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FFB-Discussion Paper No. 87

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**Does Job Satisfaction Adapt to Working Conditions? -
An Empirical Analysis for Rotating Shift Work,
Flextime, and Temporary Employment in UK**

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Does Job Satisfaction Adapt to Working Conditions? –**An Empirical Analysis for Rotating Shift Work, Flextime, and Temporary Employment in UK****Dominik Hanglberger**

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Abstract

The hedonic treadmill model for subjective well-being was subject to several recent empirical analyses based on individual panel data. Most of this adaptation literature is concentrated on how life events affect measures of life satisfaction and happiness, whereas adaptation processes of domain satisfactions like job satisfaction are largely unstudied. The aim of this paper is to test empirically adaptation processes of self-reported job satisfaction. For this purpose we consider flexibility characteristics of a job and derive hypotheses about which flexibility measures allow for or impede adaptation processes. Hypotheses are tested using data from up to 18 waves of the British Household Panel Survey (BHPS). We estimate fixed-effects panel models to test adaptation processes based on intra-individual changes in job satisfaction. Our results show no adaptation to rotating shift work, little adaptation to temporary employment, but full adaptation to flextime regulations.

JEL: J28, J81

Keywords: *job satisfaction, adaptation, hedonic treadmill model, rotating shift work, temporary employment, flextime, British Household Panel Study, fixed-effects panel estimation*

Zusammenfassung

Die Adaptionstheorie – basierend auf dem hedonic treadmill model – wurde in mehreren Studien hauptsächlich von Psychologen und Ökonomen empirisch überprüft. Der Schwerpunkt wurde dabei auf die Auswirkungen einzelner Lebensereignisse auf globale subjektive Wohlfahrtsindikatoren (Lebenszufriedenheit/Happiness) gelegt. Auf die Zufriedenheit mit einzelnen Lebensbereichen wurde die Adaptionstheorie bislang kaum angewendet. Ziel dieses Beitrags ist es deshalb zu untersuchen, inwiefern die Arbeitszufriedenheit von Adaptionseffekten beeinflusst wird und welche Umstände einer individuellen Adaption an veränderte Arbeitsbedingungen förderlich bzw. hinderlich ist? Dazu analysieren wir auf Basis von bis zu 18 Wellen des British Household Panel Surveys (BHPS), wie abhängig Beschäftigte in ihrer subjektiven Bewertung der Arbeitssituation auf die Einführung von Gleitzeitregelungen, die Arbeit in Wechselschichtsystemen und befristete Beschäftigungsverhältnisse reagieren. Unsere auf fixed-effects Regressionsmodellen basierenden Analysen zeigen, dass das Adaptionspotential je nach Arbeitsplatzmerkmal deutlich variiert. Während positive Effekte von Gleitzeitregelungen auf die Arbeitszufriedenheit voll adaptiert werden, findet sich für die befristete Beschäftigung nur eine teilweise Adaption. Für die Arbeit in Wechselschichtsystemen zeigt sich ein dauerhaft negativer Effekt auf die Arbeitszufriedenheit, also kein Adaptionseffekt.

JEL: J28, J81

Schlagwörter: *Arbeitszufriedenheit, Adaption, hedonic treadmill model, Schichtarbeit, befristete Beschäftigung, Gleitzeit, British Household Panel Study, fixed-effects Panelschätzung*

1 Introduction

The theory of adaptation of subjective well-being, also known as the hedonic treadmill model (Brickman and Campbell 1971), states that life events do not affect subjective well-being in the long run. Instead it is assumed, that following a shift in happiness or satisfaction caused by a good or bad event individuals quickly return to their neutral individual set point. Diener and Diener (1996) altered this model by assuming a non-neutral, positive set point. Frederick and Loewenstein (1999) explain adaptation by automatic habituation processes, which result in a descent of constant or repeated stimuli from conscious perception. The suggested mechanisms causing adaptation are changes in individual ideals, attention, and interests. Diener et al. (2006: 302) reason that “*the happiness system is thus hypothesized to reflect changes in circumstances rather than the overall desirability of the circumstances themselves.*”

The hedonic treadmill model was subject to several recent empirical analyses based on individual panel data. Most of this literature concentrates on how certain life events affect life satisfaction and global happiness measures, whereas adaptation processes of domain satisfactions are largely unstudied. Aim of this paper is to empirically test adaptation processes of self-reported job satisfaction.

The application of the traditional hedonic treadmill model to job satisfaction implies, that any corporate or government effort to increase job satisfaction by changes in working conditions or regulations will not result in a lasting improvement of job satisfaction. Since literature on adaptation of life satisfaction showed, that adaptation does not occur for all events at the same extent (see Chapter 2), knowledge about which working conditions cause lasting improvements or deteriorations of job satisfaction is important for government and corporate policies aiming to improve working conditions in an efficient way.

In this paper we contribute to the job satisfaction and adaptation literature by deriving and testing hypotheses about which working conditions allow for adaptation and which do not. Our empirical analyses are based on the British Household Panel Study, a large individual panel database, which enables us to follow individuals over time so that it can be controlled for unobserved individual fixed effects.

The following Section 2 shortly reviews literature on job satisfaction, on effects of different working hours arrangements on well-being, and on adaptation processes of measures of subjective well-being. In Section 3 we derive hypotheses about adaptation effects of job satisfaction. In Section 4 we shortly introduce the data base for our analyses, the British Household Panel Study (BHPS). Section 5 describes the empirical strategy we follow and the econometric models used. In Section 6 results from econometric analyses are presented and finally our results are summarized in Section 7.

