Lags and Leads in Life Satisfaction: A Test of the Baseline Hypothesis*

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Summary. We look for evidence of habituation in twenty waves of German panel data: do individuals, after life and labour market events, tend to return to some baseline level of wellbeing? Although the strongest life satisfaction effect is often at the time of the event, we find significant lag and lead effects. We conclude that there is complete adaptation to divorce, widowhood, birth of first child, and layoff. However, adaptation to marriage is only incomplete, and there is no adaptation to unemployment for men. In general, men are more affected by labour market events (unemployment and layoffs) than are women. Last, we find no consistent evidence that happiness provides insurance against hard knocks: those with high and low baseline satisfaction levels are broadly equally affected by labour market and life events.

Keywords: Life Satisfaction; Anticipation; Habituation; Baseline Satisfaction; Labour Market and Life Events.

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1. Introduction

One of the central questions in the analysis of subjective wellbeing (SWB) is whether people adapt to conditions. If so, then life is to some extent typified by a hedonic treadmill, in which conditions or circumstances may not, at least in the long-run, matter. This proposal, originally made by Brickman and Campbell (1971), has more recently been modified to reflect the idea that the level of adaptation or habituation might be influenced by the individual's personality (Headey and Wearing, 1989) and that the baseline set-point might be positive (Diener and Diener, 1995). However, in general the interest that the hedonic treadmill has inspired in the social sciences has not been matched by good evidence testing for its existence.

Many of the existing empirical studies are based on cross-section data and, as such, compare the experiences of different groups at the same point in time. One obvious shortcoming of such studies is that they can not shed light on whether any differences found between groups reflect initial differences in SWB, or pre-existing group differences with respect to the situation in question. For example, several studies have found that paraplegics are not that much less happy than their comparison groups. It is, however, possible that paraplegics were more likely to have a high happiness level before their accidents (for example, because of a greater likelihood of extraverts and approach-oriented people being exposed to the kinds of activities that produce spinal cord injuries). Existing longitudinal data, such as Silver's (1982) study of paraplegics, have examined relatively short time-spans (such as two months) and therefore may not have fully captured the development of adaptation.

The present study contributes to the existing literature on adaptation, but in the context of large-scale long-run panel data. By doing so, we advance from the standard literature which has very largely relied on contemporaneous correlations. Our sample of more than 130,000 person-year observations in twenty waves of German Socio-Economic Panel (GSOEP) data is large enough to identify substantial numbers of people experiencing a range of significant life and labour market events.

The use of long-term panel data has other advantages, in addition to that of the sheer brute force of large sample size. A vexed question in social science concerns the causality between SWB and various life events. For example, it is well-known that events such as unemployment and marriage have large and significant cross-section correlations with various measures of SWB. However, it seems likely that these events themselves are correlated with the individual's (past) levels of SWB: relatively unhappy people tend to become unemployed (Clark, 2003) whereas happiness increases the chances of marriage (Stutzer and Frey, 2006). The use of panel data allows us to tease out the causality between SWB and life or labour market events. In terms of theory, the above questions are absolutely key to understanding the determinants of subjective wellbeing; they are also essential for our understanding of the effects that policies (for example, with respect to unemployment or divorce) will have on people's experienced wellbeing over long time periods.

We consider six different life and labour market events: unemployment, marriage, divorce, widowhood, birth of first child, and layoff**.** Our proxy utility measure is overall life satisfaction, measured on a scale of zero to ten. We are particularly interested in the way in which wellbeing evolves around the time of marriage, entry into unemployment, and so on. A novel, and potentially important, part of our analysis is that we calculate all life satisfaction movements relative to a "baseline" level. In the graphical analysis this is given by the level of life satisfaction predicted from a fixed effects regression. In the multivariate analysis we include controls for individual fixed effects into all of the regressions. As such, we control for any individual idiosyncratic effects in reported life satisfaction.

Both bivariate (graphical) and multivariate (regression) analyses reveal that the strongest impact on life satisfaction often (but not always) appears at the time that the events in question occur. However, there are both significant lags and leads. Men are more affected than women by negative labour market events, and past unemployment and layoffs continue to be important for men for a longer time than they are for women. There are also notable differences in time scales. For some events, there is rapid and complete adaptation, while others have a lasting effect. In the regression analysis, we conclude that there is complete adaptation to four of the six events examined. The exceptions are marriage, to which adaptation is only partial, and unemployment, for which we find no evidence of adaptation for men. The anticipation of a pleasant or unpleasant event is also often an important component of individual wellbeing. Life satisfaction contains an important intertemporal dimension.

We last consider the question of whether happiness provides insurance against hard knocks. Perhaps surprisingly, we cannot find strong evidence of this: those with high baseline satisfaction are least adversely affected by unemployment, but also reap smaller rewards from marriage and children.

The remainder of the paper is structured as follows. Section 2 briefly reviews some literature on subjective wellbeing, and section 3 discusses the methodology and data. Sections 4 and 5 focus on bivariate and multivariate evidence respectively, while section 6 concludes.

2. Previous Literature

The relationship between subjective wellbeing and unemployment has recently inspired a lively literature. Some examples include Blanchflower (2001), Björklund and Eriksson (1998), Clark (2003), Clark and Oswald (1994), Di Tella *et al.* (2001), Gerlach and Stephan (1996), Goldsmith *et al.* (1996), Jürges (2006), Korpi (1997), Namazie and Sanfey (2001), Winkelmann and Winkelmann (1998), and Woittiez and Theeuwes (1998). A standard result in this literature is that unemployment is associated with lower levels of satisfaction or wellbeing, echoing the findings in the psychological and sociological literature showing that unemployment causes mental illness, depression, lower self-esteem or even suicide. An earlier review of the psychological and sociological literature can be found in Fryer and Payne (1986).

A substantial amount of theoretical work in Economics has been devoted to addiction, whereby past consumption of some good affects the utility of current consumption (Becker and Murphy, 1988), and its behavioural consequences. Addiction has typically been tested for using data on consumption of psychotropes, for example Becker *et al*. (1994). Although the keystone of Becker and Murphy's theory is utility, only little research has combined consumption data with measures of subjective wellbeing (two recent examples are Gruber and Mullainathan, 2005, and Jürges, 2001).

The concept of addiction or adaptation in the psychology literature has mostly been tested with wellbeing data from cross-sectional studies (see Frederick and Loewenstein, 1999, for a review). However, to identify movements in wellbeing relative to some baseline, large-scale panel data is arguably essential. In an early contribution, Headey and Wearing (1989) followed individuals in the Australian Panel Study over an eight-year period. After an initial strong reaction to bad and good events, individuals tended to return to baseline SWB

levels. These results are important, but still leave some questions unanswered. First, do some individuals differ in the extent of their adaptation? Second, is the degree of adaptation different for different well-defined major events? Headey and Wearing considered an aggregate of a number of events, some of which were arguably not particularly important.

A more recent small literature has appealed to panel data to model the dynamic relation between various events and subjective wellbeing, particularly looking for evidence of adaptation. Clark *et al*. (2001) find that the negative wellbeing effect of current unemployment is attenuated for those who have experienced more unemployment in the past. The psychological basis for this finding is that judgements of current situations depend on the experience of similar situations in the past, and that higher levels of past consumption or experience may offset higher current levels of these phenomena by changing expectations (see Kahneman and Tversky, 1979, and Ariely and Carmon, 2003). As Myers (1992, p.63) notes, "if superhigh points are rare, we're better off without them". Clark (2006) considers adaptation within the current unemployment spell in three panel data sets, and concludes that, broadly, unemployment starts off bad and stays bad. Lucas *et al.* (2004) use hierarchical linear modelling techniques applied to GSOEP data to conclude that any adaptation to unemployment is at best incomplete. Chi *et al*. (2006) use NLSY data to show evidence that job satisfaction bounces back after instances of job turnover.

A second set of papers has considered adaptation to marriage or divorce. Existing evidence suggests that there is an anticipation effect of marriage, and a "spike", so that the largest wellbeing effect occurs in the year of marriage; there is however some disagreement as to the extent of subsequent adaptation (Lucas *et al.*, 2003, Lucas and Clark, 2006, and Zimmerman and Easterlin, 2006). Lucas (2005) finds partial adaptation to divorce in hierarchical linear modelling analysis of the GSOEP, while Oswald and Gardner (2006) conclude that there is complete adaptation to divorce in BHPS data.

