects are reported.

5 Results

Table 2 displays the estimates of the determinants of hours spent on total housework for women and men. These are followed by estimates of the determinants of the share of housework by men and women. Finally, results from the estimates of time spent on different kinds of housework are presented.[12]

Regardless of gender, being retired increases time spent on housework. The increase of time devoted to housework might partly be ascribed to an intergenerational reallocation of housework, and partly to the fact that the reduction of income when retired may be compensated to some extent by an increase of home production.

[12] It should be noted that the variable household income/1000 is divided by 1000 in all estimates below to take account of the small value of a marginal change of one rouble.

Table 2
Determinants of time spent on total housework for women and men

	Women		Men	
	Marginal effect	Std. Err.	Marginal effect	Std. Err.
Age	-.020	.016	-.011	.015
Age difference	.018	.031	-.024	.032
Retired	1.238**	.493	1.283**	.510
Number of children	-.017	.254	.446*	.247
Child age 0-3	4.726***	.639	1.143*	.652
Child age 4-6	3.165***	.699	.618	.690
Child age 7-12	1.986***	.559	-.044	.538
Child age 13-17	1.051*	.542	.290	.571
Multigeneration	-.305	.276	.095	.276
Education high	-.030	.345	.916***	.331
Education low	-.105	.450	-.635*	.372
Education high sp.	.876***	.333	-.132	.324
Education low sp.	-.014	.273	.400***	.013
Labour income share	-5.387***	.610	-2.091***	.531
Total household income	-.503***	.172	.079	.168
Market work spouse	.0436	.027	.014	.034
Own house	.390	.357	.276	.492
Weekday	.413	.291	-.176	.365
Log Likelihood	-1775.160		-1571.344	
Observations	681		681	

*** Significant at 1 per cent, ** significant at 5 per cent, *significant at 10 per cent
Source: Own calculations.

Regarding women, the presence of children (all ages) increases time spent on housework; the effect decreases with increasing age of the youngest child, confirming that young pre-school children need more time. The number of children, however, has no significant effect on women's time spent on housework.[13] These figures can be compared with the figures from Switzerland (Sousa-Poza et al., 2001), where the number of children increases the time spent on housework, though a substantial economics of scale with regard to childcare is also reported.

[13] We also estimated the impact of housework without childcare, and these results suggest that fathers with children aged 4-12 spend less time at housework without childcare (while mothers with children aged 0-12 spend more time at housework without childcare). Thus, it seems that male contribution to housework to a large extent is due to childcare. Fathers with many children also contribute more to housework without childcare (but substantially less than they do with housework when childcare is included). Results from these estimates are available on request.

In our results, to be married/cohabiting with a highly-educated man increases the time the woman devotes to housework whereas own educational attainment has no significant effect (medium level of education category is the reference).[14] Thus, female education does not seem to affect time spent by women on total housework. The impact of relative labour income is high and negatively correlated with total housework. The impact of household income on female housework is also negative, but weaker. These results are partly in line with Gronau (1977), who suggested that an increase in the market wage rate decreases time spent on housework whereas a rise in other household income increases leisure and mainly decreases market work.[15]

The results for men differ somewhat from those for women. As in Sweden (see Anxo et al., 2002), only young pre-school children (0 to 3 years) increase the time the husband spends on housework, albeit substantially less than for women. On the other hand, the number of children has a positive effect, suggesting that men contribute more to household activities when the number of children increases. These results can be compared with France (Anxo and Carlin, 2004) or Switzerland (Sousa-Poza et al., 2001) where the presence of children does not affect men's allocation of time spent on housework at all. Furthermore, in our estimates, a high education of the man increases the time spent on housework; however, as mentioned above, it also increases the time spent by the *woman* on housework. This suggests that in households where the man is highly educated, both men and women spend more time on housework. This may have to do with possession of a greater number of appliances that need repair, maintenance and care, but also due to more time spent on children by the highly-educated man. This is partly in line with Sousa-Poza et al. (2001) who find that high levels of education increase the male's time spent on housework and childcare. Our figures may also be compared with the figures from France, where the husbands of wives with high educations spend more time on home production (Anxo and Carlin, 2004). In our results, however, a high education of the woman does not affect time allocated by the man. A high share of income decreases the time spent by men on housework, but the impact is smaller compared to women.

Overall, fewer variables showed a significant effect for men, and the marginal effects are generally weaker. This is in line with the results of Sousa-Poza et al. (2001), who concluded that men are less affected by socio-economic variables than women. According to Apps and Rees (2003), time allocation studies show that the arrival of a child leads to a relatively larger fall in mother's leisure. In line with this, we would expect the presence of children to increase the housework time for both mothers and fathers, albeit less for fathers; our results confirm this. Hence, in several respects, our results are in accordance with the results obtained in previous research.

To further explore the relationship between time allocation and gender, we estimate the male share of housework time. Table 3 below displays the results of our estimations.

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[14] There is a clear tendency for assortative mating, regarding education, in our sample.

[15] Note however that Gronau discusses other household income and not total household income.

Table 3
Male share of total housework

	Marginal effect	Std. Err.
Age	-.001	.001
Age difference	.000	.002
Retired	.088**	.036
Number of children	.034**	.017
Child age 0-3	-.011	.042
Child age 4-6	-.041	.043
Child age 7-12	-.046	.037
Child age 13-17	.019	.038
Multigeneration	.023	.019
Education high	.043*	.023
Education low	-.030	.031
Education high sp.	-.012	.024
Education low sp.	.034	.035
Labour income share	-.150***	.036
Total household income	.008	.012
Market work spouse	.015***	.002
Own house	.027	.024
Weekday	-.021	.020
Log Likelihood	-190.985	
Observations	681	

*** Significant at 1 per cent, ** significant at 5 per cent, * significant at 10 per cent
Source: Own calculations.

As shown by Table 3, being retired increases the relative contribution of husband by 9 per cent. At first sight, our results suggest that retired men exhibit more egalitarian values concerning the gender division of housework. However, if both spouses are retired, the husband's share actually decreases[16]. Thus, the increase in the relative contribution of the retired husband is mainly due to the wife still working. The number of children positively affects the male share of housework. This might reflect the fact that fathers of many children have family-oriented preferences and are thereby inclined to devote more time at home.[17] High educational attainment of the husband also has a positive impact on its relative contribution to housework. This suggests that for males, high educational attainment might be associated

[16] Results available on request.
[17] It may also be true that women living with more "egalitarian" men are more prone to have more children. However, this explanation implies that the number of children is endogenous.

with more egalitarian values. The education of the woman has no effect on the male share, however. As expected, a higher male share of labour income has a negative effect on husband's relative contribution to housework while an increase of female market work has the reverse effect. A positive effect of the market hours of the wife has also been reported in France (Anxo and Carlin, 2004) and Germany (Beblo, 1999). In France, Germany and the US (Hersch and Stratton, 1994), an increase of husband's share of total household income reduced his relative contribution to housework.[18] Thus, our results are similar to previous studies in several respects. However, total household income negatively affects the male share in France, Germany and the US, a result that differs from our results for Taganrog.

Generally, men are less sensitive than women to changes in socio-economic variables. Furthermore, it is interesting to note that a high education of the woman has no effect on time spent or time share, whereas a high education of the man has a large impact on male relative contribution to housework and also on the time both spouses spend on housework. Note also that the impact of household income is insignificant for men. Women are thus more sensitive to variation of total household income than men. However, even though the aggregate results reported above yield valuable information, a deeper analysis of the gender division of housework requires a decomposition of housework into sub categories.

Concerning time spent on childcare, it is interesting to note that both retired men and retired women clearly contribute to childcare in Russia. Both men and women are also positively affected by the age of the youngest child; the effect decreases with the age of the child, as older children generally need less care. Independent of gender, an increase of the spouse's labour income reduces the time devoted to children which can be ascribed to either comparative advantage or bargaining factors. A couple living in a multigenerational household also reduces the time they devote to children, reflecting the childcare implication of the older generation. Furthermore, women living with low-educated men spend less time on childcare. A low education of the man is correlated with a lower number of children (see Appendix), and maybe also with certain values regarding upbringing that are connected with less time spent on childcare. A low-educated man, because of low earnings and lower attachment to the labour market, may also induce the woman to work more and therefore spend less time with childcare. For men, high educational attainment has a positive effect on time devoted to children. As can be seen in the appendix, high education is positively correlated with number of children.

Regarding plot work, men are positively affected by age and women by ownership of a house. It may be that older people are more likely to have inherited or purchased a plot and the necessary tools with which to work on it. The reason why age is only significant for men and not for women may partly be because retired women do more childcare (and thus have less time for the plot than men, see Table 4). To own a house may include owning a piece of land or a

[18] As mentioned above, definitions, methods and sampling procedures differ between studies. As an example, in the analysis from the US, Germany and France, childcare was not included in housework.

garden, as well. It appears that women are more prone to work on a plot if is connected to the house, whereas men work on plots that are separated from the residence.