2 Review of literature

There is a growing and wide field of literature on job satisfaction from several disciplines. Among the first economists using subjective measures like job satisfaction was Freeman (1978). Using American panel data he showed, that job satisfaction is a good predictor for quits as an observable labour market behaviour. The same could be shown for Great Britain (Clark 2001) and Germany (Clark et al. 1998). This result gave rise to further studies from economists especially in the last 15 years. Most of the economics literature on job satisfaction

is dealing with the effect of income and relative income on job satisfaction like Clark and Oswald (1996) and Donohue and Heywood (1997), union membership (Heywood, Siebert and Wei 2002, Powdthavee 2010, Bryson et al. 2004, 2010), and determinants of job satisfaction in general (Clark 2005).

In our analysis we examine how temporary employment, rotating shift work, and flextime regulations affect job satisfaction. Existing studies analysing effects of working hours on job satisfaction mainly concentrate on the amount of working time, and differences between part-time and full-time workers (e.g. Gash et al. 2010).

Further, there is some literature on the mismatch between preferred and effective amount of working hours. Merz and Lang (1999) study the development and determinants of the mismatch between desired and actual working hours over a ten year period based on German panel data. Among other results, freelancers compared to others find a balance of desired and actual working hours in the course of a decade. Wooden et al. (2009) links this mismatch to subjective well-being measures. Their study based on Australian panel data finds that it is not the amount of working hours but the mismatch of working hours, which affects subjective well-being.

Further literature related with the topic of flexible working hours is e.g. dealing with the question, which socio-economic variables increase the probability of working non-standard working. Regarding this question Merz and Burgert (2003) find that different aspects of working time arrangements – the timing of working time and the fragmentation of working time – are explained by different socio-economic factors. Further literature is concerned with income effects of atypical working hours (Merz et al. 2009). Andresen et al. (2007) examine how working unusual working hours affects European maritime pilots and find a negative effect on job satisfaction.

Janssen and Nachreiner (2004) use cross section data to analyze effects of several flexible working hour arrangements on health and subjective well-being. They find that high variability of working hours negatively affects health and satisfaction. The effects are more pronounced if the flexibility is controlled by the company. Surprising is the result, that variability has a negative effect, even when employees can determine flexibility by themselves. It might be argued, that this result is caused by unobserved heterogeneity which is not accounted for in the cross sectional setting of the study. An analysis by Hanglberger (2010) finds a positive effect of self determined working hours on job satisfaction in Germany.

Temporary employment is mostly seen as a measure to enhance flexibility at the labor market. By employing workers with fixed term contracts companies can avoid job protection legislation (Booth et al. 2002). Employers benefit from this flexibility, because their workforce can quickly be adjusted to current demand. For workers temporary employment increases job insecurity. Besides insecurity temporary employment involves several negative job aspects for employees: in UK "...temporary jobs typically pay less, are associated with lower satisfaction in some job components and provide less work related training" (Both et al. 2002:190).

Ferrer-I-Carbonell and van Praag (2006) found for Spain and the Netherlands that temporary employment negatively affects job satisfaction. Further they show that these effects depend on contract duration and are differently pronounced in countries with differing labor market regulations. Bardasi and Francesconi (2004) used ten waves of the British Household Panel Study to study effects of atypical employment (temporary and part-time) on mental and global health as well as on life and job satisfaction. Their analyses using fixed-effects estimations

show almost no effects on health measures, but lower job satisfaction levels for casual and seasonal workers.

De Witte and Näswall (2003) tested if the effect of temporary employment on job satisfaction persists when it is controlled for the subjective perceived job insecurity. Based on OLS regressions for four European countries they found that the negative effect of temporary employment disappears when subjective job insecurity is controlled for. Similar results are presented by Origo and Pagani (2009).

Aim of this study is not to study interdependencies between subjective and objective job insecurity, or how perceived insecurity arises. Rather we consider job insecurity as one of the main characteristics of temporary employment. Hence we consider temporary employment as an objective measure of job insecurity. For this reason it makes little sense to control for subjective job insecurity in our study. A review of psychological literature on the effects of job insecurity on psychological well-being can be found in de Witte (1999).

Even if several studies use panel data to estimate job satisfaction models, besides Powdthavees' (2010) analysis on job satisfaction and unionisation there is no literature using large sample panel data to account for adaptation processes of job satisfaction.

In contrast adaptation theory of life satisfaction measures was object of several empirical analyses. Early studies were mainly based on cross sectional data. Among the first of this kind was a study by Brickman et al. (1978) supporting adaptation theory. The study used data on 22 lottery winners, 29 paralyzed accident victims and 22 controls to show, that lottery winners were not happier and paraplegics were not substantially less happy than non-winners and individuals who could walk. A short review of similar cross sectional studies comparing different groups of individuals to test adaptation theory can be found in Diener et al. (2006).

A weakness of cross sectional analyses is that life events are not exogenous. E.g. flextime is a working hours arrangement, which is correlated with higher job positions allowing for autonomous work. Hence there are more ambitious and career-minded individuals among workers in flextime, who might – independently of the present working hours arrangement – differ in subjective well-being levels from other workers. In other words, it is not clear, if individuals with high satisfaction levels achieve positions with flextime, or if flextime causes individuals to be more satisfied. In this context Clark (2003) showed that not only unemployment makes individuals unhappy, but also unhappy individuals are more likely to become unemployed. This is why besides the above mentioned cross sectional analyses there is an increasing number of studies using individual panel data to examine adaptation processes. Longitudinal studies are more powerful than cross sections since they allow to follow specific individuals over several points in time. In so doing it becomes visible, if differences in satisfaction levels between groups of individuals, which are found in cross sectional analyses, are also associated with intra-individual changes in subjective well-being. Further it can be tested, if these changes are permanent, or if adaptation occurs.