The use of subjective wellbeing measures attracts some scepticism among economists, although they are well-received by many researchers in other social science disciplines, such as psychology, sociology and management. One argument is that the cross-sectional analysis of measures of job and life satisfaction is meaningless due to the inherent non-comparability of the responses: one respondent's satisfaction of 8 (on a 0 to 10 scale, say) can mean something quite different from another respondent's 8. There is now a substantial literature in social science addressing this issue, proposing validity tests based on cross-rater or third-party evaluations, and physiological and neurological correlates of

wellbeing scores. In addition, panel data allows individuals' wellbeing scores to be related to their future behaviour: those with low job satisfaction quit more often, those with low life satisfaction divorce more often and die younger. If wellbeing responses cannot be compared, then they would have no predictive power in behavioural equations. A recent summary of validation approaches applied to wellbeing data is provided in Clark *et al*. (2006). The methods to analyse adaptation in the current paper appeal to long-run panel data in which controls for individual fixed effects are introduced. As such, all of our results come from intra-individual analyses, and are immune to problems of interpersonal comparability.

3. Methodology and Data

The empirical work is based on data from the first twenty waves of the West German sub-sample of the GSOEP, spanning the period 1984-2003 (see Burkhauser *et al.*, 2001). We mainly focus on respondents who are between 16 and 59 years of age; this yields a sample of 65,658 person-year observations for males and 65,447 person-year observations for females. For the analysis of widowhood, we extend the upper age bracket to 80, producing larger samples of 77,115 and 80,066 observations for men and women respectively. The GSOEP being panel data, there are multiple observations per individual. The data are unbalanced, in that not every person is present for all twenty waves (some leave before 2003, and some enter after 1984).

Our key variable is subjective wellbeing. This is measured by the response to the question "*How satisfied are you with your life, all things considered*"? This question is asked of all respondents every year in the GSOEP. Responses are on a eleven-point scale from zero to ten, where 0 means completely dissatisfied and 10 means completely satisfied. Table 1 shows the distribution of this satisfaction score for men and women in the GSOEP sub-samples used in our subsequent empirical analysis.

Our goal is to examine how life satisfaction responds to a number of different experiences. We consider six labour market and family events (this list is not intended to be exhaustive) that occur to a number of the sample members over the sample period: entry into unemployment, marriage, divorce, widowhood, birth of first child, and layoff. The incidence of these life events is calculated directly from the panel data, rather than using retrospective information. For example, "entry into unemployment" is defined by current labour force status being unemployment, whereas labour force status at the previous interview was not unemployment (i.e. $UN_t=1$ but $UN_{t-1}\neq 1$).

The long run of the GSOEP data yields non-negligible numbers of observations of these phenomena: these are summarised in Table 2. For men (women), we observe 981 (960) marriages, 1324 (1161) births of first child, 355 (389) divorces, and 143 (451) widowhoods. For the labour market events, the respective figures are 2132 (1917) entries into unemployment and 1417 (939) layoffs.

The panel nature of the data allows us to track individuals' reported life satisfaction both pre and post the event. Given twenty waves of panel data, we can potentially follow individuals for up to nineteen years before or after the event occurred, depending on both the calendar year in which the event occurred and how long the individual is present in the sample. In practice, the vast majority of individuals can be tracked for far shorter periods. In the statistical analysis, we restrict ourselves to four-year periods before and after the event in question. The requirement that we observe individuals for four years either following or previous to the event reduces the number of observations, but not to the point that no significant relationships can be identified. The number of events are broadly evenly split between men and women, although unemployment and layoff are somewhat more prevalent for men, and the rate of widowhood is three times higher for women than for men. These numbers are not meant to reflect the population incidence rate, as the men and women who are observed for five years continuously in the GSOEP are not representative of the population at large.

3.1. Definition of "baseline satisfaction"

The paper's title begs the definition of how to define baseline satisfaction for individual i, SB_i. We have here adopted a regression approach. We run fixed effects life satisfaction regressions, controlling for age, nationality, years of education, marital status, number of children, health, labour force status, household income, region and year. Baseline satisfaction is calculated as the predicted value of life satisfaction from this regression. This predicted value uses information from both observables (the list of right-hand side variables above) and unobservables, via the fixed effect. As such, the analysis of life satisfaction relative to baseline of those who at some stage become unemployed controls for the selection effect that unemployment tends to happen to the relatively unhappy. The analogous reverse argument can be made for marriage.

Implicit in the above definition of baseline satisfaction is the fact that we treat life satisfaction as a cardinal construct. As such, our fixed effect analysis is based on "within"

regressions. There are two practical reasons for assuming cardinality: first, linear analysis renders the results easier to interpret; and, second, panel estimation is able to appeal to the whole sample, rather than the sharply reduced sample under conditional fixed effects logits that respect ordinality (where the dependent variable is recoded to be dichotomous, and identification is based on individuals who change life satisfaction over time). Pragmatically, the cardinal and ordinal analysis of subjective wellbeing produces the same qualitative results here, as emphasised by Ferrer-i-Carbonell and Frijters (2004).

Alternative definitions of baseline satisfaction can be imagined. A previous version of the paper defined SB_i as the average life satisfaction individual *i* reported over the period five to seven years before the event took place. This reduced the sample size significantly, as it required that individuals be continuously observed for at least seven years. Equally, SB_i can be measured by the life satisfaction of "people like you" at the time that the event (marriage, unemployment, etc.) occurs, where "people like you" (appealing to the Leyden literature on reference groups) were those with the same sex, age and level of education. Both of these alternative approaches produce results that are similar to those presented below.

3.2. Hypotheses

Our objective is to measure movements in life satisfaction, before, during, and after a certain event, compared to baseline satisfaction. Our work thus differs from the vast majority of the existing literature, which considers only the contemporaneous impact of an event on subjective wellbeing. We have four main research questions.

[1] Are labour market and life events contemporaneously correlated with life satisfaction?

[2] Do past events matter?

[3] Does life satisfaction anticipate future events?

[4] Are happy people less affected by negative life events?

The first question is the least original, and has been extensively covered in existing work. The other questions are to our mind more innovative.

Note that the second question can potentially be broken up into two separate parts for those events that are entries into states. Consider entry into unemployment for example. The first part of the second question then asks if, over the whole sample and controlling for current labour market status, past entry into unemployment affects current life satisfaction.

Most social science research, with its emphasis on contemporaneous correlations, has ignored this question. The second part of the question refers to habituation: does past entry into unemployment matter for those who are still currently unemployed? In other words, does the effect of unemployment on wellbeing depend on the duration of unemployment? In practice, we only apply this distinction to unemployment in the statistical analysis. An analogous approach can be taken for marriage, divorce and widowhood: we can look at the effect of marriage three years ago for everyone who married at that time, or only for those who remained married. In practice, fewer individuals changed marital status relatively quickly than moved out of unemployment, and there was no statistical difference between the first and second parts of question number two.

The following section provides a bivariate graphical representation of the data. This will provide some answers to questions [1] through [3]. The issue of other confounding explanatory variables, and question [4], will then be addressed via multivariate analysis.

4. Lags and leads: graphs

Figures 1-6 present a first pass at the question of lags and leads. Here there are no controls: we simply track average life satisfaction (from t-4 to t+4) for those who, at time t, experience the event in question. As such, the graphs rely on the balanced sample of those who are observed from four years before to four years after the event in question; this explains why the sample sizes are smaller than those indicated in Table 2. The horizontal line represents the average level of baseline satisfaction, SB_i: statistically significant differences of life satisfaction from the baseline are marked by "*". These graphs are produced separately for men and women.

A number of general points stand out in these Figures. First, there are indeed significant movements away from the baseline satisfaction level associated with the six events analysed in this paper. Second, there is evidence of both lags and leads: the shift away from baseline satisfaction is evident both before and after the event. The peak effect is most often, but not always, located at time t=0, when the event itself actually occurs. Last, although the details differ, the general shape of changes in life satisfaction as a function of life events is similar between men and women.