Table 4
Determinants of total hours of childcare and plot work for women and men

	Childcare, women Marg. Eff.	Std. Err.	Childcare, men Marg. Eff.	Std. Err.	Plot work women, Marg.Eff.	Std. Err.	Plot work men, Marg. Eff.	Std. Err.
Age	-.030***	.006	-.008***	.003	.008	.005	.017**	.007
Age difference	-.001	.017	.010	.010	-.003	.009	-.040*	.014
Retired	.910***	.049	.393**	.196	.003	.140	-.061	.207
Number of children	-.052	.091	.042	.044	.079	.070	.017	.099
Child age 0-3	5.753***	.124	2.979***	.177	-.256**	.108	.021	.287
Child age 4-6	4.299***	.105	2.759***	.445	-.100	.181	.119	.397
Child age 7-12	2.768***	.288	1.467***	.244	-.097	.131	-.118	.193
Child age 13-17	1.807***	.356	.966***	.283	-.129	.114	-.316**	.130
Multigeneration	-.378***	.144	-.150*	.083	.130	.086	.172	.122
Education high	.0704	.185	.199*	.117	-.057	.100	.262	.179
Education low	.617	.465	-.152	.130	.019	.122	-.283**	.135
Education high sp.	.077	.183	-.011	.095	.091	.117	-.250**	.122
Education low sp.	-.546*	.307	-.146	.145	-.020	.096	.290	.255
Labour income share	-1.125***	.304	-.434***	.136	-.616***	.219	-.396	.244
Total household inc.	-.065	.088	-.067	.053	-.043	.050	.097	.065
Market work spouse	.020	.013	-.006	.008	.003	.008	.013	.014
Own house	-.111	.179	-.096	.094	.546***	.157	.221	.163
Weekday	.140	.155	-.006	.086	-.029	.090	-.247	.146
Log Likelihood	-840.489		-571.604		-380.489		-470.651	
Observations	681		681		681		681	

*** Significant at 1 per cent, ** significant at 5 per cent, *significant at 10 per cent
Source: Own calculations.

Furthermore, women are also negatively affected by their share of labour income. Men, on the other hand are also affected negatively by age differences, which may be due to the bargaining effect. Household income has no effect, thus plot work does not seem to be a way to counteract the effect of low household income on consumption. This result reminds us of the findings of Clarke et al (2000) mentioned in the introduction, that the rich do not have the time to work on a plot and the poor do not have the money, thus plot-work is mainly done by the middle class. Furthermore, men are affected negatively by low education and also by high

education of the spouse. Since education is correlated to income, this may also be related to the findings of Clarke et al (2000). Table 5 below, shows the estimates for traditional housework and other work.

Table 5
Traditional housework and other work for women and men

	Traditional Housework Women Marg.Eff.	Std. Err.	Traditional Housework Men, Marg.Eff.	Std. Err.	Other Work Women Marg.Eff.	Std. Err.	Other Work Men Marg. Eff.	Std. Err.
Age	-.001	.012	-.008	.007	-.026	.021	-.007	.010
Age difference	.023	.022	-.015	.014	-.042	.055	.006	.022
Retired	.752**	.356	.930***	.263	-.322	.399	.112	.322
Number of children	.062	.182	.088	.114	-.134	.192	.381**	.188
Child age 0-3	.289	.457	-.298	.252	-.562	.547	-.766***	.295
Child age 4-6	.379	.489	-.316	.262	-.132	.436	-.717**	.286
Child age 7-12	.581	.394	-.259	.230	.058	.439	-.518	.334
Child age 13-17	.322	.383	.020	.239	-.176	.367	.159	.389
Multigeneration	-.159	.226	-.115	.123	.136	.271	.246	.183
Education high	-.035	.244	.079	.153	.128	.312	.376*	.228
Education low	-.284	.316	-.007	.198	.274	.357	.018	.288
Education high sp.	.402*	.246	.193	.163	-.238	.301	-.130	.213
Education low sp.	.166	.194	.074	.224	.041	.326	-.174	.282
Labour income sh	-2.748***	.435	-.261	.234	-.214	.454	-.789**	.342
Total household inc	-.306**	.127	-.025	.077	.001	.148	.029	.112
Market work sp.	.027	.020	.022	.014	-.056**	.023	-.013	.019
Own house	.130	.253	.224	.165	-.309	.276	.011	.226
Weekday	.278	.207	-.308**	.140	-.247	.511	.346**	.175
Log Likelihood	-1583.544		-977.443		-755.655		-899.031	
Observations	681		681		681		681	

*** Significant at 1 per cent, ** significant at 5 per cen,t *significant at 10 per cent
Source: Own calculations.

For women, the time devoted to traditional housework is negatively related to the share of labour income and also to household total income. Thus working more at home may be a way for women to compensate for a low income (or women may have a low income because they work at home to a large extent). Women also spend more time on traditional housework when

married (cohabiting) with a highly educated man. Men, however, are affected negatively by weekday. This is not very surprising as men work more on the market and this normally takes place during the week, hence men do more traditional housework during the weekends. As mentioned above, the increase of time devoted to housework by retired individuals might partly be ascribed to an intergenerational reallocation of housework, and partly to the fact that the reduction of income when retired may be compensated for (to some extent) by an increase in home production.

Men devote more time to other work than women do and women are affected negatively only by market work of the spouse. Thus if the husband does more market work, the women do *less* other work. This seems a bit puzzling but may be explained by the fact that if the spouse works a lot, there is simply less time for the woman to do "other work" as she is occupied with other types of housework. High education has a positive effect on men. This confirms that men with higher educations do more "other" housework, which may be due to owning more products that need repair and maintenance or due to values connected with education. Furthermore, labour income is negatively connected with other work, for men. Men are also affected positively by week day, thus other work is performed mainly during the week. It is notable that the impact of household income seems to be insignificant for both men and women. Men are affected negatively by the presence of small children but positively by number of children. The latter may perhaps be due to needing to repair of children's equipment, clothes, instruments, electronics, etc.

6 Conclusion

The results of our estimations reveal clearly that men's and women's housework is affected differently by socio-economic factors. Men are more sensitive to changes in socio-economic variables regarding other work and plot work, but frequently the impacts of the variables are stronger for women.

The relative income of men and women turns out to be significant in all estimates except for plot work and traditional housework for men and other work for women, as expected from the efficiency theory and bargaining models. A variation of relative income affects time spent on housework for women significantly more compared to men. It is also worth noting that household income has no significant impact on men's behaviour, but significantly reduces the time women spend on total housework and on traditional housework. Increasing home production seems to be a way for women to compensate for low household income. As mentioned above, second jobs in Russia are held mainly by men. There are therefore grounds to presume that men compensate for a low income by working extra outside the home whereas women work at home.[19]

[19] It was mentioned above that workers who have experienced wage arrears, involuntary leave, or work less than full time are more likely to take on a second job (Foley, 1997).

Female educational attainment matters only for male plot work (where a low education of the spouse significantly *decreases* the time spent on this activity), and for male total housework (where a low education of the spouse significantly *increases* the time spent on this activity). High education of the women had no effect on time allocation. This is interesting, especially since Russian women are on average well-educated. In contrast, male education is shown to be important for both men and women in several estimates, suggesting that female education is of substantially less importance regarding bargaining or efficiency. As it is unlikely that highly educated men and women should differ substantially in work efficiency, other explanations for the different impacts of education could be norms and differences in power or bargaining power between spouses. A high education of the man increases time spent by both men and women on housework and increases men's share. This indicates that more housework is produced in households where a highly educated man is present, and that on average the gender division of housework is more evenly distributed in highly educated couples. High educational attainment increases the man's time spent on childcare and other household activities; the former may suggest that egalitarian values are positively associated with high education, and the latter may suggest that high education is correlated with a higher likelihood of owning equipment that needs repair and maintenance. Overall, the variable differences in age had no/little importance.[20]

Several variables have differentiated impact on share and time spent on housework. Although men are relatively less influenced by the presence of children, the number of children increases the time spent on housework, the male share of total housework and also the time spent on other work. Market work of the spouse affects the share of total housework (positively) for men, but not the hours spent on housework.

Generally, the variables have a larger impact on women than on men. As determinants such as share of income, household income, education and education of the spouse affect men and women differently, it seems probable that the efficiency theory does not suffice to explain the gender differences. Thus, other theories have to be mobilised as complements. To disentangle the effect of barraging power, norms and institutions is probably an impossible task; they are all likely to be interrelated. Our results are to a large degree in line with previous research and they do not indicate that Russian experience differs from Western experiences more than Western experiences differ among themselves.[21] Gender differences in time allocation show the same pattern over countries and regions even if societies may differ in many other aspects.

[20] The effects of different age-groups were also estimated and were seen to be somewhat larger than the effect of age, but there were no differences in significance.

[21] Sweden is in this regard, an exception (see Anxo et al., 2002).

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electronic ***International Journal of Time Use Research***
2007, Vol. 4, No. 1, 93-117 ***dx.doi.org/10.13085/eIJTUR.4.1.93-117***

The changing relationship between parents' education and their time with children

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Abstract

Inequality in American society is under extensive public and academic scrutiny today. This paper utilizes time-use data to explore one facet of that inequality. It examines differences in the time that American parents spend with their children across different levels of parental education. It also examines how these differences have changed between 1985 and 2003. In addition, it explores educational differences in the ratios of mothers' child time to fathers' child time. The results indicate that better educated parents used to and continue to spend more time with their children than the less educated. Although parents at all levels of education have increased their time with children over the years, the better educated have made relatively larger gains. Further, while mothers spend more time with children than fathers, the ratio of mothers' to fathers' child time was and continues to be lower for the better educated than the less educated. Lastly, the gap in parent-child time between mothers and fathers has narrowed at every education level between 1985 and 2003.

JEL-Codes: J13, J22
Keywords: Parents' time with children, parental education, time use and inequality

I am grateful to Daniel Hamermesh for helpful comments, Shameek Sinha for valuable discussions and Sagarika Chalasani for excellent programming assistance. Also thanks to the two anonymous referees for their critiques.