Empirical analyses of adaptation processes based on panel data are mostly dealing with private life events like marriage, divorce, widowhood, birth of a child and disability. Adaptation of global measures of subjective well-being to labour market events like unemployment is studied by Clark et al. (2008). Lucas (2005) used 18 waves of the SOEP to analyze adaptation to divorce. He found that there was some but not full adaptation and distinct gender differences in the effects on subjective well-being. Lucas et al. (2003) found that there are large individual differences in adaptation to marriage. Oswald and Powdthavee (2008) use fixed-effects models on British and German panel data to estimate adaptation of

individuals who become disabled. They find evidence for adaptation between 30 and 50 per cent to disability.

3 Hypotheses

The literature on adaptation processes reviewed in Chapter 2 suggests that adaptation exists, but the extent of adaptation to life events differs largely between different types of events and individuals. Frederick and Loewenstein (1999) suggest two explanations for differences in adaptation to different life events. From evolutionary theory he derives that there is no or not much adaptation to incentives which are necessary for survival or reproduction. As a second property of a stimulus, which affects its adaptation potential, they propose temporal variability. The lower the variability of a stimulus, the higher the adaptation potential. The reasoning behind the variability argument is that high temporal variability causes individuals to perceive ongoing changes, which prevent adaptation processes to start.

In our study we test the adaptation theory on job satisfaction considering changes in individual working conditions. For that purpose we analyse the effect of rotating shift work, flextime regulations, and temporary employment. Those characteristics were chosen, because they are prominent in the working arrangement and flexibility discussion and because they can be measured objectively. For other important determinants of job satisfaction (e.g. relations to colleagues, tasks,...) an objective measurement is difficult. The estimation of adaptation effects over a period of several years requires incentives, which can be regarded as constant over a few years for some individuals. This precondition is fulfilled by the above chosen job characteristics.

Rotating shift work, flextime regulations, and temporary employment can all be seen as flexibility measures within the labor market. For different types of flexibility we expect different effects on job satisfaction. A positive effect of flexibility is expected, when a measure is employee based. That is when employees have increased flexibility at their disposal. This is the case for flextime regulation, which allows employees to partly determine their working hours autonomously to better fit working hours and personnel needs (Sparks et al. 2001).

A negative effect of flexibility on job satisfaction is expected when job or working hours flexibility is at the employers disposal (employer based flexibility). Rotating shift work or temporary employment are types of flexibility, which can be classified as employer based. Another important aspect might be if individuals have to work at unfavorable times like in the evening or at night. This is the case for workers in rotating shift work. Evening and night work, and the regular change of working times might collide with the circadian rhythm of an individual and thus affect recreation processes. Rouch et al. (2005) found a negative impact of shift work cognitive ability; an effect, which was found to increase with the duration a worker already spent in shift-work. Further shift work might compromise the possibilities to sustain social and family ties (Shen and Dicker 2008). Both arguments, the disturbance of circadian rhythm and the conflict between job and private life, are supposed to have a negative impact on job satisfaction.

From Frederick and Loewenstein's (1999) theoretical thoughts about which events allow or hinder adaptation the following hypotheses concerning adaptation effects of the above mentioned working conditions can be derived:

Introduction of flextime is connected with a single upward shift in workers' autonomy. The introduction of flextime is a single event leading to a permanent higher level of control over

own working hours. Changing into flextime is therefore associated with only one change in working hours regulations with constant regulations afterwards. Further there is no conflict with personal basic needs. Based on this one can state the hypothesis:

(H1) The introduction of flextime can only temporarily increase job satisfaction.

The effect of rotating shift work on job satisfaction differs from a change in flextime in several aspects. Workers in rotating shift work are faced with changes in working times every week. Further, workers in rotating shift work regularly have to work in the mornings, evenings, or at night. This conflicts with the individual need for recreation. Hence the unpleasant and changing working times are assumed to negatively affect job satisfaction and the repetitive change of working times impedes adaptation processes. This leads to Hypothesis (2):

(H2) There is no adaptation to rotating shift work.

Temporary employment is increasing job insecurity for employees so we expect that it reduces job satisfaction. Since the duration of work contracts is typically between several months up to several years, perceived changes are less regular than for rotating shift work. Depending on the contract period of a job, temporary employment can thus offer enough time for adaptation processes. But with expiration of a work contract getting closer, a worker is again faced with the uncertainty of his job. This is why Hypotheses (3) states:

(H3) Individuals do not adapt fully to temporary employment, thus temporary employment affects job satisfaction in the longer run.

This together with the hypotheses above will be the focus of our analyses.

4 Data – British Household Panel Survey

For our analyses we used data drawn from the British Household Panel Survey (BHPS) waves A to R (1991-2008). The BHPS is a nationally representative household panel, surveyed since 1991, and includes more than 5000 households and 10,000 individuals. For detailed information on sampling and interview methods used see Taylor et al. (2010).

