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## **Work Time and Hours Constraints**

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## **i. Abbreviations**

BHPS	British Household Panel Survey
BUC	Blow-Up and Cluster
Coef.	Coefficient
CPS	Current Population Survey
DSEP	Dutch Socio-Economic Panel
GDP	Gross domestic product
GSOEP	German Socio-Economic Panel
GTUS	German Time Use Survey
HILDA	Household, Income and Labour Dynamics in Australia
HoL	Home On-Line Survey
ISSP	International Social Survey Program
MTUS	Multinational Time-Use Study
NSCW	National Survey of Changing Work Force
NLSY	National Longitudinal Survey of Youth
OLS	Ordinary least squares
SUR	Seemingly unrelated regression

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# 1 Introduction

Because labor supply and the corresponding demand are elementary to the economic process of value creation, labor supply makes up one of the overarching areas of economics. It is therefore not surprising that “work time” is one of the most extensively studied variables in economic analysis. Work time issues also consistently take center stage in political, social and economic debates, especially in the context of persistent high unemployment, the steady increase in atypical employment, rising poverty, the demand for minimum wages, the ageing of the work force, the shortage of skilled workers, and the (un)balance between work and family life.

Because most people must pursue a paid job as a major source of income, paid employment is not only of essential interest to economists but also fundamental to both individuals and society. The type and extent of paid work, particularly, determine economic as well as social status and generate identity and self-image, so work time issues are crucial for how people allocate their time and structure their everyday life. In the process of time allocation, however, individuals constantly face a trade-off between paid work and other activities such as family responsibilities, housework, or leisure.

According to the neoclassical theory of labor supply, individuals can freely choose how many hours they work: rational agents decide how many work hours to provide to the labor market by maximizing an individual utility function subject to a budget constraint. Hence, under the neoclassical assumptions of perfect markets with full information and rational individual behavior, actual work hours should be consistent with individual preferences. Yet, both theoretical considerations and empirical evidence show substantial mismatches between

actual hours worked and work hour preferences, a gap referred to as work hours constraints.

This thesis, therefore, aims to draw a comprehensive picture of labor supply hours and the extent and determinants of work hours constraints while pinpointing possible consequences and policy implications of such constraints and highlighting the relevance of individual work time preferences with respect to a meaningful debate on work time issues. Most particularly, it offers a comprehensive analysis of how the consideration of individually preferred work hours and the discrepancy between these and actual work hours can foster an understanding of individual labor market participation decisions. What insights, for example, do individual preferences for work hours provide for successful policy implementation if policy makers address topics such as the length of the work week, balance between work and family life or the need for more substantive part-time jobs? Likewise, what incentives might lead employers to reduce work hour mismatches?

Despite their importance, these issues of work hour preferences and constraints have not yet been adequately considered in the overall debate on work time and labor market policy. Nor has attention been paid to a further pivotal question: how these restrictions affect workers' health and well-being. To date, there are only a few studies that investigate the meaning of work hours constraints in the context of happiness and well-being in the work place. This thesis, therefore, constitutes the first study for Germany and the United Kingdom on the potential adverse health consequences of being constrained in the choice of number of work hours.

The thesis begins by assessing the quality of labor supply hours data and addressing the general question of the accuracy of German work time data. To this end, chapter 2 presents a comparison of work time data collected using two

different techniques: the diary method and the interview method, the most common time-data collection technique in surveys. Specifically, it compares work time data collected by the German Time Use Survey (GTUS) using the diary method with stylized work time estimates from the GTUS, the German Socio-Economic Panel, and the German Microcensus. This comparative analysis focuses on the differences between the time-diary and interview data and whether deviations between the two techniques are subject to certain reporting patterns that might reflect desired self-image or a gender-specific reporting behavior. It also investigates whether stylized work time estimates have sufficient variation to reproduce a true picture of working hours.

Chapter 3 then analyzes the discrepancy between actual and desired working hours in a multinational setting with a focus on work hours constraints in 21 heterogeneous countries. Most particularly, using the latest International Social Survey Program (ISSP) data with a focus on work orientations, it addresses the central research question of whether work hours constraints are interrelated with macroeconomic variables such as (i) unemployment rates, (ii) GDP per capita as a measure of welfare, (iii) average weekly work hours, and (iv) income inequality. It also reports the results of a microlevel multivariate analysis designed to identify the determinant role of sociodemographic variables like prosperity and income, high risk of unemployment, and working conditions in working hours constraints and discover whether, with respect to working conditions, these constraints are also affected by gender issues.

Finally, chapter 4 addresses the question of whether employees who work more hours than desired suffer adverse health consequences, an issue important not only for the individual but also for government formulation of work time policy. The chapter answers this question through an analysis of the impact of the discrepancy between actual and desired work hours on self-perceived health outcomes in Germany and the United Kingdom. Drawing on nationally

representative longitudinal data, this analysis ascertains whether work hour mismatches (i.e., differences between actual and desired hours) have negative effects on workers' health. In particular, it investigates whether "overemployment" – working more hours than desired – has negative effects on different measures of self-perceived health. The thesis ends with a summary of findings and conclusions drawn (chapter 5).

## **2 How Accurate are German Work-time Data?**

### **A Comparison of Time-diary Reports and Stylized Estimates<sup>1</sup>**

#### **2.1 Introduction**

Few economic variables are used more frequently in empirical analysis than “work time,” data on which appear in numerous empirical studies in such diverse areas as labour supply, income, productivity, time allocation, growth models, poverty, and subjective well-being. Yet, whereas such ubiquitous use is not surprising given the social importance of paid employment, few empirical researchers question the validity and reliability of the time data collected by conventional surveys.<sup>2</sup> In reality, however, the method of collection for time data leaves room for a fair degree of skepticism.

By far the most common means of time-data collection is an interview technique that asks respondents directly how many hours they work per week (typically or normally) or has respondents provide information about how many hours they actually worked in a specific time period (usually yesterday or the previous week). In the time-use literature, however, there is widespread discussion on whether and under what conditions such so-called stylized estimates can appropriately measure time allocation [see Dex (1991), Heckman (1993),

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<sup>1</sup> This chapter is based on Otterbach and Sousa-Poza (2009). The final publication is available at [www.springerlink.com](http://www.springerlink.com). The data used in this chapter were made available by the German Federal Statistical Office (GTUS and Microcensus), Wiesbaden, and the German Socio-Economic Panel (GSOEP) study at the German Institute of Economic Research (DIW), Berlin.

<sup>2</sup> At least in comparison to income data.

Klevmarken (1999), Juster, Ono, and Stafford (2003)]. Most particularly, the question format – that is, the time period referred to (e.g. one day or one week) and how generally or specifically an activity is defined – plays a key role in the reliability of recall data. In principle, shorter recall periods improve the accuracy of self-reports [Dex (1991), p. 20]. More often, however researchers are interested in weekly work hours, meaning that to assess the time spent working in a week, respondents must recall their working hours on every single weekday and sum them up to the weekly work hours. In addition, they must also decide whether the entire week can be considered a normal or non-normal workweek. In fact, Robinson and Gershuny (1994, p. 11) assume that respondents tend to adjust their reported weekly work hours to normal (rather than non-normal) workweeks and often give socially desirable estimates that reflect their desired self-image. Hence, although paid work is a uniquely defined activity, it is questionable whether respondents appropriately account for lunch and coffee breaks, as well as for irregularities like overtime and work brought home. Moreover, respondents need clear instruction as to whether to include or exclude commuting times. Given that these questions are answered in less than 10 seconds and as part of longer surveys, we can only expect rather rough estimates.

An alternative and generally far more reliable measurement technique of time allocation is that of time diaries that respondents are requested to keep for predefined time intervals (usually 10 or 15 minutes). For each interval, respondents use their own words to fill in the primary activity and subsequently, any secondary activity. The interval space in the diary also provides room for the participant to report where and with whom these activities take place. Thus, time diaries enable respondents to report their activities in the framework of their temporal sequence during the day and ensure that the summing-up condition is fulfilled (i.e. that respondents' overall daily activities sum up to 24 hours). Such diaries also avoid the need to define activities and instruct respondents what to

include or exclude in their estimates of certain activity groups. Rather, respondents use their own words for the diary reports, which are then coded into over 200 activity categories.

Another advantage of diary entries over interview recall questions is that respondents need not estimate a complete and complex time period and/or make vague calculations about the length of the workweek. Rather, even when assessing regular and well-defined activities like paid work, the time diary accounts more precisely for irregularities and interruptions of activity patterns. The time specifications from diaries, therefore, can be considered more accurate than the somewhat rough estimates produced by interview questions.

To empirically test the accuracy of these assumptions, this study compares work-time data collected by a diary technique with data collected through interviews.

## **2.2 Previous Research**

Several studies that compare time data collected by diary with data from interviews are based on housework time. For example, Kan and Pudney (2007) analyze data from the Home On-Line Survey (HoL), which contains both stylized data and seven-day diary data collected in Great Britain from 1999 to 2001. Focusing on time spent for housework, the authors also compare the time specifications of the Home On-Line Survey with the stylized estimates of the British Household Panel Survey (1991 – 2004) and find evidence for systematic biases in the stylized estimates that are also detected by Kan (2006). The presence of dependent children increases the gap between stylized estimates and diary reports; that is, since childcare activities very often occur simultaneously with housework time, respondents mix both activities to produce double-counted



stylized estimates [Kan (2006), pp. 8, 17]. In addition, men with traditional gender attitudes report larger stylized estimates than they report in the diaries, a tendency that is reversed (and the gap decreased) the more housework hours these “traditional men” work. Using the National Survey of Families and Households and time-diary reports from the American’s Use of Time data, Press and Townsley (1998) show that both men and women overreport their housework hours. Interestingly, the extent of wives’ overreporting (mean overreport of housework by 12.8 hours) is even larger than men’s (mean overreport of 5.8 hours). A general overestimation with respect to housework is also detected by Marini and Shelton (1993). In a recent comparative study of both measurement techniques using data from the Norwegian Time Use Survey Kitterød and Lyngstad (2005) reveal only modest differences with respect to housework time, suggesting that in Norway, the traditional role of housewives has almost disappeared and therewith socially desirable responses.

Bonke’s (2005) investigation of the gap between stylized estimates and diary reports from the 2001 Danish Time Use Survey for paid as well as unpaid work shows time diaries to be the more accurate method. Specifically, Bonke’s results indicate that people who work many hours of paid work tend to overestimate their work hours in their questionnaire responses, whereas people who only work a few hours tend to underestimate their labour market participation. Gershuny et al. (2007) find a similar pattern for the seven European and North American countries of Canada, the UK, the US, Norway, the Netherlands, Finland, and Sweden. Based on an analysis of the Multinational Time-Use Study (MTUS) for the years 1998 to 2003, these authors also show that people with few work hours tend to underestimate their work time, whereas people with longer workweeks tend to overestimate their work time, but only small differences are observable for those who work normal work hours (i.e. approximately 30–50 hours per week). Overall, except for Canadian women and

Finnish men, the gap between stylized estimates and diary reports seems to follow the rule of the “greater the estimate – the greater the overestimate” and an increasing gap over time is observable for those respondents reporting the longest workweeks [Gershuny et al. (2007), p. 9]. This observation, the authors suggest, may be explainable by the increase in self-employment, second jobs, atypical employment, and irregular working schedules.

The overestimation of work hours produced by reliance on stylized estimates is also investigated by Juster and Stafford (1991), who compare six industrialized countries (USA, Japan, USSR, Finland, Hungary, Sweden) and two developing countries (Botswana and Nepal). These authors find that, compared to diary information, stylized work time estimates from the US Current Population Survey (CPS) underestimate the decline in working hours over time (1965-1981), a finding replicated by Juster, Ono, and Stafford (2003). Nevertheless, even though the major bias of stylized estimates is overestimation, in some cases – for example, if people work regular hours – the time specifications from stylized estimates and diary reports yield quite similar results [Juster, Ono, and Stafford (2003), p. 19]. In addition, even though stylized estimates and diary reports may differ in level, they seem to conform quite well in analyses of trends over time.

To analyze differences in weekly work using both measurement techniques for nine countries, Robinson and Gershuny (1994) draw on a multinational longitudinal collection of time diaries that covers studies in 20 countries over the past 30 years. On an aggregate level, the difference (defined as stylized work time estimates minus time specifications for paid work reported in the diaries) takes negative values for those who report few weekly work hours, increases to slightly positive values for people whose stylized estimates are between 20 and 44 hours per week, and then further increases for people whose weekly work hours rise above 45 hours. This relationship is especially observable at an aggregate level when the data are cumulated (across countries and for the

period 1978–1990), and a quite similar systematic pattern also emerges at a disaggregate level within each country. Given that the difference in weekly work hours remains stable across the countries analyzed, it is seemingly independent of the exact question format, the reference period of the interview question, or the number of diary days collected [Robinson and Gershuny (1994), p. 16)].

In all, as this overview shows, there is wide discussion on the reliability of time-use data, including work-time data<sup>3</sup>. Yet few papers focus on the implications of such discussion. One exception is Klevmarcken's (2005) investigation of how the choice of data source and the applied measurement technique of paid work affect wage rate elasticities and income elasticities. Specifically, his study shows that the time-use data collection method strongly influences the estimates of wage rate effects on labour supply, especially when weekend work is taken into account. Likewise, Carlin and Flood's (1997) comparison of time-diary versus survey data on how children affect the labour supply of Swedish men reveals that conventional survey data conceal any effect of the number and age of children on these males' labour supply, whereas the time-diary data show that children strongly influence male labour supply and significantly reduce the work hours by 2.6 to 3.4 hours per week.<sup>4</sup>

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<sup>3</sup> Most studies conclude that data obtained from the diary method is more accurate than stylised estimates. Nevertheless, a few authors in general assess stylized estimates as a reliable work-time measure, e.g. Frazis and Stewart (2004) or Jacobs (1998).

<sup>4</sup> Interestingly, the authors also show that the extent to which Swedish public policy encourages fathers to take a more active role in child rearing is strongly dependent on the choice of data source. They do conclude, however, that “the time diary data do enable us to find out something we cannot find out using ordinary survey data” [Carlin and Flood (1997), p. 181].

## **2.3 Data and Methodology**

### **2.3.1 Data**

The German Federal Statistical Office's second German Time Use Survey (GTUS), carried out in 2001/2002, one decade after the 1991/1992 survey, administered a household questionnaire to about 5,400 households and an individual questionnaire to 12,600 individuals aged 10 years and older living in these households. These household members also kept time diaries and described their activities on three days – two weekdays and one weekend day. To account for seasonal and weather-related activities, the time-use survey was undertaken over a period of one year (from April 2001 until March 2002) and collected on a total of 37,000 diary days. The raw diary information was coded according to an activity list that follows the guidelines for the harmonization of European time-use studies [Eurostat (2000)] and contains more than 230 activities. Besides personal information such as education, marital status, age, income, and respondent characteristics, the personal questionnaire contained stylized estimates of paid work collected through an interview question about a typical workweek. Specifically, respondents were asked to report their typical weekly work hours for primary and possible secondary jobs but explicitly instructed to exclude overtime and unpaid lunch breaks. Hence, by providing information about paid work from both the individual questionnaire and the time diaries, the GTUS allows comparison of work-time data obtained from the same respondents by two different measurement techniques.

In our analysis, we include employed respondents aged between 20 to 60 years but exclude non-employed individuals (i.e. respondents reporting 0 overall work hours per week either in the diary or in the questionnaire), as well as

individuals doing civil or military service (39 cases). Since the information given about paid work in the questionnaire refers to an entire week, we must, in a first step, calculate weekly work hours from the three diary days. We do so using the following common approach: The weekly work hours given in the diaries are equal to the average of the two recorded weekdays times 5 plus the work hours for the weekend day times 2. Respondents were also asked to report whether a diary day was a “normal day” or an “exceptional day” (e.g. due to illness or leave). We exclude exceptional days – when people were absent and report 0 work hours from the calculation of the weekly work hours – and calculate a normal or typical work week from the diary information that corresponds to the stylized estimates of a typical work week. In all, we use 10,317 normal diary days<sup>5</sup> and in about 60% of the cases within our sample the work week is constructed using the diary information of 3 normal days. In further a 30% of the cases the time specifications of paid work according to the diary consist of 2 normal days and in less than 10% of the cases the work week is constructed using one diary day. The analysis refers to the total hours of paid work for the primary, and if applicable, the secondary occupation.

### **2.3.2 Methodology**

Using kernel density estimates we first examine the distributions of the GTUS diary data and stylized estimates as well as two other data sources containing stylized work time estimates - the 2001 German Microcensus and the 2001 German Socio-Economic Panel (GSOEP). We proceed with a comparison of work-time specifications within these three data sources.

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<sup>5</sup> The distribution of days is as follows: Monday (13.9%), Tuesday (14.2%), Wednesday (14.1%), Thursday (15.1%), Friday (12.6%), Saturday (14.2%), Sunday (15.7%).

The microcensus, which samples 1% of the population, is the most comprehensive annual household survey in Germany and provides official statistics on a number of labour-market issues. The GSOEP, an annual longitudinal panel survey encompassing about 12,000 households and over 20,000 respondents, is equally representative of the German population.<sup>6</sup> To evaluate the work-time specifications from these data sources, we first construct workload categories with five-hour intervals from the information in the stylized estimates and then compare the grouped means for the different sources. We then compare the stylized estimates and diary reports within the GTUS using the means for people who report to work, for example, between 1 and 5 hours (from the questionnaire) and these same respondents' diary entries.

The next step in the descriptive analysis is a closer examination of the difference (Diff) between both measurement techniques. We define the individual difference as

$$Diff_i = QI_i - DI_i \quad (1)$$

where  $QI_i$  is the stylized estimate of working hours given by individual  $i$  in the questionnaire and  $DI_i$  is the number of working hours that an individual reports in the diary.

We then estimate the following OLS regression model:

$$Diff_i = \alpha_1 + \beta_{1j} X_{ij} + \varepsilon_i \quad (2)$$

The difference is explained by a set of control variables  $X_{ij}$  – that is, age, age<sup>2</sup>, gender, higher education, the presence of dependent children (aged 6 and younger), and flexible working schedules. This latter means that individuals have no fixed starting and ending points for work time and are flexible with respect to

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<sup>6</sup> For further information on the German microcensus and the GSOEP, see Schmid (2000) and the SOEP Group (2001), respectively.

its organization, which could make stylized estimates more difficult. We also introduce a dummy variable for female respondents to probe for any gender-specific reporting behaviour such as gender-specific social desirability. The presence of dependent children influences respondents' work-time patterns, especially with respect to irregularities like children occasionally falling sick or having to be taken to school. Likewise, a dummy variable for higher education assesses whether reporting behaviour is related to the level of education and whether social desirability is linked to highly educated respondents.

We then proceed with three more regression models (2, 3, and 4) in which the dependent variable is the difference as defined above. Model 2 is an extension of model 1 in that it also contains the number of working hours reported in the diary (DI) as an explanatory variable:

$$Diff_i = \alpha_2 + \beta_2 DI_i + \gamma_{1j} X_{ij} + \varepsilon_i \quad (3)$$

Models 3 and 4 probe for significant interaction effects between the time specifications in the diary and female respondents and flexible working schedules, respectively.

To account for heteroscedasticity, we estimate all OLS models with robust standard errors. However, one drawback of an OLS analysis of the difference between stylized estimates and diary reports is the inability to understand the measurement error process underlying both measurement techniques. That is, although the diary method is considered the more exact, it is not completely without measurement error. We therefore implement the same approach that Kan and Pudney (2007) employed to investigate the measurement error process for stylized estimates and diary reports of housework time. That is, we assume that the diary measure ( $DI_i$ ) is an unbiased estimate of the true but unobservable working hours  $W_i$ . However, since the diary days are selected randomly,  $DI_i$

deviates from  $W_i$  and, although we exclude exceptional days, diary reports comprise random deviations from average days. We write this deviation as

$$DI_i = W_i + U_i \quad (4)$$

In contrast,  $QI_i$  deviates randomly and - as pointed out in section 2.2 - systematically from the true working hours  $W_i$ :

$$QI_i = W_i + \alpha_3 + \beta_{3j}Y_{ij} + V_i \quad (5)$$

where  $U_i$  and  $V_i$  denote the random component of measurement error.  $Y_{ij}$  is a set of variables that describes the bias of the stylized estimates. The model of true working hours can then be written as follows:

$$W_i = \alpha_4 + \beta_{4j}Z_{ij} + \varepsilon_i \quad (6)$$

where  $Z_{ij}$  is a set of variables assumed to influence the time use for paid work and  $\varepsilon_i$  is a random error term. If we substitute equation (6) into equations (4) and (5), it yields

$$DI_i = \alpha_4 + \beta_{4j}Z_{ij} + U_i + \varepsilon_i \quad (7)$$

$$QI_i = \alpha_3 + \beta_{3j}Y_{ij} + \alpha_4 + \beta_{4j}Z_{ij} + V_i + \varepsilon_i \quad (8)$$

Based on the further assumption that  $Z_{ij}$  and  $Y_{ij}$  contain the same variables, we estimate the intercept ( $\alpha_3 + \alpha_4$ ) and the coefficients ( $\beta_3 + \beta_4$ ) in equation (8) jointly. This assumption also implies that all variables which affect 'true' working hours also affect the misreporting bias. Hence, for an efficient estimation of equations (7) and (8), we apply Zellner's (1962) method of seemingly unrelated regression (SUR). Even though the measurement errors for the diary and the questionnaire are assumedly uncorrelated with each other,

$$\text{corr}(U_i, V_i) = 0 \quad (9)$$



the SUR estimation allows for interdependency of both equations via the error term,  $\varepsilon_i$ . Hence, in our approach, the SUR is comparable to estimating two distinct OLS regressions of  $DI_i$  and  $QI_i$  on the same set of variables; however, using the information that both equations are interdependent via the error terms makes our estimation more efficient than OLS.