Specifically, Figure 1 shows that, for men, entry into unemployment is associated with sharp movements in life satisfaction, with a peak reduction, compared to baseline, of half a point on the zero to ten life satisfaction scale. It should be emphasised that this does

not reflect selection, since both the satisfaction and baseline figures include individual fixed effects. The bottom panel of Figure 1 shows the same graph for women: the patterns are the same here, but the effects are muted. In particular, while unemployment has a negative contemporaneous effect (of about 0.3 points), there are no significant lagged effects.

Figure 2 repeats this exercise for a positive event: marriage. As might be expected (or hoped), the contemporaneous correlation between marriage and life satisfaction is positive. The lead or anticipation effect is also positive, such that the life satisfaction of those who will be married in the future is higher than their baseline, although this effect is not significant. However, the positive effects of marriage only seem to last for a couple of years. By three years after marriage, both men and women seem to have returned to their baseline level of satisfaction.

The lead effect is far more pronounced in Figure 3, where life satisfaction is sharply below its baseline level in the two years prior to a divorce. This effect is particularly large for women. After divorce, satisfaction quickly reverts to its baseline level for both sexes. The greatest life satisfaction effect of divorce for women is found two years preceding the event, whereas for men it is at the time that the divorce occurs. For men, the size of the divorce effect is about the same order of magnitude as that associated with unemployment in Figure 1. Figure 4 repeats the analysis for widowhood. As might be imagined, the contemporaneous effects of widowhood are extremely large, but what stands out is the same V-shaped curve as observed for unemployment and divorce above.

The effect of birth of first child on life satisfaction (Figure 5) differs somewhat between men and women. We see some evidence of anticipation one year before birth for men, but not for women; on the contrary, women are significantly more satisfied than their baseline level one year after birth, whereas men are not. By the time the child is aged three to four, both sexes report satisfaction significantly below their baseline levels.

Last, Figure 6 shows that being laid off is associated with lower wellbeing for both sexes. Men seem to anticipate layoff, in that their satisfaction is significantly lower one year before the event. In addition, there is evidence that layoff produces long-lasting effects on life satisfaction for men, whereas women quickly return to, and stay at, their baseline satisfaction level.

While this approach is simple, we do believe that these figures provide useful information. It is worth emphasising that, although the approach is bivariate, we still control for selection as we map out all life satisfaction changes relative to baseline. If a happy person

marries, we trace out their life satisfaction relative to their normal happiness; if an unhappy person marries, we trace out their life satisfaction relative to their normal miserableness.

These figures provide some preliminary answers to the hypotheses in section 3.2. There is clear evidence that life events are correlated with life satisfaction (question [1]); we also see anticipation (question [3]), in that there are most often significant movements in life satisfaction before the event occurs, for both men and women. Question [2] concerned habituation. Here the bivariate approach reveals its weakness for entries into states that may potentially only last for relatively short periods of time. Specifically, the figures do not reveal what happens to individuals in the years following the transition. Although the dropout rate from marriage over four years is small in these data, this is less true for those who enter unemployment, who on average will find a new job or leave the labour force relatively quickly (in terms of the figures' time scale). As such the "bouncing back" that many of the figures reveal could be either habituation, or new life events. Multivariate analysis is needed to disentangle these phenomena.

5. Regression results

In this section, we move to a multivariate analysis of lags and leads in life satisfaction, still considering the same six events. The principal reason for using multivariate, rather than bivariate, analysis is the likely presence of omitted variables (or confounding factors) which may be correlated with both life satisfaction and the life event under consideration. For example, unemployment is accompanied by a sharp fall in income: is it this movement in income that is behind the life satisfaction effects of unemployment? Alternatively, marriage and divorce tend to be concentrated at certain times of life, and many studies find a strong relationship between measures of SWB and age.

In the spirit of the graphs above, we want to know whether life and labour market events permanently shift people away from their "normal" levels of wellbeing. We present our method in detail for only one of the life events above: unemployment. The summary results for the other five life events then follow. The life satisfaction regressions in Table 3, which refer to unemployment, have three special characteristics. First, they control for individual fixed effects. Second, they control for the state variables, which are the subject of this paper (divorce, unemployment etc.). Third, they also introduce controls for the date at which the transition into the state occurred. The right-hand side variables in the regressions include nationality, education, number of children, age, household income, health, labour

force status, marital status, and region and year dummies.

The first and third columns of Table 3, which deal with lagged effects of unemployment for men and women respectively, have a number of different unemployment-related control variables. The first is the fact of being unemployed at the time of the interview. This can be considered as the long-run effect of unemployment on wellbeing, as it shows the average reduction in life satisfaction independent of the duration of the unemployment spell. A significant estimate of this long-run effect is inconsistent with complete adaptation (the hedonic treadmill suggesting that nothing matters in the long run).

There follows a set of five dummy variables under the heading "Entry into Unemployment". These indicate whether the individual reported an entry into unemployment within the past year, 1-2 years ago, 2-3 years ago, 3-4 years ago, or 4-5 years ago. Note that these variables do not *per se* inform us about current labour force status. Someone who is currently employed could quite easily have entered unemployment three years ago. The only case in which there is a one-to-one match is entry into unemployment in the past year, which by construction requires that the individual currently be unemployed (see Section 3).

To provide further information about habituation to unemployment, we also need to know the effect of date of entry into unemployment for those who still remain unemployed. This is provided by the set of four dummy variables under the heading "Interactions". These interact current unemployment with four dummies for date of entry into unemployment (from 1-2 years ago to 4-5 years ago, in steps of one year). The effect on wellbeing of an unemployment spell which started 2-3 years ago, for example, is then calculated as the sum of the coefficients on three different variables: currently unemployed; entry into unemployment 2-3 years ago (UN_{t-2}); and Unemployed* UN_{t-2} (the interaction term).

The regression results show that contemporaneous unemployment is associated with significantly lower wellbeing, as is almost always found in the literature. There is therefore not complete adaptation to unemployment, as it is still associated with long-run lower life satisfaction. Second, the estimated coefficients on the four past entry into unemployment variables all attract negative coefficients. Specifically, any entry into unemployment within the past three years is associated with significantly lower current life satisfaction for both men and women, with the effect being larger the more recent was the entry into unemployment. Those who entered unemployment in the past could of course be currently occupying any kind of labour market position: employed, unemployed, or inactive: this will be picked up by the "Current Status" variables.

We expect the life satisfaction effect of past entry into unemployment to depend on whether the individual is still unemployed today. The "interactions" set of unemployment dummies in columns one and three tests whether the effect of past unemployment depends on current unemployment status. There are four of these interactions, defined as (Unemployment)*(UN_{t-k}), for k=1 to 4. As explained above, by construction all of those who entered unemployment within the past year are currently unemployed.

The first three of these dummy variables attract negative and significant coefficients for men. For women, only the first of the interactions is significant. The additional SWB effect of recent entry into unemployment for the currently unemployed is thus given by the sum of the respective "Entry into unemployment" and "Interaction" variables. It is noticeable that for men this sum is consistently around -0.3, and if anything, becomes larger over time, so that there is little evidence of habituation to unemployment for men. For women, the estimated coefficients are typically less well defined, but there is some evidence that unemployment of short duration has a somewhat larger effect on wellbeing than unemployment of longer duration: there is some habituation to unemployment for women.

The conclusions from this analysis of lagged unemployment are therefore threefold:

- Current unemployment hurts;
- Past unemployment reduces SWB for those who are <u>not</u> currently unemployed;
- There is little evidence of habituation to unemployment for men: unemployment starts off bad and stays bad (see also Clark, 2006). There is some evidence of habituation for women.

Regression tables can be difficult to decode. The text table below illustrates the estimated wellbeing effect of various types of labour force histories for men. These are all relative to the omitted category (representing the zero): someone who is inactive in the labour force, who has not been unemployed over the past four years, and will not become unemployed in the next four years.