The sample is restricted to employees aged 15 to 64. To account for unobserved individual heterogeneity and adaptation effects we used lags and leads. Therefore only individuals with employee status and reported job satisfaction for at least six consecutive years could be used for the analysis. Table 2 shows the number of individuals in our estimation sample who move between working conditions states. Job satisfaction is surveyed on a seven point scale (1="not satisfied at all" – 7 ="completely satisfied"). Besides information on the working time characteristics and temporary employment, the BHPS offers information on many personal and household characteristics, job history, occupation and industry, and other work related items. Table 3 gives an overview of variables and definitions used in the following analyses. Working hours arrangements were asked as multiple response question. Respondents could choose several answers from the following list: flextime; annualised hours; term time only; job share; nine day fortnight; 4 ½ day week; 0 hours contract. In case no item of the list is appropriate, respondents could choose "none of those above". Regarding the times of day when individuals work, the BHPS contains detailed information. Individuals could choose one item from the list, which fits best to their working time: mornings only; afternoons only; during the day; evenings only; at night; both lunch/evenings; other times/day; rotating shifts;

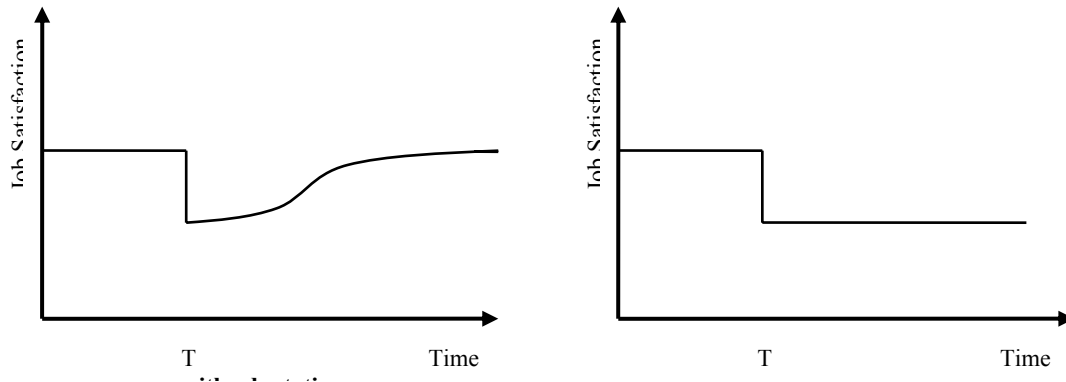
varies/no pattern; daytime and evenings; other. For detailed information on used items and variable definitions see Table 3 in the Appendix section.

For our analyses we used three different BHPS sub-samples since not all information used for our study was surveyed every year. With respect to temporary employment we were able to use all waves from 1991-2008. The effects of shift work could be analysed with data from wave 1 to 12. All analyses regarding flextime are based on waves 9 to 18.

5 Empirical strategy and econometric modelling

The aim of this paper is to test if rotating shift work, flextime regulations, and temporary employment affect individual job satisfaction permanently, or if individuals adapt to these job aspects. Figure 1 shows changes in job satisfaction following a change in working conditions in cases with and without adaptation.

Figure 1: (No) adaptation after an event at time T which negatively affects job satisfaction



Source: Own illustration.

As mentioned, job satisfaction is measured on a 7 point scale by asking respondents “*How satisfied are you with your present job overall?*”. Since one cannot measure exact utility differences between two points on a satisfaction scale, satisfaction measures have ordinal scaling. Hence the use of regression models, which assume cardinality, is problematic. Ordered probit ordered logit models (McKelvey and Zavoina 1971, 1975), however, do explicitly account for different intervals between certain points on a satisfaction scale by making use of a latent variable model, where the intervals on the 7 point scale are estimated and can deviate from each other. In an ordered probit model latent job satisfaction S^* is regressed on a set of variables \mathbf{w} containing information about job aspects and a set of control variables \mathbf{x} containing personal, household, and other socio-economic characteristics. The relation between S^* and the observed job satisfaction S is as follows ($\mu_0, \mu_1, \mu_2, \dots$ are estimated cut points between the values of S):

$$\begin{aligned}
 S_i^* &= \mathbf{w}_i' \boldsymbol{\alpha} + \mathbf{x}_i' \boldsymbol{\beta} + \varepsilon_i & \varepsilon &\sim N(0;1) \\
 S_i &= \begin{cases} 0 & \text{if } S_i^* < \mu_0 \\ 1 & \text{if } \mu_0 < S_i^* < \mu_1 \\ \dots & \end{cases} & (1)
 \end{aligned}$$

Besides ordinality another problem in analysing satisfaction measures is the question of inter-individual comparability of subjective well-being. Different individuals might not assess the same situation by the same point on a satisfaction scale. Further there is some evidence for environmental and genetic components in satisfaction measures (Arvey et al. 1989, Lykken and Tellegen 1996, De Neve et al. 2010). In most cases – and here – one cannot control for these components with available data. It is likely that genetic and environmental differences do not only affect job satisfaction, but are also correlated with other variables in \mathbf{w} and \mathbf{x} . In this case, the estimates of cross sectional ordered probit models are biased.

If we assume, that this so-called unobserved individual heterogeneity is constant over time, estimating the following panel fixed-effects model would be an appropriate solution:

$$S_{it} = \mathbf{w}_{it}'\boldsymbol{\alpha} + \mathbf{x}_{it}'\boldsymbol{\beta} + a_i + \varepsilon_{it} \quad (2)$$

S_{it} is the reported job satisfaction of individual i at time t . a_i contains all time constant unobserved individual heterogeneity and is ‘cancelled out’ when estimating a fixed-effects panel model. ε_{it} is a idiosyncratic error term.

As noted, an appropriate model for estimating causal effects on well-being should account for ordinality of well-being as well as for individual fixed-effects. Since estimates of fixed-effects ordered-probit models are biased (Greene 2002), van Praag and Ferrer-I-Carbonell (2008) proposed a probit-adapted ordinary least squares (POLS) estimation procedure. The POLS estimation is based on the assumption that well-being is normally distributed in the population. Knowing the empirical distribution of a satisfaction variable, the expected z -values for each observed satisfaction score on the seven point scale can be calculated. These z -values can then be used for linear estimations of fixed-effects models. We estimated linear fixed-effects models as well as fixed-effects models based on POLS. Since the results in our analyses were basically the same with the result by Ferrer-I-Carbonell and Frijters (2004), that it makes little difference if one assumes cardinality or ordinality we only present linear fixed-effects estimations in this paper. POLS estimates are available from the author on demand.