The above SUR model also enables joint tests of coefficients, as well as study of the variance and covariance of the measurement error. Therefore, we analyze the residuals in equations (7) and (8), defined as  $R_{1i} = U_i + \varepsilon_i$  and  $R_{2i} = V_i + \varepsilon_i$ , using variances and covariance:

$$Var(R_{1i}) = \sigma_\varepsilon^2 + \sigma_U^2 \quad (10)$$

$$Var(R_{2i}) = \sigma_\varepsilon^2 + \sigma_V^2 \quad (11)$$

$$Cov(R_{1i}, R_{2i}) = \sigma_\varepsilon^2 \quad (12)$$

We can then obtain the measurement error variances  $\sigma_U^2$  and  $\sigma_V^2$  as follows:

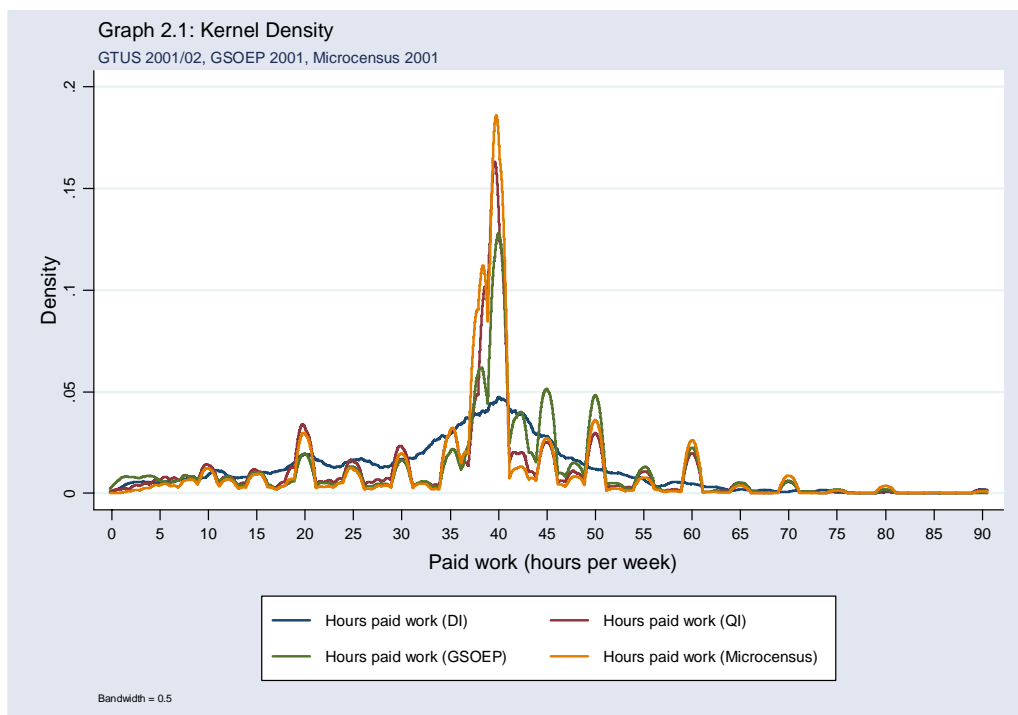
$$\sigma_U^2 = Var(R_{1i}) - Cov(R_{1i}, R_{2i}) \quad (13)$$

$$\sigma_V^2 = Var(R_{2i}) - Cov(R_{1i}, R_{2i}) \quad (14)$$

## 2.4 Results

Using kernel density estimates our descriptive analysis begins by analyzing the distributions for working hours reported in the GTUS diaries and the stylized estimates from the GTUS, the GSOEP and the German Microcensus (see graph 2.1).

As pointed out in section 2.2, the distributions clearly confirm what the literature has already reported: the stylized estimates (graph 2.1) are often clustered (or heaped) between 38 and 40 weekly working hours, the range of typical contracted hours for full-time employment in Germany. We also identify some clustering at 20, 30, 45, 50, and 60 hours. Although the stylized estimates have very similar distributions, there is some difference in the extent of clustering among the different data sets considered here. The distribution of the weekly working hours reported in the diaries is much smoother.



The total average weekly work hours, grouped by gender and full- versus part-time employment (defined as individuals working more or less than 35 hours per week), and the difference between stylized estimates and diary reports are given in table 2.1.

Whereas the questionnaire data indicate that, in total, employed people work about 38 hours on average per week, the diary entries report average weekly work hours of about 37 hours. Additionally, the difference for both measurement techniques is larger for men (1.6 hours) than for women (0.2 hours). We also report the results of a t-test for the comparison of means between the time specifications in the diary and the questionnaire within each row. In contrast to the overall mean and the means for men, we observe no significant differences in the female sample, which could suggest that women give more exact stylized estimates. Table 2.1 also reveals that, based on stylised estimates, underreporting (overreporting) is more common among part-time (fulltime) workers.

We proceed with the analysis of grouped weekly work hours by adding the GSOEP and German microcensus data to those of the GTUS (see table 2.2).

<b>Table 2.1: Mean Hours Paid Work</b>				
	N	QI	DI	Diff (QI-DI)
Men	2393	42,0	40,3	1,6***
Women	1709	32,4	32,2	0,2
<b>Total</b>	<b>4102</b>	<b>38,0</b>	<b>37,0</b>	<b>1,0***</b>
Part Time	771	18,7	22,2	-3,4***
Full Time	3331	42,5	40,4	2,1***

Comparison of the grouped means (two-sample t-test):  
 \* p < 0.05; \*\* p < 0.01; \*\*\* p < 0.001

**Table 2.2: Comparison among Three Datasets**

	GTUS 01/02		GSOEP	Microcensus
	DI	QI	2001	2001
<b>Workload</b>	<b>Group average</b>			
1 1 - 5 h	11.7	3.3 ***	3.7 ***	3.9 ***
2 6-10 h	16.4	8.5 ***	8.4 ***	8.7 ***
3 11 - 15 h	17.4	13.4 ***	13.2 ***	13.6 ***
4 16 -20 h	22.2	19.3 ***	19.0 ***	19.3 ***
5 21 -25 h	25.5	23.7 *	23.7 *	23.9
6 26 - 30 h	29.2	29.1	28.9	29.3
7 31 - 35 h	35.3	34.6	34.0 *	34.4
8 36 -40 h	39.0	39.0	39.1	39.1
9 41 -45 h	41.2	43.2 ***	43.3 ***	43.8 ***
10 46 -50 h	42.7	49.1 ***	49.0 ***	49.3 ***
11 51-55 h	46.7	53.8 ***	53.6 ***	54.0 ***
12 56-60 h	46.3	59.3 ***	59.3 ***	59.7 ***
13 61-65 h	49.8	63.9 ***	64.1 ***	64.3 ***
14 66-70 h	56.7	69.4 ***	69.3 ***	69.9 ***
<b>Total</b>	<b>37.0</b>	<b>38.0 ***</b>	<b>38.70 ***</b>	<b>38.1 ***</b>

Comparison of the grouped means (two-sample t-test) with respect to GTUS diary data: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

Specifically, we look for equality of means in the three datasets. Because the total mean working hours according to the stylized estimates seem very similar among all three data sources, we cannot reject the null hypothesis that the total working hours in the GSOEP, the microcensus, and the GTUS are equal. In fact, according to the grouped means, the time specifications in the GSOEP are very similar to the stylized estimates in the GTUS, so the null hypothesis cannot be rejected except for workload categories 4 and 7. A comparison of the microcensus data with those of the stylized estimates in the GTUS also reveals that the means within each category are equal except for workload categories 1,7,9, and 12<sup>7</sup>.

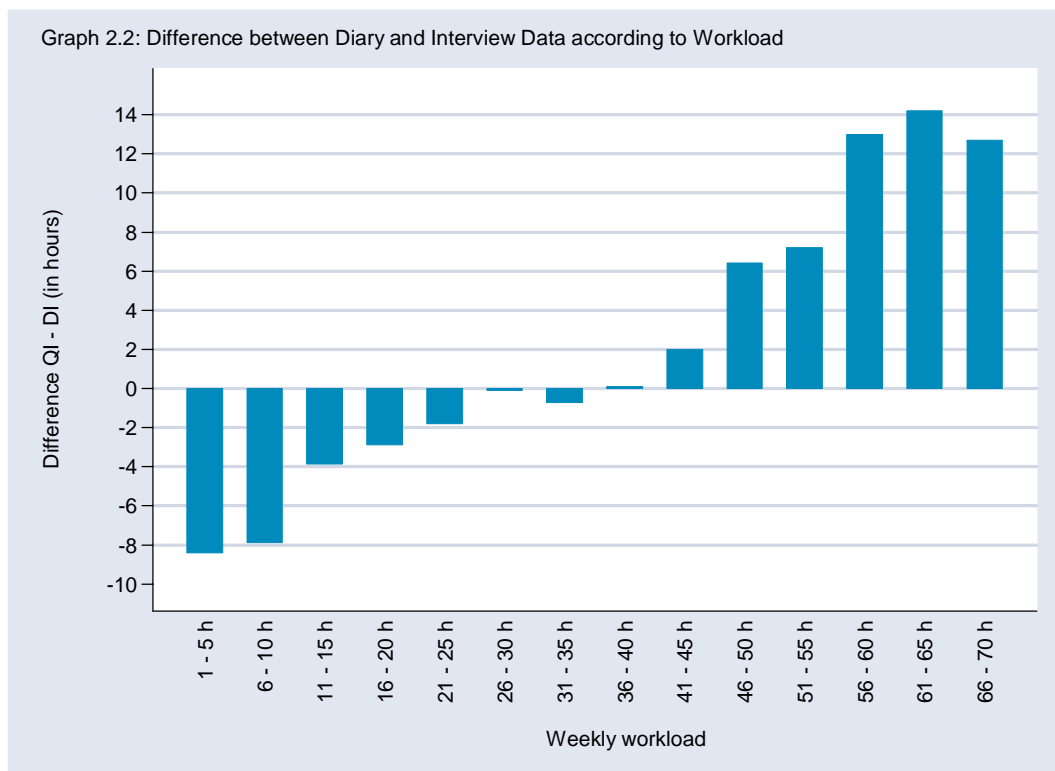
We next investigate the time specifications reported in the diaries. Because the grouped mean working hours from the diary reports can be regarded as statistically equal to the GTUS stylized estimates for categories 6, 7, and 8 (i.e., for a weekly workload between 26 and 40 hours), the ‘regular’ working hours measured by the diary measure seem consistent with the stylized estimates. For categories 6 and 8, based on a comparison of the GSOEP stylized estimates with the time specifications in the diaries, we can reject neither null hypothesis of equal grouped means. Likewise, based on our comparison of the grouped stylized estimates from the microcensus and the grouped mean working hours from the diaries, we cannot even reject the null hypothesis for categories 5 to 8 (weekly workload between 21 and 40 hours). This outcome confirms the presumption that stylized estimates seem to conform quite well to the diary reports in an analysis of regular working hours (half time or full time).

In contrast, a closer look at the work-time data from the GTUS (as reported in table 2.3) reveals very large negative differences between diary reports and stylized estimates for the low workload categories. More specifically, the

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<sup>7</sup> To test the equality of grouped stylized estimates a 99% confidence level is chosen.

difference values increase as the workload increases until it takes values of around 0 for categories 6, 7, and 8. However, if people work more than 40 hours, the difference takes positive values and increases with the workload. Given that the diary method is assumed to be the more exact technique for capturing ‘true’ working hours, we can state that people who work only a few hours per week (according to their stylized estimates) strongly underestimate their workload in the questionnaire, people who work more than 40 hours per week overestimate their workload, but respondents with a workload between 26 and 40 hours give quite exact stylized estimates. This relationship is illustrated in graph 2.2 and these results conform very well to the findings of other studies (see section 2.2).



**Table 2.3: Hours Paid Work per Week**

Workload	N	DI	QI	Diff (QI - DI)
		Group average		
1 1 - 5 h	62	11.7	3.3	-8.4 ***
2 6-10 h	139	16.4	8.5	-7.9 ***
3 11 - 15 h	95	17.4	13.4	-3.9 ***
4 16 -20 h	165	22.2	19.3	-2.9 ***
5 21 -25 h	108	25.5	23.7	-1.8 *
6 26 - 30 h	155	29.2	29.1	-0.1
7 31 - 35 h	262	35.3	34.6	-0.7
8 36 -40 h	1,989	39.0	39.0	0.1
9 41 -45 h	477	41.2	43.2	2.0 ***
10 46 -50 h	280	42.7	49.1	6.4 ***
11 51-55 h	110	46.7	53.8	7.2 ***
12 56-60 h	173	46.3	59.3	13.0 ***
13 61-65 h	51	49.8	63.9	14.2 ***
14 66-70 h	35	56.7	69.4	12.7 ***
<b>Total</b>	<b>4,102</b>	<b>38.0</b>	<b>37.0</b>	<b>1.0 ***</b>

Comparison for equality of means within each category (two-sample t-test): \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

We then proceed with the regression analysis using OLS regression models that treat the difference of both measurement techniques as a dependent variable. First, in model 1 (first column of table 2.4), we regress the above-defined difference on a set of controls. In this model, the coefficients of all variables except the dummy variables for female respondents and flexible working schedules are insignificant. All other variables kept constant, the difference for female respondents is on average 0.971 hours lower than that for men, which suggests that on average women give more exact stylized estimates.

Again holding all other variables constant, employed people with flexible working schedules report on average a difference that is 5.525 hours larger than that for employees having fixed starting and ending points and no flexibility in work-time organization.

**Table 2.4: Regression Models (OLS)**

<b>Model</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<b>Dependent = Diff (QI - DI)</b>				
<b>Constant</b>	4.687	-10.867 ***	-15.024 ***	-8.300 **
<b>Hours paid work (QI)</b>	---	0.400 ***	0.527 ***	0.332 ***
<b>Age</b>	-0.263	-0.314 **	-0.359 **	-0.310 **
<b>Age<sup>2</sup></b>	0.003	0.004 **	0.005 **	0.004 **
<b>Female</b>	-0.971 *	2.704 ***	11.062 ***	2.518 ***
<b>Child under 6</b>	0.914	2.048 **	1.631 **	1.845 **
<b>Higher education</b>	0.641	0.331	0.359	0.321
<b>Flexible schedules</b>	5.525 ***	2.679 ***	2.251 ***	-6.260 *
<b>Female * hours pw (QI)</b>	---	---	-0.220 ***	---
<b>Flexible * hours pw (QI)</b>	---	---	---	0.211 **
<b>F-value</b>	15.33 ***	40.61 ***	35.47 ***	47.68 ***
<b>R<sup>2</sup></b>	0.046	0.190	0.201	0.200
Note: * p < 0.05; ** p < 0.01; *** p < 0.001				



We extend model 1 by introducing the stylized estimates of working hours as an explanatory variable. As reported in table 2.4, doing so results in a large increase in the  $R^2$  from 4.6 % to 19.0 %.

In this extended model, all variables except the dummy variable for higher education are significant; however, the constant is significant but negative. Beginning with a negative difference and a workload close to 0, increasing working hours augment the difference (i.e. reduce the difference in absolute values) and thus lead to more exact stylized estimates until the difference takes positive values that increase as the number of work hours reported in the questionnaire rises. Hence, the more hours people report in the questionnaire, the more exaggerated those stylized estimates, a phenomenon observed in other studies and dubbed “the greater estimate-greater overestimate rule” [Gershuny et al. (2007), p. 9].

The difference for female respondents is 2.704 hours higher than that for men. The presence of children aged 6 or younger and flexible working schedules lead to a 2.048 and 2.679 hours higher difference, respectively. Whether these also lead to more exact or inexact stylized estimates (i.e. a difference closer to or further from 0) can only be assessed in conjunction with the stylized estimates from the questionnaire.

To further analyze the reporting behaviour of female respondents and respondents with flexible working schedules, we introduce the interaction terms for the dummy variables female and flexible schedules (in model 3 and 4, respectively) into the working hours reported in the questionnaire. Again, in these two models, all variables are significant except the dummy variable for higher education. Most particularly, the results for model 3 indicate that the constant for female respondents (representing working hours close to 0) is, in absolute values, 11 hours lower than that for men. Moreover, increasing work hours reported in the

questionnaire produce an increase in the difference (i.e. a reduction in the difference in absolute values until the difference takes positive values). However, the regression line for female respondents with respect to rising work hours reported in the questionnaire is not as steep as that for male respondents, which strongly supports the hypothesis that women give more accurate stylized estimates than men.

The regression results for model 4, shown in the last column of table 2.4, can be similarly interpreted. Respondents with flexible working schedules have a high negative constant (-15.56 compared to -8.3 for respondents without flexible schedules), and the regression line with respect to increasing working hours reported in the questionnaire is 0.211 units steeper than for respondents in the reference category (i.e. people with fixed working schedules). The shape of the regression line with respect to increasing working hours reported in the questionnaire is also closer to the horizontal reference line representing a zero difference for respondents without flexible working schedules. Hence, these results confirm that flexible working patterns make stylized estimates more difficult and less accurate.<sup>8</sup>

To further assess the reliability of the work-time data obtained using both measurement techniques, we investigate the results of the SUR (see table 2.5).

In addition to this SUR estimation, which reveals the differences for the regression coefficients from both measurement techniques, we carry out a Wald test for equality of coefficients (see the 2 last columns of table 2.5). At a 95% confidence level, all coefficients are different except for the dummy variables of higher education and the presence of children aged 6 or younger, which are only significantly different at the 90% confidence level. The largest difference in

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<sup>8</sup> We also ran the regression models for men and women separately. A notable result is that the dummy variable for dependent children under 6 in model 2 is only significant in the female sample.

coefficients is detected for the dummy variable of flexible schedules. On average, respondents with flexible schedules give 7.1 hours higher stylized estimates than those in the reference category but on average report only 1.5 hours longer work hours in their diaries than do respondents without flexible schedules. The difference for all other coefficients can be interpreted analogously.

**Table 2.5: SUR Estimation**

	Hours paid work (QI) Coef.	Hours paid work (DI) Coef.	Wald test Chi <sup>2</sup> (1)
<b>Constant</b>	38.84 ***	34.153 ***	4.08 *
<b>Age</b>	0.127	0.391 **	4.67 *
<b>Age<sup>2</sup></b>	-0.002	-0.005 **	5.22 *
<b>Female</b>	-9.177 ***	-8.205 ***	7.43 **
<b>Child under 6</b>	-2.831 ***	-3.745 ***	2.90
<b>Higher education</b>	0.775 *	0.134	2.94
<b>Flexible schedules</b>	7.108 ***	1.582 **	169.85 ***
<b>Pseudo-R<sup>2</sup></b>	0.21	0.10	
<b>chi<sup>2</sup></b>	1184.29***	512.17***	

Note: \* p < 0.05; \*\* p < 0.01; \*\*\* p < 0.001

From the correlation matrix (not reported here), we find that the residuals of both equations ( $R_1$  and  $R_2$ ) are correlated by 0.5337, so we can reject the null hypothesis of a zero correlation using a Breusch-Pagan test ( $\chi^2 = 1269.973$ ;  $p = 0.000$ ). We then analyze the residual variance and covariance using equations (11) to (13) to calculate the estimated variance components  $\hat{\sigma}_U^2$ ,  $\hat{\sigma}_V^2$ , and  $\hat{\sigma}_\varepsilon^2$  (see table 2.6).

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**Table 2.6: Residual Variance and Covariance**

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	<b>R<sub>1</sub> (DI)</b>	<b>R<sub>2</sub> (QI)</b>
Residual variance	172.60	153.11
Residual covariance		96.38
$\hat{\sigma}_\varepsilon^2$		96.38
$\hat{\sigma}_U^2$		76.22
$\hat{\sigma}_V^2$		56.74

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According to the Pudney and Kan (2007) approach applied here for paid work,  $\hat{\sigma}_\varepsilon^2$  is the estimated residual variance of the underlying model of ‘true’ working hours (equation (7)), while  $\hat{\sigma}_U^2$  and  $\hat{\sigma}_V^2$  are the measurement error of the diary reports and stylized estimates, respectively. The genuine variability of true and correctly measured working hours is higher than the residual variances of both the diary reports and the stylized estimates. Thus, our results indicate that neither the diary nor the stylized estimate method captures the high variability of ‘true’ working hours. This observation echoes Juster and Stafford’s (1991) claim that labour supply hours, especially, show very poor data quality when measured by conventional survey techniques (i.e. when measured via questionnaire). More specifically, these authors argue that time diaries “... suggest that the distribution of labour hours has a good deal more variance than is shown in conventional studies” [Juster and Stafford (1991), p. 485]. Likewise, according to Carlin and Flood (1997, p. 172), survey data do not have enough variation to reproduce a true picture of working hours, so the higher variability of the diary measures is not an indication of greater measurement error but rather a more exact reflection of the underlying variability of true working hours.

## 2.5 Conclusions

The aim of this chapter has been to compare work-time data collected using time diaries with those collected through interview. The first such study for Germany, this analysis, based on data from the German Time Use Survey (GTUS), the German Socio-Economic Panel (GSOEP), and the German Microcensus, reveals a discrepancy in work-time data depending on the data collection method.