The estimated effect of unemployment on life satisfaction: Males

	Current status	*Lags/leads*	*Interactions*	***Total***
Employed; no past or future unemployment	0.269	0	0	0.269
Employed; was unemployed with spell starting 1-2 years ago	0.269	-0.112	0	0.157
Employed; was unemployed with spell starting 3-4 years ago	0.269	-0.021	0	0.248
Unemployed; spell started less than 1 year ago	-0.523	-0.345	0	-0.869
Unemployed; spell started 1-2 years ago	-0.523	-0.112	-0.281	-0.916
Unemployed; spell started 3-4 years ago	-0.523	-0.021	-0.367	-0.911

This table illustrates two key points.

- The effect of unemployment on wellbeing is largely independent of its duration (compare lines 4 through 6).
- Past unemployment reduces the wellbeing of the currently employed (lines 1 and 2), but only if it is recent (lines 1 and 3).

Columns 2 and 4 in Table 3 present the effect of **future** unemployment on current life satisfaction (lead effects). There are no "current status" or "interactions" variables in these regressions as the risk group for future unemployment consists only of those who are currently employed. Those who will enter unemployment within the next year report significantly lower levels of life satisfaction. The size of the effect is larger for men than for women.

- Future unemployment significantly reduces both men's and women's current wellbeing.

All regressions include a full set of demographic controls. The estimated coefficients should be interpreted bearing in mind that these regressions include fixed effects, so that the results do not represent selection of the unhappy into unemployment. There is a positive correlation between life satisfaction and household income, and particularly with individual health. The marital status variables are significant in the expected direction.

The remainder of this section considers the other five life events. The key regression results are summarised in Table 4. For simplicity's sake, the lag and lead results are presented in the same column (rather than in separate columns, as in Table 3), although they actually come from two separate regressions. Reading the regression coefficients from the second line to the bottom in each column provides the multivariate equivalent of the Figures discussed above. The first line refers to current status, and measures the long-run effect of the state in question, and thus shows whether adaptation is complete. This does not apply to layoff, which is a transition rather than a state.

The first two columns refer to marriage. Current marriage is positively correlated with life satisfaction: this is represented as the "Long-run Effect", and the coefficient corresponds closely to that on "marriage" in Table 3. The fact that this is positive and significant suggests that there is not complete adaptation to marriage. In addition to this positive long-run effect, recent marriage (within the past two years) is associated with an extra boost to life satisfaction. As such, there is some, but not complete, habituation to marriage. There is no strong evidence of lead effects.

The long-run effect of divorce is not significant, so that habituation seems complete. However, a very recent divorce is associated with lower life satisfaction for men, but not for women; there is even evidence that women who divorced four to five years ago are significantly more satisfied with their lives. Divorce is where we find the strongest lead effects: two years for women and three years for men (and even four years for women at the ten per cent level).

The next set of regression results refers to widowhood. Whilst the long-run effect is zero, or even positive for women, the short-run effects are large and negative for both sexes. As such, widowhood has a sharp negative impact effect which largely dissipates over a three-year period. There thus seems to be complete habituation to widowhood in this data. We recognise that cell sizes are small here, especially for widowers, but this cannot explain why the estimated lag coefficients should start negative but then turn positive.

The next set event is more positive: birth of first child. The long-run effect here refers to the estimated coefficient on the variable "number of children": this is insignificant for men, but negative and significant for women. Significant positive lag effects are found for one year for men, and for two years for women. However, by the time one's first child is 4-5 years old, the estimated coefficients are negative for both men and women. There is a one-year lead effect of birth of first child for men, but not women, as in Figure 5.

Last, there is a negative effect of past layoff for men for two years. As the graphs above suggested, layoffs affect women to a lesser extent. While the one-year lag effect is negative, some of the estimated coefficients on longer lags are actually positive. It should be remembered that all of these regressions control for a large number of individual characteristics, including household income. One of the main interests of the economic literature on layoffs has been the income implications. This is controlled for in the regressions, so that the we are picking up the non-pecuniary psychological impact of past layoff. We find lead or anticipation effects of layoffs for both sexes.

Our fourth research question concerned the potential insurance effects of happiness: are the happy hurt less by negative life events? We analyse this question by taking the estimated fixed effect as a measure of each individual's baseline satisfaction. We then interacted the fixed effect with the lagged variables in Tables 3 and 4, to see if those with "happy personalities" do better. The results are not particularly conclusive, in that most of the interactions attracted insignificant coefficients. We did find an insurance effect with respect to unemployment: those with high baseline wellbeing suffered less when unemployed. However, there is also some evidence that it is those with lower levels of baseline wellbeing who experienced the greatest satisfaction boost from marriage and birth of first child. The questions of which groups are more or less affected by life events, and which groups adapt faster, remain open.

In terms of our research questions, we arguably already knew the answer to Number 1, and Table 3 showed that, as expected, unemployment and widowhood reduce life satisfaction, while the married report higher levels of life satisfaction. Question 2 asked about habituation. We conclude that there is habituation for all of the events we have analysed, bar one. Habituation can be seen in the graphs by the largest satisfaction impact being at the time of the event; in the regression tables it is shown by the estimated coefficients on the event having occurred recently being larger in absolute value than the estimated coefficients on the longer lag variables. The significance of the estimated coefficient on the "Long-Run Effect" reveals whether habituation is complete or not.

Question 3 concerned anticipation. Tables 3 and 4 revealed that even in multivariate analysis we find evidence of anticipation for every event, although the length of the anticipatory period varies. Finally, Question 4 remains largely unanswered: happiness does not necessarily provide insulation against the effect of negative experiences.

There are as a general rule only few differences between the graphs and the regression Tables. As such, movements in labour force status, income and health are largely irrelevant for explaining the degree of adaptation. One important exception is unemployment, where the effect of past entry into unemployment depends crucially on the individual's current labour force status. Another is layoffs, where the graphs suggested long-run effects for men, but the regressions do not. Further investigation showed that it was the presence of labour force status dummies in the regression that was behind this difference. As such, one reason for the long-run effect of layoffs in the raw data is that they are associated with future unemployment. No such effect exists for those who find another job. The layoff regressions also suggest a positive effect of past layoff for women. We have no clear idea why this comes about, although it seems to be restricted to older women only.

The table below summarises our findings with respect to anticipation and adaptation.

	Men		***Women***	
	Anticipation	*Adaptation*	*Anticipation*	*Adaptation*
Unemployment	1 Year	None	1 Year	Some
Marriage	2 Years	Some	None	Some
Divorce	3 Years	Full	4 Years	Full
Widowhood	2 Years	Full	3 Years	Full
Birth 1st Child	1 Year	Full	None	Full
Layoff	1 Year	Full	2 Years	Full

These numbers come from Tables 3 and 4, including significance at the ten per cent level for the lead figures. Men are more affected by labour market events than women, both in terms of the size of the effect, and, for unemployment, the degree of adaptation. However, in general men and women are quite similar. The birth of first child provides a larger satisfaction boost to women than to men when it happens, but four years later both sexes are equally unhappy.

There is full adaptation by both sexes to four of the six events. The exceptions are marriage, for which we find only partial habituation, and unemployment. This is the only event for which a substantial sex difference in adaptation appears, with women showing some adaptation, but men showing essentially no adaptation over the first four years of unemployment.

6. Conclusion

This paper has used twenty waves of the GSOEP to examine the relationship between life satisfaction and past, contemporaneous, and future labour market and life events. We apply the same analytical techniques to evaluate the degree of anticipation and adaptation to unemployment, marriage, divorce, widowhood, birth of first child, and layoff. The results, both bivariate and multivariate, provide strong evidence for both lag and lead effects of events on current life satisfaction. There are, however, differences in time scales. For some events, there is a rapid return to baseline satisfaction, while others (marriage and unemployment) have lasting effects. Similarly, the anticipation of a pleasant or unpleasant event is often a very important explanatory factor of an individual's current level of wellbeing. We believe that this represents some of the first large-scale evidence of effects of habituation and anticipation in life satisfaction with respect to a variety of important life events.