1 Introduction

Phrases like 'time squeeze' have been creeping into common parlance with greater frequency in recent years (Milkie et al., 2004; Gershuny, 2000; Hochschild, 1989). For parents, with this perceived time squeeze there invariably comes a sense that they are unable to spend as much time with their children as they would have liked to. But why is parental time important? The widely held belief that spending time with one's children can benefit them in a great number of ways is amply supported in the academic literature. For one, Neidell (2000) found that uninterrupted time with the mother in the first year has positive effects on a baby's cognitive outcomes, and even stronger positive effects on non-cognitive outcomes. Izzo et al. (1999) found that parental involvement with children from kindergarten through third grade is positively related to student achievement, with involvement at home having the largest benefits. Fleisher (1977) and Datcher-Loury (1988) both concluded that maternal child care time significantly raises children's years of schooling (although the impact is limited to those whose mothers had at least 12 years of schooling). Leibowitz (1974) demonstrated that there is a positive correlation between parental time inputs and children's ability at later ages. Hofferth and Sandberg (2001), in their study of children under the age of 13, found that family time spent at meals is associated with fewer behavioral problems. McLanahan and Sandefur (1994) argue that children of single parents have a higher probability of experiencing early pregnancies and difficulties establishing themselves in the labor force, not only because of their families' relatively poorer economic standing, but also because of reduced parent-child time.

Now while it is true that the importance of this paper rests on the idea that parental time is good for children, it is also true that there exist wide variations in how much time parents are actually able to put in. There exist variations in parent-child time by sex, age, education level, and work status of the parent, age of the child, family income and family type (Sayer, Gauthier and Furstenberg, 2004; Bryant and Zick, 1996). Apart from the variations between groups (as defined by the above-mentioned demographic traits) at a given point in time, there have been substantial changes in parental time over the years between and even within groups (Sandberg and Hofferth, 2001; Sayer, Bianchi and Robinson, 2004). My research here focuses on variations in parent-child time in two-parent families by educational attainment of the parent, and changes over time. More specifically, I will analyze (i) differences in parental time between education groups in a given year, (ii) changes in the differences in parental time between education groups from 1985 to 2003 and, (iii) changes in parental time from 1985 to 2003 within education groups.

2 Relevance

Why might it be important to study educational differences in parental time? It has already been established that parents can influence a variety of their children's outcomes. But are there educational differences in the extent to which parents can procure better life outcomes for their children?

What has repeatedly been found in national studies over the last 50 years is that, as a general rule, the more highly educated the parents, the greater the chances that their children will succeed in the K-12 school system, complete high school, go on to college and achieve higher levels of literacy as an adult (Sticht and Armstrong, 1994). These relationships are generally found to be robust to the inclusion of several household, school, and community-level variables, suggesting that parental education does indeed have an independent effect on a child's human capital acquisition (Strauss and Thomas, 1995). It has been theorized that one mechanism through which this happens is the time that parents spend with their children (Leibowitz, 1974; Coleman, 1988). Assuming that this is true and that the stated hypotheses are supported i.e. educated parents do indeed spend more time with their children than less educated parents, it implies that parents with higher education are able to invest more in their children. They are able to transmit more human capital and cultural capital to their kids, thereby ensuring better outcomes for their children than less educated parents can ensure for theirs. It is easy to see how this is one way in which socioeconomic inequalities are generated and transmitted inter-generationally. Further, if the gap in parental time between the better educated parents and less educated parents has widened, this means that later-life inequalities that start with certain kids having better cognitive and non-cognitive outcomes than others are on the rise. Even if we already knew that such inequities were rising, studying educational differences in parental time allows the identification and pinpointing of one mechanism through which inequity perhaps persists and grows.

What about gender differences in parental time? Why is it important to study how much time mothers put into the care of kids versus what fathers put in, and to study how that equation has changed over time? If women are increasingly resembling men in terms of their labor force activity, it is important to understand if the two sexes are looking more alike in terms of non-market time as well, especially child care, because it speaks volumes about the intra-household bargaining process and its evolution over time. The relative contributions of the two sexes to domestic labor have profound implications for the future of family. Also, it is important to look at the gender ratio of parental time by education groups to see if the predicted increases in gender equity are restricted to certain segments of the population.

3 Theoretical background and hypotheses

It is well-established that in the 1980s, wage inequality increased sharply in the United States (Bound and Johnson, 1992; Katz and Murphy, 1992; Levy and Murnane, 1992; Murphy and Welch, 1992). Although both within-group and between-group inequality increased, it is the latter kind that is of primary concern here. Wage differentials increased along several dimensions, perhaps the most significant of which were wage differentials by education. The college premium or the earnings of a college graduate over and above the earnings of a high school graduate saw an especially marked increase. And although the 1990s (Katz and Autor, 1999) saw a slowdown in the growth of inequality, there was still an upward trend in wage inequality by education level (Mishel, Bernstein and Boushey, 2002). Essentially, in the period that is under examination in this paper, there was a clear divergence in the growth in returns to education (Gottschalk and Danziger, 2005)

Paralleling this increase in the college premium was an increase in the overall hours worked by American dual-earner families (Jacobs and Gerson, 2001). Of course the predominant component of this increase was the rise in female labor force participation. The percentage of women aged 25-54 that worked full-time year-round rose at every education level. However, as the increase in the returns to education might suggest, the proportion of women with less than a high school education that were employed full-time year-round was significantly less than that of other women by 2003. For example, among married women with a spouse and child under age 18 present, 73.3% of college-educated women were in the labor force compared to 47.1% of women with less than a high school diploma (Mosisa and Hipple, 2006). For the men it is a slightly different story. The share of men working full-time year-round declined at all education levels since 1985. And although there was a downward trend for all men, the decrease has been significant for men with less than a high school diploma. Employment rates aside, the other component of increased annual hours is an increase in weekly hours worked. Weekly work hours in the general population tend to increase with education levels. Over the last couple of decades, among those working, hours worked rose at every wage quintile for both men and women (Gottschalk and Danziger, 2005) but the hour gap between education levels has also increased. In other words, weekly hours worked by less educated workers and better educated workers have diverged, with better educated workers now working more hours per week and more weeks per year. Again, this has been true for both men and women (U.S. Department of Labor, 1999; Bluestone and Rose, 1997).

These facts lead to several questions. If better educated people work more than less educated people do, how does the distribution of the rest of their time over other activities differ from the distribution among less educated parents? The second question is that if number of hours worked are different for men and women, are there education-related gender differences in parental time? Lastly, if hours worked have been changing differently for men and women, and for parents of different education levels, have the differences in parental time between the sexes and between education categories also been changing, and if so how?

The first of the hypotheses concerns educational differences in parental time.

Better educated people spend more time with their children than less educated people do. This should be true of both 1985 and 2003 and this should be true of both fathers and mothers separately i.e. better educated fathers spend more time with kids than less educated fathers, better educated mothers spend more time with kids than less educated mothers.

Since better educated parents earn more per hour than less educated parents, and work more hours than the latter do, they obviously have higher incomes. A higher income means that they have a greater ability to purchase substitutes to their own labor in household production. Household production is defined to include activities like meal preparation, house cleaning, doing laundry, and grocery shopping. The time that they thus buy-off can be used in child care, in personal care, or for their own leisure activities. Given that parents prefer spending time with children to other non-market activities (Juster and Stafford, 1985), one expects time spent in child care to go up before time in other activities does. Also, one may hypothesize that better educated parents are better informed about the positive effects of parental time on children and consequently act to ensure positive outcomes for their children, even if it means that they have less time for personal care, sleep and leisure (Bianchi, 2000).

The second hypothesis concerns changes in parental time over the years.

Parents at all levels of education are spending more time with their children in 2003 than they did in 1985. Education is more strongly associated with parent-child time in 2003 than it was in 1985. This should hold true for both fathers and mothers.

Consider what happened to real wages during the 18-year period between 1985 and 2003: Following the recession of the early 1980s, real wages in the second half of the 1980s continued to decline for less educated males while they registered modest gains for better educated men. In that period, women at almost all points in the distribution saw strong increase in their real wages, with the growth being strongest at the upper deciles. The recession of the early 1990s further depressed the real wages of less educated males. However, starting around 1993, the real wage growth of individuals from the lowest deciles (particularly men) outstripped the growth of everyone except those in the topmost decile (Gottschalk and Danziger, 2005). Due in part to the increases in the federal minimum wage, this growth more than compensated for the declines of the previous decade for less educated men. Of course the college premium remained and continued to grow during this period for both men and women. Also, women's real wages at every level continued their upward tick in the 1990s. From 2000 to 2003, wages at all education levels grew at a slow pace for men and women but relatively evenly (0.7% for the 20th percentile, 1.4% for the 50th percentile and 1.3% for the 95th percentile; Economic Policy Institute, 2006). Put together, these facts paint a picture of overall real wage growth in the period of interest to us. According to the argument presented in the first hypothesis, this would suggest an increase in parent-child time due to the increase in income available for the purchase of substitutes to less-preferred household production activities.

A second rationale for this hypothesis is the recent emergence of a new ideal regarding optimal child-rearing practices. The use of terms like "responsible fathering" (Doherty et al., 1998) and "intensive mothering" (Hays, 1996) are indicative of norms that prescribe highly involved parenting as the best way to raise a child. The origins of this new ideal could be varied: the increasing emphasis on child development (Alwin, 1996), the visibility of the conservative social movement of the 1980s and 1990s with its emphasis on traditional childrearing practices (Bartkowski and Ellison, 1995), overcompensation for perceived neglect on the part of mothers that are increasingly active in the labor force (Bianchi, 2000). Ultimately, what this ideal entails among other things is significant time investments on the part of parents regardless of labor force status and economic class.