In the first instance, our comparison among three datasets shows that the stylized time specifications for paid work conform very well to the diary information if respondents work between 26 and 40 hours per week. However, people who report fewer weekly work hours in the questionnaires underestimate their workload compared to the more exact time diaries. In contrast, those whose working hours exceed 40 hours per week exaggerate their working time the more hours they report in the questionnaire. Our findings thus confirm the results of studies in other countries.

We also looked for any gender-specific reporting behavior and assessed whether different time specifications of both measurement techniques are linked to flexible working patterns. The descriptive analysis and the regression results indicate that women, on average, give more accurate stylized estimates than men. We also show that work patterns (flexible or fixed with regard to starting and ending points and the organization of respondents' working time) significantly influence the difference of both measurement techniques. Moreover, flexible working schedules make recall more difficult and produce stylized estimates that are more inaccurate than the time specifications of respondents with fixed work-time patterns.

We confirmed these results by applying a seemingly unrelated regression in which the coefficients for the dummy variables of female and flexible

schedules show large and significant differences. These SUR results also reveal that conventional survey data do not have enough variation to give an exact picture of true and unobservable working hours; rather, stylized estimates obtained by interview cluster around conventional working hours, whereas diary data are distributed much more smoothly and contain higher variation. Nevertheless, according to our SUR model, time-diary data, although responsive to the difference between contracted and actual hours, fail to capture the high variability of the underlying ‘true’ working hours.

## **3 Mismatches between Actual and Preferred**

### **Work Time:**

### **Empirical Evidence of Hours Constraints**

### **in 21 Countries<sup>9</sup>**

#### **3.1 Introduction**

In terms of the economics of labor supply, neoclassical theory proposes that individuals can freely choose how many hours they work in the labor market. Specifically, individuals assign the extent of their work hours by maximizing a utility function subject to a budget constraint. Thus, under the central neoclassical assumptions of rational individual behavior and perfect markets, actual hours worked should be consistent with individual preferences. However, both empirical evidence and theoretical insights suggest that individuals are restricted in their choice of work hours and work either more or less than they would like.

As with other restrictions, work hours constraints are the result of long-term contracts, job insecurity, insufficient matching between search and mobility costs, work hour regulations, and the tax system [see Lang and Kahn (2001) and Sousa-Poza and Henneberger (2002)]. Moreover, because of asymmetric information on worker productivity, employers use long work hours as a screening instrument to distinguish productive workers from unproductive

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<sup>9</sup> This chapter is based on Otterbach (2010). The final publication is available at [www.springerlink.com](http://www.springerlink.com). The data used in this chapter were made available by the GESIS data archive.

workers [see Sousa-Poza and Ziegler (2003) and Landers, Rebitzer, and Taylor (1996)].

Understanding work hours constraints is particularly important for policy makers, employers, and trade unions because these restrictions serve as a measure of well-being in the workplace and overall life satisfaction. Taking into account work hours restrictions is also essential when policy directly affects such time allocation measures as work week changes and flexible work schedules. Indeed, work time issues frequently arise in response to persistent unemployment, poverty, discussion on minimum wage, the postulation of greater compatibility between work and family life, work–life balance, and job satisfaction. Thus, a meaningful discussion of work time policies necessarily requires an analysis of individually preferred work hours and the discrepancy between these and actual work hours.

Drawing on International Social Survey Program (ISSP) data on work hours constraints and their trends in 21 countries, this empirical study sheds light on the extent and determinants of work hours constraints in an international setting. The paper is structured as follows: section 3.2 gives an overview of previous research, section 3.3 describes the ISSP dataset and the analytical methodology, section 3.4 presents the results of the study, and section 3.5 outlines the conclusions and policy implications.



## **3.2 Previous Research and Empirical Evidence of Hours Constraints**

Several studies focus on hours constraints in a cross-national setting. For example, using the 1998 Employment Options of the Future Survey, Holst (2007), in a comparison of actual versus desired work hours in 15 EU countries and Norway, shows that the desired work hours of men and women are closer than their actual work hours. In addition, in all countries studied, respondents see very long weekly work hours as undesirable. Based on a further analysis for Germany using data from the German Socio-Economic Panel (GSOEP), Holst (2007) also argues that compliance with stipulated work hours would lead to a convergence of actual and desired work hours. She also suggests that the existence and age of children are important determinants of the difference in desired work hours between men and women.

Bosch and Wagner (2002), again drawing on Employment Options of the Future Survey data, report similar results. They therefore suggest not only a general reduction in work time but setting an upper bound for work hours and enhancing substantial part-time jobs rather than marginal employment. Since labor supply decisions are primarily made in the household context, work time and its division on a household level are important variables. As yet, however, they have received insufficient policy maker attention [see Bosch and Wagner (2002), p. 9]. Indeed, based on their findings, Bosch and Wagner (2002) argue that high employment rates among women and an equal distribution of work hours between spouses are sound prerequisites for short individual work hours and a general reduction of the work week. In this context, the company and collective labor agreement frameworks, the supply of child care facilities, and the

position of spouses in the tax and social system all play important roles [see Bosch and Wagner (2002), p. 9].

In another cross-national study based on 1989 and 1997 ISSP data, Sousa-Poza and Henneberger (2002) analyze work hours constraints in 21 countries to assess the extent to which macrovariables like unemployment rates, GDP per capita, and average weekly work hours influence hours constraints. Because these macrovariables are correlated with country-specific hours constraints, they attribute the desire to work more or less to macroeconomic welfare measures. They also estimate ordered probit models at the microlevel to identify how socioeconomic variables, actual work time, and such working conditions as job security, self-assessed income levels, flexible work schedules, and relations with colleagues influence hours constraints. They then compare their results for the U.S. with two other U.S. studies by Jacobs and Gerson (1998) and Bond, Galinsky, and Swanberg (1998), which are based on data from the National Survey of Changing Work Force (NSCW) in 1992 and 1997. Whereas the latter two analyses indicate that a majority of American employees want to work less, Sousa-Poza and Henneberger's results imply that employees in the U.S. are underemployed and desire to work more. They attribute these different results primarily to the different wording used in each survey. Whereas the ISSP question on preferred work hours explicitly refers to a change in income if individuals wish to decrease or increase their workload, the NSCW does not instruct respondents to take a change of income into account.

The use of different data sources also produces a wide range of estimates for the share of U.S. workers wanting to decrease their workload, from 6% up to 50% [see Golden and Altman (2008)]. This wide deviation is again strongly related to the question format, as well as to the representation of different occupational groups and the stage of the business cycle [see Golden and Gebreselassi (2007)]. In fact, based on a comparison of the 1985 and 2001

Current Population Survey (CPS) data, Golden and Gebreselassi (2007) show that the share of underemployed and overemployed U.S. workers remained almost unchanged over this long period. This finding is remarkable given that such working conditions as job structure, work flexibility, and workplace technology, as well as the work force itself, were subject to substantial changes within this time frame [see Golden and Gebreselassi (2007), p.31].

Likewise, Bell and Freeman (2001) investigate the differences in actual and desired work hours between the U.S. and Germany using longitudinal and cross-sectional data; specifically, National Longitudinal Survey of Youth (NLSY) data for 1989 through 1996, 11 waves of the GSOEP (1985–1995), and ISSP data from 1989 and 1997. The authors attribute the substantially lower work hours in Germany to lower earnings inequalities in that country than in the U.S, which, together with differences in job opportunities to increase earnings, give higher incentives for U.S. workers to work longer hours<sup>10</sup>. Earnings inequalities, opportunities for advancement, and occupational prospects are also mentioned as explanatory factors for these longer work hours by Michelacci and Pijoan-Mas (2007).

Additionally, Bowles and Park (2005) point out that decisions about time allocation between work and leisure are motivated by Veblen effects, i.e. individuals desire to emulate the rich with respect to their consumption patterns and choose “their work and spending activities in order to be more like a higher income group, rather than seeking distance from lower income groups” [Bowles and Park (2005), p. 399]. The authors analyze data on average annual work hours and income inequality in 10 countries over the period 1963-1998 and find that work hours increase with increasing income inequality [see Bowles and Park (2005), p. 398]. Schor (2001) argues that the aspiration toward continuous

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<sup>10</sup> For a more critical view on the incentive models discussed by Bell and Freeman (2001 and 1995), see Osberg (2003).

consumption growth not only leads to unsustainable consumption patterns and therewith ecological degradation but also to a socially undesirable time allocation between work and leisure. The author points out that ‘rising hours of work and declining leisure time are part of a larger nexus of eroding social capital, associated with high levels of stress and inadequate time for family and community’ [Schor (2001), p. 3]. Therefore, trading income for time is a necessary requirement toward sustainability and improvement of individuals’ well-being [see Schor (2001) and Schor (2005)].

In a more recent study that uses GSOEP 2004 data and focuses particularly on Germany, Grözinger, Matiaske, and Tobsch (2008) argue that taking into account desired work hours would lead to a substantial increase in employment. More specifically, after calculating an overall redistribution of 83.4 million work hours [see Grözinger, Matiaske, and Tobsch (2008), p. 11], the authors suggest that adjusting actual time worked to preferred work hours could result in an overall increase in employment of 2.4 million new jobs at 34.5 weekly work hours. They also analyze the impact of over- and underemployment on job satisfaction, life satisfaction, and health satisfaction by estimating ordered probit models. Since hours constraints have a significantly negative impact on all these variables, constrained workers suffer a considerable loss in quality of life [see Grözinger Matiaske, and Tobsch (2008), p. 6]. This result is not surprising given that unpaid overtime is increasing in Germany as workers faced with high unemployment rates and a high risk of unemployment become more willing to provide it [Anger (2006)]. This willingness to work additional unpaid hours is also related to expectations of better job opportunities and higher earnings in the future [see Anger (2006), p. 195].

A recent analysis of panel data by Wooden, Warren, and Drago (2009) also relates measures of subjective well-being such as job satisfaction and overall life satisfaction to work hours mismatches. Using the first five waves of the

Household, Income and Labour Dynamics in Australia (HILDA) survey the authors find out that the extent of overemployment is larger than that of underemployment. Working time mismatches significantly decrease job and life satisfaction whereas the number of work hours affects subjective well-being only marginally if workers are unconstrained [see Wooden, Warren, and Drago (2009), p. 171]. Thus, the authors conclude that work time policies (as currently practiced for example in France) that aim at a general limitation of work hours could impose further mismatches among workers who prefer long hours and therefore result in reduced job and life satisfaction [see Wooden, Warren, and Drago (2009), p. 172].

One earlier but detailed econometric panel analysis by Merz (2002), which uses 10 waves of the GSOEP (1985–1994), assumes that time and income are decisive determinants of individual welfare and time sovereignty a significant determinant of hours constraints, especially among different occupational groups. That is, such different groups as freelancers, the self-employed, or dependent employees not only show different patterns in preferred work hours but also in realization of their desired work time [see Merz (2002), p. 333]. This study investigates not only age, human capital, and wages but also the impact of time use on a household level. Drawing on Becker's (1965) household production model, time for housework, child rearing, and do-it-yourself activities are assumed to be exogenous; therefore household characteristic variables (household size, number of children, household net income) are incorporated into the analysis. The author finds significant gender differences with respect to these household characteristics: whereas child care hours, the number of children, and the remaining household net income are significant factors in explaining hours constraints in the female sample, these variables are insignificant for men [see Merz (2002), p. 339]. Interestingly, education and work experience seemingly

have no significant influence on hours constraints, a remarkable result in the context of the labor supply literature [see Merz (2002), p. 339].

Another panel study of hours constraints by Böheim and Taylor (2004) uses 9 waves (1991–1999) of the British Household Panel Survey (BHPS) and focuses on the impact of actual and desired work hours on individual job mobility and changing work hours behavior. Specifically, the authors suggest that underemployed workers (both men and women) are more likely to change jobs within or between employers than unconstrained and overemployed workers [see Böheim and Taylor (2004), p. 154]. The least likely to leave the labor market completely are the underemployed, although men employed part time are also more likely to drop out of the labor force than men employed full time regardless of whether they are constrained in work time or not [see Böheim and Taylor (2004), p. 157]. The authors state that overemployed women are more likely to stop working than the unconstrained. While upward adjustment among underemployed women is facilitated by changing jobs within the employer, the authors conclude that work hours adjustments among the under- and overemployed (both men and women) are facilitated by changing the employer [see Böheim and Taylor (2004), p. 161].

These results are confirmed by Euwals (2001) who analyzes female labor supply and the flexibility of work hours using three waves (1987 -1989) of the Dutch Socio-Economic Panel (DSEP). Women who desire fewer work hours are more likely to leave the labor market while an adjustment of work hours is less likely for women who stay in the same job and with the same employer. Movers adjust their work hours according to the preferred direction to a larger extent than people who stay in their job and with the same employer [see Euwals (2001), p. 132)]. The author also confirms that wage-considerations play a major role with respect to job mobility [see Euwals (2001), p. 132)].

### **3.3 Data and Methodology**

The International Social Survey Program (ISSP),<sup>11</sup> an international collaboration of (at present) over 40 countries, aims to add a cross-country and cross-cultural perspective by providing national data and projects in a multinational setting. Since 1985, the ISSP has been carried out annually with a recurrently changing focus on issues relevant to the member countries and the goal of expressibility in all languages.

This present analysis of work hours constraints drew on the ISSP datasets for 1989, 1997, and 2005, which all focus on work orientations. Besides numerous economic and socio-demographic variables, these datasets also include different variables of job characteristics and working conditions measured primarily on a Likert-type scale. The two more recent datasets enable the study of hours constraints and their trends over time for the following 21 heterogeneous countries: Bulgaria, Canada, Cyprus, the Czech Republic, Denmark, France, Germany, Great Britain, Hungary, Israel, Japan, New Zealand, Norway, the Philippines, Portugal, Russia, Slovenia, Spain, Sweden, Switzerland, and the United States.

It should be emphasized that in this survey, the item asking respondents about their preferred work hours, reproduced below in its exact format, explicitly refers to an adjustment in earnings. Moreover, only those respondents who are currently working for pay answer this question:

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<sup>11</sup> The ISSP datasets are kept in the GESIS Data Archive, which is responsible for archiving, data integration, and documentation, as well as for data distribution. Documentation of the respective modules is available from the GESIS Data Archive web page and from the GESIS Data Archive Online Study Catalogue (ZACAT).

Think of the number of hours you work and money you earn in your main job, including regular overtime. If you only had one of these three choices, which of the following would you prefer:

- Work longer hours and earn more money
- Work the same number of hours and earn the same money
- Work fewer hours and earn less money

As pointed out by Sousa-Poza and Henneberger (2002, p. 218), the ISSP question format is comparable to other surveys (e.g., the 1985 and 2001 CPS) but the questions' exact wording may be strongly related to contradictory research findings and the hypothetical questions they raise [see also Lang and Kahn (2001)]. Thus, different results from different data sources should be interpreted carefully.

This study of work hours constraints begins with a descriptive analysis of the extent of hours constraints and their trends over time. The two most recent ISSP data sets (1997 and 2005) enable a comparison of 21 countries, 6 of which are also included in the ISSP 1989 dataset. These latter are therefore incorporated into the subsequent analysis of whether country differences in hours constraints are related to macroeconomic variables like unemployment rates, GDP per capita, average weekly work hours, and income inequality. In order to test the sensitivity of these relationships, observations with high influence are detected using the DFBETA influence measure. DFBETAs measure the difference of a coefficient (in terms of the estimated standard error of this coefficient) if a specific observation is included or excluded. According to Belsey, Kuh, and Welsh (1980, p. 28) the influence of an observation is assessed as being high if the absolute value of DFBETA exceeds the size-adjusted cutoff of  $\sqrt{2/n}$ .



A microlevel multivariate analysis then estimates ordered probit models using the pooled data for 1997 and 2005<sup>12</sup> to assess the impact of sociodemographic variables and working conditions on hours constraints. This multivariate methodology is determined by a dependent variable (hours constraints) with three possible outcomes: 0 for respondents who want to work less and earn less, 1 for respondents who are satisfied with their number of work hours and their earnings, and 2 for respondents who want to work more and earn more. The variables describing working conditions and actual workload categories are coded as dummy variables. Moreover, dummy variables for each country, with Germany as the reference category, are incorporated into the model to account for cultural and institutional differences and other unobserved country effects. The model also includes a dummy variable indicating the year of the survey to capture time specific differences such as state of the economy in these particular years.

Besides the coefficients of the ordered probit estimation, run for both the full sample and females and males separately, the marginal effects are reported to explain changes in the predicted probability of falling into one of the three ordered categories of the dependent variable when the related independent variable changes by one unit [see Greene (2003), pp. 736 ff.]. Thus, the marginal effects give valuable information about the magnitude of the impact of the respective explanatory variables. For the dummy variables, the marginal effects are calculated for a discrete change from 0 to 1.

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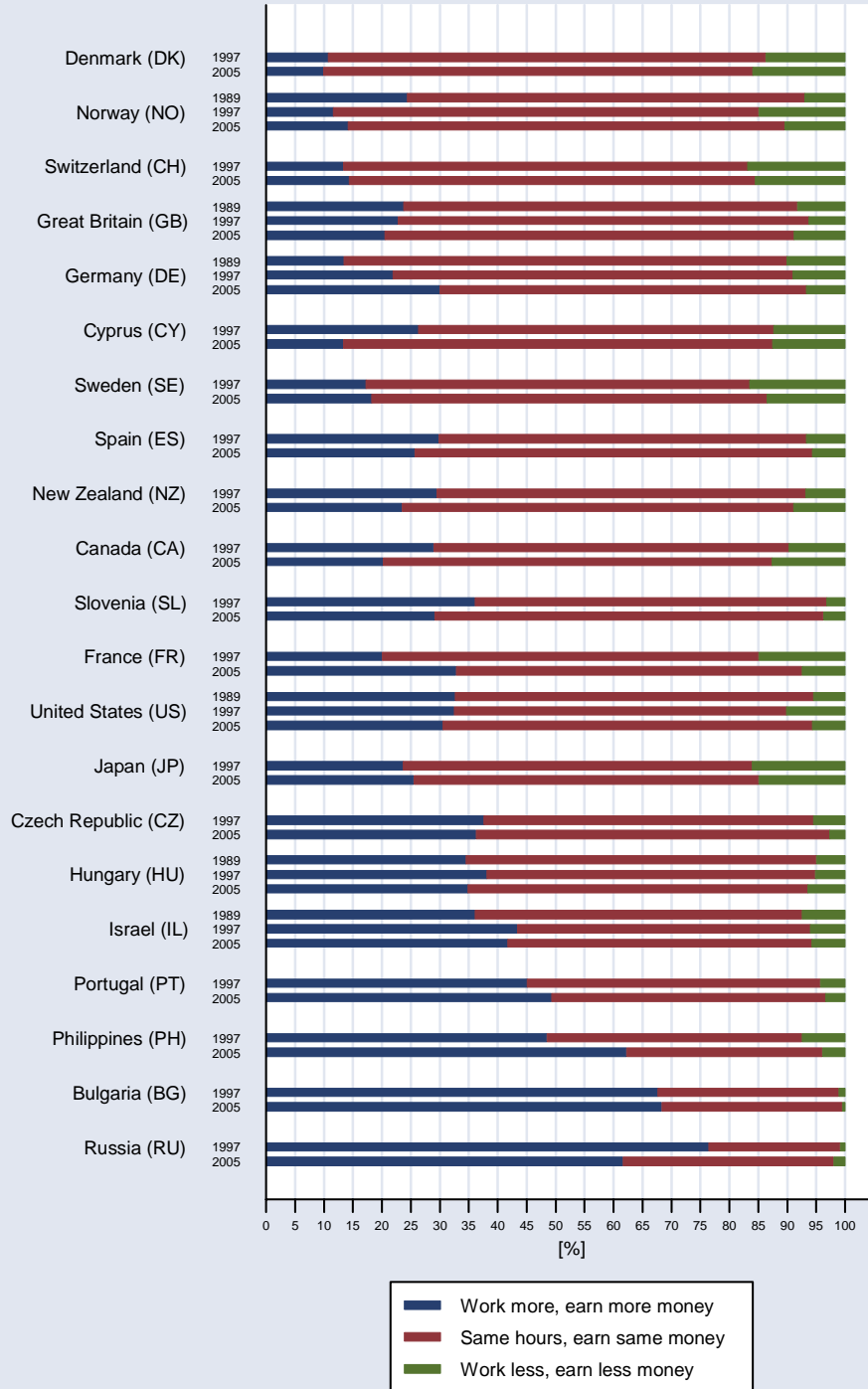
<sup>12</sup> The ISSP 1989 data are inappropriate for the pooled analysis because of decisive differences in the variables that describe working conditions.

### 3.4 Results

Graph 3.1, which summarizes the descriptive analysis, gives the percentage of constrained and unconstrained workers at the country level ordered according to the proportion of unconstrained workers. The upper third, which contains the highest percentages of unconstrained workers, includes all Scandinavian countries in the dataset (i.e., Denmark, Norway, and Sweden), as well as Switzerland, Great Britain, Germany, and Cyprus. The centre span includes Spain, New Zealand, Canada, Slovenia, France, the United States, and Japan, with 68% to 59% of workers being satisfied with their current work time/earnings situation. The countries with the largest share of constrained workers are Russia, Bulgaria, and the Philippines, with less than 45% of the workforce satisfied and up to 75% wanting additional hours and additional earnings. These countries are followed by Portugal, Israel, Hungary, and the Czech Republic, also in the category of most constrained workers.