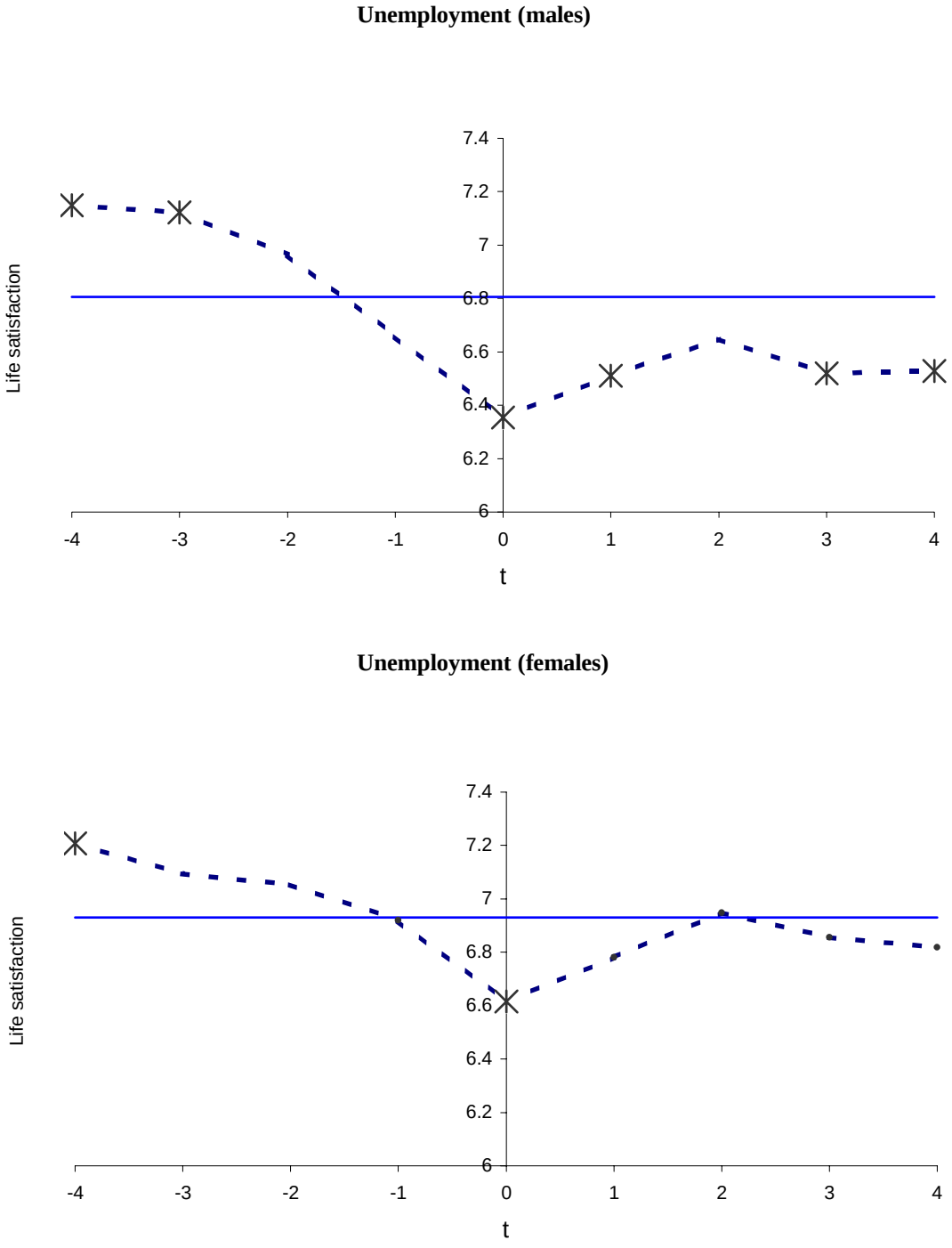
We have uncovered significant differences between men's and women's life satisfaction in terms of the relationships with both past and future labour market events. Last, we have considered the question of whether "happier" individuals (those with a larger value of the fixed effect in life satisfaction equations) are less affected by adverse life events, although we have not produced a definitive answer.

We have only started to scratch the surface of what can be done with large-scale long-run panel data including subjective wellbeing variables. Our most general conclusion is that research that seeks to relate measures such as life satisfaction only to an individual's labour force and marital status at a point in time is in danger of missing important information. Just as the word "life" implies a long-term process, life satisfaction seems to contain an important intertemporal dimension.

FIGURES

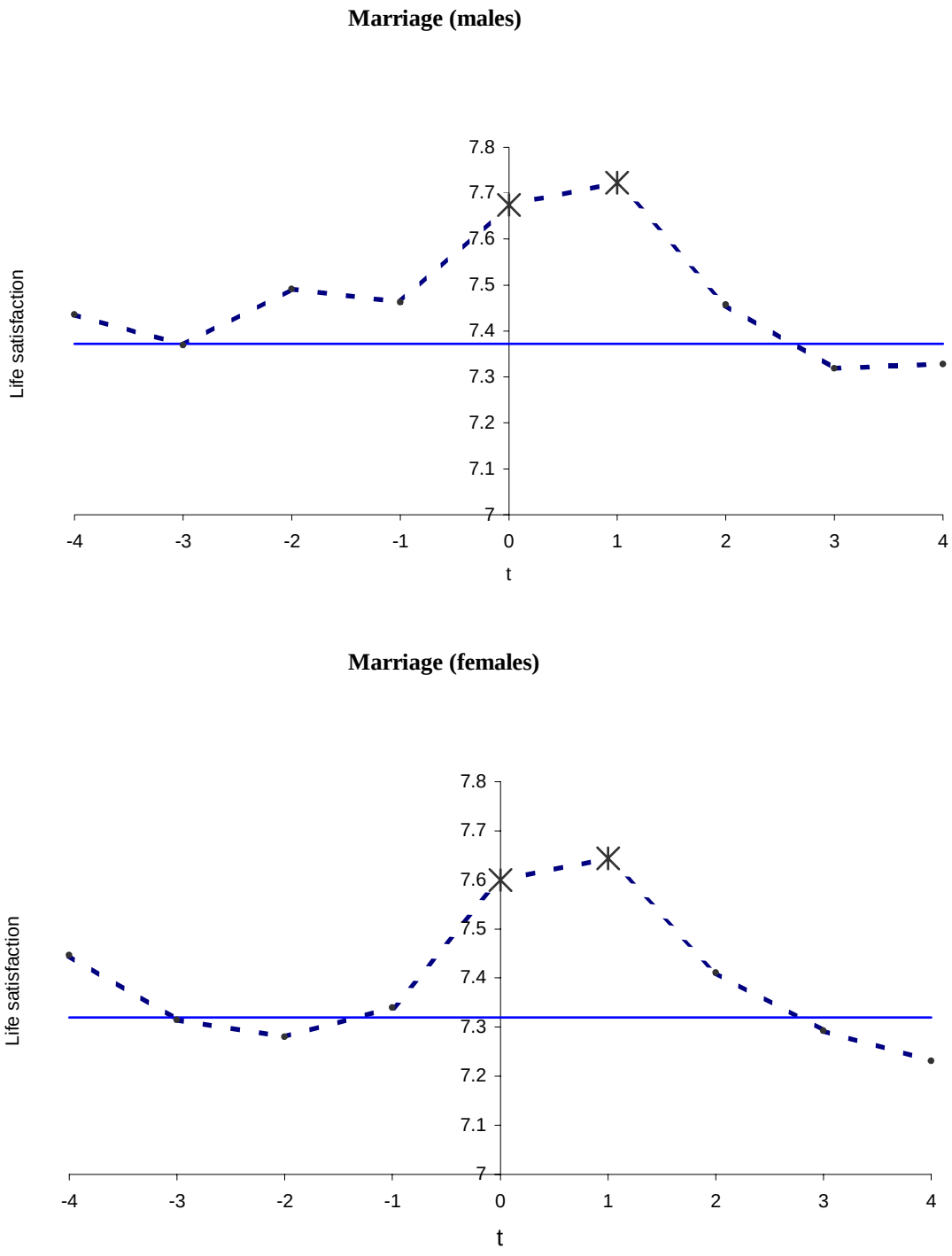
Note to all Figures: * indicates significance at the 5% level.

Figure 1. Unemployment and life satisfaction.