The third hypothesis concerns educational differences in changes in parental time.

Better educated parents have made greater increases in their time with children than less educated parents have. The association between education and parent-child time became stronger for better educated parents.

As discussed in the rationale for the first hypothesis, with the growth in real wages of college-educated men and women on average outpacing the growth in real wages of low-income individuals between 1985 and 2003, it follows that better educated families saw a greater increase in their disposable incomes. Again, according to the household labor substitutes argument, they can buy-off differentially more free time in 2003 than in 1985 relative to the less educated. Coupled with the statement about time with children being preferred to time in other non-work activities, this leads us to expect a greater increase in parent-child time for better educated parents.

The fourth hypothesis concerns educational differences in the gender ratio.

The ratio of mothers' time to fathers' time is smaller for better educated parents than it is for less educated parents. This should be true of both 1985 and 2003.

The ratio of women's wages to men's wages is higher for workers with at least some college education when compared to workers who are high school graduates or less (Blau, 1998). One would then expect the distribution of the non-market time of better educated men and women to be more similar when compared to less educated men and women. A second explanation exists for why this may be true. Given that egalitarian values about the division of household labor are positively correlated with education (Inglehart and Norris, 2003), although mothers still spend considerably more time in child care than fathers do, one would expect mothers and father to be more similar in terms of their child time as one moved up the education ladder.

The fifth hypothesis concerns changes in the gender ratio of parental time.

The ratio of mothers' time to fathers' time is lower in 2003 than it was in 1985 at all levels of education.

Why might one think that the gender ratio of parental time has narrowed over the years? It has to do with the closing of the gender wage gap over the past two decades. The 1980s were a time of dramatic decline in the gender difference with the difference declining by one percent every year. The wage gap literature concludes that the main reason for this dramatic decrease in the 1980s was an increase in women's marketable skill levels relative to men's. The 1990s saw a definite slowdown in the convergence of wages between the sexes, but declines in the gap were still registered. This phenomenon was common to workers of all education levels (O'Neill and Polacheck, 1993; Polachek, 2004). The more similar the wages, the more similar the expected distribution of market and non-market time. So it is reasonable to predict that the gender ratio in parental time will have declined for all education levels.

4 Literature review

The subject of parental time is one that has received a fair amount of attention in various studies over the years. In many of these, researchers have looked at the relationship between education and parental time. Most find that time spent in child care is indeed positively associated with parental education levels (Zick and Bryant, 1996; Hill and Stafford, 1980; Leibowitz, 1974; Gronau, 1977). And this is true not just of American families. Sayer, Gauthier and Furstenberg (2004) explicitly analyze educational differences in parental time across select industrialized countries, namely Canada, Germany, Italy and Norway. What they find again supports this idea of education being an important determinant of parental time. Almost across the board, they find that for both mothers and fathers, parental time trends upwards with increases in education.

When it comes to changes over the years, there are few studies which have followed trends in parental time, and even fewer of them have followed recent trends. One of the earliest studies to show that parental time might actually be increasing was that of Bryant and Zick (1996) who used U.S. Department of Agriculture surveys from the late 1920s and early 1930s that asked married women about time devoted to family care and compared these to data from the National Time-Use in Economic and Social Accounts samples collected at the University of Michigan for 1975 and 1981. Hofferth and Sandberg (2001), and Sandberg and Hofferth (2001) have extensively analyzed the 1997 Child Development Supplement to the Panel Study of Income Dynamics which collected data on children's activities, and compared these to the 1981 University of Michigan study. Their analyses based on these data sets show that the time that parents spend with and around their children has clearly increased over time. Sayer, Bianchi, and Robinson (2004) used time diary data to assess trends in parent-child time from the mid-1960s to the late 1990s. They found that although there were intermittent declines, both mothers and fathers spent more time with children in the 1990s compared to the 1960s, a finding that was contrary to conventional wisdom. Similar results in other work by Bianchi, Robinson and Milkie (2006) are explained in terms of the decreasing time that

women spent in housework, an increase in multitasking, the incorporation of children into adult leisure time, and the gradually increasing effort that men are putting into housework.

That brings us to the topic of gender differences in parental time with kids. Most of the above papers examine both fathers' time and mothers' time. Fewer papers explicitly examine the relationship between the two. Sayer, Bianchi, and Robinson (2004) find that mothers are hands down still the more active of the two genders when it comes to taking care of children, but the gender gap in parental time has narrowed over the years. Bianchi (2000) found that between 1965 and 1998, in married two-parent families the ratio of fathers' to mothers' time spent in primary care increased significantly from 0.24 to 0.55, while the ratio of primary *and* secondary time with children increased from 0.51 to 0.65 Gauthier, Smeeding, and Furstenberg (2004) also find evidence in support of a narrowing gender gap in parent-child time.

All the aforementioned papers are important contributions to the study of parental time but there is certainly always scope for variations of and additions to the existing literature, all of which can provide other valuable insights into parental behavior. The first contribution of this paper is that it looks at parental time trends up until 2003. The latest analysis in any of the aforementioned papers is of data from 1998. Although a five year period (1998-2003) may not have seen substantial changes, it is definitely worth knowing if earlier trends in parent-child time are still continuing or if new ones are emerging. This paper is the first to utilize the ATUS, a rich source of data, to examine this issue of educational differences in parental time. Secondly, there is very limited research on trends in parental time based on education levels. While Bianchi, Cohen, Raley and Nomaguchi (2004) study such trends, later on in this paper I present results that somewhat differ from theirs. This further underscores the importance of continued research attention to this topic. Lastly, although there has been some work looking at trends in the gender ratio of parent-child time, educational differences in the gender ratio of parent-child time are yet to be examined.

5 Data and variables

The two main data sets that I use in my analysis are the Americans' Use of Time project and the American Time Use Survey (ATUS). The Americans' Use of Time project originated in the University of Maryland in 1985. Respondents were asked to record in diaries each activity they engaged in over a 24-hour period, when the activity began, the time the activity ended, where it occurred, and who was present when the activity took place. While individuals were asked to keep diaries, there were three methods used to retrieve their accounts. The first was by asking the respondents to mail their diaries back, the second was to interview them over telephone, and the third was to interview them in person. While the majority of the diaries came from the mail-back method, exploratory analyses established there were no statistically significant differences in parent-child time between the mail-back diaries, the phone interviews, and the personal interviews. A total of 4939 diaries were collected from persons of age

18 or older. Since I examine only married two parent families with at least one child, I retained 1218 observations.

The American Time Use Survey is conducted by the Bureau of Labor Statistics and the first round of data was collected in 2003. The sample for this survey was drawn from households that had completed their final month of interviews for the Current Population Survey (CPS). At first release, the ATUS contained a total of 20,720 interviews of individuals aged 15 or over. Again, I only retained respondents who were husbands or wives from married two-parent families with at least one child. This left me with a total of 6084 observations.

The dependent variable for the analysis is the total number of minutes that a respondent spends *primarily* caring for his or her child/children in a 24 hour time period. It includes all sorts of activities like the physical care of children, dressing and feeding a child, playing with a child, talking to and disciplining a child, helping him or her with homework, attending to a child's health, traveling and waiting primarily associated with children etc. Appendix Table 1 lists the response categories that were used to compute total time spent in primary child care.

I created four categories of educational attainment based on the number of years of education completed by the respondent: those with less than 12 years, high school graduates, those with some college, and those with a college degree or more (i.e. graduate education of some sort). Other important variables are included in the multivariate analyses as controls. The first is the respondent's age. A second control included in the regression equation is the number of children that are present in the household. Additionally, a dummy is included for the presence of a child under the age of 5. The last control is an indicator for whether the diary day is a weekday or a weekend. Appendix Table 2 shows a description of the variables. Appendix Table 3 gives summary statistics for dependent and independent variables.

6 Methods

To start with, I will describe trends in parents' time with children. In this first section, mean number of minutes spent in childcare per day are presented. The means (and standard deviations) for parents of different education levels are tabulated separately for 1985 and 2003, and for men and women. Note that the means are derived from total time spent in child care and not time per child even though the average number of children has declined since 1985. This choice is dictated by the existence of economies of scale in raising children. For instance, cooking for three kids is barely more time consuming than cooking for two. If I were to use time per child, parents with more children would look like they were not investing as much time on them just because the marginal increase in investment per child is not constant and is not equal to the investment for the first child. In other words, using time per child would underestimate the total effort of parents with more children when compared to parents with fewer children. As the results later show, using total time instead of time per child in fact un-

derestimates the increase in parent-child time over the years (since families have on average become smaller)

The ratios of mothers' to fathers' child time are also presented as part of the descriptive analysis. The ratios are tabulated separately for parents of different education levels, separately for 1985 and 2003. Descriptive analyses are weighted for diary day. Weights are used to correct for the over-sampling of weekends in the 2003 data.

The frequent occurrence of zeros in time use data demands the use of a tobit type I for the multivariate analyses. The interpretation and reporting of the tobit coefficients is different from OLS. It is done in two parts, i) changes in the conditional expected value of time spent in child care for parents reporting nonzero time in these activities, and ii) changes in the probability of mothers and fathers engaging in child care activities (McDonald and Moffitt, 1980).