In almost all countries (except Denmark, Switzerland, and Norway in 1997), the fraction of workers who prefer longer hours and earn more money exceeds the fraction that wants to work less and earn less. Moreover, in countries where large shares of workers want to work and earn more only small fractions of the workforce state the desire to work less and earn less (e.g. in Russia, Bulgaria, the Philippines, Portugal and Israel with more than 40% being underemployed). On the other hand, in countries where the fraction of workers who desire shorter work hours and less money is high (e.g., Denmark, Switzerland, and Norway in 1997) the fraction that wants to work more and earn more is relatively small compared to other countries. However, no clear pattern of changes is observable over time and over all countries.

Graph 3.1: Hours Constraints in 21 Countries



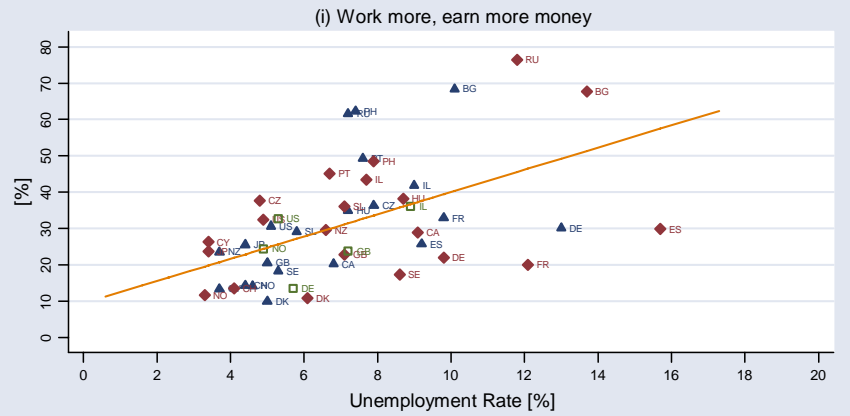
Note: The countries are ordered according to the share of unconstrained workers

Nonetheless, whereas some countries (e.g., Germany, France, Portugal, and the Philippines) show a steady increase in the fraction of workers wanting longer work hours and higher earnings over the observed time period; in Spain, Canada, New Zealand, and the U.S., this group decreased steadily. Moreover, the fractions of workers preferring longer hours change to a greater extent than the fractions of those wanting to work less and earn less.

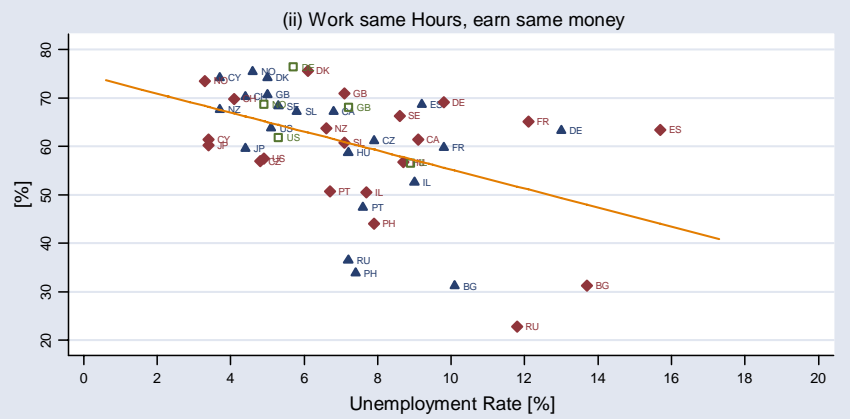
These findings raise the question of why there are considerable and significant country differences in hours constraints. One possible interrelation is suggested by the correlation between hours constraints and unemployment rates, which is illustrated in graph 3.2. In this graph, observations with a high influence are identified and observations with an absolute value of  $DFBETA > 2/\sqrt{n}$  are not represented in the regression line. The  $R^2$  values show that in the three cases (underemployment, no constraints, overemployment) depicted in the subgraphs, (i) 0.205, (ii) 0.140, and (iii) 0.334 of the variation of hours constraints among these countries can be explained by unemployment rates.

The relationship revealed in graph 3.2 is clear: on average, in countries with high unemployment rates, the fraction of workers who prefer to work longer hours and earn more money is higher than in countries with lower unemployment rates (see subgraph (i)). On the other hand, the country-specific percentages of satisfied workers and those who prefer shorter work hours and less money decline with rising unemployment rates (see subgraph (ii) and (iii)). One possible explanation for this relationship could be that, as Bell and Freeman (2001) propose, labor supply decisions are forward looking: people work longer hours to avoid being laid off during recessions. In the face of high unemployment rates especially, workers prefer additional work hours to layoffs and when future layoffs are anticipated, they seek additional earnings for income smoothing [see Bluestone and Rose (1998)].

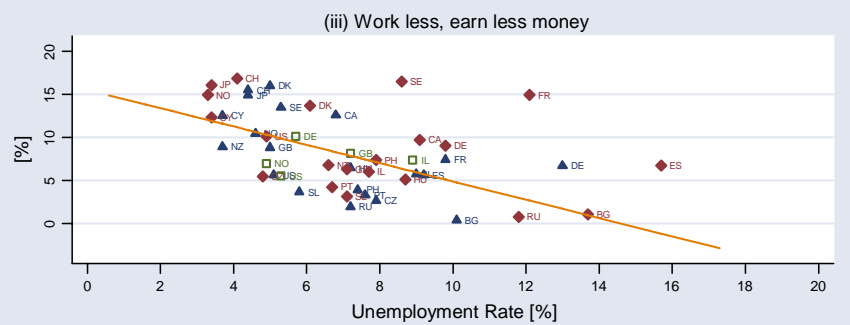
Graph 3.2: Hours Constraints and Unemployment



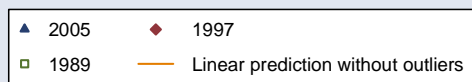
Note: The following observations are treated as outliers and are therefore not represented in the regression line: BG (2005), DE (2005), BG (1997), ES (1997), FR (1997), RU (1997)



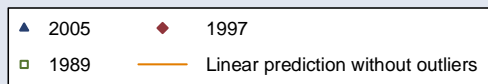
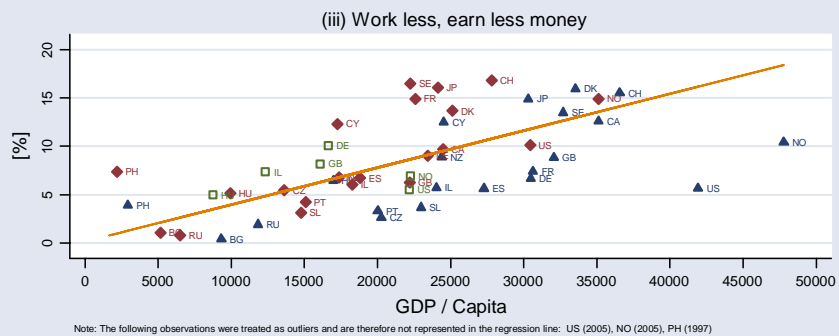
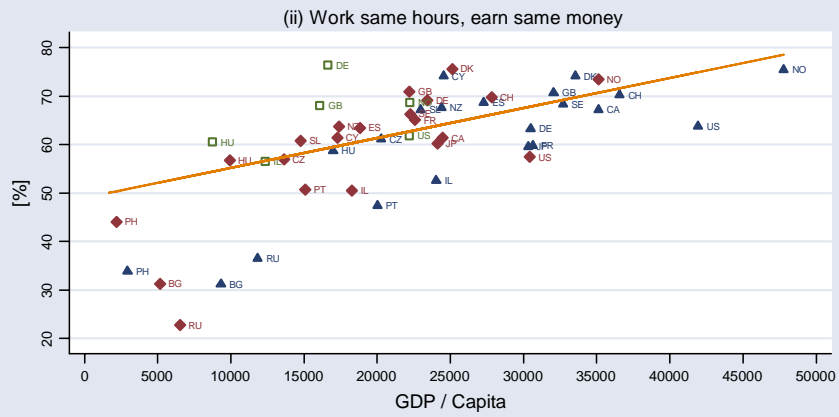
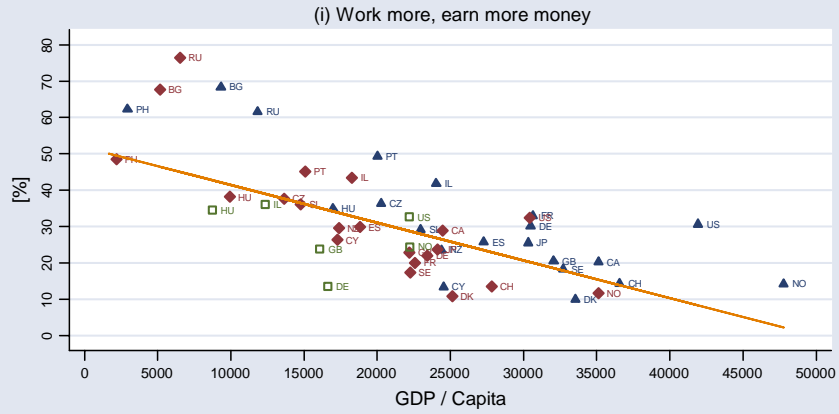
Note: The following observations are treated as outliers and are therefore not represented in the regression line: BG (2005), DE (2005), BG (1997), ES (1997), FR (1997), RU (1997)



Note: The following observations are treated as outliers and are therefore not represented in the regression line: FR (1997), ES (1997)



Graph 3.3: Hours Constraints and GDP per Capita

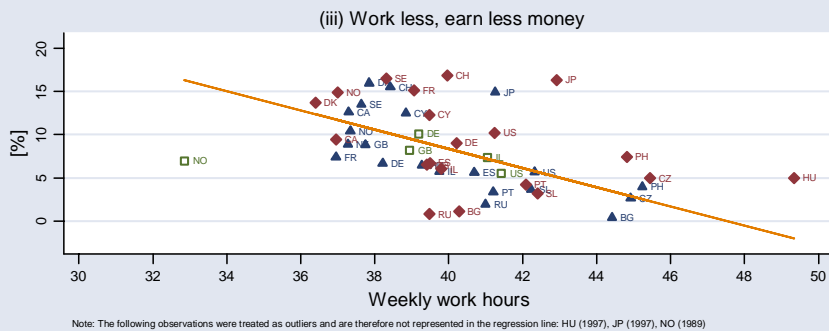
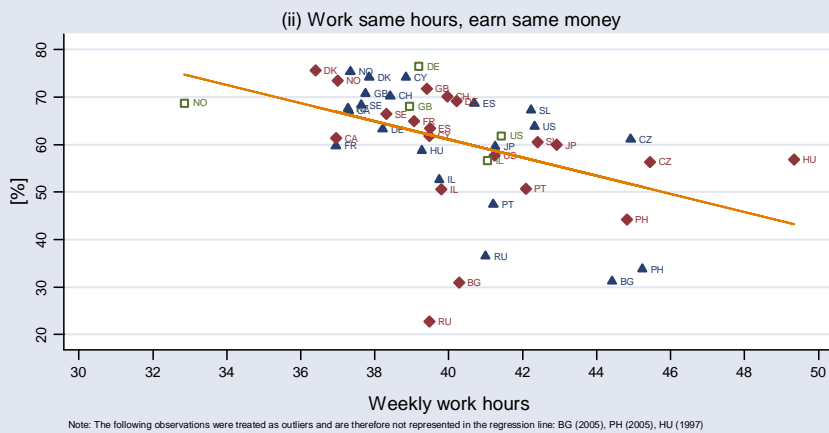
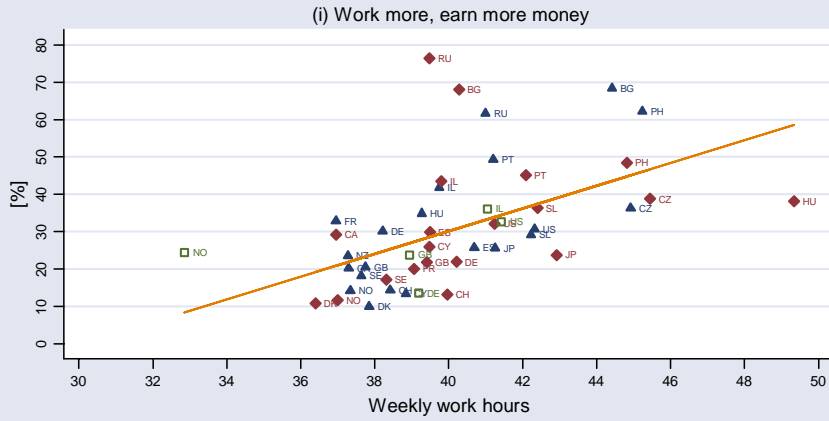


Indeed, as Anger (2006) points out, when high unemployment rates impose a risk of future layoffs, even the willingness to work unpaid overtime is greater, and if workers expect to be underemployed or unemployed in the future, they are less likely to state a preference for fewer hours [see Golden and Gebreselassi (2007), p. 19].

Graph 3.3 depicts the interrelationship between GDP per capita (based on purchasing power parities) as a measure of welfare and hours constraints. Again, using the absolute values of DFBETA, observations with a high influence are not represented in the regression line. In countries with a higher GDP per capita, the percentages of workers who prefer longer work hours are substantially lower than in countries with low GDP per capita ( $R^2 = 0.469$ ). On the other hand, the portion of workers who are satisfied and wish to work less increases with rising GDP per capita (with a  $R^2$  of (ii) 0.314 and (iii) 0.471, respectively). Thus, high portions of workers who prefer long work hours are, on average, predominantly located in less wealthy countries (in terms of GDP per capita), whereas considerably higher percentages of unconstrained workers and those who wish to work less and earn less are found in richer countries (e.g., Norway, Denmark, Switzerland).

As pointed out in section 3.2 and as the analysis of the previous graphs shows, income considerations play a key role in determining the willingness to work more or less. Besides inequality of wages, differences in average weekly work hours across countries is another component that determines earnings inequality. Average weekly work hours vary from about 33 hours in Norway (1989) to nearly 50 hours in Hungary (1997). How does the average length of the work week affect the desire to work more or less? Interestingly, as graph 3.4 illustrates, the fraction of workers who want to work more (less) and earn more (less) money increases (decreases) with increasing work hours whereas the

Graph 3.4: Hours Constraints and Average Weekly Work Hours



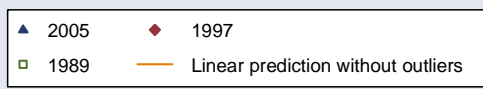
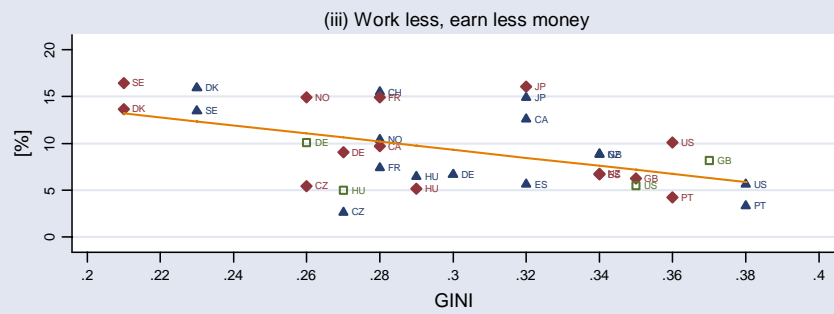
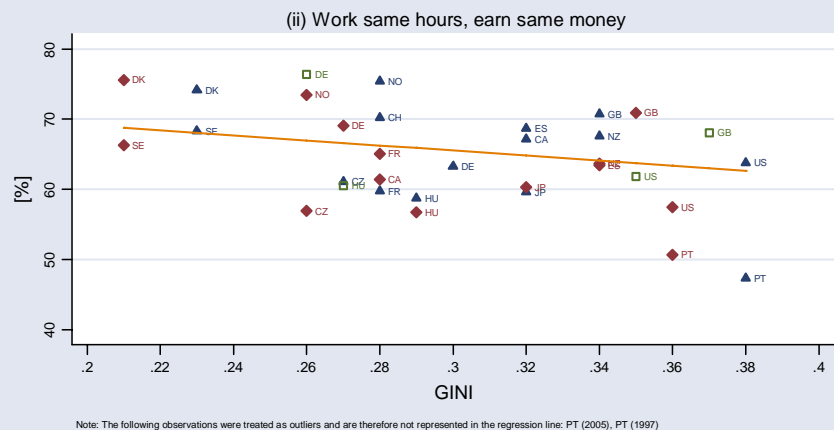
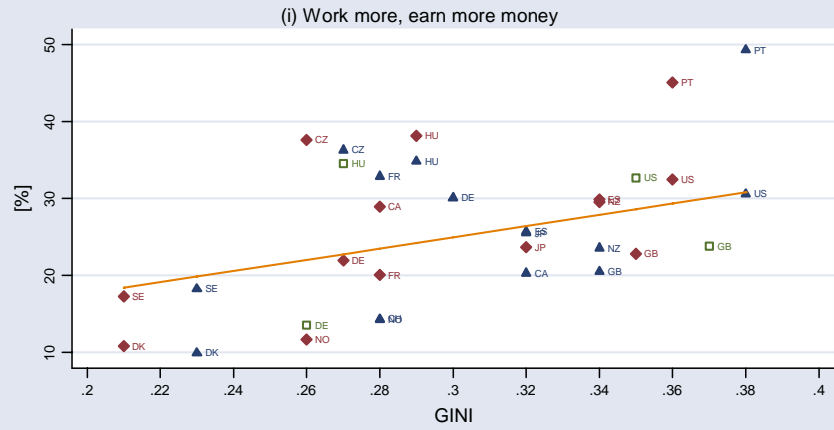


portion of satisfied workers decreases. This relationship is statistically significant at the 99% level with  $R^2$ - values of 0.20 (i), 0.16 (ii) and 0.33 (iii) for the three subgraphs, respectively. Again, observations with high influence are not represented in the regression line.

Since labor income is determined by hourly wages multiplied by the number of work hours, again, workers' income considerations could account for the positive slope of subgraph (i) and the negative slopes of subgraphs (ii) and (iii), respectively. As Sousa-Poza and Henneberger (2002) show, less wealthy countries (in terms GDP per capita) tend to have relatively long work weeks and relatively low unit labor costs (in terms of wages) compared to countries with high GDP per capita. The authors detect a negative correlation between average weekly work hours and GDP per capita, which also proves statistically significant using the pooled ISSP data set.

A further possible explanation for country differences, the relationship between different hours constraints and country-specific income distributions in terms of Gini coefficients, is illustrated in graph 3.5. However, because of data unavailability, this figure does not include Bulgaria, Cyprus, Israel, the Philippines, Russia, and Slovenia. Again, using the same outlier diagnostics as in the previous illustrations, observations with a high influence (the DFBETA statistic) are not represented in the regression line. The correlations in subgraphs (i) and (iii), however, are significant at the 95% and 99% level and explain 16% and 24% of the inter-country variation in terms of  $R^2$ , respectively.

Graph 3.5: Hours Constraints and Income Inequality



On the other hand, the different income inequalities seemingly have no statistically significant impact on the portion of unconstrained workers (p-value of the slope coefficient = 0.12). Subgraph (i), particularly, illustrates a clear relationship: the Scandinavian countries have relatively equal income distributions and low percentages of workers who desire additional hours and earnings, whereas countries like the U.S., Great Britain, and New Zealand exhibit high income inequalities and a large portion of workers who aspire to work additional hours. As pointed out in section 3.2, greater earnings inequalities provoke employee willingness to work additional hours, since they expect better advancement opportunities and an increase in wages.

Table 3.1 presents the results of the ordered probit estimation in the multivariate analysis. Here, the majority of coefficients is highly significant, and reveals a number of determinants that affect hours constraints. First, in terms of the sociodemographic variables in the full sample, women are less likely to desire additional hours and earnings than men. Whereas marital status has no significance in the male sample, in the female sample, married women are rather more underemployed than unmarried women, which contrasts to the study by Sousa-Poza and Henneberger (2002, p. 229). This could possibly be explained by changing gender roles related to paid and unpaid work or perhaps changing economic conditions in certain countries in the sample.

