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

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 "some-times" 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 pre-school children have a significant impact on the mother's feeling "sometimes" or "nearly al-ways" 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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