But while the tobit gives us the marginal effects of changes in the right-hand-side variables, but it does not tell us how much of the predicted change in parent-child time between the two sample years can be attributed to changes in coefficients and how much to changes in sample characteristics. Important changes in sample characteristics also referred to as compositional or structural factors include the increase in overall levels of education in the past few decades (U.S. Census Bureau, 2000), the increase in work hours and labor force participation rates (for the better educated and for women), changes in the average age of parents, and changes in the number of children per household. There is the possibility that the change in parent-child time is not fully explained by these structural changes alone, and that there are behavioral changes that may have occurred. In order to understand the relative contribution of structural and behavioral factors to the change in parent-child time, the last part of the analysis will be a simple decomposition. Used here is a decomposition that can be applied to nonlinear dependent variables (Barmby and Smith, 2001; Joesch and Spiess, 2002). The decomposition is performed using the following equation:

$$\textit{Predicted minutes}_{2003} - \textit{Predicted minutes}_{1985} =$$

$$Y(\beta_{2003} * X_{2003} - \beta_{2003} * X_{1985}) - Y(\beta_{2003} * X_{1985} - \beta_{1985} * X_{1985})$$

The first term on the right-hand side of the equation represents the change in fathers' (mothers') predicted mean child care time due to changes in means of the independent variables between 1985 and 2003. The second term on the right-hand side of the equation represents the change in fathers' (mothers') predicted child care time due to differences in the intercept and slopes.

7 Results

7.1 Findings from the descriptive analysis

(i) Support for the first hypothesis that education is positively associated with parent-child time:

A look at Table 1A reveals that within a given year, for both fathers and mothers, parents with more years of education spend more time with their children in a given day than parents with fewer years of education. For example, fathers with at least 16 years of education spent double the time that the least educated fathers spent in child care, 34 minutes compared to 17 in 1985, 72 minutes compared to 36 in 2003. The same is true of mothers, just not as pronounced as it is for fathers. The minutes spent in child care are similarly larger for every education level when compared to every education level below it.

Table 1A
Mean minutes spent in child care

	Men		Change	t	Women		Change	t
Education in years	1985	2003	1985-2003		1985	2003	1985-2003	
< 12	17 (58)	36 (82)	+19	g	49 (77)	100 (130)	+51	g
= 12	23 (54)	55 (101)	+32	g	84 (108)	111 (123)	+27	g
13-15	22 (45)	64 (108)	+42	g	89 (115)	119 (125)	+30	g
>= 16	34 (64)	72 (101)	+38	g	91 (95)	155 (135)	+64	g
t	c	a,b,c,d,e,f			a,b,c	b,c,d,e,f		
n	570	2860			648	3224		

Notes: Standard deviations reported in parentheses
a = Those with less than 12 years differ from those with 12 years at p<=.05
b = Those with less than 12 years differ from those with 13 to 15 years at p<=.05
c = Those with less than 12 years differ from those with 16 or more years at p<=.05
d = Those with 12 years differ from those with 13 to 15 years at p<=.05
e = Those with 12 years differ from those with 16 or more years at p<=.05
f = Those with 13 to 15 years differ from those with 16 or more years at p<=.05
g = 1985 mean differs from 2003 mean at p<=.05
Source: Compiled by author from the 1985 AUT project and the 2003 ATUS.

Table 1B shows that even the proportion of parents participating in child care on a given day increases with education level for men and women, in 1985 and 2003. The descriptive results are thereby consistent with the first prediction that better educated parents spend more time with their kids.

Table 1B
Proportion reporting positive number of minutes in child care

	Men		Change	t	Women		Change	t
Education in years	1985	2003	1985-2003		1985	2003	1985-2003	
< 12	0.21	0.36	+.15	g	0.50	0.69	+.19	g
	(0.41)	(0.48)			(0.50)	(0.48)		
= 12	0.35	0.48	+.13	g	0.71	0.74	+.03	
	(0.48)	(0.50)			(0.45)	(0.46)		
13-15	0.36	0.59	+.23	g	0.74	0.81	+.07	
	(0.48)	(0.50)			(0.44)	(0.41)		
>= 16	0.48	0.67	+.19	g	0.75	0.88	+.13	g
	(0.50)	(0.48)			(0.43)	(0.35)		
t	a,b,c,e	a,b,c,d,e,f			a,b,c	b,c,d,e,f		
n	570	2860			648	3224		

Notes: Standard deviations reported in parentheses
a = Those with less than 12 years differ from those with 12 years at p<=.05
b = Those with less than 12 years differ from those with 13 to 15 years at p<=.05
c = Those with less than 12 years differ from those with 16 or more years at p<=.05
d = Those with 12 years differ from those with 13 to 15 years at p<=.05
e = Those with 12 years differ from those with 16 or more years at p<=.05
f = Those with 13 to 15 years differ from those with 16 or more years at p<=.05
g = 1985 mean differs from 2003 mean at p<=.05
Source: Compiled by author from the 1985 AUT project and the 2003 ATUS.

(ii) Support for the second hypothesis that parent-child time has increased at every level of education:

Looking across years, Table 1A reveals that time spent in child care has increased for every education level from 1985 to 2003. Men have had the most notable increases, with fathers at every level of education having more than doubled the time that they spend in child care between the two years. Similarly, mothers at every education level have increased their time with children. The increases were significant for both fathers and mothers. Table 1B and 1C show that the increases in time with children come from increases in proportions reporting

non-zero values for child care as well as across-the-board increases in participants' mean minute. All these results are consistent with the second prediction that time with children would have increased for parents of all education levels in the 18-year period.

Table 1C
Participants' mean minutes in child care

	Men		Change	t	Women		Change	t
Education in years	1985	2003	1985-2003		1985	2003	1985-2003	
< 12	80	98	+18		98	145	+47	g
	(107)	(113)			(84)	(138)		
= 12	67	115	+48	g	117	151	+34	g
	(74)	(122)			(111)	(124)		
13-15	61	108	+47	g	120	148	+28	g
	(58)	(122)			(119)	(124)		
>= 16	71	109	+38	g	121	176	+55	g
	(77)	(103)			(92)	(131)		
t						c,e,f		
n	212	1575			456	2509		

Notes: Standard deviations reported in parentheses
a = Those with less than 12 years differ from those with 12 years at p<=.05
b = Those with less than 12 years differ from those with 13 to 15 years at p<=.05
c = Those with less than 12 years differ from those with 16 or more years at p<=.05
d = Those with 12 years differ from those with 13 to 15 years at p<=.05
e = Those with 12 years differ from those with 16 or more years at p<=.05
f = Those with 13 to 15 years differ from those with 16 or more years at p<=.05
g = 1985 mean differs from 2003 mean at p<=.05
Source: Compiled by author from the 1985 AUT project and the 2003 ATUS.

(iii) Support for the third hypothesis that parent-child time has increased more for the better educated compared to the less educated:

Table 1A shows that for fathers, the increases in their child time from 1985 to 2003 are bigger for the better educated (except that those with some college gained 4 more minutes than the ones with a college degree, 42 compared to 38). For mothers, although the most educated did in fact have the largest increase (64 minutes), the least educated also had a fairly large increase (51 minutes). Of course, that number is not anomalous if one considers the fact that to start with, the least educated women spent the least amount of time in child care among all the women in 1985 (49 minutes). The results are roughly consistent with the prediction (more for

men than women) that the increases should become larger moving up in education levels. Note that I tabulate changes in raw number of minutes and not a percent change because of the existence of a 'ceiling effect' i.e. there is only so much time a parent can spend with a child in 24 hours while also performing all the activities necessary for the continuation of daily life. The increase from year to year has an upper bound, and for those that were already spending a lot of time with their kids, a percentage figure would appear to shortchange their increase in investment (especially highly educated mothers who always had very high rates of participation and high levels of child time conditional on participation).

In results not shown here (due to the endogeneity issue discussed later), when women were separated by their work status, the numbers still supported the hypotheses. Mothers that worked spent between 65% and 90% of the amount of time that non-working mothers spent with children. There were clear educational differences within both kinds of working mothers, full time and part time workers. Essentially however, regardless of work status, maternal time with children increased with education levels and also increased between 1985 and 2003.

(iv) Support for the fourth hypothesis that the ratio of women's child time to men's child time is lower for better educated parents than for less educated parents:

Table 1A clearly reveals that in a given year women spend more time in child care than do men with corresponding levels of education. This has been repeatedly demonstrated in almost all time-use studies. Table 2 gives the ratios of women's child time to men's child time in 1985 and 2003. In 1985, the best educated had a ratio of 2.68, lower than that of all other education levels. In 2003, the best educated had a ratio lower than that of the least educated (2.15 compared to 2.78). In fact, everyone with a high school diploma or more had a lower ratio than the least educated. The results are somewhat consistent (consistent when comparing the tails) with the fourth prediction that in terms of their time with children, better educated men and women are more similar to each other than the less educated men and women are.

Table 2
Ratio of women's to men's time with children

Education in years	1985	2003	Change
< 12	2.88	2.78	-.10
= 12	3.65	2.01	-1.64
13-15	4.04	1.86	-2.18
>= 16	2.68	2.15	-.53

Source: Compiled by author from the 1985 AUT project and the 2003 ATUS.