Age, on the other hand, seems to have a linear effect on hours constraints: increasing age reduces the predicted probability of wanting additional hours and earnings, and older respondents tend to show more satisfaction with their work/pay combination or reduced hours. Likewise, respondents with high degrees tend to fall into the unconstrained worker category or want to work less and earn less (full sample and both subsamples). In the full sample, the coefficients of all work hours categories are significant, and in both this sample and the female and male subsamples, their signs change from positive to negative if respondents work

Table 3.1: Hours Constraints and Working Conditions  
(Pooled Sample 1997 and 2005)

	Full sample			Females			Males			ME (y=0)	ME (y=1)	ME (y=2)
	Coef.	ME (y=0)	ME (y=1)	ME (y=2)	Coef.	ME (y=0)	ME (y=1)	ME (y=2)	Coef.			
Year 2005	0.059 ***	-0.008	-0.012	0.020	0.086 ***	-0.012	-0.016	0.028	0.034	-0.004	-0.008	0.012
Female	-0.193 ***	0.025	0.040	-0.065	--	--	--	--	--	--	--	--
Age	-0.018 ***	0.002	0.004	-0.006	-0.017 ***	0.002	0.003	-0.006	-0.022 ***	0.003	0.005	-0.008
Age <sup>2</sup>	0.000 **	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000 *	0.000	0.000	0.000
Married	0.112 ***	-0.014	-0.024	0.038	0.247 ***	-0.033	-0.047	0.080	-0.025	0.003	0.006	-0.009
High degree	-0.111 ***	0.015	0.022	-0.037	-0.132 ***	0.019	0.023	-0.042	-0.093 ***	0.012	0.021	-0.032
11-20 work hours	0.255 ***	-0.028	-0.064	0.092	0.328 ***	-0.036	-0.078	0.114	0.055	-0.006	-0.013	0.020
21-30 work hours	0.196 ***	-0.022	-0.047	0.069	0.225 ***	-0.027	-0.049	0.076	0.116	-0.013	-0.029	0.042
31-40 work hours	0.096 **	-0.012	-0.021	0.033	0.102 *	-0.013	-0.020	0.033	0.092	-0.010	-0.023	0.033
41-50 work hours	-0.124 ***	0.016	0.025	-0.042	-0.162 ***	0.023	0.029	-0.052	-0.087 **	0.011	0.020	-0.030
51-60 work hours	-0.148 ***	0.020	0.028	-0.049	-0.183 ***	0.028	0.028	-0.056	-0.130 ***	0.016	0.029	-0.045
> 60 work hours	-0.100 **	0.014	0.019	-0.033	-0.063	0.009	0.011	-0.020	-0.120 **	0.016	0.025	-0.041
<b>Working conditions</b>												
Job is secure	-0.038 *	0.005	0.008	-0.013	-0.032	0.004	0.006	-0.010	-0.043 *	0.005	0.010	-0.015
Income is high	-0.217 ***	0.031	0.040	-0.071	-0.221 ***	0.034	0.034	-0.068	-0.216 ***	0.028	0.046	-0.074
Good job opportunities	0.100 ***	-0.013	-0.022	0.034	0.074 ***	-0.010	-0.014	0.024	0.114 ***	-0.013	-0.027	0.041
Job is interesting	0.064 ***	-0.009	-0.013	0.022	0.026	-0.004	-0.005	0.008	0.101 ***	-0.013	-0.022	0.035
Can work independently	0.034	-0.004	-0.007	0.011	0.085 ***	-0.012	-0.015	0.027	-0.018	0.002	0.004	-0.006
Can help other people	-0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.001	-0.001	0.000	0.000	0.000
Job is usefull to society	0.027	-0.003	-0.005	0.009	0.064 *	-0.009	-0.011	0.020	-0.008	0.001	0.002	-0.003
Work is exhausting	-0.064 ***	0.008	0.013	-0.022	-0.107 ***	0.015	0.019	-0.034	-0.030	0.004	0.007	-0.011
Job is physically demanding	0.134 ***	-0.017	-0.030	0.046	0.128 ***	-0.017	-0.025	0.042	0.140 ***	-0.016	-0.034	0.050

(Table continued)

Table 3.1 – continued

Job is stressfull	-0.103 ***	0.014	0.021	-0.035	-0.127 ***	0.018	0.022	-0.040	-0.083 ***	0.010	0.019	-0.029
Job is dangerous	0.040	-0.005	-0.009	0.014	0.054	-0.007	-0.010	0.018	0.031	-0.004	-0.007	0.011
Unflexible working schedules	0.065 ***	-0.009	-0.014	0.022	0.081 ***	-0.011	-0.015	0.026	0.053 *	-0.006	-0.012	0.019
Good relations with management	0.068 ***	-0.009	-0.014	0.023	0.061 *	-0.009	-0.011	0.019	0.071 **	-0.009	-0.016	0.025
Good relations with colleagues	-0.053 **	0.007	0.011	-0.018	-0.077 **	0.010	0.015	-0.025	-0.032	0.004	0.007	-0.011
Worries about loosing the job	0.171 ***	-0.021	-0.038	0.059	0.203 ***	-0.026	-0.041	0.067	0.137 ***	-0.016	-0.033	0.049
GB	-0.041	0.006	0.008	-0.014	-0.123	0.018	0.019	-0.038	0.059	-0.007	-0.014	0.021
US	0.175 ***	-0.020	-0.041	0.062	0.165 **	-0.021	-0.035	0.055	0.202 ***	-0.021	-0.053	0.074
HU	0.303 ***	-0.032	-0.078	0.110	0.329 ***	-0.036	-0.079	0.115	0.287 ***	-0.028	-0.078	0.107
NO	-0.333 ***	0.053	0.050	-0.103	-0.294 ***	0.048	0.038	-0.086	-0.356 ***	0.054	0.060	-0.114
SE	-0.237 ***	0.036	0.039	-0.075	-0.095	0.014	0.016	-0.030	-0.352 ***	0.054	0.058	-0.112
CZ	0.345 ***	-0.035	-0.090	0.125	0.306 ***	-0.034	-0.072	0.106	0.407 ***	-0.037	-0.117	0.153
SI	0.293 ***	-0.031	-0.075	0.106	0.434 ***	-0.044	-0.111	0.155	0.207 **	-0.022	-0.054	0.076
BG	1.121 ***	-0.067	-0.357	0.424	1.229 ***	-0.074	-0.385	0.460	1.037 ***	-0.059	-0.336	0.396
RU	1.146 ***	-0.070	-0.362	0.433	1.238 ***	-0.078	-0.384	0.462	1.064 ***	-0.063	-0.342	0.405
NZ	0.049	-0.006	-0.011	0.017	0.081	-0.011	-0.016	0.027	0.024	-0.003	-0.006	0.009
CA	0.010	-0.001	-0.002	0.003	-0.011	0.002	0.002	-0.004	0.046	-0.005	-0.011	0.016
PH	0.612 ***	-0.052	-0.179	0.231	0.564 ***	-0.052	-0.153	0.206	0.632 ***	-0.049	-0.193	0.242
IL	0.393 ***	-0.039	-0.105	0.144	0.364 ***	-0.039	-0.089	0.128	0.421 ***	-0.038	-0.121	0.159
JP	-0.057	0.008	0.011	-0.019	-0.101	0.015	0.016	-0.031	-0.015	0.002	0.003	-0.005
ES	0.031	-0.004	-0.007	0.011	0.054	-0.007	-0.010	0.017	0.003	0.000	-0.001	0.001
FR	0.070	-0.009	-0.015	0.024	0.062	-0.008	-0.012	0.020	0.093	-0.010	-0.023	0.033
CY	-0.129 **	0.018	0.024	-0.042	-0.080	0.012	0.013	-0.025	-0.171 **	0.023	0.034	-0.057
PT	0.551 ***	-0.050	-0.156	0.205	0.637 ***	-0.059	-0.174	0.232	0.480 ***	-0.042	-0.140	0.182
DK	-0.367 ***	0.060	0.051	-0.111	-0.350 ***	0.060	0.040	-0.100	-0.371 ***	0.057	0.061	-0.118
CH	-0.423 ***	0.071	0.055	-0.126	-0.347 ***	0.059	0.040	-0.099	-0.498 ***	0.082	0.071	-0.153
No. of observations	30,829				14,648				16,181			
<i>(Table continued)</i>												

Table 3.1 – continued

Log likelihood	-24478	-11500	-12872
Prob > chi <sup>2</sup>	0.000	0.000	0.000
Pseudo-R <sup>2</sup>	0.100	0.106	0.100

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Note: \* p < 0.05; \*\* p < 0.01; \*\*\* p < 0.001

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more than 40 hours. For both men and women, the probability of wanting additional hours significantly decreases if their actual work time is above 40 hours per week, whereas part-time workers are more likely to increase their work hours.

Various coefficients describing working conditions are also significant. If respondents perceive their income as high, the predicted probability that they fall into the category of workers who want additional hours and earnings is 7.1% lower (6.8% for females and 7.4% for males) than that for the reference category. Good job opportunities also increase the probability of wanting additional hours and earnings among both men and women. Interestingly, job security is only significant at the 95% level for the full sample and for men: it is insignificant for women. However, respondents who are worried about losing their jobs are 5.9% more likely (6.7% for women and 4.9% for men) to want an increase in hours and earnings.

An analysis of working conditions reveals additional gender differences; specifically, the dummy variables for whether working independently is possible, whether the job is socially useful, whether relations with colleagues are good, and whether work is exhausting are only significant for women, not for men. In contrast, if men have an interesting job, they tend to want additional hours, but this variable is insignificant for women.

If workers perceive the job as stressful, it reduces the probability of either men or women preferring longer work hours. Physically demanding jobs, however, increase the willingness for additional hours. Likewise, respondents with inflexible work schedules are more likely to want additional hours than respondents with flexible work schedules. However, flexible work time and schedules can result in long hours and induce people to work at times usually reserved for recreation, leisure, and family life [see Lee, McCann, and Messenger (2007), p. 152].

The country dummy variables reflect the country-specific differences that are explained by neither the sociodemographic variables nor the working conditions incorporated in the model, all interpreted with respect to the reference category, Germany. The results indicate that workers in the U.S. are 4.1% less likely to be satisfied and 6.2% more (2% less) likely to want longer (shorter) work hours than German workers.

As pointed out by Sousa-Poza and Henneberger (2002, p. 233), explaining country differences is difficult because such analysis would require further variables that describe the institutional settings, traditions, and cultural background. Yet, even though the U.S. and Japan, for example, have very different cultures, cultural aspects could lead workers in these countries, who already have long work weeks, to desire additional hours. For example, according to Reynolds (2004), overwork and resulting health problems are serious issues in Japan, but U.S. workers consider “hard work [to be] the key to economic success” [Reynolds (2004), p. 98].

Workers in all Scandinavian countries are more likely to be satisfied with their work hours than workers in Germany. One intuitive explanation could be that these countries have implemented effective strategies to reduce mismatched hours and improve the compatibility between work and family life. However, workers in Scandinavian countries face wide-ranging redistribution policies and a high burden of taxation which reduce the incentive to work longer hours. Consequently, it is not astonishing that at the same time, workers in these countries are more likely than those in Germany to reduce hours and give up income, even though they face fewer work hours than German workers. Scandinavian countries also have the lowest percentages of workers with very long work weeks (more than 50 hours) compared to other European countries [see Lyonette and Clark (2009)]. On the other hand, intended redistribution policies pursued by German trade unions’ strategy for reducing work hours have widely



failed to decrease unemployment and poverty. In addition, wage inequality in Germany has increased over the past three decades. In a detailed analysis of micro-data Dustmann, Ludsteck, and Schönberg (2007) show that the fanning out of the German wage structure in the 1980s (primarily increasing wage inequality at the top of the distribution) and in the 1990s (increasing wage inequality at the bottom of the distribution) appears to be very comparable to the experiences in the U.S. and the UK. Thus, increasing wage inequality in Germany and the unions' effort to reduce work hours can explain the rise in the share of German workers who want to work more and earn more.

### **3.5 Conclusions and Policy Implications**

A first and important insight from this study is that hours constraints are not only omnipresent (in most countries, more than a third of the workforce face constraints), in a number of countries, they have increased over the past decades. Why is this the case, and what policy measures can address and remedy this phenomenon? As this paper shows, country differences are clearly interrelated with key macrolevel economic variables like unemployment rates, GDP per capita, average weekly work hours, and income inequality. That is, in countries where people face high unemployment rates, high percentages of workers desire additional work hours and earnings. Moreover, relatively fewer wealthy countries (in terms of GDP per capita) are characterized by large shares of workers who desire to work more and earn more.

Likewise, as the multivariate analysis illustrates, sociodemographic variables and working conditions are important determinants of hours constraints. Self-perceived income, job advancement opportunities, and worries about losing a job especially are central to explaining the existence of microlevel mismatches

between actual and desired work hours. Nonetheless, on both a macro- and a microlevel, prosperity in terms of GDP per capita and income are important driving forces of the desire to work longer hours and earn more money. Imminent unemployment in the face of high unemployment rates in a certain country and worry about losing a job on an individual level have a strong impact on the desire for additional work hours and earnings. Thus, the desire to work more or less seems strongly related to income considerations and the expected employment situation.

Country differences with respect to the ratio between underemployment and overemployment, and differences in terms of whether both mismatches occur simultaneously or with different magnitude also affect policy implications. As the analyzes shows, especially in poor countries (in terms of GDP per capita and high unemployment rates), the desire for additional hours and earnings, most probably motivated by poverty and income considerations, widely dominates the small fraction of workers that want to work less and earn less. Thus, policy measures that combat poverty can also effectively combat underemployment, because the two go hand in hand.

In the debate on work hours, the most discussed issues are unemployment and the resulting poverty. Therefore, in terms of policy that considers work hours constraints, the study findings imply a reallocation of the existing labor demand to take into account individual preferences for shorter or longer work weeks. Given the prerequisite that underemployment and overemployment occur to about the same extent, these redistribution potentials are immense but the conclusions drawn and their implications also depend on the data sources used. Moreover, work hours mismatches are caused by both sides of the labour market. Missing or inappropriate qualifications for part-time jobs, for example, could prevent employers from offering more substantive part-time jobs.

The study of hours constraints reveals important information about job mobility, as well as present and future labor market behavior. Such study not only improves explanation of labor supply decisions but shows “how people adapt their labor supply when these constraints were relaxed” [Wolf (1998), p. 23] or aggravate. Hence, individual preferences for work hours and their impact on labor market participation decisions can provide valuable insights for successful policy implementation if policy makers take into account the length of the work week, the need for more substantive part-time jobs, and/or a better balance between work and family life. Yet, as already pointed out, actual and preferred work time and its division on a household level have not received adequate attention in the widespread discussion of work time and labor market policies [see Bosch and Wagner (2002)].

Successful strategies for reducing work hours mismatches depend on the underlying reasons between both labour supply and demand and therefore also require employees’ effort to reduce such mismatches. However, considering workers’ preferences is an important step to reduce job mobility (by means of changing the employer) and therewith turnover costs for employers and unemployment costs. In addition, because hours constraints are related to quality of life and job satisfaction, work time policies meant to improve these two aspects should address individual preferences and be designed to reduce mismatches in work hours. Employer efforts to reduce such mismatches, particularly, could improve employee motivation and productivity.

## 4 Work Hours Constraints and Health<sup>13</sup>

### 4.1 Introduction

Numerous studies show that many workers face hours constraints in that their *desired* work time does not correspond to their *actual* work time [e.g., Euwals and van Soest (1999), Jacobs and Gerson (1998), Kahn and Lang (1995), Otterbach (2010), Sousa-Poza and Henneberger (2002), Stewart and Swaffield (1997)]. Such constraints are widespread in mature economies, with more than one third of workers in the United States, Japan, France, Germany, Portugal, and Spain reporting them. There is also evidence that in some countries, such as Germany, France, and Portugal, such constraints have become more prevalent in recent decades [Otterbach (2010), p. 149]. Several reasons have been offered for the existence of hours constraints, including long-term contracting [Kahn and Lang (1992)], asymmetric information about workers' productivity [Landers, Rebitzer, and Taylor (1996), Sousa-Poza and Ziegler (2003)], income inequality [Bell and Freeman (1995)], mismatches [Altonji and Paxson (1988), Kahn and Lang (1996)], wage rigidity [Kahn and Lang (1996)], job insecurity [Stewart and Swaffield (1997)], and labor market regulations [Rottenberg (1995)]. However, despite the vast interest in the causes of hours constraints, surprisingly little research examines their consequences.

The purpose of this study is to analyze the effect that hours constraints may have on workers' health. The state of workers' health has been receiving

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<sup>13</sup> This chapter is partially based on Bell, Otterbach, and Sousa-Poza (2012). The data used in this chapter were made available by the German Socio-Economic Panel (GSOEP) Study at the German Institute of Economic Research (DIW), Berlin, and the Institute for Social and Economic Research (ISER) at the University of Essex which is responsible for the British Household Panel Survey.

increased attention among public officials and also in the business community. As pointed out in a recent *Economist* article (July 8<sup>th</sup>, 2010), annual check-ups and company wellness programs have become a familiar part of the corporate landscape. More than half of larger U.S. companies offer advice on health issues and over a third have gyms. Although such attention to workers' physical and psychological well-being may stem from an employer belief that healthier workers are more productive and have lower levels of absenteeism, showing concern for worker well-being may also enhance a firm's reputation, reducing turnover and improving the quality of job applicants.

One important link between a firm's work environment and workers' health is the length of the work week, as well as minimum safety and health requirements for the organization of work time. In Europe, this latter is defined by the Working Time Directive of the European Union (see Directive 2000/34/EC of the European Parliament and of the Council of 22 June 2000), which considers a work week that exceeds 48 hours in 7 days to be detrimental to health. Not surprisingly, a large body of literature (primarily in the medical field) examines the relationship between work time and health and does indeed show that the length of the work week can have an adverse effect on a worker's physical as well as mental health [see, for example, Sparks et al. (1997), Spurgeon, Harrington, and Cooper (1997), van der Hulst (2003)]. A related concept is that of "time poverty" [Vickery (1977)], i.e., a situation in which individuals do not have enough discretionary time to engage in leisure, educational, and other activities that improve their well-being [Kalenkoski, Hamrick, and Andrews (2011)]. Such poverty is often associated with long working hours and it can affect health outcomes.

Another important, yet largely neglected, issue is the potential effect on health outcomes of individual choices and preferences for the length of the work week. That is, if individuals recognize the effects that long hours may have on

their health, then such considerations will enter into their calculations of the opportunity cost of leisure and their evaluation of a desirable work week: the opportunity cost of hours worked in excess of desired hours will exceed the wage. Such imbalance may result in adverse consequences, such as poorer health outcomes. It is also possible to construct an opportunity cost schedule in which workers may suffer adverse effects on their well-being if actual hours worked are *less* than desired hours. Only few studies exist that focus on the well-being outcomes of such hours constraints [for example, Wooden, Warren, and Drago (2009), Friedland and Price (2003), and Grözinger, Matiaske, and Tobsch (2008)].

In this paper, we contribute to this literature by analyzing the effect that hours constraints have on different measures of workers' health in Germany and the UK. Our choice of countries is motivated not only by the availability of two interesting and comparable longitudinal surveys; namely, the British Household Panel Survey (BHPS) and the German Socio-Economic Panel Survey (GSOEP). Moreover, these two countries differ substantially with regards to working hours: as of 2008, workers in the UK averaged a total of 1,638 working hours per year as opposed to 1,344 in Germany [see OECD (2010)]. The UK labour market is considered as one with the longest working hours in Europe [see Warren (2003), p. 734] and decisive institutional differences with respect to the regulation of working time compared to Germany. In Germany, collective bargaining by trade unions and works councils has a strong impact on working time agreements. On the other hand, trade unions in Britain are comparatively weak and the regulation of working time is limited [see Bell et al. (2000), p. 1 and Fagan (2001), p. 246]. In 2011, the UK was one of 16 EU member states using an "opt out" of the 48-hour maximum work week stipulated by the EU's Working Time Directive. Specifically, workers "opt out" of the 48 hour maximum by providing a written voluntary statement of their wish to do so, which can be cancelled at any time. Workers that choose not to opt out, however, are protected from unfair treatment.

Such arrangements are not available in Germany. Thus, our analysis additionally provides valuable insights on how different levels of working time regulation affect the extent of hours constraints and their impact on health.

The paper proceeds as follows: section 4.2 outlines the literature documenting the relationship between working time and health, section 4.3 describes the data and methods, section 4.4 presents the results, and section 4.5 concludes the paper.

## **4.2 Relevant Research**

### **4.2.1 Working Time and Health**

The large body of literature on the relationship between work hours and health indicates that adverse health effects are extensive and range from such medical disorders as general exhaustion, fatigue, stress, unhappiness, and depression to diabetes, impairment of the immune system, hypertension, and severe cardiovascular risk and disease [see Caruso (2006)]. Additional studies also imply that the length of the work week influences health-related factors like smoking behavior and alcohol consumption [Eriksen (2005); Radi, Ostry, and LaMontagne (2007); Steptoe et al. (1998)], unhealthy eating habits and weight gain [Shields (1999)], and lack of exercise [Artazcoz et al. (2009)].

For example, Sparks et al. (1997), in a meta-analysis of 21 studies, detect a small but significant negative relationship between long work hours and both physical and mental health outcomes. Combining these findings with those from a qualitative analysis of 12 other studies, these authors conclude that their meta-

analytic results “offer support for a link between long work hours and ill-health” [p. 406]. In another review of the research, Spurgeon, Harrington, and Cooper (1997), besides pointing to long working hours as a serious source of occupational stress (p. 370 f.), also conclude that “there is currently sufficient evidence to raise concerns about the risks to health and safety of long working hours” [p. 367]. This observation is echoed by van der Hulst (2003), who, after reviewing 27 empirical studies with a focus on the association between long work hours and health behavior and physiological recovery, concludes “that there is evidence of a link between long work hours and ill health” [p. 183].

In Japan, where in 2004 28% of the non-agricultural workforce worked 49 hours per week and longer and 12% of employees had a work week of 60 hours and more [see Iwasaki, Takahashi, and Nakata (2006)], the unexpected death of young workers because of overwork and resulting cardiac insufficiency has become a serious social problem [see Nakanishi et al. (2001)]. In one case-control study, Liu and Tanaka (2002) show that working above 60 hours per week, as compared to fewer than 40 hours per week, increases the risk of acute myocardial infarction by a factor of 2. Likewise, insufficient sleep (less than 5 hours per day) and frequent lack of sleep (less than 5 hours per day two or more days per week) double or triple the risk of acute cardiac failure [see Liu and Tanaka (2002), p. 447]. The danger of overwork was brought to light a decade earlier by Uheta's (1991) study of 203 Japanese workers diagnosed with cardiovascular attacks (so-called Karoshi victims), two thirds of whom had faced excessive workloads before the heart attack (including 60 hour work weeks and an accumulation of over 50 hours of overtime in a month). European evidence for such a positive and significant relationship between job strain and cardiovascular morbidity and mortality is also provided by 18 out of the 34 studies analyzed by Belkic et al. (2004).