While cross sectional estimations use inter-individual variance in the observed variables for estimation, fixed-effects coefficients are estimated by exploiting intra-individual variance. This implicates that effects of variables which do not vary over time for individuals cannot be estimated. On the other hand, by basing estimations on differences in job satisfaction “within” individuals, we avoid the problem of inter-individual comparability of satisfaction scores. Fixed-effects estimates show the average effect (in points of the satisfaction scale) of a change in an explanatory variable on job satisfaction for individuals who experienced changes in the respective variable.

Since in model (2) α cannot vary depending on the duration a person is exposed to certain working conditions, we implicitly assume that there is no anticipation and adaptation (Figure 1, right panel) to working conditions. To allow for anticipation and adaptation we estimate a model of type (3):

$$S_{it} = \mathbf{w}_{it,T-2}\boldsymbol{\alpha}_{T-2} + \mathbf{w}_{it,T-1}\boldsymbol{\alpha}_{T-1} + \mathbf{w}_{it,T}\boldsymbol{\alpha}_T + \mathbf{w}_{it,T+1}\boldsymbol{\alpha}_{T+1} + \mathbf{w}_{it,T+2}\boldsymbol{\alpha}_{T+2} + \mathbf{w}_{it,T+3}\boldsymbol{\alpha}_{T+3} + \mathbf{x}_{it}'\boldsymbol{\beta} + a_i + \varepsilon_{it} \quad (3)$$

Each of our analyses for rotating shift work, temporary employment and flextime are based on a different sample, since the information about all three job aspects is not available for all panel waves. While we could use all waves (1991-2008) for our analyses considering temporary employment, we had to restrict the sample for rotating shift work (wave 1-12) and

flextime (wave 9-18), as mentioned. For this reason we consider the case when w_{it} contains only one dummy variable, indicating e.g. if an individual is working in rotating shift work: x_{it} includes all other controls. $w_{it,T}$ is 1 only if individual i moved into rotating shift work during the year before t , otherwise $w_{it,T}$ is 0. To capture how long an individual is working in rotating shift work we extended our model by several dummy variables. $w_{it,T+1}$ is a dummy variable indicating that i moved into rotating shift work 1 to 2 years ago and did not move out since then. The content of $w_{it,T+2}$ is analogue. The definition of $w_{it,T+3}$ deviates from the other dummies. $w_{it,T+3}$ is 1 if the duration of rotating shift work is 3 years or longer. To allow for anticipation of changes in working conditions, we further included $w_{it,T-1}$ and $w_{it,T-2}$ which are 1 if i moves into rotating shift work the following year or within 1 to 2 years and does not work shift work at time t .

Using this model in our analysis we can only consider individuals, which were employed and thus reported job satisfaction and working conditions two years before and three years after t . In our sample individuals with low employability thus might be underrepresented, since they have higher probabilities of becoming unemployed for some time and thus must be excluded from our analysis.

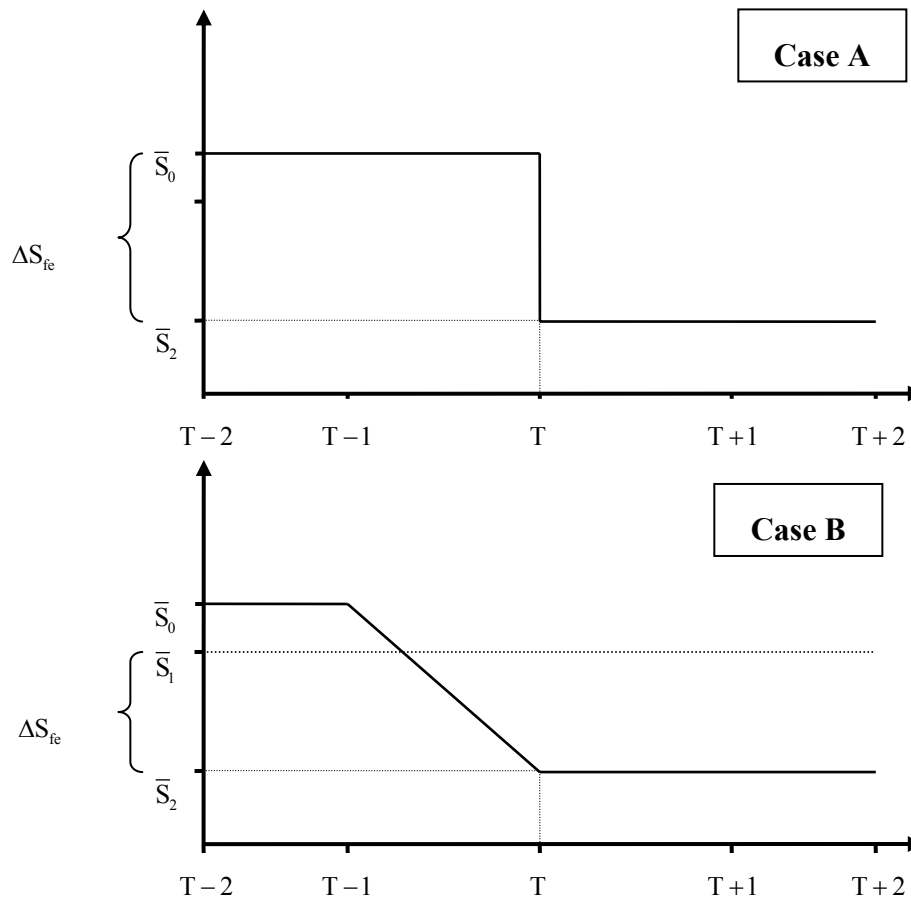
Some explanatory notes might be helpful to understand the meaning of the α -coefficients in (3). If an individual does not work in rotating shift work and will not within the two years after t , all w_{it} -dummies in (3) are 0. If an individual is working rotating shift work or will do within the coming two years, just one of all w_{it} -dummies takes on the value 1, all others are 0. E.g. α_T can therefore be interpreted as the difference in job satisfaction in the first year of rotating shift work compared to the years when no rotating shift work was done and no shift work was upcoming in the following two years. This interpretation has some implications for the evaluation of fixed-effects models which do not or not sufficiently account for anticipation and adaptation effects.