(v) Support for the fifth hypothesis that the ratio of women's child time to men's child time is lower in 2003 than in 1985 for all levels of parental education:

The last column of Table 2 shows negative change in the ratio for every education level. The decrease was biggest for the group with the largest ratio in 1985 - parents with some college (a decline of -2.18 from 4.04) - and next biggest for those with 12 years of education (a decline of -1.64 from 3.65). The results indicate clear support for the prediction of a decline in the ratio for all education levels because of a closing in the gender wage gap at all education levels.

7.2 Findings from the multivariate analysis

(i) Support for the first hypothesis that education is positively associated with parent-child time:

Table 3A shows the results of the separate tobits from 1985 and 2003, of men's child time on dummies for education level and other controls. It reveals that education is indeed positively associated with parent-child time. Both in 1985 and 2003, compared to men with less than 12 years of education, men of all other education levels have a greater positive probability of reporting a non-zero value for minutes spent in child care, and education is positively associated with minutes spent in child care conditional on them having reported a non-zero value. Further, these associations become larger moving up in education levels. In 1985, men with at least 16 years of education are .18 times more likely than the least educated to have a non-zero value for time spent in child care, and spend 15.7 minutes more than the least educated (conditional on a positive probability). In 2003, the same comparison shows a .28 higher probability and 42.9 more minutes, painting a similar picture for the association between education and parent-child time 18 years later.

Table 3B shows tobit coefficients for women. Again, both in 1985 and 2003, there is an increase in the positive probability of women reporting non-zero minutes with increases in education. Further, conditional on being uncensored, better educated women clearly spend more time with children than women with lower levels of education.

(ii) Support for the second hypothesis that parent-child time has increased at every level of education:

Table 4 presents separate results for men and women from a pooled regression on 1985 and 2003 data. In addition to earlier controls, a year dummy (coded 1 for 2003), and interactions between each independent variable and the year dummy are included on the right hand side. Looking first at men, the support for this hypothesis is clear. The coefficients on the education and year interactions show that fathers at every education level have an increased probability of participating in child care in 2003 when compared to 1985. And then, conditional on a positive probability, education is more positively associated with parent-child time in 2003. F tests of the coefficients on the year-education interaction terms reveal that they are jointly significant. Looking at the interaction terms in the columns for women reveals exactly the

same picture as for men, confirming the hypothesis that at all education levels, parent-child time has increased between 1985 and 2003 for women as well.

Table 3A
Tobit estimates of fathers' time with children

	1985			*2003*		
	Tobit	Conditional on being uncensored	Probability uncensored	Tobit	Conditional on being uncensored	Probability uncensored
Education in years (omitted < 12)						
= 12	24.9	7.2	0.09	53.7 *	21.1	0.14
	(20.4)			(12.5)		
13-15	31.1	9.4	0.11	81.6 *	33.1	0.21
	(22.8)			(12.5)		
>= 16	51.7 *	15.7	0.18	109.1 *	42.9	0.28
	(20.7)			(11.9)		
Age of respondent	0.3	0.1	0.00	-1.7 *	-0.6	0.00
	(0.7)			(0.4)		
Number of children	11.6 *	3.3	0.04	21.9 *	8.2	0.06
	(5.0)			(3.2)		
Child under age 5	51.9 *	15.5	0.18	67.2 *	25.6	0.18
	(14.9)			(7.1)		
Weekday	2.7	0.8	0.01	2.1	0.8	0.01
	(12.1)			(6.2)		
Intercept	-134.5 *	-38.4	-0.50	-73.3 *	-27.4	-0.20
	(41.6)			(22.6)		
-2 Log likelihood	*-1474*			*-10956*		
n (Censored)	358			1285		
n (Uncensored)	212			1575		

Notes: Standard errors reported in parentheses, * significant at p<.05
Source: Compiled by author from the 1985 AUT project and the 2003 ATUS.

(iii) Support for the third hypothesis that parent-child time has increased more for the better educated compared to the less educated:

The magnitudes of the coefficients discussed above validate this hypothesis. Looking at the education-year interaction terms in Table 4, where the omitted category is parents with less than 12 years of education, the positive probabilities of reporting non-zero values of child time in 2003 (over and above the probability of reporting non-zero values in 1985) increase

with education level. This is true of both men (.06, .10, .11) and women (.01, .02, .10). Further, conditional on having reported a non-zero value, the increase in the number of minutes spent with children increases with education level for men (7.4, 14.7, 14.9) and women (2.4, 5.4, 29.5) These results differ from the results obtained in previous research (Bianchi et al., 2006) which do not point to a trend of divergence in parent-child time by education level.

Table 3B
Tobit estimates of mothers' time with children

	1985			*2003*		
	Tobit	Conditional on being uncensored	Probability uncensored	Tobit	Conditional on being uncensored	Probability uncensored
Education in years (omitted < 12)						
= 12	22.4	10.8	0.07	30.8 *	17.2	0.10
	(16.8)			(10.3)		
13-15	33.4	17.0	0.10	48.5 *	27.4	0.10
	(18.5)			(10.1)		
>= 16	30.8	15.6	0.09	89.6 *	50.8	0.19
	(18.7)			(9.9)		
Age of respondent	-4.3 *	-2.1	0.00	-2.2 *	-1.2	0.00
	(0.7)			(0.4)		
Number of children	8.0	3.9	0.03	28.5 *	15.5	0.06
	(4.1)			(2.8)		
Child under age 5	87.1 *	45.3	0.25	88.1 *	48.9	0.19
	(13.7)			(6.1)		
Weekday	47 *	21.6	0.15	55.1 *	30.0	0.12
	(10.8)			(5.1)		
Intercept	101.8 *	49.4	0.32	6.9	3.7	0.02
	(34.7)			(18.8)		
-2 Log likelihood	*-2928*			*-16535*		
n (Censored)	192			715		
n (Uncensored)	456			2509		

Notes: Standard errors reported in parentheses, * significant at p<.05
Source: Compiled by author from the 1985 AUT project and the 2003 ATUS.

Table 4
Tobit estimates of parent-child time pooled over 1985 and 2003

	Men			*Women*		
	Tobit	Conditional on being uncensored	Probability uncensored	Tobit	Conditional on being uncensored	Probability uncensored
Education in years (omitted < 12)						
= 12	32.6	12.0	0.10	26.0	14.1	0.10
	(27.9)			(20.6)		
13-15	40.9	15.3	0.10	37.9	20.8	0.10
	(31.1)			(22.7)		
>= 16	66.6 *	24.7	0.20	35.5	19.3	0.10
	(28.2)			(22.9)		
12 years education*D2003	20.2	7.4	0.06	4.5	2.4	0.01
	(30.4)			(22.9)		
13-15 years education*D2003	39.2	14.7	0.10	10.1	5.4	0.02
	(33.3)			(24.7)		
16 or more years education*D2003	40.5	14.9	0.11	53.2 *	29.5	0.10
	(30.4)			(24.8)		
D2003	106.9	33.1	0.30	-90.2	-53.8	-0.18
	(60.1)			(46.2)		
Intercept	-177.2 *	-63.2	-0.49	98.2 *	52.2	0.20
	(56.0)			(42.4)		
-2 Log likelihood	*-12444*			*-19480*		
n (Censored)	1643			907		
n (Uncensored)	1787			2965		

Notes: Standard errors reported in parentheses, * significant at p<.05
Control variables included but not shown: Age of respondent, number of children, dummies for presence of child under age 5 and weekday diary, and interactions of these four variables with the 2003 year dummy.
Source: Compiled by author from the 1985 AUT project and the 2003 ATUS.

It would be useful to mention at this point that apart from the tobits discussed so far, I ran similar regressions with one additional right hand side variable, time spent in market work. This was determined from information in the respondents' time diary about minutes spent at work, minutes spent on work-related travel, and minutes spent in own education (if respondent was under the age of 30). Presumably, time spent in the labor force should be negatively correlated with time spent in child care, and this was indeed the case. Results from tobits including market time showed that the effects of education for men and women, in 1985 and 2003, were similar (in fact, almost identical) to the results shown in this paper. Predictions

were also robust to separate regression analyses for working and non-working mothers. However, there is a clear case of endogeneity here. It is unclear whether parents determine their market time or child time first. While this is a promising avenue of analysis for future papers, the results are not presented and discussed here. I have consistently excluded all labor force variables other than education from the rest of the analysis due to the endogeneity problem.

7.3 Findings from the decomposition analysis

The decomposition done separately for men and women reveals that a very small percentage of the increases in parent-child time is explained by changes in the means of the independent variables, especially for women (Table 5).

Table 5
Decomposition of parent-child time

	Men	Women
Predicted mean minutes in child time 2003	62	128
Predicted mean minutes in child time 1985	25	82
Raw difference in minutes	37	46
Difference due to coefficients	36	45
Difference due to means of independent variables	1	1
Percent unexplained	97.3	97.8
Percent explained	2.7	2.2

Source: Compiled by author from the 1985 AUT project and the 2003 ATUS.

For men, only 1 minute out of the 37 minute increase from 1985 to 2003 can be explained by changes in the means of the independent variables. For women, that number is 1 minute out of 46 minutes. There are several potential explanations for why compositional changes in this model explain so little. For one, there could be other variables unaccounted for in this model that are positively related to parent-child time and whose means may have changed significantly over time. For example, changes in time spent at work may explain some of the change on parent-child time (except that we know that hours in the labor force have increased more for the better educated and if anything, this should reduce their child time). A second explanation is that the changes in the slopes or propensities could potentially be behavioral (as opposed to compositional), and may explain the increase in parental time over the years at least partially. However, there is no explicit way to test with our current data whether and why these behavioral changes occurred. For example, it would be insightful to know whether the 2003 respondents are more likely to subscribe to the intensive parenting model than the 1985 respondents. Finally, the way in which parental time was measured could have changed between the two surveys although using total child time (as opposed to just physical care or interactive care, which are more open to definitional issues) minimizes the influence of differ-

ential measurement. Note that this issue of measurement certainly does not affect our observation of the differences between education groups within a given year.