In more recent work, Virtanen et al. (2010) analyze the interrelation between overtime and the occurrence of such coronary conditions as incident fatal coronary heart disease, nonfatal myocardial infarction, or definite angina pectoris. Using data from the Whitehall II study, an occupational cohort sample of British civil servants, these authors analyze a sample of 6,014 full-time civil servants aged between 39 and 61 who were followed over an 11-year period. They find that workers who engage in 3 to 4 hours of overtime per day have a 1.60-fold risk of coronary heart disease compared to employees that do no overtime. Even when several additional cardiovascular risk factors are also controlled for – including smoking, alcohol consumption, body mass index, nutrition, sleeping hours, psychological distress, diabetes, and blood pressure – this negative impact of overtime remains quite stable with a hazard ratio of 1.56 [see Virtanen et al. (2010), p. 1742]. Interestingly, the authors also suggest that the effect of long work hours on cardiovascular disease may be mitigated by high decision (versus low decision) latitude at work [Virtanen et al. (2010), p. 1743].

Even though all the above studies suggest a link between long work hours and adverse health outcomes, however, most have methodological shortcomings that make it difficult to draw definite conclusions. Specifically, as van der Hulst (2003) points out, “there is a serious shortage of well-controlled studies that confirm and strengthen the evidence” [p. 183]; most particularly, because such research fails to address confounding variables that could potentially moderate the effects of long working hours on health. The author therefore suggests that investigation should also include demographic variables, work and home characteristics, and personality factors as covariates. Such studies are also criticized on the grounds that most use cross-sectional data and small and often non-representative samples (e.g., males in certain occupational groups [see Wooden, Warren, and Drago (2009), p. 151]).

#### 4.2.2 The Effects of Hours Constraints

The focus in this chapter is not on the length of the work week *per se*, but, instead on the (health) effects of the difference between actual working hours and desired working hours. We are not aware of much research on this topic.

Wooden, Warren, and Drago (2009), using the first five waves of the Household, Income, and Labour Dynamics in Australia (HILDA) panel data, relate hours constraints to measures of subjective well-being like job satisfaction and life satisfaction. More specifically, they show that both over- and underemployment have a negative effect on job and life satisfaction but these are unaffected by the *number* of work hours if this is consistent with worker preferences. Thus, rather than the absolute number of work hours *per se*, work hours *mismatch* may be the decisive factor in determining whether long hours reflect undesirable work overload and whether short hours indicate a lighter workload [Wooden, Warren, and Drago (2009), p. 172]. This finding is consistent with workers, whose health and well-being may be differentially affected by working time, selecting into different lengths of workweek to avoid adverse health and well-being consequences. Based on their findings, the authors strongly recommend further research to shed light on the question of whether work hours mismatch is also related to adverse health effects.

Friedland and Price (2003), drawing on the first two waves (1986 and 1989) of the Americans' Changing Lives Study, examine the relationship between health and four different types of underemployment – based on work hours, income, skills, and status – as well as overemployment. In contrast to Wooden, Warren, and Drago (2009), they find only moderate evidence for the hypothesis that underemployment (versus adequate employment) defined by work hours mismatch is associated with lower levels of physical health and psychological

well-being. Moreover, although they find no significant impact of overemployment on life satisfaction and self-image, they do show that overemployed workers report lower levels of job satisfaction and more chronic disease [see Friedland and Price (2003), p. 39 f.).

Similar outcome variables, including job satisfaction, life satisfaction, and health satisfaction are examined by Grözinger, Matiaske, and Tobsch (2008) using a 2004 cross-section of GSOEP data. The authors show that the difference between actual and desired work time (in absolute terms, i.e., over- and underemployment) does have a significantly negative effect on all these outcome variables. They also find that, in line with Wooden, Warren, and Drago's (2009) observation of larger effects for job than for life satisfaction, the magnitude of the effect is highest with respect to job satisfaction and lowest with respect to health satisfaction [see Grözinger, Matiaske, and Tobsch (2008), p. 95]. Based on their findings overall, they conclude that work hours mismatch in terms of over- and underemployment significantly decreases workers' quality of life.

### 4.3 Data and Methodology

In our extension of the previous literature, we analyse the impact of work hours mismatch on health in Germany and the United Kingdom. We employ two large panel data sets, the German Socio-Economic Panel (GSOEP) and the British Household Panel Survey (BHPS),<sup>14</sup> which are nationally representative data sources and contain extensive information at the household and individual level. The GSOEP, a longitudinal panel survey of private households in Germany administered annually since 1984, currently encompasses around 12,000 households with approximately 21,000 persons. For our analysis, we use the 17 waves subsequent to German reunification from 1992 to 2008. The BHPS, repeated annually since 1991, includes about 10,000 households across the UK. This present analysis draws on all available 17 waves of the BHPS, encompassing the 1991 to 2007 period, excluding self-employed respondents but including all employees aged 16 to 65. We use an unbalanced panel in which individuals were observed for an average period of 5.46 (GSOEP) and 5.73 (BHPS) years, respectively.

In addition to sociodemographic variables and information on work time and employment, both data sources contain measures of worker preferences with regard to working time. It is important to note, however, that although the items asking respondents about their preferred working hours explicitly refer in both surveys to an adjustment of earnings, they differ in terms of the exact question format and wording. Whereas GSOEP respondents are asked to state the number of preferred working hours, respondents in the BHPS are asked to indicate

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<sup>14</sup> For more information on the GSOEP and the BHPS, see Wagner, Frick, and Schupp (2007) and Lynn (2006), respectively.

whether they would like more, the same, or fewer hours than their current hours. More specifically, respondents are asked the following questions:<sup>15</sup>

*GSOEP*: If you could choose your own number of working hours, taking into account that your income would change according to the number of hours:

How many hours would you want to work? \_\_\_\_, \_\_\_ hours per week

*BHPS*: Thinking about the number of hours you work, assuming that you would be paid the same amount per hour, would you prefer to:

- Work fewer hours than you do now
- Work more hours than you do now
- Or carry on working the same number of hours?

To provide a meaningful comparison of Germany and the UK, we first calculate the difference between actual weekly work hours (including overtime) and desired work hours for GSOEP respondents. We then assign workers to three different categories of hours constraints: (i) *overemployed workers*, whose actual work time exceeds desired work time by 4 hours; (ii) *unconstrained workers*, for whom the difference between actual and desired work hours is in the range of -4 hours to +4 hours; and (iii) *underemployed workers*, whose desired work time exceeds the actual work time by 4 hours.<sup>16</sup> The attribution of BHPS respondents

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<sup>15</sup> Lang and Kahn (2001) compare a number of surveys in Europe and the U.S. and show that the phrasing of the questions relating to hours constraints is important and that different wordings can give rise to very different results. The use of two very different measures of hours constraints in the BHPS and GSOEP data sets thus offers a type of robustness check of our results.

<sup>16</sup> Using an approach similar to that employed by Bell and Freeman (2001) in their comparison of GSOEP data with the U.S. Current Population Survey (CPS), we allow for a 4 hours tolerance with respect to the discrepancy between actual and desired work hours in order to account for substantial mismatches.

to these categories, in contrast, is based directly on the answers on preferred work hours given in the questionnaire. In a third step, we categorise workers by their work hours (including paid overtime) and then assign them to the three hours constraint states described above. That is, we build an interaction variable between actual work hours categories, the occurrence, and the direction of hours constraints [c.f. Wooden, Warren, and Drago (2009)] in order to distinguish the *desired* hours preferences of workers who *actually* work short or long hours. This method allows us to test whether health outcomes are different for someone who works 25 hours a week and wishes to work fewer hours and someone who works 55 hours a week and wishes to work fewer hours.

Both data sets provide self-reported variables describing respondents' overall health. Our multivariate analysis thus includes information about self-assessed health and health satisfaction. The self-reported health variables in our analysis may be influenced by unobserved and time-invariant personal characteristics such as personality and motivation. The panel structure of the data enables us to hold these influences constant and control for unobserved heterogeneity. Initially, we treat all health outcomes as cardinal variables and estimate fixed-effects models of the following form:

$$HO_{it} = \alpha X_{it} + \beta Y_{it} + \mu_i + \varepsilon_{it} \quad \text{with } i = 1, \dots, N \text{ and } t = 1, \dots, T \quad (15)$$

where  $HO_{it}$  denotes individual  $i$ 's level of health outcome reported at time  $t$ . As described above,  $X_{it}$  is the categorical interaction variable between actual working time category and workers' hours preferences (overemployed, unconstrained, or underemployed).  $Y_{it}$  contains a set of time-variant control variables such as age, age<sup>2</sup>, job tenure, marital status, number of children, net wage, household income, and a variable that indicates whether workers' overtime is unpaid. We also control

for the disability grade (GSOEP) or disability status (i.e., whether or not a person is disabled) (BHPS), respectively. Finally, we include year dummies and a set of dummy variables based on two-digit occupational codes that allow us to control for job-specific characteristics that might also influence health outcomes. The unobservable individual specific effects are captured by  $\mu_i$ , and  $\varepsilon_{it}$  denotes the disturbance term.

As our dependent variable is ordinal, we also estimate a fixed-effects ordered logit model. A general formulation of this model is:

$$y_{it}^* = x_{it}'\beta + \alpha_i + \varepsilon_{it} \quad \text{with } i = 1, \dots, N \text{ and } t = 1, \dots, T \quad (16)$$

where  $y_{it}^*$  is a latent variable for individual  $i$  at time  $t$ ,  $x_{it}$  an index of observed characteristics and  $\alpha_i$  the unobservable characteristics. The latent variable is related to the observed ordered variable  $y_{it}$  as follows:

$$y_{it} = k \quad \text{if } \tau_k < y_{it}^* \leq \tau_{k+1} \quad \text{with } k = 1, \dots, K \quad (17)$$

A number of estimators have been developed for such models [Chamberlain (1980), Das and van Soest (1999), Ferrer-i-Carbonell and Frijters (2004)]. In essence, these models simplify the estimation problem by collapsing the categorical responses into two classes and then implementing a fixed-effects binary logit. The models differ in the way the cut-off point for this dichotomization is determined. However, in a recent study, Baetschmann, Staub, and Winkelmann (2011) show with Monte Carlo simulations that those estimators

based on an endogenous dichotomization, i.e. where the cut-off point is determined as a function of the outcome of the dependent variable, are inconsistent. Baetschmann, Staub, and Winkelmann (2011) propose a new estimator, the “Blow-Up and Cluster” (BUC) estimator, that estimates all possible dichotomizations jointly using different cut-off points. The name of the estimator also describes the way it is implemented: every observation in the sample is replaced by  $K-1$  copies of itself, i.e. the sample is “blow-up”, and every  $K-1$  copy of the individual is dichotomized at a different cut-off point. A conditional maximum likelihood logit is then estimated on the entire “blown-up” sample. Since some individuals contribute to several terms in the log-likelihood, standard errors are clustered at the individual level. Baetschmann, Staub, and Winkelmann (2011) show that this estimator is not only easy to implement<sup>17</sup>, it clearly outperforms existing estimators – especially if the ordered dependent variable displays very low frequencies in certain categories (as is the case in most subjective well-being variables).

An issue that has not received much attention in the predominantly medical literature on working time and health is reverse causality. It is conceivable that working hours constraints are determined by health status [see Geyer and Myck (2010)]. Thus, deterioration in health could reduce desired working time which in turn could give rise to overemployment. This would imply that employers and employees cannot agree on a new contract to accommodate changed health status. Issues of the costs to employers of re-contracting, employee beliefs about the permanence of the new health state, employee discount rates, etc., will influence the likelihood of a new contract being formed.

Ex ante, workers choose between contracts on the basis of their perceptions of job characteristics. One job attribute which the employer must

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<sup>17</sup> We use the STATA code provided by Baetschmann, Staub, and Winkelmann (2011).



stipulate in the job contract is normal working hours. Employee's current and prospective state of health may influence their choice between different lengths of the work week.

Workers will be less well informed about work intensity. If the intensity of work is underestimated, workers may argue that they are overemployed, irrespective of the level of their contracted hours of work. Similarly, if it is overestimated, their response to a question on desired working time is likely to be that they are underemployed. Workers who perceive that their employment requires effort beyond their initial expectations may suffer adverse health consequences.

On the other hand, workers who receive a health "shock" may argue that their working hours are constrained if the costs of re-contracting outweigh the benefits. Whether due to health concerns, or to some other cause, these costs would include those of finding a new job with hours that the worker would categorise as "unconstrained".

The argument for reverse causality is that workers' state of health affects their response to a question about whether their preference is for more, or for fewer working hours. This implies that workers' health is exogenous. Factors exogenous to the workplace may certainly play an important role in determining perceived health states. For example, the origins of smoking behaviour may, for many workers, lie outside the workplace.

If workers know their state of health with certainty, perhaps because of chronic illness, they will take this into account when selecting between contracts offering different levels of normal working hours. There is no reason to believe that healthy workers and unhealthy workers differ in their levels of asymmetric information about the nature of the contract. Under these conditions, health status will not drive responses to questions on hours constraints. However, an

unexpected change in health status may cause workers to believe that their current working hours are sub-optimal. We do not rule out such reverse causality effects, and therefore we cannot be certain that the stronger effect is from hours constraints to health status rather than vice-versa.

Interestingly, our results for the effects of hours constraints on self-assessed health in the BHPS are similar to those for health satisfaction in the BHPS and for both health variables in the GSOEP. The difference is that the BHPS self-assessed health question asks respondents to consider their state of health over the last twelve months, while the other questions implicitly ask about current health status. If a twelve month assessment dilutes the role of health surprises in the analysis, then the similarity of response across all four relationships suggests that such health surprises do not have a prominent role in determining hours constraints.

A further methodological issue is related to the use of subjective variables on both the right and left-hand side of the equation: hours constraints are partially subjective (desired working time) and we use self-reported health as an explanatory variable. The finding that hours constraints is related to subjective health may be driven by unobserved ‘third factors’ such as personality traits [for example, neuroticism, hardiness, extrovertism, or negative affectivity; see Brief et al. (1988); Watson, Clark, and Carey (1988)]. The fixed-effects in our model are particularly important in order to capture these unobserved characteristics.

## 4.4 Results

Our initial descriptive analysis illustrates the distributions of the dependent variables and the hours constraints variables pooled over all waves (see tables 4.1 and 4.2). Table 4.1 shows the distributions for the health variables in both the BHPS and the GSOEP. A comparison of the health satisfaction variable in the two data sets is difficult as the variables are coded differently. The self-assessed health variable is, however, coded on a 5-point scale in both the BHPS and the GSOEP, thus making a comparison possible. An interesting observation is that Germans assess their health substantially worse than the British – respondents in the BHPS were two times more likely to report a “very good” health than individuals in the GSOEP (11% vs. 27%). As there is little evidence that objective health (e.g. life expectancy) differs between these two countries, this difference is most probably being driven by cultural differences in reporting behaviour.

As shown in table 4.2, 41.5% and 31.8% of the German and British work force, are overemployed, respectively. In both countries, overemployment is more pronounced among men than women with 44.9% and 34.2% of German and British men being overemployed compared to 37.6% and 29.6% of German and British women, respectively. Moreover, the fraction of overemployed workers within each workload category rises monotonically as work hours increase. Interestingly, in Germany substantially more individuals (13.55%) work very long (50+) hours than in the UK (3.92%).

An overview of the outcome variables with respect to the question format, as well as the coding, is given in appendix table A, and the summary statistics are provided in appendix table B. It is important to note that tenure, which we include as a control variable is measured in years with the same employer and years in the same job, in Germany and the UK, respectively. This may explain the large tenure

**Table 4.1: Relative Frequency Distributions of Dependent Variables**

**GSOEP**

Scale	Health satisfaction			Scale	Self-assessed health				
	Full sample	Men	Women		Full sample	Men	Women		
Completely dissatisfied	0	0.43	0.38	0.48	Bad	1	1.16	1.08	1.26
	1	0.46	0.46	0.46	Poor	2	8.77	7.97	9.71
	2	1.56	1.51	1.63	Satisfactory	3	30.03	29.44	30.72
	3	3.63	3.47	3.82	Good	4	48.76	49.75	47.61
	4	4.7	4.55	4.87	Very Good	5	11.27	11.77	10.69
	5	11.43	10.68	12.31					
	6	9.95	10.17	9.69					
	7	18.65	18.93	18.33					
	8	27.17	27.52	26.77					
	9	13.57	13.67	13.45					
Completely satisfied	10	8.44	8.66	8.18					
Total		100	100	100		100	100	100	
Number of observations		127,017	68,332	58,685		127,071	68,351	58,720	

**BHPS**

Scale	Health satisfaction			Scale	Self-assessed health				
	Full sample	Men	Women		Full sample	Men	Women		
Not satisfied at all	1	1.5	1.27	1.72	Bad	1	0.69	0.59	0.77
	2	3.08	2.77	3.36	Poor	2	4.4	3.66	5.09
	3	8.58	8.14	8.98	Satisfactory	3	17.96	17.34	18.53
	4	13.18	12.14	14.13	Good	4	49.47	48.79	50.1
	5	24.99	25.96	24.11	Very Good	5	27.48	29.63	25.51
	6	32.69	33.97	31.53					
Completely satisfied	7	15.98	15.75	16.18					
Total		100	100	100		100	100	100	
Number of observations		68,425	32,654	35,771		99,589	47,653	51,936	

Note: Number of observations is based on the regression samples  
Data are pooled over all waves included in the regression analysis

**Table 4.2: Relative Frequency Distributions of Workload Categories and Hours Constraints by Gender**

<b>GSOEP</b>	<b>Full sample</b>	<b>Men</b>	<b>Women</b>
< 20h: underemployed	3.85	1.27	6.86
<20h: unconstrained	4.24	1.03	7.99
<20h: overemployed	0.40	0.09	0.76
20-35 h: underemployed	3.39	1.18	5.96
20-35 h: unconstrained	7.02	1.10	13.91
20-35 h: overemployed	2.63	0.33	5.31
35-40 h: underemployed	2.42	3.27	1.42
35-40 h: unconstrained	27.22	32.42	21.16
35-40 h: overemployed	10.73	8.61	13.2
41-49 h: underemployed	0.92	1.42	0.33
41-49 h: unconstrained	7.38	10.03	4.3
41-49 h: overemployed	16.25	18.89	13.18
50+ h: underemployed	0.27	0.45	0.07
50+ h: unconstrained	1.76	2.92	0.41
50+ h: overemployed	11.52	17.00	5.13
Total	100	100	100
N	127,071	68,351	58,720
<b>BHPS</b>	<b>Full sample</b>	<b>Men</b>	<b>Women</b>
< 20h: underemployed	3.02	1.41	4.49
<20h: unconstrained	9.99	2.87	16.53
<20h: overemployed	1.16	0.32	1.93
20-35 h: underemployed	1.73	0.93	2.47
20-35 h: unconstrained	10.79	3.08	17.86
20-35 h: overemployed	3.37	0.77	5.75
35-40 h: underemployed	2.88	4.6	1.3
35-40 h: unconstrained	34.4	43.62	25.94
35-40 h: overemployed	21.67	24.09	19.45
41-49 h: underemployed	0.28	0.5	0.08
41-49 h: unconstrained	3.53	5.88	1.37
41-49 h: overemployed	3.27	5.13	1.57
50+ h: underemployed	0.11	0.22	0.00
50+ h: unconstrained	1.48	2.68	0.38
50+ h: overemployed	2.33	3.92	0.87
Total	100	100	100
N	99,589	47,653	51,936

Note: Number of observations is based on the regression samples.  
Data are pooled over all waves included in the regression analysis.

differences between the two countries. In this analysis, some variables are recoded in order to consistently interpret negative coefficients as negative impacts on health (see appendix table A).

#### **4.4.1 The Effects on Self-perceived Health**

In the subsequent multivariate analysis, we run all regressions for both the full sample and for men and women separately.<sup>18</sup> Table 4.3 reports the GSOEP regression results for the two subjective health measures, health satisfaction and self-assessed health. The analysis of the GSOEP data excludes waves 1993 and 1996 because some variables are not available for these waves. Satisfaction with one's own health is measured on an 11-point scale, ranging from 0 (completely dissatisfied) to 10 (completely satisfied), while self-assessed health is measured on a 5-point scale, which (after recoding) ranges from 1 (bad) to 5 (very good).

One notable insight from this fixed-effects model is that overemployed employees in both the full sample and the female sample are significantly and generally (i.e., regardless of their actual workload) less satisfied with their own health than unconstrained full time workers whose actual work hours are between 35 and 40 hours (reference category). Only for overemployed men is this effect not significant when actual work hours are between 20 and 35 hours per week. The magnitude of these negative health effects can be exemplified as follows: overemployed workers in the full sample with a workload of 35 to 40 hours per week are on average 0.098 of a point less satisfied with their own health than unconstrained workers in the same workload category. The magnitude of this

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<sup>18</sup> We also estimate random-effects models (not reported here) that correspond to the fixed-effects models and carry out a Hausman test. In all regression estimations, the results favor the fixed-effects models.