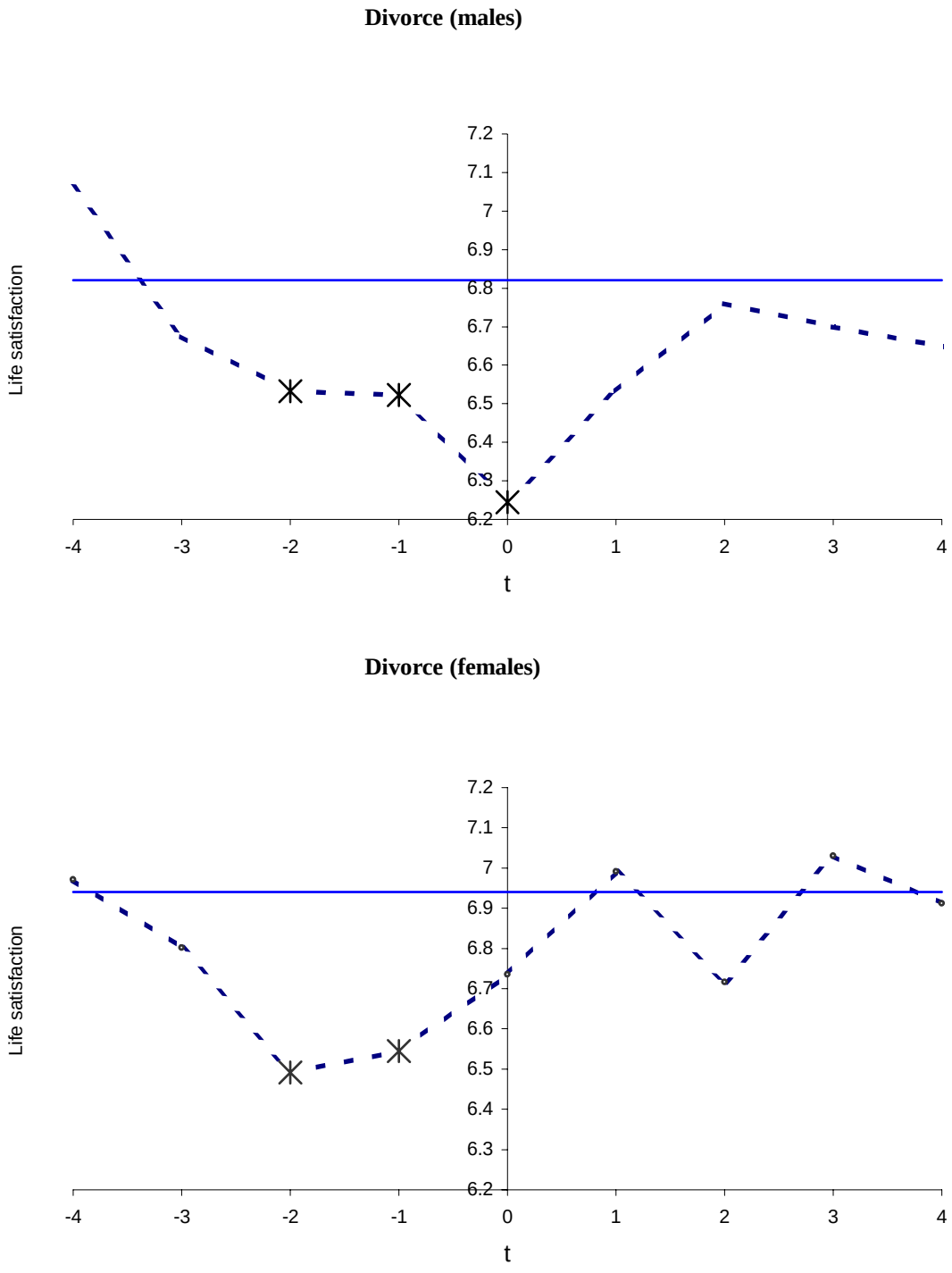
Note: Based on 283 and 383 observations for men and women respectively

Figure 2. Marriage and life satisfaction.



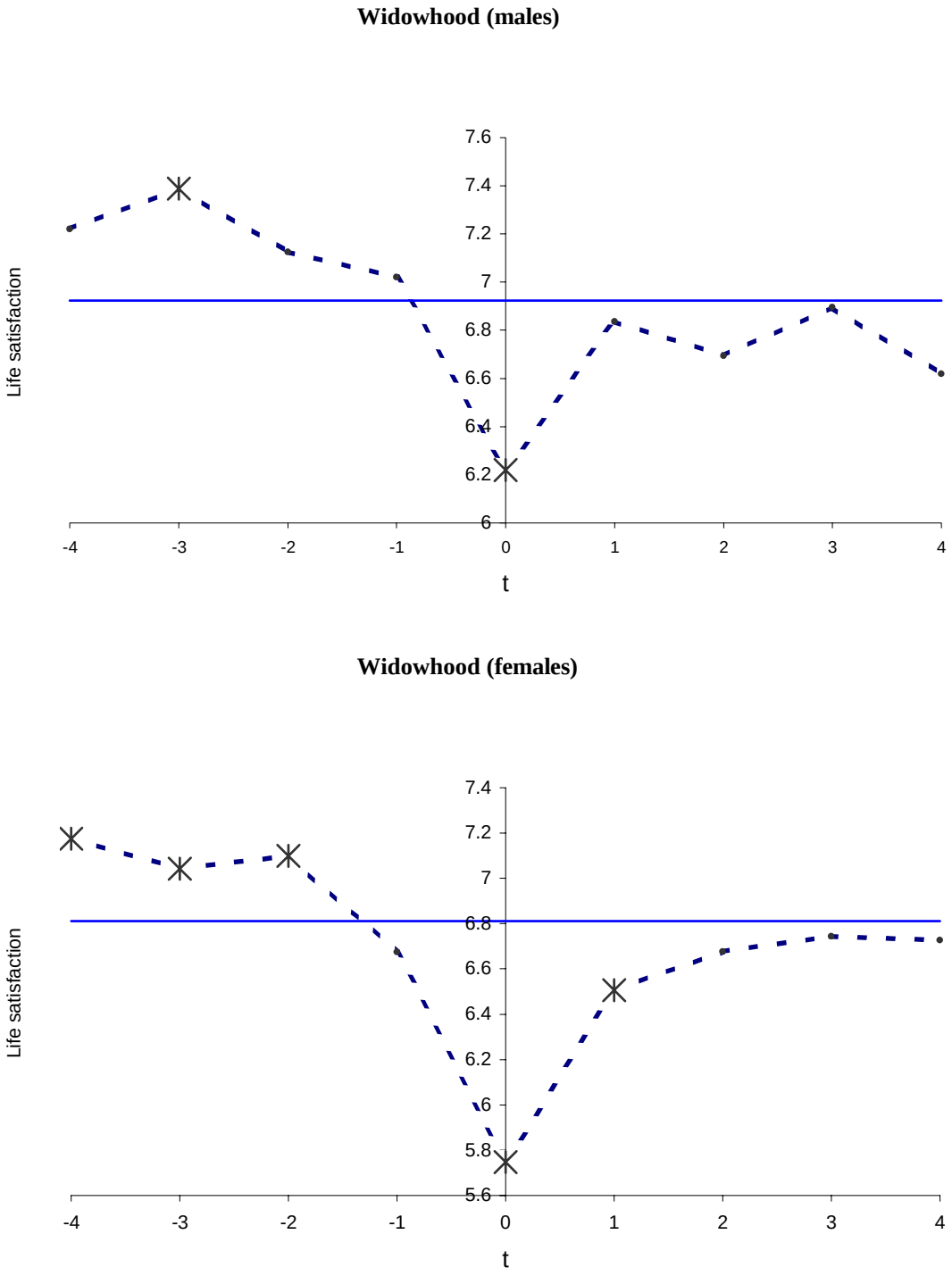
Note: Based on 279 and 261 observations for men and women respectively

Figure 3. Divorce and life satisfaction.