8 Conclusion

To summarize the findings, there were clear indications that education is indeed positively associated with child time. Better educated parents used to and continue to spend more time with their children than the less educated. The association between education and parent-child time has become larger over the years i.e. parents of all education levels have increased their time with children over the years. However, the better educated have made greater gains, both men and women. This is a crucial finding because it suggests that inequality in America is increasing along this additional dimension of parental time investments in children, potentially paving the way for greater economic inequality in the future.

When it comes to gender differences in parental time, the best educated men and women clearly look more alike in terms of their time with children than do the least educated men and women. However, the gender gap in parent-child time has narrowed at every education level in the last two decades or so. To put it simply, assuming that a more egalitarian division of labor eases a woman's life and is healthier for the child, it's good news for women and children in general but it's better news for better educated women and their children.

How much of all this change is attributable exclusively to education and how much of it is mediated by changes in the returns to education is unclear. Although the ATUS has good income data from the Current Population Survey, a lack of similarly detailed information for individuals in the 1985 data prevents the inclusion of income as a control variable. That would have served to net out the potential mediating role of income in the effects of education on parents' time with kids. Researchers should try and incorporate the income dimension into future studies of parent-child time to understand the exclusive effects of income and education. It would also be valuable if they could go beyond married, two-parent families and study trends in parental time among all types of families using the ATUS.

One last useful extension would be to study changes and educational differences in the types of activities that parents do with children. There may exist important differences in the amount of time that better educated and less educated parents allocate to developmental versus routine activities. Some types of activities may be more beneficial to kids than others, and it may be the case that better educated parents spend more time in activities such as reading to their children, or helping children with school work than less educated parents. Unfortunately, the size of the 1985 sample simply did not permit such a breakdown. As discussed in an earlier section, the existence and widening of educational differences in parent-child time, and the existence and narrowing of gender differences in parent-child time both have important implications, but there is still ample room for further research.

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Appendix

Appendix 1
Survey categories used to compute child time

1985	2003
- Baby care (child under 5 years old)	- Physical care for household children
- Child care (child 5 to 17 or mixed ages)	- Reading to/with household children
- Help with homework, teaching children, fixing things for children	- Playing with household children, not sports
- Talk to, read or discipline children	- Arts and crafts with household children
- Indoor playing with children	- Playing sports with household children
- Outdoor playing with children	- Talking with/listening to household children
- Activities related to child health	- Helping/teaching household children (not related to education)
	- Organization and planning for household children
- Other child care, babysitting	
- Travel related to above activities	- Looking after household children (as a primary activity)
	- Attending household children's events
	- Waiting for/with household children
	- Picking up/dropping off household children
	- Homework (household children)
	- Meetings and school conferences (household children)
	- Home schooling of household children
	- Waiting associated with household children's education
	- Providing medical care to household children
	- Obtaining medical care for household children
	- Waiting associated with household children's health
	- Travel related to caring for and helping household children

Source: 1985 AUT project and 2003 ATUS, own illustration

Appendix 2
Description of variables

Child time	Total minutes spent on child care in a 24 hour period
Education < 12 years	Respondent has completed less than 12 years of education
Education = 12 years	Respondent has completed 12 years of education
Education 13-15 years	Respondent has completed 13 to 15 years of education
Education >= 16 years	Respondent has completed 16 years of education or more
Age of respondent	Respondent's age in years
Number of children	Number of children in the household under the age of 18
Child under age of 5	Dummy for presence of child under the age of 5, =1 if present
Weekday	Dummy for diary day, =1 if weekday
D2003	Dummy for survey year, =1 if observation from 2003

Source: 1985 AUT project and 2003 ATUS, own illustration

Appendix 3
Summary statistics

	Men		Women	
	1985	2003	1985	2003
Child time	25.5	62.0	82.4	128.5
	(2.4)	(1.9)	(4.1)	(2.6)
Education in years				
< 12	0.12	0.10	0.10	0.09
= 12	0.43	0.26	0.50	0.26
13-15	0.16	0.25	0.20	0.28
>= 16	0.29	0.39	0.19	0.37
Age of respondent	38.7	40.6	36.2	38.3
	(0.4)	(0.2)	(0.3)	(0.2)
Number of children	2.3	2.0	2.3	1.9
	(0.1)	(0.02)	(0.1)	(0.02)
Child under age 5	0.36	0.43	0.35	0.43
Weekday	0.72	0.71	0.73	0.71
n	570	648	2860	3224

Source: 1985 AUT project and 2003 ATUS, own illustration

electronic ***International Journal of Time Use Research***
2007, Vol. 4, No. 1, 118-124 dx.doi.org/10.13085/eIJTUR.4.1.118-124

time-pieces

news on time use research in the
electronic **International Journal of Time Use Research**

New developments in time technology – projects, data, computing and services

THE HARMONISED EUROPEAN TIME USE DATABASE AND THE TABLE GENERATING TOOL

Klas Rydenstam
Statistics Sweden

A the turn of the millennium around 20 European countries conducted time use surveys according to the harmonised guidelines prepared by Eurostat. Based on these surveys, Statistics Finland and Statistics Sweden have developed the Harmonised Time Use Database and the HETUS table generating tool with a grant from Eurostat. Statistics Sweden has built the web-based tabulation instrument and maintains the database and the tool. The database includes information on main and secondary activity, location and "with whom" for each 10 minute slot.

Presently the database includes micro data from fifteen European countries: Belgium, Bulgaria, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Norway, Poland, Slovenia, Spain, Sweden and the United Kingdom. The interactive, internet based, user friendly tool for producing user defined statistical tables is open to researchers and other interested users.

To get credentials to access the tool, please contact Klas Rydenstam, Statistics Sweden (klas.rydenstam@scb.se).

electronic ***International Journal of Time Use Research***
2007, Vol. 4, No. 1, 118-124 dx.doi.org/10.13085/eIJTUR.4.1.118-124

Book notes

by Kimberly Fisher

Anderson, B., Brynin, M., Gershuny, J. and Y. Raban (Eds.)
Information and communication technologies in society – E-living in a digital Europe (2007)

Contributing Authors: Alakeson, V., Anderson, B., Bakardjieva, M., Bober, M., Brynin, M., Dehio, J., Diduca, D., Dutton, W.H., Di Gennaro, C., Gershuny, J., Goodman, J., Graskamp, R., Haddon, L., Heres, J., Ling, R., Livingstone, S., Partridge, C., Pasquini, A., Raban, Y., Rothgang, M., Schmidt, C.M., Shepherd, A., Soffer, T., Steijn, B., Tijdens, K., Thomas, F., Vicario, L. and B. Yttri
Publisher: Routledge, New York
Languages Available: English

This book arises from related research projects using the 1998-2001 Home On-Line longitudinal study in the UK and two waves of the E-Living Survey in six European countries which have examined the effects of the increasing prevalence of information and communication technologies (ICTs) on daily life in Europe. Some authors consider the question from a macro-level, others from a micro-level. While the authors find a wide range of effects, the nature of these effects are weak and varied. The authors counsel against hoping that the spread of technology will lead to rising quality of life, economic prosperity and social cohesion – the actual effects of ICTs on behaviour are more complex and not necessarily steering change in a single direction.

Bianchi, S., Robinson, J.P. and M.A. Milkie
Changing rhythms of American family life – ASA Rose Series in Sociology (2006)

Publisher: The American Sociological Association (ASA) and the Russell Sage Foundation (RSF), New York
Website:
http://www.russellsage.org/publications/books/060110.113159
Languages Available: English

The authors use time-diary surveys collected over four decades from parents in the United States to examine the time parents spend with their children. Contrary to the fears expressed in some quarters of the potential impact of women's increased participation in the workforce, these authors find that parent's time with children has remained at a consistent level across time. Women have made time for children and paid work by reducing time in domestic labour and increasing multi-tasking.

Breedveld, K., van den Broek, A., de Haan, J., Harms, L., Huysmans, F. and E. van Ingen

De tijd als spiegel – Hoe Nederlanders hun tijd besteden (2006)

Publisher: Sociaal en Cultureel Planbureau, The Hague
Website:
http://www.scp.nl/publicaties/boeken/903770283x.shtml
Languages Available: Dutch

This book makes use of the national time use surveys collected by SCP every five years from 1975 to 2005 to look at changing activity patterns in the Netherlands. The book covers a range of main categories of daily activities.

Bryant, K.D. and C.D. Zick
The economic organization of the household, revised edition (2005)

Publisher: Cambridge University Press, Cambridge
Languages Available: English

This book aims to provide intermediate-level undergraduate students of economics grounding in the theories and practices involved in modelling income generating and consumption behaviours in households. The fifth chapter, covering time in market work, domestic production and leisure, and the sixth chapter, covering human capital and parents' investments in their children, are of particular relevance to time use researchers. The book also explores changes in the daily behaviours of families in the United States across time.