**Table 4.3: GSOEP - Fixed-effects and Fixed-effects Ordered Logit Models**

	Health satisfaction						Self-assessed health					
	Fixed-effects			Fixed-effects ordered logit			Fixed-effects			Fixed-effects ordered logit		
	Full sample	Men	Women	Full sample	Men	Women	Full sample	Men	Women	Full sample	Men	Women
< 20h: underemployed	-0.044	-0.107	-0.038	-0.049	-0.153	-0.048	-0.038***	-0.052*	-0.044**	-0.132**	-0.213*	-0.159**
<20h: unconstrained	-0.033	0.079	-0.057	-0.039	0.134	-0.079	-0.024	0.007	-0.038**	-0.092	0.029	-0.148**
<20h: overemployed	-0.303***	-0.427*	-0.300***	-0.412***	-0.637	-0.408***	-0.111***	-0.082	-0.125***	-0.409***	-0.080	-0.488***
20-34 h: underemployed	0.009	-0.080	0.017	0.021	-0.109	0.027	-0.007	-0.056**	-0.002	-0.026	-0.198*	-0.014
20-34 h: unconstrained	-0.032	0.037	-0.048	-0.037	0.136	-0.071	-0.022*	-0.060**	-0.024*	-0.073	-0.184	-0.086
20-34 h: overemployed	-0.154***	-0.122	-0.170***	-0.216***	-0.163	-0.244***	-0.080***	-0.056	-0.088***	-0.285***	-0.237	-0.314***
35-40 h: underemployed	-0.008	-0.011	-0.009	-0.009	-0.022	0.002	0.014	0.010	0.021	0.034	0.014	0.076
35-40 h: overemployed	-0.098***	-0.088***	-0.107***	-0.137***	-0.132***	-0.142***	-0.048***	-0.049***	-0.049***	-0.171***	-0.180***	-0.170***
41-49 h: underemployed	-0.033	-0.088	0.240*	-0.036	-0.125	0.326*	-0.029	-0.058**	0.128**	-0.112	-0.224**	0.385**
41-49 h: unconstrained	-0.002	-0.007	0.019	-0.014	-0.023	0.017	-0.007	-0.008	0.003	-0.033	-0.039	0.007
41-49 h: overemployed	-0.096***	-0.089***	-0.105***	-0.141***	-0.131***	-0.150***	-0.046***	-0.036***	-0.061***	-0.172***	-0.132***	-0.217***
50+ h: underemployed	-0.007	-0.063	0.397	-0.034	-0.111	0.541	-0.083**	-0.081**	-0.030	-0.278*	-0.266	-0.101
50+ h: unconstrained	0.004	-0.002	0.118	-0.010	-0.026	0.169	-0.019	-0.013	-0.006	-0.060	-0.031	-0.053
50+ h: overemployed	-0.092***	-0.068***	-0.152***	-0.138***	-0.103**	-0.213***	-0.052***	-0.037***	-0.082***	-0.178***	-0.122***	-0.274***
Constant	9.240***	9.489***	9.074***				4.829***	5.132***	3.369***			
Number of observations	127,017	68,332	58,685	415,592	220,774	194,818	127,071	68,351	58,720	165,482	87,798	77,684
log L				-152,452	-80,248	-72,050				-59,559	-31,162	-28,297
F	49.601	33.331	18.316				60.959	40.785	22.866			
R <sup>2</sup>	0.067	0.078	0.056				0.092	0.106	0.081			

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The dependent variables are health satisfaction and self-assessed health, respectively.

Model also includes socioeconomic control variables for age, tenure, marital status, number of children, net wages, household income, the grade of disability, unpaid overtime, wave dummies, and dummies for 2-digit occupational codes.

effect is thus comparable to an increase in disability grade of 7 percentage points. A very similar pattern with respect to the sign and significance of the coefficients is observed in the fixed-effects ordered logit model. Only for overemployed men working less than 20 hours per week we do not observe a significant effect in the fixed-effects ordered logit model opposed to the fixed-effects estimates.

Likewise, self-assessed health is in general significantly and negatively affected by overemployment for the full sample and the female sample, but in the male sample it appears only if actual work hours exceed 35 hours per week. Females are more likely to have other binding time constraints related to family care, which perhaps explains why their adverse effects occur across all ranges of actual hours worked, whereas for men the effects are only significant when actual working hours are longer. This gender difference has also been highlighted in a number of studies relating to time poverty [see, for example, Merz and Rathjen (2009)]. Women (especially in households with children) are much more likely to face time stress and have less discretionary time for leisure activities [Harvey and Mukhopadhyay (2007)]. Underemployed men who work <20, 20–34, 41–49, and 50+ hours per week also exhibit a lower general health state than the reference category. For underemployed women, however, this is only the case when the work hours are fewer than 20 per week. Thus, with respect to self-assessed health, underemployment seems to be a more severe problem among German men than among German women. This finding may relate to the association between work time and self-image. In particular, gender identity [see Akerlof and Kranton (2000)] and traditional gender roles may influence male preferences for full-time employment. The psychological consequences of underemployment may therefore be more adverse for males than females if these preferences are not being met and if men are involuntary employed part-time. Again, in the fixed-effects ordered logit model we observe nearly the same pattern with respect to the sign and



significance of the coefficients (except for the unconstrained who work 20-34 hours and underemployed men working 50 hours and more).

In the BHPS, satisfaction with health is surveyed on a 7-point scale, ranging from not satisfied at all (1) to completely satisfied (7). It should also be noted that BHPS data on this variable are available only from 1996 to 2000 and from 2002 to 2007. Self-assessed health is collected on a 5-point scale, ranging from bad (1) to very good (5), and available in all waves except 1999. The results of the fixed-effects models (see table 4.4) indicate that, compared to the reference category, overemployment in the 35–40 hours workload category has a significant and negative effect on both health satisfaction and self-assessed health. In this workload category, these negative effects of overemployment are consistent for both the full sample and the male and female subsamples. For the remaining workload categories, health satisfaction is only affected by overemployment when workers in the full sample and the female sample work 20 hours per week or more. Women’s self-assessed health is significantly negatively affected by overemployment if they work 20 hours per week or more. We also find significantly negative effects of overemployment on self-assessed health for the full sample in the 20–34 hours and 50+ hours per week workload categories. The main results of the fixed-effects models are confirmed by the fixed-effects ordered logit models. That is, with respect to both health measures we find significant negative effects of overemployment in the workload categories 35 to 40 hours per week (full sample, male and female sample) and in the categories 20 to 35 hours (full sample, female sample). However, if work hours exceed 40 hours per week, the negative effects of overemployment are only supported in the workload category of 50 hours and more.

**Table 4.4: BHPS - Fixed-effects and Fixed-effects Ordered Logit Models**

	Health satisfaction						Self-assessed health					
	Fixed-effects			Fixed-effects ordered logit			Fixed-effects			Fixed-effects ordered logit		
	Full sample	Men	Women	Full sample	Men	Women	Full sample	Men	Women	Full sample	Men	Women
< 20h: underemployed	-0.020	-0.033	-0.039	-0.071	-0.132	-0.154*	-0.005	-0.057*	-0.002	0.008	-0.230	0.056
<20h: unconstrained	0.012	0.003	-0.018	0.078	0.100	-0.042	-0.005	-0.014	-0.016	0.036	-0.008	0.025
<20h: overemployed	-0.013	-0.012	-0.049	0.088	0.034	-0.036	-0.027	0.026	-0.052*	-0.004	0.200	-0.066
20-34 h: underemployed	0.018	-0.068	0.023	-0.038	-0.111	-0.035	0.030	-0.010	0.033	0.059	-0.062	0.087
20-34 h: unconstrained	-0.023	-0.014	-0.054**	-0.040	-0.061	-0.092	-0.006	0.005	-0.021	-0.040	-0.042	-0.059
20-34 h: overemployed	-0.102***	-0.091	-0.139***	-0.161*	-0.030	-0.263***	-0.081***	-0.053	-0.101***	-0.225***	-0.130	-0.266***
35-40 h: underemployed	0.014	0.053	-0.088	-0.047	0.058	-0.342**	0.007	0.005	0.012	-0.006	-0.026	0.015
35-40 h: overemployed	-0.103***	-0.068***	-0.147***	-0.180***	-0.112**	-0.157***	-0.042***	-0.022**	-0.067***	-0.146***	-0.098**	-0.195***
41-49 h: underemployed	0.025	0.008	0.294	0.095	0.104	0.245	-0.009	-0.028	0.136	0.100	0.003	0.731
41-49 h: unconstrained	-0.012	0.025	-0.104*	0.044	0.158*	-0.237	0.012	0.017	0.013	0.088	0.111	0.068
41-49 h: overemployed	-0.057*	-0.025	-0.102*	-0.106	-0.054	-0.158	-0.024	-0.005	-0.054*	-0.094	-0.061	-0.115
50+ h: underemployed	0.177	0.132	1.348*	0.229	0.154	---	0.170**	0.178**	0.010	0.526	0.491	---
50+ h: unconstrained	-0.053	-0.055	0.051	-0.137	-0.173	0.083	0.022	0.039*	-0.044	0.009	0.052	-0.131
50+ h: overemployed	-0.082**	-0.051	-0.137*	-0.187*	-0.077	-0.301	-0.034*	-0.017	-0.067*	-0.121	-0.028	-0.320*
Constant	7.964*	18.712***	-12.894				5.646***	5.915***	5.462***			
Number of observations	68,425	32,654	35,771	187,879	86,305	101,570	99,589	47,653	51,936	105,670	48,967	56,701
log L				-35,603	-16,030	-27,509				-37,909	-17,382	-20,447
F	11.115	7.195	5.939				27.779	15.806	13.558			
R <sup>2</sup>	0.022	0.030	0.022				0.037	0.044	0.035			

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The dependent variables are health satisfaction and self-assessed health, respectively.

Model also includes socioeconomic control variables for age, tenure, marital status, number of children, net wages, household income, being disabled, unpaid overtime, wave dummies, and dummies for 2-digit occupational codes.

--- Categories are omitted due to a small number of observations in these cells.

#### 4.4.2 The Effects on Mental Health<sup>19</sup>

The BHPS contains two further variables that describe respondents' mental health state with regard to unhappiness and depression, as well as stress. Specifically, respondents are asked whether they have recently felt under constant strain and whether they have felt unhappy or depressed. Both variables are coded on a 4-point scale and, after recoding, range from much more (1) to not at all (4). The results of the fixed-effects regression models, reported in table 4.5, show that mental health is also negatively influenced by overemployment. For the depression variable, we find significantly negative effects for all workload categories in the full sample, a finding that also holds for the female subsample except when actual work hours are between 41 and 49 hours per week. Additionally, in the male sample, overemployed workers whose workload is in the categories above 35 hours per week are more frequently affected by unhappiness and depression compared to the reference category of unconstrained full-time workers with weekly work hours between 35 and 40 hours. These main results, i.e. the detrimental effects of overemployment on unhappiness and depression, are confirmed by the fixed-effects ordered logit models.

For the stress variable, the fixed-effects regression results reveal a very clear picture: consistently, throughout both the full sample and the subsamples, we find significantly negative effects of overemployment on stress. That is, overemployed workers are more frequently under constant strain than unconstrained workers with actual weekly work hours between 35 and 40 hours. Again, these negative effects of overemployment on stress are confirmed by the fixed-effects ordered logit models.

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<sup>19</sup> The results of this section were published in Constant and Otterbach (2011).

**Table 4.5: BHPS - Fixed-effects and Fixed-effects Ordered Logit Models**

	Stress						Depression					
	Fixed-effects			Fixed-effects ordered logit			Fixed-effects			Fixed-effects ordered logit		
	Full sample	Men	Women	Full sample	Men	Women	Full sample	Men	Women	Full sample	Men	Women
< 20h: underemployed	0.006	0.033	-0.012	-0.086	-0.093	-0.105	-0.053***	-0.020	-0.070***	-0.174***	-0.228	-0.181**
<20h: unconstrained	0.010	0.019	-0.003	-0.041	-0.091	-0.045	-0.005	0.003	-0.018	-0.017	-0.036	-0.037
<20h: overemployed	-0.069***	-0.131**	-0.074***	-0.318***	-0.465*	-0.313***	-0.090***	-0.027	-0.114***	-0.276***	-0.115	-0.336***
20-35 h: underemployed	0.003	0.085**	-0.034	0.004	0.297*	-0.112	-0.082***	-0.083**	-0.094***	-0.242***	-0.233	-0.284***
20-35 h: unconstrained	-0.010	0.070***	-0.015	-0.015	0.172	-0.083	-0.031***	0.036	-0.057***	-0.102**	0.080	-0.169***
20-35 h: overemployed	-0.113***	-0.093**	-0.133***	-0.475***	-0.415**	-0.530***	-0.102***	-0.038	-0.127***	-0.327***	-0.180	-0.387***
35-40 h: underemployed	-0.028**	-0.018	-0.053*	-0.101	-0.068	-0.176	-0.070***	-0.055***	-0.117***	-0.264***	-0.222***	-0.392***
35-40 h: overemployed	-0.105***	-0.090***	-0.126***	-0.390***	-0.344***	-0.451***	-0.084***	-0.083***	-0.090***	-0.266***	-0.271***	-0.276***
41-49 h: underemployed	-0.037	-0.036	-0.027	-0.034	-0.052	0.106	0.003	0.007	0.002	0.109	0.072	0.328
41-49 h: unconstrained	-0.001	-0.003	0.025	-0.014	-0.004	-0.000	0.021	0.025	0.019	0.077	0.107	0.014
41-49 h: overemployed	-0.098***	-0.089***	-0.110***	-0.287***	-0.291***	-0.228*	-0.055***	-0.065***	-0.023	-0.105*	-0.137*	-0.024
50+ h: underemployed	0.092	-0.101	0.602	-0.273	-0.310	-0.057	0.032	0.026	0.428	0.015	-0.037	0.321
50+ h: unconstrained	-0.069***	-0.063***	-0.054	-0.252***	-0.260***	-0.651***	-0.010	-0.022	0.095	-0.033	-0.077	-0.256
50+ h: overemployed	-0.172***	-0.154***	-0.206***	-0.570***	-0.513***	-0.080***	-0.073***	-0.067***	-0.083**	-0.231***	-0.202**	-0.035**
Constant	4.502***	3.201	4.677***				4.497***	2.498	5.004***			
Number of observations	98,692	47,187	51,505	102,799	47,791	55,008	98,681	47,183	51,498	108,805	48,827	59,978
log L				-39,185	-18,156	-20,917				-42,434	-18,906	-23,440
F	10.039	5.819	6.055				5.414	3.089	3.563			
R <sup>2</sup>	0.001	0.026	0.002				0.008	0.009	0.010			

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The dependent variables are stress and depression, respectively.

Model also includes socioeconomic control variables for age, job tenure, marital status, number of children, net wages, household income, being disabled, unpaid overtime, wave dummies, and dummies for 2-digit occupational codes.

## 4.5 Concluding Comments

This study provides additional evidence of a relationship between work time and health. However, in contrast to the wide body of literature on the health effects of work time, we focus on the health effects of the mismatch between desired and actual work time. Thus, following Spurgeon, Harrington, and Cooper (1997, p. 370), we argue that the effects of work time on health depend on whether individuals opt for long work hours voluntarily or whether the combination of work intensity and hours prevailing in their job does not meet their preferences. Because work time preferences differ substantially among individuals (especially among women), the associated health implications may be related to the extent to which such preferences are met. Overall, our results provide evidence that overemployment (actual hours exceeding desired hours) has a significantly negative effect on workers' health. This is true even when the actual weekly hours are relatively short. Moreover, although the possibility of reverse causation cannot be fully eliminated, we would argue that the information advantage that workers have over their own health characteristics compared to the characteristics of their job makes it more likely that the effects we observe are driven by the impact of mismatches between actual and desired hours on health rather than vice-versa.

In contrast to the majority of studies that analyze the relationship between work time and health, our study has the advantage of using nationally representative data that cover almost the entire workforce and contain a rich set of controls and several different measures of perceived health. The existence of a panel also allows us to control for potentially omitted unobservable personal traits, such as psychic constitution or early childhood experiences.

The results of our study indicate that labour market and work time policies meant to address health consequences should not only take into account the

absolute length of the work week but also the mismatches between actual and preferred work time. Since a good health state is essential for human manpower, understanding work hours constraints is particularly crucial for employers. These restrictions not only affect workers' health but also serve as a measure of job and life satisfaction. Thus, employer efforts to reduce mismatches between actual and desired work hours could reduce absenteeism due to health problems and improve job performance by means of increased employee motivation and productivity.

Successful strategies for maintaining and improving workers' health are especially important in the context of demographic change and ageing societies. Germany, for example, faced with massive ageing of the workforce, has increased the statutory retirement age from 65 to 67 to attenuate its shrinking labour force and the resulting shortage of skilled labour. A fortiori, therefore, it is crucial to establish new and enhance existing work time policies in order to assure workers' physical and mental health until old age. To do so successfully, policy-makers must take into account this potential mismatch between actual and desired work hours.

## 5 Conclusions

This thesis began by assessing the quality of work time data collected by two different means: the diary method and the interview method. Specifically, chapter 2 compared work time data collected by the German Time Use Survey (GTUS) using the diary method with stylized work time estimates from the GTUS, German Socio-Economic Panel, and German Microcensus. Although on average the differences between the time-diary data and the interview data are not great, the results show significant deviations between these two techniques for certain types of individuals, especially those with long working hours and flexible work schedules. The analysis also reveals a gender-specific reporting behavior: women, on average, give more accurate stylized work time estimates than men. A subsequent application of the seemingly unrelated regression method [Zellner (1962)] also indicates that stylized work time estimates capture insufficient variation to reproduce a true picture of working hours. Not only does chapter 2 comprise the first such study for Germany using the GTUS, but the results raise the further questions of whether and to what extent the alternative use of diary reports rather than stylized estimates affects the estimation of labor supply elasticities and wage functions. Although comprehensive analysis of this question is beyond the scope of this thesis, it opens interesting avenues for future research.

Despite neoclassical claims that individuals can freely choose how many hours they wish to allocate to paid work, this thesis, like many other studies, shows that a considerable share of workers is constrained with respect to the number of working hours. Thus, in chapter 3, the focus shifted to the topic of work hours constraints; most particularly, the discrepancy between actual and desired working hours in a multinational setting. Drawing on the latest data from the International Social Survey Program (ISSP) with a focus on work orientations

hours constraints in 21 nations were analyzed. This chapter also addressed the question of why work hours constraints differ significantly between countries. One major finding is that such constraints and their country differences are interrelated with key macrolevel economic variables like unemployment rates, GDP per capita as a measure of welfare, average weekly work hours, and income inequality. A subsequent multivariate analysis also reveals that, on both macro- and microlevels, sociodemographic variables like prosperity and income, high risk of unemployment, and working conditions play an important role in determining work hours constraints, and the desire to work more or less seems strongly related to income considerations and job (in)security. The results further suggest that, with respect to working conditions, such constraints are also affected by gender issues.

To investigate the important issue of whether employees who work more hours than wanted suffer adverse health effects, the analysis in chapter 4 drew on nationally representative longitudinal panel-data to examine the impact of the discrepancy between actual and desired work hours on self-perceived health outcomes in Germany and the United Kingdom. In addition to estimating fixed-effects models, it applied a newly developed tool, the Baetschman, Staub and Winkelmann's (2011) "blow-up-and-cluster" (BUC) estimator. The results indicate that work-hour mismatches (i.e., differences between actual and desired hours) have negative effects on workers' health. In particular, "overemployment" – working more hours than desired – has detrimental effects on different measures of self-perceived health. These findings not only provide additional evidence for the relation between working hours and health but also indicate that the effects of work time on health are decisively determined by work hour restrictions; that is, whether individuals opt for long work hours voluntarily or whether their work time preferences are not being met.



This thesis not only offers a comprehensive picture of labor supply hours but also a sound analysis of the potential mismatch between actual and desired work hours and the consequences and policy implications of such mismatches. Taken together, the analytic results highlight the importance of considering work hours constraints within the overarching debate on work time issues. Most particularly, they provide valuable insights into job mobility, labor market behavior, and labor supply decisions, challenging issues faced by most industrialized countries that are of particular interest in the context of the skilled labor shortages and shrinking labor forces induced by demographic change and societal ageing.

Employers trying to reduce job mobility and high turnover costs, for example, could benefit greatly from taking into account employees' work hour preferences: since work hours constraints serve as a measure of job satisfaction and overall life satisfaction, considering work time preferences should increase worker motivation and productivity and at the same time decrease absenteeism. Not only should consideration of work time preferences be a decisive factor for employers competing for skilled labor, but in ensuring high productivity, high quality work, and high levels of job satisfaction, successful strategies to reduce work hour mismatches may play as important a role as obvious techniques like appropriate worker-to-job and skills-to-task fit. Reducing work hours constraints is thus an important step to building fruitful work environments in which employee effort is appropriately acknowledged. Employers who address their employees' work time preferences not only contribute to a better work environment but can create high levels of commitment and increase both their workers' and their companies' welfare.

Because work hours constraints have direct effects on the labor market and on labor market participation decisions, these restrictions are of paramount importance for successful policy implementation. Hence, work time policies

meant to address well-being in the workplace, re-entry after parental leave, or balance between work and family life must take into account individual work hour preferences; especially, as being constrained in the choice of number of hours worked can have serious detrimental effects on worker health.

One major all-encompassing challenge of ageing societies is to maintain the smooth functioning of the labor market in the face of the massive ageing faced by most countries in the western world. Regardless of whether they are employed in the public or private sector, ageing personnel necessitate the generation of new concepts that support their productive efficiency and motivation. Hence, the issue of whether workers whose actual work hours deviate substantially from their desired work hours suffer negative health consequences is momentous for government formulation of work time policies. Most particular, policies meant to maintain and improve the productivity of this ageing workforce require strategies that ensure and improve workers' health into old age. If such policies are to be successful, therefore, policy makers should seriously consider incorporating measures that address the potential misalignment between actual and desired work hours.