To illustrate these effects we look at two scenarios. In Case A (see Figure 2) an event at time T deteriorates working conditions from time T on without any anticipation or adaptation effects. For simplicity let us assume, that the level of S (job satisfaction) is solely determined by the observed event. Further we illustrate a situation when the individual is observed the same and relatively short period of time before and after T . Any other situation is of course possible as well. Following the change in working conditions in T , the job satisfaction of individual i drops from level \bar{S}_0 to \bar{S}_2 . Most empirical analyses based on cross sections or using fixed-effects models are interested in this difference between \bar{S}_0 to \bar{S}_2 , the permanent or long term change in satisfaction caused by an certain incentive. By not controlling for adaptation and anticipation effects these analyses implicitly assume that no adaptation or anticipation occurs as illustrated in Case A.

Our fixed-effects estimation is based on changes in satisfaction of individuals who experienced the change in working conditions. The size of a fixed-effect coefficient without accounting for adaptation and anticipation is the difference between the average satisfaction scores before and after T :

$$\Delta S_{fe} = \bar{S}_0 - \bar{S}_2$$

Figure 2 Fixed-effects estimation and the existence of anticipation and adaptation effects



Source: Own illustration.

Let us now consider a second case (see Figure 2 Case B), where we observe anticipation in job satisfaction of a negative event occurring at time T. An estimation of a fixed effects model without accounting for the anticipation effect results in comparing satisfaction levels \bar{S}_1 and \bar{S}_2 . \bar{S}_1 is the average satisfaction before T. Since the negative anticipation effect lowers average satisfaction prior to T from \bar{S}_0 to \bar{S}_1 , the estimated coefficient underestimates the absolute value of the change in satisfaction.

This was supposed to show, that even analyses which are based on individual panel data and do control for unobserved heterogeneity do yield biased results, when anticipation and adaptation effects exist, but are not accounted for. If working in rotating shift work causes a permanent and constant downward shift in job satisfaction, α_T , α_{T+1} , α_{T+2} , and α_{T+3} from (3) should take on the same value as α from model (2) (Clark et al. 2008). Thus model (2) would be adequate to capture the effect of rotating shift work on job satisfaction. If instead people adapt to rotating shift work, the size of the α -coefficients should decrease ($|\alpha_T| > |\alpha_{T+1}| > |\alpha_{T+2}| \dots$).

To test if a variable causes changes in job satisfaction, we perform two tests. A t-test after estimating model (2)

$$H_0: \alpha = 0, H_1: \alpha \neq 0$$

and a F-Test after estimating model (3)

$$H_0: \alpha_T = \alpha_{T+1} = \alpha_{T+2} = \alpha_{T+3} = 0, H_1: \text{otherwise}$$

When a variable significantly affects job satisfaction, it can be tested, if this effect is permanently or if individuals adapt to the change in working conditions. To test the hypothesis of no adaptation we estimate model (3) and do the following F-Test:

$$H_0: \alpha_T = \alpha_{T+1} = \alpha_{T+2} = \alpha_{T+3}, H_1: \text{otherwise}$$

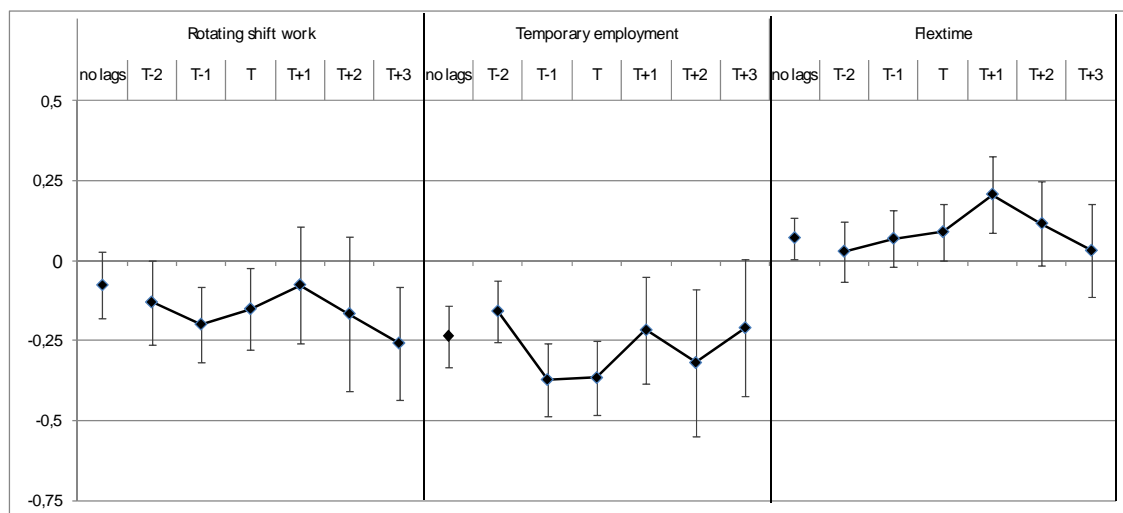
If we can reject H_0 , there is statistically significant evidence, that changes in working conditions do not constantly affect job satisfaction.