Craig, L.
Contemporary motherhood – The impact of children on adult time (2007)

Publisher: Ashgate, London
Website:
https://www.ashgate.com/shopping/title.asp?isbn=0%207546%204998%209
Languages Available: English

This book calculates the time and financial cost to parents of having children. While the revelation that having a child produces a greater time cost for women than for men may be expected, this book demonstrates both the scale and the relative inelasticity of this cost across demographic characteristics and social contexts, and also reveals the remaining sex-specialisation in parenting. The book draws on Australian data for early chapters, then uses the Multinational Time Use Study for comparison of Australia, Germany, Italy and Norway to round the analysis in comparative context.

Durán, M.A.
El valor del tiempo – ¿Cuántas horas te faltan al día? (2007)

Publisher: Espasa Hoy, Madrid
Languages Available: Spanish

This book considers theoretical issues in the arrangement of daily activities as well as time use in Spain. The author explores life cycles, weekly and monthly activity cycles, time use of children, time in sleep, personal care, family activities, paid employment, and gender differences in behaviour patterns, and leisure time.

Van Echtelt, P.
Time-greedy employment relationships – Four studies on the time claims of post-fordist work (2007)

Publisher: ICS Dissertation Series, Utrecht
Languages Available: English, Dutch

This PhD thesis, awarded at Rijksuniversiteit Groningen, examines the mismatch between preferred hours of paid work and actual hours in the Netherlands. The thesis considers the difference between the working hours and conditions of work for men and women. The author also considers the pressure of post-Fordists economic structures on employees to work overtime. The thesis explores the impact on family life and personal stress and health from overtime work.

Holmes, M., Papper, R., Popovich, M. and M. Bloxham
Engaging the ad-supported media – A Middletown Media Studies Whitepaper (2006)

Publisher: Center for Media Design: Ball State University, Muncie
Website:
https://www.bsu.edu/webapps2/cmdreports/product_select.asp?product_id=7
Languages Available: English

This book reports on the use of various media in the USA (TV, internet, radio, newspapers and magazines) in home, office, school and other locations. The book uses media diary data collected in the Middletown Media Studies 2. The book also examines the degree and nature of multitasking while using the media.

Kirkpatrick, G.
Technology and social power (2007)

Publisher: Palgrave MacMillan, London
Languages Available: English

This book explores how advances in scientific understanding and improvements in technology change culture dynamics and structures of social power. The book offers a sociological discussion of how technology shapes politics and societies.

Levine, R.
A geography of time – The temporal misadventures of a social psychologist or how every culture keeps time just a little bit differently (2006)

Publisher: Oneworld, Oxford
Website: http://www.oneworld-publications.com
Languages Available: English

This text, which won the 1998 Otto Klineberg Award in its first release offers a psychologist's perspective on variations in the understanding of time and the pace of life across cultures. While the books covers similar ground explored by Émile Durkeim in *The Elementary Forms of Religious Life* in 1912, Levine also considers the influences of contemporary economic structures and political contexts on the tempo of life in different cultures. Levine covers some elements of historical understandings of time

and how concepts of time interweave with other dimensions of lived experience.

Van der Lippe, T. and P. Peters (Eds.)
Competing claims in work and family life (2007)

Contributing Authors: Breedveld D.,de Ruijter E., Garhammer M., Glebbeek A.C., Hilgeman C., Hillebrink C., Lewis S., Lindenberg S., Moens M., Mokhtarian P.L., Ory D.T., Peters P., Pouwels B., Sayer L.C., Schippers J., Siegers J., Standen P., Tijdens K.G., Treas J., van der Lippe T., van Doorne-Huiskes A., van Echtelt P, Wielers R., Wittek R and P. Wotschack
Publisher: Edward Elgar Publishing Ltd., Glasgow
Website:
http://www.e-elgar.co.uk/Bookentry_ contents.lasso?id=4124
Languages Available: English

This book explores issues of conflict between time for family life and time in paid work, using data collected throughout Europe as well as in Australia and the United States. The authors explore how household and personal choice as well as macro-level influences and social organisation interact to create the pressures which people balancing work and family life face in the Western world. The book aims to stimulate debate among student and research audiences as well as to inform public policy.

Pääkkönen, H. (Ed.)
Time use of families (2005)

Contributing Authors: Aalto K., Anttila T., Nätti J., Niemi I., Pääkkönen H., Takala P., Varjonen J., Väisänen M. and P. Väisänen
Publisher: Statistics Finland, Helsinki
Website:
http://tilastokeskus.fi/til/akay/index_en.html
Languages Available: Finnish

This book offers a collection of articles using the 1999-2000 Time Use Survey conducted by Statistics Finland which each explore a different aspect of the daily routines of families and households in Finland. Topics include domestic work performed by families of different sizes; knowledge work in daily activities; the relationship between the relative earnings of spouses and their contribution to unpaid household work; time spent alone by school children; and the daily routines of older Finnish couples. Earlier versions of many of many chapters in this book have been presented as papers at IATUR conferences.

Paolleti I. (Ed.)
Family caregiving for older disabled people – Relational and institutional issues (2007)

Contributing Authors: Aguierre, M.B., Baillie, L., Baldassar, L., Baldock, C., Bittman, M., Bol, N., Eskola, P., Eyers, I., Fisher, K., Gustafson, D.L., Hill, P., Jeary, K., Katila, S., Lam, R.C., Martin-Mathews, A., McNeely, C.L., Ni-kander, P., Nikula, S., Oddone, M.J., Paolleti, I., Py-ysiäinen, J., Saarenheimo, M., Sand, A.-B.M., Sims-

Gould, J., Stevenson, O., Thomson, C., Walters, J., Ward-Griffin, C. and E.A. Watson, Wilding, R.
Publisher: Nova Science Publishers, Hauppauge (New York)
Website: https://www.novapublishers.com
Languages Available: English

This book explores the issues raised by the increasing need for the provision of care for the growing elderly populations in developed countries. The book covers an international span (Argentina, Australia, Canada, Finland, Germany, Hong Kong, Italy, Sweden, and the United Kingdom) and includes a variety of chapter forms, including personal stories, small scale qualitative study reports, literature reviews, and large-scale data analysis, to explore a range of issues relating to the value of care, promoting quality of care, the impact of the unpaid caring role on carers, and the gender issues raised by care (particularly the differential impact on women, who are more likely to provide the care).

Spaeth, J., Holmes, M., Moult, B. and M. Bloxham
Mind the measurement gap (2006)

Publisher: Center for Media Design: Ball State University, Muncie
Website:
https://www.bsu.edu/webapps2/cmdreports/product_select.asp?product_id=18
Languages Available: English

This book considers the multiple means by which people can access media content, and discusses how social surveys might measure this range of uses. The book highlights limitations with in-household observations and telephone-administered surveys for collecting adequate data on some new means for accessing media.

Taylor, S.
Making time (2007)

Publisher: Icon Books, London
Website:
http://www.iconbooks.co.uk/book.cfm?isbn=978-184046826-7
Languages Available: English

This book explores the psychology of time to explain how people can perceive that time moves at different rates when chronological passage of time is constant (why time flies when people are having fun and drags when people feel bored). Taylor suggests that the level of information people absorb or do not absorb, and psychological development of the ego contribute to perceptions of time in different context. The book offers suggestions on how people might alter their perceptions of time to better advantage.

Tremblay, D.G. and J. Thoemmes
Social time and social values (2006)

Publisher: Presses de l'Université du Québec, Quebec
Website:
http://www.puq.ca/fr/repertoire_fiche.asp?titre=periodique&titre2=Loisir%20et%20Société&noProduit=LES2901
Languages Available: French, English

This special journal edition for sale independently contains a collection of articles exploring the cultural assumptions and values that underlie activity patterns. The collection pays particular attention to hours of work, work-life balance, commuting time and distance, how patterns of employment influence opportunities for leisure, and what people think about their present time allocation to activities.

Voorpostel, M.
Sibling support – The exchange of help among brothers and sisters in the Netherlands (2007)

Publisher: ICS Dissertation Series, Utrecht
Languages Available: English, Dutch

This PhD thesis, awarded at the Utrecht University, examines the behaviours of a wide range of siblings in the Netherlands. The thesis draws on large-scale survey data and examines patterns of behaviour between adult siblings, looking at the effects of same sex and mixed-sex dyads; one, both or neither sibling having children; siblings close in age or not close in age. The thesis concentrates on services and assistance which siblings provide to each other.

Zuzanek, J. and R. Mannell (Eds.)
Adolescents' time use, leisure participation, and well-being from a cross-national perspective (2005)

Contributing Authors: Aronson, R.M., Blanke, K., Chenu, A., Corneliβen, W., Glorieux, I., Hilbrecht, M., Huysmans, F., Kaczynski, A.T., Lesnard, L., Mannell, R., Pääkkönen, H, Short, S., Soupourmas, F., Staempfli, M., Stevens, F., Vaage O.F., van den Broek, A., Vandeweyer, J., Vernon, M., Wittenberg, M., Zeijl, E. and J. Zuzanek
Publisher: Presses de l'Université du Québec, Quebec
Languages Available: English (introduction also available in French)

This special edition of the journal Loisir et Societe/Society and Leisure presents research exploring the daily activities of young people in Australia, Belgium, Canada, Finland, France, Germany, the Netherlands, Norway, South Africa, the United Kingdom, and the USA, comparing the patterns of girls and boys on school days and non-school days. These papers reflect work inspired through collaborative meetings on young people's leisure and well-being coordinated by the Comparative Study of Adolescent Time Use (CATUS), a consortium with recognised association with IATUR, and funded by grants from the Social Sciences and Humanities Research Council of Canada and the Canadian Institute for Health Information. Many of these papers have previously appeared in earlier form at previous IATUR conferences.