## 6 Literature

- Akerlof, George A. and Kranton, Rachel E.** (2000): Economics and Identity, *The Quarterly Journal of Economics*, 115 (3), pp. 715-753.
- Altonji, Joseph G. and Paxson, Christina H.** (1988): Labor Supply Preferences, Hours Constraints, and Hours-wage Trade-offs, *Journal of Labor Economics*, 6 (2), pp. 254-276.
- Anger, Silke** (2006): Zur Vergütung von Überstunden in Deutschland: Unbezahlte Mehrarbeit auf dem Vormarsch, *DIW-Wochenbericht*, 73 (15-16), pp. 189-207.
- Artazcoz, Lucía, Cortès, Imma, Escribà-Agüi, Vicenta, Cascant, Lorena, and Villegas, Roman** (2009): Understanding the Relationship of Long Working Hours with Health Status and Health-related Behaviours, *Journal of Epidemiology and Community Health*, 63 (7), pp. 521-527.
- Baetschmann, Gregori, Staub, Kevin E., and Winkelmann, Rainer** (2011): Consistent Estimation of the Fixed Effects Ordered Logit Model, *IZA Discussion Paper No. 5443*.
- Becker, Garry S.** (1965): A Theory of the Allocation of Time, *The Economic Journal*, 75 (299), pp. 493-517.
- Belkic, Karen L., Landsbergis, Paul A., Schnall, Peter L., and Baker, Dean** (2004): Is Job Strain a Major Source of Cardiovascular Disease Risk?, *Scandinavian Journal of Work, Environment and Health*, 30 (2), pp. 85-128.
- Bell, David N. F., Hart, Robert A., Hübler, Olaf, and Schwerdt, Wolfgang** (2000): Paid and Unpaid Overtime Working in Germany and the UK, *IZA Discussion Paper No. 133*.

- Bell, David N. F., Otterbach, Steffen, and Sousa-Poza, Alfonso** (2012): Work Hours Constraints and Health, *Annales d'Économie et de Statistique*, 105-106, pp. 35 - 54.
- Bell, Linda A. and Freeman, Richard B.** (1995): Why Do Americans and Germans Work Different Hours?, in F. Buttler, W. Franz, R. Schettkat, and D. Siskice (eds.), *Institutional Frameworks and Labour Market Performance*, London: Routledge, pp. 101-131.
- Bell, Linda A. and Freeman, Richard B.** (2001): The Incentive for Working Hard: Explaining Hours Worked Differences in the U.S. and Germany, *Labor Economics*, 8 (2), pp. 181-202.
- Belseley, David, A., Kuh, Edwin, and Welsch, Roy, E.** (1980): Regression Diagnostics, New York: Wiley.
- Bluestone, Barry and Rose, Stephen** (1998): Macroeconomics of Work Time, *Review of Social Economy*, 56 (4), pp. 425-441.
- Böheim, René and Taylor, Mark P.** (2004): Actual and Preferred Working Hours, *British Journal of Industrial Relations*, 42 (1), pp. 149-166.
- Bond, James T., Galinsky, Ellen, and Swanberg, Jennifer E.** (1998): The 1997 National Study of the Changing Workforce, New York: Families and Work Institute.
- Bonke, Jens** (2005): Paid Work and Unpaid Work: Diary Information versus Questionnaire Information, *Social Indicators Research*, 70 (3), pp. 349-368.
- Bosch, Gerhard and Wagner, Alexandra** (2002): Konvergenz der Arbeitszeitwünsche in Westeuropa - Konturen eines neuen Arbeitszeitstandards, *IAT-Report*, 2002-01, pp. 1-9.

- Bowles, Samuel and Park, Yongjin** (2005): Emulation, Inequality, and Work Hours: Was Thorsten Veblen Right?, *The Economic Journal*, 115 (11), pp. 397-411.
- Brief, Arthur P., Burke, Michael J., George, Jennifer M., Robinson, Brian S., and Webster, Jane** (1988): Should Negative Affectivity Remain an Unmeasured Variable in the Study of Job Stress?, *Journal of Applied Psychology*, 73 (2), pp. 193-198.
- Carlin, Paul S. and Flood, Lennart** (1997): Do Children Affect the Labour Supply of Swedish Men? Time Diary vs. Survey Data, *Labour Economics*, 4 (2), pp. 167-183.
- Caruso, Claire C.** (2006): Possible Broad Impacts of Long Work Hours, *Industrial Health*, 44 (4), pp. 531-536.
- Chamberlain, Garry** (1980): Analysis of Covariance with Qualitative Data, *Review of Economic Studies*, 47 (1), pp. 225-238.
- Constant, Amelie F. and Otterbach, Steffen** (2011): Work Hours Constraints: Impacts and Policy Implications, *IZA Policy Paper No. 35*.
- Das, Marcel and van Soest, Arthur** (1999): A Panel Data Model for Subjective Information on Household Income Growth, *Journal of Economic Behavior & Organization*, 40 (4), pp. 409-426.
- Dex, Shirley** (1991): The Reliability of Recall Data: A Literature Review, *ISER Working Paper No. 1991-11*.
- Dustmann, Christian, Ludsteck, Johannes, and Schönberg, Uta** (2007): Revisiting the German Wage Structure, *IZA Discussion Paper No. 2685*.
- Eriksen, Willy** (2005): Work Factors and Smoking Cessation in Nurses' Aides: A Prospective Cohort Study, *BMC Public Health*, 5 (142), pp. 1-11.

- Eurostat** (2000): Guidelines on Harmonised European Time Use Surveys, Luxembourg: European Commission and Eurostat.
- Euwals, Rob** (2001): Female Labour Supply, Flexibility of Working Hours, and Job Mobility, *The Economic Journal*, 111 (471), pp. 120-134.
- Euwals, Rob and van Soest, Arthur** (1999): Desired and Actual Labour Supply of Unmarried Men and Women in the Netherlands, *Labour Economics*, 6 (1), pp. 95-118.
- Fagan, Colette** (2001): Time, Money and the Gender Order: Work Orientations and Working-Time Preferences in Britain, *Gender, Work and Organization*, 8 (3), pp. 239-266.
- Ferrer-i-Carbonell, Ada and Frijters, Paul** (2004): How Important is Methodology for the Estimates of the Determinants of Life Satisfaction?, *The Economic Journal*, 114 (497), pp. 641-659.
- Frazis, Harley and Stewart, Jay** (2004): What can Time-Use Data Tell Us about Hours of Work?, *Monthly Labor Review*, 127 (12), pp. 3-9.
- Friedland, Daniel S. and Price, Richard H.** (2003): Underemployment: For the Health and Well-being of Workers, *American Journal of Community Psychology*, 32 (1-2), pp. 33-45.
- Gershuny, Jonathan, Robinson, John P., Fisher, Kimberly, and Martin, Steve** (2007): Workweek Estimate – Diary Differences and Regression to the Mean, Unpublished Manuscript.
- Geyer, Johannes and Myck, Michal** (2010): Poorer Health – Shorter Hours? Health and Flexibility of Hours of Work, *IZA Discussion Paper No. 5169*.
- Golden, Lonnie and Altman, Morris** (2008): Why Do People Overwork? Over-supply of Hours of Labor, Labor Market Forces and Adaptive Preferences, in R. Burke and C. Cooper (eds.), *The Long Work Hours Culture: Causes,*

*Consequences and Choices*, Bingley: Emerald Group Publishing Limited, pp. 61-83.

**Golden, Lonnie and Gebreselassie, Tesfayi** (2007): Overemployment Mismatches: The Preference for Fewer Work Hours, *Monthly Labor Review*, 130 (4), pp. 18-37.

**Greene, William H.** (2003): *Econometric Analysis*, 5th ed., Upper Saddle River: Prentice Hall.

**Grözinger, Gert, Matiaske, Wenzel, and Tobsch, Verena** (2008): Arbeitszeitwünsche, Arbeitslosigkeit und Arbeitszeitpolitik, *WSI Mitteilungen* (2), pp. 92-98.

**Harvey, Andrew S. and Mukhopadhyay, Arun K.** (2007): When Twenty-four Hours Is Not Enough: Time Poverty of Working Parents, *Social Indicators Research*, 82 (1), pp. 57-77.

**Heckman, James J.** (1993): What Has Been Learned about Labor Supply in the Past Twenty Years?, *American Economic Review*, 83 (2), pp. 116-121.

**Holst, Elke** (2007), Arbeitszeitwünsche von Frauen und Männern liegen näher beieinander als tatsächliche Arbeitszeiten, *DIW-Wochenbericht*, 74 (14-15), pp. 209-215.

**Iwasaki, Kenji, Takahashi, Masaya, and Nakata, Akinori** (2006): Health Problems due to Long Working Hours in Japan: Working Hours, Workers' Compensation (Karoshi), and Preventive Measures, *Industrial Health*, 44 (4), pp. 537-540.

**Jacobs, Jerry A.** (1998): Measuring Time at Work: Are Self-Reports Accurate?, *Monthly Labor Review*, 121 (12), pp. 42-51.

**Jacobs, Jerry A. and Gerson, Kathleen** (1998): Who Are the Overworked Americans?, *Review of Social Economy*, 56 (4), pp. 442-459.

- Juster, F. Thomas, Ono, Hiromi and Stafford, Frank P.** (2003): An Assessment of Alternative Measures of Time Use, *Sociological Methodology*, 33 (1), pp. 19-54.
- Juster, F. Thomas and Stafford, Frank P.** (1991): The Allocation of Time: Empirical Findings, Behavioral Models, and Problems of Measurement, *Journal of Economic Literature*, 29 (2), pp. 471-522.
- Kahn, Shulamit and Lang, Kevin** (1992): Constraints on the Choice of Work Hours: Agency vs. Specific-capital, *Journal of Human Resources*, 27 (4), pp. 661-678.
- Kahn, Shulamit and Lang, Kevin** (1995): Sources of Hours Constraints: Evidence from Canada, *Canadian Journal of Economics*, 28, pp. 914-928.
- Kahn, Shulamit and Lang, Kevin** (1996): Hours Constraints and the Wage/Hours Locus, *Canadian Journal of Economics*, 29, pp. 71-75.
- Kalenkoski, Charlene M., Hamrick, Karen S. and Andrews, Margaret S.** (2011): Time Poverty Thresholds and Rates for the US Population, *Social Indicators Research*, 104 (1), pp. 129-155.
- Kan, Man Yee** (2006): Measuring Housework Participation: The Gap between "Stylised" Questionnaire Estimates and Diary-based Estimates, *ISER Working Paper No. 2006-11*.
- Kan, Man Yee and Pudney, Stephen** (2007): Measurement Error in Stylised and Diary Data on Time Use, *ISER Working Paper No. 2007-03*.
- Kitterød, Ragni H. and Lyngstad, Torkild H.** (2005): Diary versus Questionnaire Information on Time Spent on Housework – the Case of Norway, *Electronic International Journal of Time Use Research*, 2 (1), pp. 13–32.



- Klevmarken, Anders N.** (2005): Estimates of a Labour Supply Function Using Alternative Measures of Hours of Work, *European Economic Review*, 49 (1), pp. 55-73.
- Klevmarken, Anders N.** (1999): Microeconomic Analysis of Time-Use Data: Did We Reach the Promised Land?, in J. Merz and M. Ehling (eds.), *Time-Use Research, Data and Policy*, Baden-Baden: NOMOS Verlagsgesellschaft, pp.423-456.
- Landers, Renée M., Rebitzer, James B., and Taylor, Lowell J.** (1996): Rat Race Redux: Adverse Selection in the Determination of Work Hours in Law Firms, *American Economic Review*, 86 (3), pp. 329-348.
- Lang, Kevin and Kahn, Shulamit** (2001): Hours Constraints: Theory, Evidence, and Policy Implications, in G. Wong and G. Picot (eds.), *Working Time in Comparative Perspective*, Vol. 1: Patterns, Trends and the Policy Implications of Earnings Inequality and Unemployment, Kalamazoo: Upjohn Institute of Employment Research, pp. 261-284.
- Lee, Sangheon, McCann, Deirdre, and Messenger, Jon C.** (2007): *Working Time Around the World*, London: Routledge.
- Liu, Ying and Tanaka, Hiromi** (2002): Overtime Work, Insufficient Sleep, and Risk of Non-fatal Acute Myocardial Infarction of Japanese Men, *Occupational and Environmental Medicine*, 59 (7), pp. 447-451.
- Lynn, Peter** (ed.) (2006): Quality Profile: British Household Panel Survey Version 2.0: Waves 1 to 13: 1991-2003, *ISER Report*, University of Essex.
- Lyonette, Claire and Clark, Michael** (2009): Unsocial Hours: Unsocial Families?, Cambridge: Relationships Foundation.

- Marini, Margaret M. and Shelton, Beth A.** (1993): Measuring Household Work: Recent Experience in the United States, *Social Science Research*, 22 (4), pp. 361-382.
- Merz, Joachim** (2002): Time and Economic Well-being – A Panel Analysis of Desired versus Actual Working Hours, *Review of Income and Wealth*, 48 (3), pp. 317-346.
- Merz, Joachim and Rathjen, Tim** (2009): Time and Income Poverty: An Interdependent Multidimensional Poverty Approach with German Diary Time Use Data, *IZA Discussion Paper No. 4337*.
- Michelacci, Claudio and Pijoan-Mas, Joseph** (2007): Why Do Americans Work More than Europeans? Differences in Career Prospects, *CEPR - Policy Insight*, 12, pp. 1-4.
- Nakanishi, Noriyukia, Yoshida, Hiroshia, Nagano, K., Kawashimo, H., Nakamura, Koji, and Tatara, Koso** (2001): Long Working Hours and Risk for Hypertension in Japanese Male White Collar Workers, *Journal of Community Health*, 55 (5), pp. 316-322.
- Organisation for Economic Co-operation and Development (OECD)** (2010): Average Annual Hours Worked per Worker, [www.stats.oecd.org](http://www.stats.oecd.org).
- Osberg, Lars** (2003): Understanding Growth and Inequality Trends: The Role of Labour Supply in the US and Germany, *Canadian Public Policy*, 29 (Supplement), pp. 163-183.
- Otterbach, Steffen and Sousa-Poza, Alfonso** (2009): How Accurate are German Work-time Data? A Comparison of Time-diary Reports and Stylized Estimates, *Social Indicators Research*, 97 (3), pp. 325-339.

- Otterbach, Steffen** (2010): Mismatches Between Actual and Preferred Work Time: Empirical Evidence of Hours Constraints in 21 Countries, *Journal of Consumer Policy*, 33 (2), pp. 143-161.
- Press, Julie E. and Townsley, Eleanor** (1998): Wives' and Husbands' Housework Reporting: Gender, Class, and Social Desirability, *Gender & Society*, 12 (2), pp. 188-218.
- Radi, Samia, Ostry, Aleck, and LaMontagne, Anthony D.** (2007): Job Stress and Other Working Conditions: Relationships with Smoking Behaviors in a Representative Sample of Working Australians, *American Journal of Industrial Medicine*, 50 (8), pp. 584-596.
- Reynolds, Jeremy** (2004): When Too Much Is Not Enough: Actual and Preferred Work Hours in the United States and Abroad, *Sociological Forum*, 19 (1), pp. 89-120.
- Robinson, John P. and Gershuny, Jonathan** (1994): Measuring Hours of Paid Work: Time-Diary vs. Estimate Questions, *Bulletin of Labour Statistics*, pp. 11-17.
- Rottenberg, Simon** (1995): Regulation of the Hours of Work and its 'Externalities' Defenses, *Journal of Labor Research*, 16 (1), pp. 97-104.
- Schmid, Simone** (2000): Erwerbstätigkeit im Mikrozensus. Konzepte, Definition, Umsetzung, *ZUMA Arbeitsbericht 2000/01*.
- Schor, Juliet B.** (2001): The Triple Imperative: Global Ecology, Poverty and Worktime Reduction, *Berkeley Journal of Sociology*, 45, pp. 2-16.
- Schor, Juliet B.** (2005): Sustainable Consumption and Worktime Reduction, *Journal of Industrial Ecology*, 9 (1), pp. 37-50.
- Shields, Margot** (1999): Long Working Hours and Health, *Health Reports*, 11 (2), pp. 33-48.

- SOEP Group** (2001): The German Socio-Economic Panel Study (GSOEP) after More Than 15 Years – Overview, *Vierteljahreshefte zur Wirtschaftsforschung*, 70 (1) pp. 134-144.
- Sousa-Poza, Alfonso and Henneberger, Fred** (2002): An Empirical Analysis of Working-hours Constraints in Twenty-one Countries, *Review of Social Economy*, 60 (2), pp. 209-242.
- Sousa-Poza, Alfonso and Ziegler, Alexandre** (2003): Asymmetric Information about Workers' Productivity as a Cause for Inefficient Long Working Hours, *Labour Economics*, 10 (6), pp. 727-747.
- Sparks, Kate, Cooper, Cary L., Fried, Yitzhak, and Shirom, Arie** (1997): The Effects of Hours of Work on Health: A Meta-analytic Review, *Journal of Occupational and Organizational Psychology*, 70 (4), pp. 391-408.
- Spurgeon, Anne, Harrington, J. Malcolm, and Cooper, Cary L.** (1997): Health and Safety Problems Associated with Long Working Hours: A Review of the Current Position, *Occupational and Environmental Medicine*, 54 (6), pp. 367-375.
- Steptoe, Andrew, Wardle, Jane, Lipsey, Zara, Mills, Rachel, Oliver, Georgina, Jarvis, Martin, and Kirschbaum, Clemens** (1998): A Longitudinal Study of Work Load and Variations in Psychological Well-being, Cortisol, Smoking, and Alcohol Consumption, *Annals of Behavioral Medicine*, 20 (2), pp. 84-91.
- Stewart, Mark B. and Swaffield, Joanna K.** (1997), Constraints on the Desired Hours of Work of British Men, *The Economic Journal*, 107 (1), pp. 520-535.

- Uheta, Tetsunojo** (1991): Long Working Hours and Occupational Stress-related Cardiovascular Attacks among Middle-aged Workers in Japan, *Journal of Human Ergology*, 20 (2), pp. 147-153.
- van der Hulst, Monique** (2003): Long Work Hours and Health, *Scandinavian Journal of Work, Environment and Health*, 29 (3), pp. 171-188.
- Vickery, Clair** (1977), The Time-Poor: A New Look at Poverty, *The Journal of Human Resources*, 12 (1), pp. 27-48.
- Virtanen, Marianna, Ferrie, Jane E., Singh-Manoux, Archana, Shipley, Martin J., Vahtera, Jussi, Marmot, Michael G., and Kivimäki, Mika** (2010): Overtime Work and Incident Coronary Heart Disease: The Whitehall II Prospective Cohort Study, *European Heart Journal*, 31 (14) pp. 1737-1744.
- Wagner, Gert G., Frick, Joachim R., and Schupp, Jürgen** (2007): The German Socio-Economic Panel Study (SOEP) – Scope, Evolution and Enhancements, *Schmollers Jahrbuch*, 127 (1), pp. 139-169.
- Warren, Tracey** (2003): Class and Gender-based Working Time? Time Poverty and the Division of Domestic Labour, *Sociology*, 37 (4), pp. 733-752.
- Watson, David, Clark, Lee A., and Carey, Greg** (1988): Positive and Negative Affectivity and Their Relation to Anxiety and Depressive Disorders, *Journal of Abnormal Psychology*, 97 (3), pp. 346-353.
- Wolf, Elke** (1998): Do Hours Restrictions Matter? A Discrete Family Labor Supply Model with Endogenous Wages and Hours Restrictions, *ZEW Discussion Paper No. 98-44*.
- Wooden, Mark, Warren, Diana, and Drago, Robert** (2009): Working Time Mismatch and Subjective Well-being, *British Journal of Industrial Relations*, 47 (1), pp. 147-179.

**Zellner, Arnold** (1962): An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias, *Journal of the American Statistical Association*, 57 (298), pp. 348-368.

## 7 Appendix

<b>Table A: Overview of Dependent Variables</b>			
Variable	Data source	Question format	Coding scheme
<b>Health satisfaction</b>	<b>GSOEP</b>	How satisfied are you with... your health?	<b>11-point scale</b> , [totally unhappy (0) to totally happy (10)]
	<b>BHPS</b>	How dissatisfied or satisfied are you with...your health?	<b>7-point scale</b> [not satisfied at all (1) to completely satisfied (7)]
<b>Self-assessed health<sup>1</sup></b>	<b>GSOEP</b>	How would you describe your current health?	<b>5-point scale</b> [bad (1) to very good (5)]
	<b>BHPS</b>	Please think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been ...	<b>5-point scale</b> [very poor (1) to excellent (5)]

<sup>1</sup> Variables are recoded.

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**Table B: Summary Statistics**

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**GSOEP**

Variable	Mean	Std. Dev.	Min	Max
Health satisfaction	7.05	1.97	0	10
Self-assessed health	3.60	0.84	1	5
Age	39.99	11.47	16	65
Age2	1,730.98	926.56	256	4,225
Tenure	10.16	9.70	0	58
Married	0.62	0.49	0	1
Number of children	0.69	0.95	0	10
Grade of disability	2.55	11.73	0	100
Net wage	8.54	5.29	0.04	361.63
ln (household income)	7.88	0.48	3.83	11.53
Unpaid overtime	0.13	0.34	0	1

**BHPS**

Health satisfaction	5.19	1.39	1	7
Self-assessed health	3.99	0.83	1	5
Age	37.44	12.19	16	65
Age2	1,550.09	949.03	256	4,225
Tenure	4.30	5.84	0	51
Married	0.54	0.50	0	1
Number of children	0.68	0.96	0	8
Disabled	0.02	0.12	0	1
Net wage	6.71	4.37	0.00	332.56
ln (household income)	7.85	0.57	4.10	11.20
Unpaid overtime	0.20	0.40	0	1

Note: Number of observations is based on the regression samples.  
Data are pooled over all waves included in the regression analysis.