In our estimations and tests of adaptation processes, we controlled for personal and household characteristics, year of interview, job tenure, size of establishment, commuting time, union membership, occupation and industry. For a full listing of included control variables see Table 3.

6 Results

To test if certain job characteristics affect job satisfaction in a positive or negative way, we estimated a fixed effects model without anticipation and adaptation effect – model (2) – and another fixed effects model accounting for anticipation and adaptation, model (3). Figure 3 shows the coefficients from model (2), marked as “no lags” model and the adaptation process estimated in model (3) connecting the lag and lead coefficients. For all coefficients a 90% confidence interval is shown. For each of our three hypotheses we estimated model (2) and (3) based on the same sub-sample, the same individuals and years.

Figure 3: Adaptation processes for different working condtions; based on fixed-effects regressions



Source: Own illustration based calculation on BHPS waves 1 to 18 (temporary employment), waves 1 to 12 (rotating shift work), 9 to 18 (flextime); 90% confidence intervals.

In case of adaptation the absolute value of α should decrease with T. If α_T , α_{T+1} , α_{T+2} , and α_{T+3} are approximately at the same level, no adaptation can be found.

First we test H(1): “The introduction of flextime can only temporarily increase job satisfaction.” As can be seen from the right graph in Figure 3. After the introduction of flextime in T job satisfaction increases for two years. After this period the effect diminishes

and no significantly positive effect of flextime is visible anymore. A F-Test of no effect can be rejected at a 5% significance level. Even if graphical analysis indicates that adaptation occurs, using a F-Test we cannot reject the hypothesis of no adaptation to flextime ($H_0: \alpha_T = \alpha_{T+1} = \alpha_{T+2} = \alpha_{T+3}$) with reasonable type I error values. Interestingly job satisfaction is highest in the second year after introduction of flextime. This suggests that individuals need some time to adjust their behaviour to increased flexibility.

Table 1: Fixed-effects regression results; dependent variable: job satisfaction

	Rotating Shift Work		Temporary Jobs		Flextime	
no lags and leads	-0.0762 (-1.21)		-0.236*** (-4.09)		0.0710 (1.80)	
T-2	-0.13 (-1.62)		-0.158** (-2.65)		0.0288 (0.49)	
T-1	-0.199** (-2.74)		-0.372*** (-5.40)		0.0689 (1.29)	
T	-0.151 (-1.93)		-0.366*** (-5.18)		0.0896 (1.68)	
T+1	-0.0758 (-0.68)		-0.217* (-2.13)		0.207** (2.79)	
T+2	-0.166 (-1.13)		-0.319* (-2.28)		0.116 (1.44)	
T+3	-0.266* (-2.56)		-0.210 (-1.61)		0.0314 (0.36)	
Controls (see Table 3)	✓	✓	✓	✓	✓	✓
	F-Stat.	p-value	F-Stat.	p-value	F-Stat.	p-value
H_0 : No effect	2.1	0.0786	7.44	0.0000	2.42	0.0463
H_0 : No adaptation	0.81	0.4866	0.85	0.4683	1.76	0.1529
R ² within	0.	0447	0.0463		0.0487	
n (individuals)		3865	6602		4863	
n(person wave observations)		16450	36222		16315	

Note: t-ratios based on robust standard errors in parantheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. For a list of here not listed controls see Appendix Table 3.

Source: Own calculations based calculation on BHPS waves 1 to 18 (temporary employment), waves 1 to 12 (rotating shift work), 9 to 18 (flextime).

(H2) states that “*there is little adaptation to rotating shift work*”. Our estimates show negative anticipation effects, which might be explained by the fact that workers know in advance, that they will soon have to work in rotating shift work. In the first year of rotating shift work job satisfaction is 0.15 points lower. The variance of the coefficient estimates is higher for α_{T+1} and α_{T+2} , but there is no level shift. Graphically it seems that there is no adaptation. In contrast individuals working three or more years in shift work on average show lower satisfaction levels. This suggests that individuals experience rotating shift work more negatively, the longer they experience it. This effect is called ‘sensitisation’ (Frederick and

Loewenstein 1999). The test results confirm that rotating shift work negatively affects job satisfaction. The hypotheses of no adaptation² cannot be rejected. Hence our results support (H2).

(H3) “*Individuals do not adapt fully to temporary employment, thus temporary employment affects job satisfaction in the longer run*”: Estimates of the effect of temporary employment on job satisfaction show a significant negative effect at time T. At T+1 the extent of the negative effect decreases with simultaneously increasing variance. After T+1 the effect is nearly constant. It seems that there is some, but not full adaptation to temporary employment. In a F-Test of $H_0: \alpha_T = \alpha_{T+1} = \alpha_{T+2} = \alpha_{T+3}$ we cannot reject the hypothesis that there is no adaptation to temporary employment (p-value=0.4683). This supports (H3) which states that adaptation to temporary employment is not as strong as for example for flextime regulations.

7 Conclusion

Aim of this paper is to test if adaptation theory of subjective well-being also applies to job satisfaction and which job characteristics employees adapt to and which they do not adapt to. We use different measures of flexibility (rotating shift work, temporary employment, flextime) to estimate fixed-effects panel models accounting for adaptation and anticipation effects using (up to) 18 waves from the British Household Panel Survey (BHPS).