Note: Based on 103 and 120 observations for men and women respectively

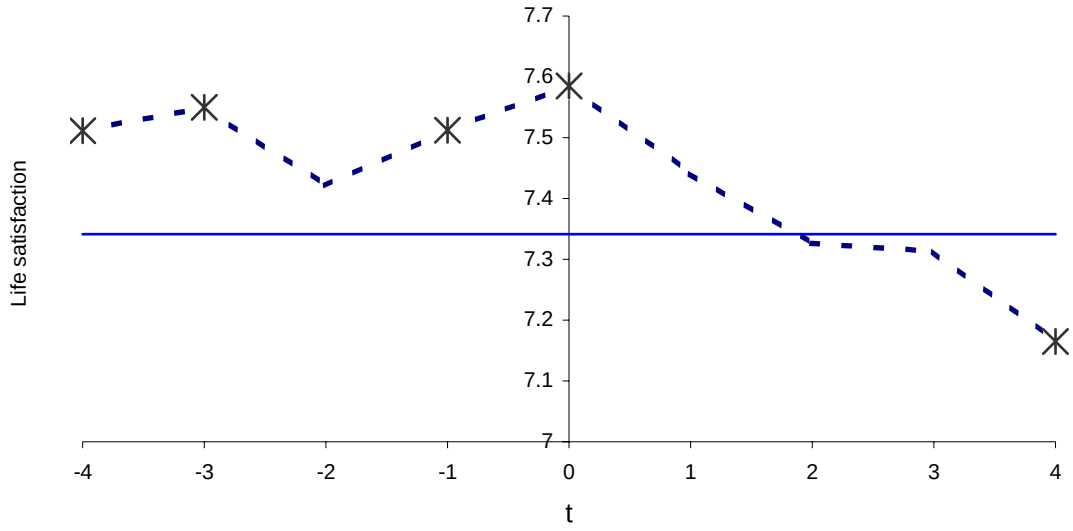
Figure 4. Widowhood and life satisfaction.



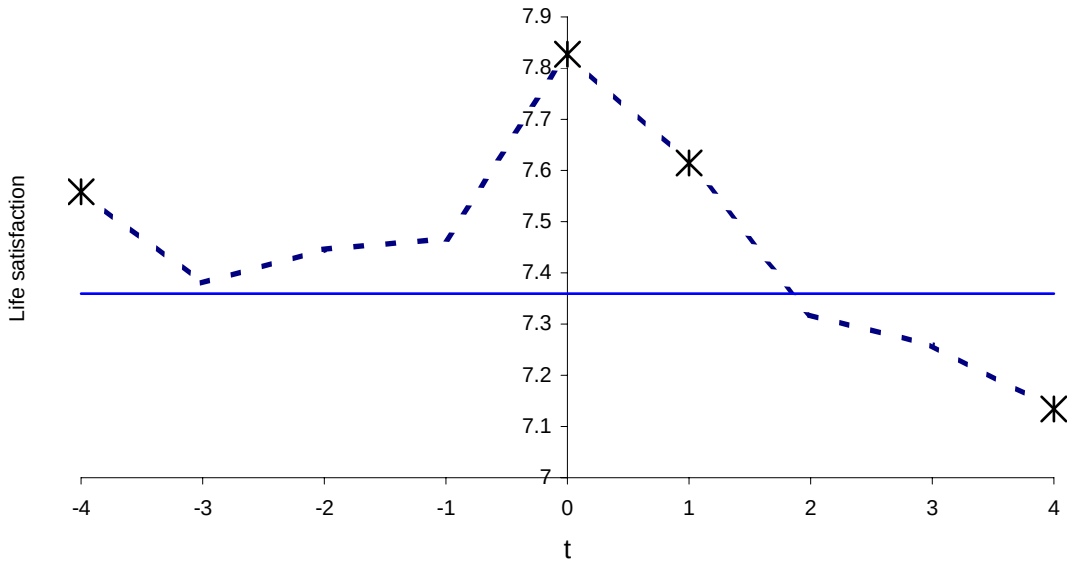
Note: Based on 55 and 207 observations for men and women respectively

Figure 5. Birth of first child and life satisfaction.

Birth of first child (males)

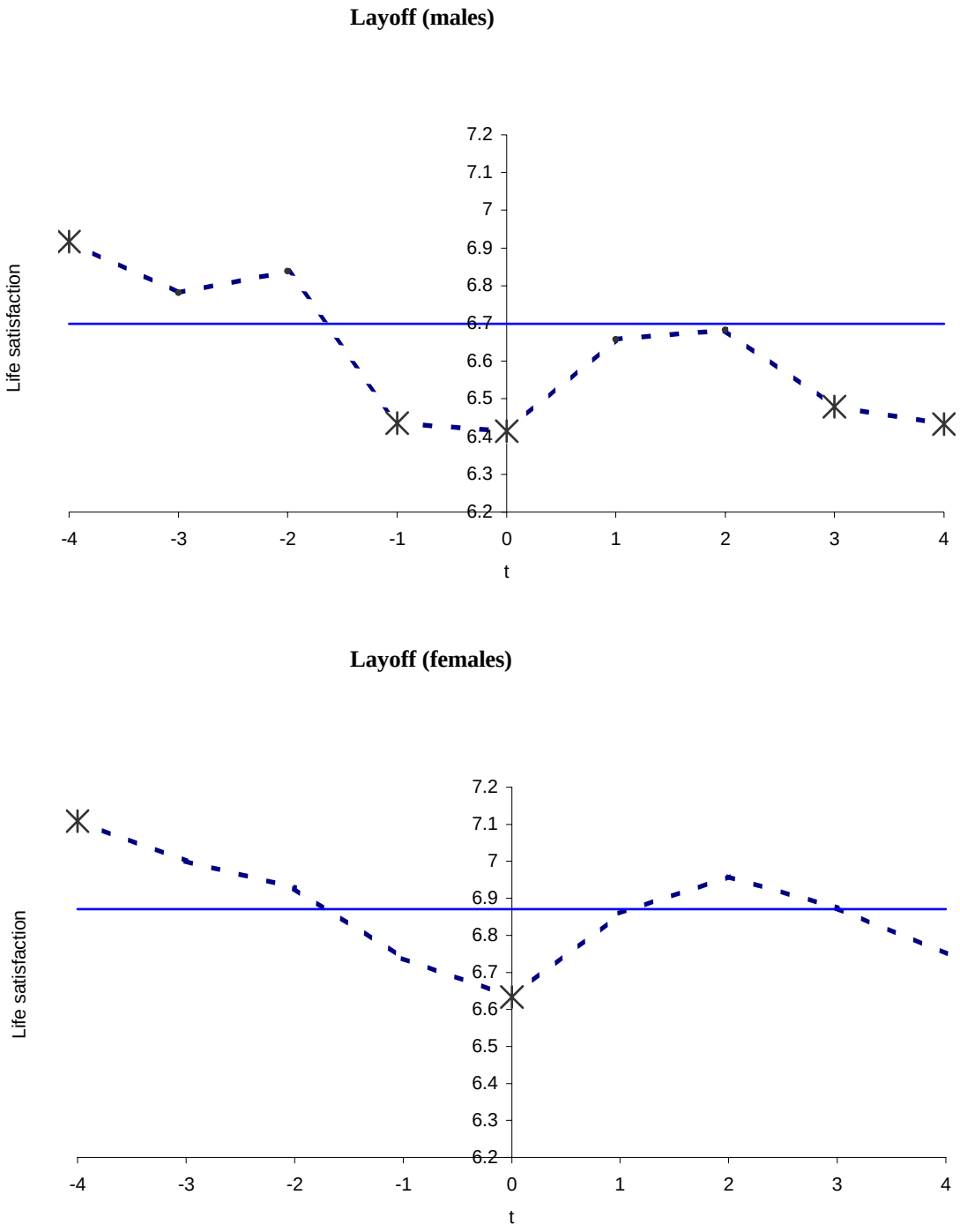


Birth of first child (females)



Note: Based on 322 and 305 observations for men and women respectively

Figure 6. Layoffs and life satisfaction.