When conducting our analysis we could only draw on individuals who had a stable employment history. Modelling anticipation and adaptation effects implies that for the analysis only individuals can be used, who have stable employment biographies. Individuals, who did not report job satisfaction for at least six consecutive years, could therefore not be included. Thus in our sample individuals with low employability might be underrepresented.

Accordingly to our expectations we find a negative effect on job satisfaction for the first year of rotating shift work and for individuals working shift work for three or more years. In contrast to Janssen and Nachreiner (2004) we find that employee based flexibility as flextime regulation increases job satisfaction. However this effect is only valid for the two years following its introduction. For temporary employment we find strong negative effect on job satisfaction. Negative anticipation is found for rotating shift work and even more pronounced for temporary employment.

Our analyses show that adaptation to changes which are associated with ongoing changes of working conditions – like rotating shift work – impede individual adaptation. Temporary employment and flextime regulations, changes in working conditions, which are perceived as occurring only one time or less frequently as it is the case for rotating shift work, seem to allow for adaptation when graphically analysing the estimation results. However we cannot reject the hypothesis of no adaptation to temporary employment and flextime.

² $H_0: \alpha_T = \alpha_{T+1} = \alpha_{T+2} = \alpha_{T+3}$ states that the effect of a change in working conditions is constant. Therefore in the strict sense we conduct a test where H_0 states: There is no adaptation and no sensitisation.

8 Appendix

Table 2: Movers between working conditions in estimation samples

	Rotating Shift Work	Temporary Jobs	Flextime
T-2	279	511	571
T-1	435	549	876
T	403	531	903
T+1	200	163	398
T+2	146	74	267
T+3 or more	961	194	1111

Source: Own calculations based calculation on BHPS waves 1 to 18 (temporary employment), waves 1 to 12 (rotating shift work), 9 to 18 (flextime).

Table 3: Definitions of control variables in regression models

Variable	Definition
SATISFACTION MEASURES	
Overall job satisfaction	Scaled 1-7; highest category 7
CURRENT JOB: WORKING HOURS	
Working hours	usual weekly working hours excluding overtime
Working hours ² /100	Working hours ² /100
Overtime	hours overtime in normal week
Overtime ²	overtime ² / 100
No overtime dummy	Dummy = 1 if R does not work overtime
Paid overtime	share of paid overtime
Working time preference	(2 dummies) Assuming the same wage R prefers to work: <i>more hours</i> ; <i>fewer hours</i> ; <i>continue with same working hours</i> ; omitted category: continue with same
Working hours arrangements dummies	<i>flextime</i> ; <i>annualized hours</i> ; <i>term time only</i> ; <i>job share</i> ; <i>nine day fortnight</i> ; <i>4 ½ day week</i> ; <i>zero hours contract</i> ; <i>none of those above</i> ; omitted category: none of those above
Times of day	Times of day R usually works – 11 categories reduced to the following 5: <i>during the day</i> ; <i>evenings only</i> ; <i>at night</i> ; <i>rotating shifts</i> ; <i>mornings only</i> ; <i>[afternoons only both lunchtime/evenings, other times/day, varies/no pattern, daytime and evenings, other]</i> ; omitted category: during the day
PERSONAL CHARACTERISTICS	
Age dummies (10)	15-19; 20-24;.....; 60-64; omitted category: 35-39
Marital status dummies	(6) <i>married</i> , <i>widowed</i> , <i>separated</i> , <i>divorced</i> , <i>never married</i> , <i>living as a couple</i> ; omitted category: married

Variable	Definition
Health dummies (3)	Rs self rated health status; <i>excellent</i> , <i>good</i> (in wave I <i>good</i> includes: good and very good), <i>fair-poor</i> (wave I: fair & poor; wave J-Q: fair, poor & very poor); omitted category: <i>fair-poor</i>
Region	19 dummies for regional and metropolitan areas
HOUSEHOLD CHARACTERISTICS	
Household size dummies	Number of individuals in household: 1; 2; 3; 4; 5; 6 or more; omitted category: 1
Number of children dummies	Number of children under the age of 16 in household; 0; 1; 2; 3+; omitted category: 0
GENERAL LABOUR MARKET & CURRENT JOB:	
Part-time employment	R is <i>part-time</i> (5-29 hours per week) employed
Log wage	ln(monthly net labor income/working hours per week)
Commuting time	hours spent traveling to work door to door
Commuting time ²	Commuting time ²
Job change dummy	R changed job within 365 days before interview
Job tenure	number of years in current job
Job tenure ²	(number of years in current job) ² /100
Temporary job dummy	Rs current job is temporary
Multiple jobs dummy	R has more than one job
Establishment size dummies	Number of workers in establishment: <25; 25-199; 200+; omitted category: 200+
Union dummy	R is union member
CURRENT JOB: OCCUPATION, INDUSTRY	
Industry dummies	<i>Agriculture, hunting, forestry and fishing; mining and quarrying; manufacturing; electricity, gas and water supply; construction; wholesale and retail trade; hotels and restaurants; transport, storage and communication; financial intermediation; real estate renting and business activities; public administration and defence; education; health and social work; other community and personal service activities; private households with employed persons; extra territorial organisations and bodies</i> ; omitted category: manufacturing
Occupation dummies	Managers and administrators; professional; associate professional and technical; clerical and secretarial; craft and related; personal and protective service; sales; plant and machine operative; other
Manager dummy	R has managerial or supervisory duties
WAVE DUMMIES	Dummies for each wave included.

Source: Own compilation.

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