Note: Based on 229 and 221 observations for men and women respectively

Table 1. The distribution of life satisfaction

Life satisfaction	Males				Females			
	(Age 16-60)		(Age 16-80)		(Age16-60)		(Age16-80)	
	Count	%	Count	%	Count	%	Count	%
0	337	0.51	418	0.54	347	0.53	462	0.58
1	271	0.41	331	0.43	257	0.39	349	0.44
2	690	1.05	842	1.09	664	1.01	879	1.10
3	1432	2.18	1672	2.17	1473	2.25	1809	2.26
4	2020	3.08	2377	3.08	2097	3.20	2641	3.30
5	6874	10.47	8195	10.63	7494	11.45	9532	11.91
6	6927	10.55	8113	10.52	6567	10.03	8156	10.19
7	14290	21.76	16434	21.31	13357	20.41	15906	19.87
8	20206	30.77	23566	30.56	19694	30.09	23634	29.52
9	7929	12.08	9150	11.87	8423	12.87	9852	12.30
10	4682	7.13	6017	7.80	5074	7.75	6846	8.55
Total	65658	100.00	77115	100.00	65447	100.00	80066	100.00

Table 2. Number of occurrences of events in the analysis sample of the GSOEP

	Males	Females
Entry into unemployment	2132	1917
Marriage	981	960
Divorce	355	389
Widowhood	143	451
Birth of first child	1324	1161
Layoff	1417	939

Notes: Number of events for those aged 16-60. Widowhood occurrence refers the sample aged 16-80.

Table 3. The Effect of Entry into Unemployment on Life Satisfaction. Fixed Effect Regressions.

		Males		Females	
		Lags	*Leads*	*Lags*	*Leads*
Constant		7.344**	7.495**	7.137**	6.932**
		(0.201)	(0.251)	(0.211)	(0.326)
Current status	Employed	0.259**		0.035+	
		(0.024)		(0.018)	
	Unemployed	-0.520**		-0.430**	
		(0.044)		(0.046)	
Future Unemployment	3-4 Years hence		-0.220**		-0.094+
			(0.041)		(0.049)
	2-3 Years hence		-0.012		-0.058
			(0.040)		(0.048)
	1-2 Years hence		-0.043		0.023
			(0.039)		(0.047)
	Within the next year		0.026		0.039
			(0.038)		(0.046)
Entry into Unemployment	Less than one year ago	-0.327**		-0.143**	
		(0.037)		(0.040)	
	1-2 Years Ago (UN_{t-1})	-0.085*		-0.126**	
		(0.039)		(0.042)	
	2-3 Years Ago (UN_{t-2})	-0.091*		-0.063	
		(0.037)		(0.040)	
	3-4 Years Ago (UN_{t-3})	-0.005		-0.001	
		(0.037)		(0.039)	
	4-5 Years Ago (UN_{t-4})	-0.062+		-0.009	
		(0.036)		(0.038)	
Interactions	(Unemployed) × UN_{t-1}	-0.295**		0.160+	
		(0.081)		(0.089)	
	(Unemployed) × UN_{t-2}	-0.141		0.063	
		(0.090)		(0.102)	
	(Unemployed) × UN_{t-3}	-0.368**		-0.173	
		(0.095)		(0.113)	
	(Unemployed) × UN_{t-4}	-0.407**		0.167	
		(0.101)		(0.132)	
German national		-0.068	-0.086	0.110	0.169
		(0.075)	(0.086)	(0.078)	(0.108)
Education (years)		-0.014*	0.007	0.022**	0.041**
		(0.007)	(0.010)	(0.007)	(0.013)
Number of children		-0.016	-0.030**	-0.049**	-0.068**
		(0.010)	(0.010)	(0.011)	(0.015)
Age 16-20		0.282**	0.082	0.039	-0.088
		(0.047)	(0.066)	(0.049)	(0.077)
Age 21-30		0.019	-0.007	-0.028	-0.064+
		(0.028)	(0.028)	(0.028)	(0.037)
Age 41-50		-0.061*	-0.045	-0.033	-0.056
		(0.028)	(0.028)	(0.029)	(0.036)
Age 51-60		-0.077	-0.066	-0.043	-0.078
		(0.047)	(0.047)	(0.048)	(0.061)
Household income/1000		0.003**	0.002**	0.003**	0.002**
		(0.001)	(0.001)	(0.001)	(0.001)
Medium Health		-0.273**	-0.288**	-0.279**	-0.263**
		(0.020)	(0.021)	(0.019)	(0.025)
Major Health Problems		-0.804**	-0.770**	-0.843**	-0.703**
		(0.037)	(0.044)	(0.036)	(0.051)
Married		0.168**	0.206**	0.197**	0.086*
		(0.030)	(0.032)	(0.032)	(0.041)
Separated		-0.455**	-0.462**	-0.325**	-0.209**
		(0.057)	(0.059)	(0.058)	(0.071)
Divorced		0.049	0.093+	0.035	0.088
		(0.050)	(0.052)	(0.051)	(0.061)
Widowed		-0.317*	-0.072	-0.198*	-0.169
		(0.128)	(0.141)	(0.080)	(0.104)
Number of Observations		65658	51910	65447	35975
Number of Individuals		7504	6551	7389	5238

Notes: Standard errors in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%; all regressions include, region (federal lands) and year dummies; reference categories: out-of-the labour force, age 31-40, never married.

Table 4. The Effect of Life and Labour Market Events on Life Satisfaction. Fixed Effect Regressions.

	Marriage		Divorce		Widowhood		Birth of First Child		Layoff	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Long-Run Effect	***0.179****	***0.172****	***0.077***	***0.024***	***-0.015***	***0.136****	***-0.005***	***-0.028****	***NA***	***NA***
	(0.036)	***(0.039)***	***(0.053)***	***(0.039)***	***(0.099)***	***(0.061)***	***(0.010)***	***(0.011)***		
3-4 Years hence	-0.075	0.017	0.035	-0.151+	0.032	-0.003	-0.005	0.007	-0.010	-0.005
	(0.051)	(0.051)	(0.078)	(0.081)	(0.108)	(0.076)	(0.043)	(0.046)	(0.048)	(0.062)
2-3 Years hence	0.015	-0.033	-0.205**	-0.154+	0.040	-0.180*	0.015	-0.028	-0.081+	-0.031
	(0.050)	(0.052)	(0.078)	(0.081)	(0.116)	(0.076)	(0.043)	(0.046)	(0.047)	(0.062)
1-2 Years hence	0.101*	-0.023	-0.279**	-0.389**	-0.243*	-0.124+	0.027	-0.065	-0.027	-0.105+
	(0.050)	(0.052)	(0.078)	(0.081)	(0.121)	(0.076)	(0.043)	(0.046)	(0.046)	(0.061)
Within the next year	0.055	0.023	-0.216**	-0.364**	-0.239+	-0.519**	0.099*	-0.002	-0.137**	-0.145*
	(0.050)	(0.053)	(0.081)	(0.084)	(0.127)	(0.076)	(0.043)	(0.045)	(0.047)	(0.061)
Less than one year ago	0.294**	0.232**	-0.336**	-0.129	-0.943**	-1.008**	0.258**	0.408**	-0.231**	-0.099+
	(0.049)	(0.052)	(0.081)	(0.080)	(0.141)	(0.080)	(0.042)	(0.046)	(0.042)	(0.051)
1-2 Years Ago	0.219**	0.297**	-0.024	0.081	-0.088	-0.355**	0.026	0.267**	-0.070+	0.139**
	(0.051)	(0.054)	(0.081)	(0.082)	(0.128)	(0.077)	(0.042)	(0.046)	(0.041)	(0.050)
2-3 Years Ago	0.034	0.063	0.011	-0.034	-0.098	-0.092	-0.009	-0.015	0.033	0.075
	(0.049)	(0.053)	(0.079)	(0.083)	(0.123)	(0.077)	(0.042)	(0.046)	(0.042)	(0.050)
3-4 Years Ago	0.044	0.048	0.027	0.110	0.034	0.084	-0.027	-0.008	0.001	0.162**
	(0.049)	(0.053)	(0.078)	(0.082)	(0.116)	(0.076)	(0.041)	(0.046)	(0.042)	(0.049)
4-5 Years Ago	-0.011	0.017	-0.116	0.126	0.077	0.089	-0.082*	-0.082+	-0.048	0.059
	(0.048)	(0.052)	(0.079)	(0.080)	(0.110)	(0.077)	(0.041)	(0.046)	(0.043)	(0.049)

Notes: Standard errors in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%; other control variables as in Table 3.

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