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LAGS AND LEADS IN LIFE SATISFACTION: A TEST OF THE BASELINE HYPOTHESIS*

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We look for evidence of habituation in twenty waves of German panel data: do individuals tend to return to some baseline level of well-being after life and labour market events? Although the strongest life satisfaction effect is often at the time of the event, we find significant lag and lead effects. We cannot reject the hypothesis of complete adaptation to marriage, divorce, widowhood, birth of child and layoff. However, there is little evidence of adaptation to unemployment for men. Men are somewhat more affected by labour market events (unemployment and layoffs) than are women but in general the patterns of anticipation and adaptation are remarkably similar by sex.

One of the central questions in the analysis of subjective well-being (SWB) is whether people adapt to conditions. If this is the case, then life is to some extent typified by a hedonic treadmill, in which conditions or circumstances may not matter, in the long run at least. This proposal, originally made by Brickman and Campbell (1971), has more recently been modified to reflect the idea that the degree of adaptation or habituation might be influenced by individual personality (Headey and Wearing, 1989) and that the baseline set-point might be positive (Diener and Diener, 1996). However, in general the broad interest that the issues of adaptation and the hedonic treadmill has inspired across the social sciences has not always been matched by good evidence of its existence or extent.[1]

Many of the existing empirical studies of adaptation 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 cannot 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). Some existing longitudinal analysis, such as Silver's (1982) study of paraplegics, has covered relatively short time-spans (such as two months) and may therefore not have fully captured the development of adaptation.

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[1] A second key interest across economics and psychology is whether individuals mispredict any adaptation that occurs, and in which domains (health, income, commuting etc.).

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 often relied on contemporaneous correlations. Our analysis sample of over 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, and to follow the evolution of their life satisfaction as they do so.

The use of long-run 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. The above questions would seem key to our understanding of the determinants of subjective well-being; they are also essential for evaluating the effects of policy (for example, with respect to unemployment or divorce) on individuals' experienced well-being over long time periods.

We consider six different life and labour market events: unemployment, marriage, divorce, widowhood, birth of child and layoff. We are particularly interested in the way in which life satisfaction evolves around the time of marriage, entry into unemployment and so on. In this respect we distinguish two separate phenomena: anticipation and adaptation. The latter will pick up whether individuals tend to return to some baseline satisfaction level.

The same empirical approach is followed for all six events. We evaluate the extent of adaptation to marriage (for example) by including a set of marriage duration variables in a life satisfaction regression. These include dummies for recent marriage (in the past 12 months, the past 1–2 years etc.), as well as a 'long-run' marriage variable (married five or more years ago).

It is useful to distinguish two polar cases. If there is no adaptation at all to marriage (it starts good and stays good) then the estimated coefficients on all of the marriage dummies should be roughly the same. The positive effect associated with marriage will not then depend on marriage duration, or, in other words, there will be no satisfaction boost from recent marriage. Alternatively, if there is adaptation, then recent marriage will have a greater effect on satisfaction than more distant marriage. In the polar case of complete adaptation, there will be no significant effect of more distant marriage on satisfaction. It is important to note that we include individual fixed effects in these regressions, so that we effectively follow the same individual over time.

The second phenomenon is anticipation. This is dealt with empirically by looking at the coefficients on a series of lead variables (will marry in the next 12 months, in the next 1–2 years etc.). Again, a fixed effect is introduced, so that any positive effect of these lead variables will pick up anticipation rather than selection (where it is the inherently happy who are more likely to marry).

The analysis reveals 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 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 longer-lasting effect. We conclude that there is complete adaptation to five of the six events examined. The exception is unemployment, for which we find only little evidence of adaptation. The anticipation of a pleasant or unpleasant event is also often an important component of individual well-being. Life satisfaction contains an important intertemporal dimension.

The remainder of the article is structured as follows. Section 1 briefly reviews some literature on subjective well-being and Section 2 discusses the methodology and data. Section 3 describes our regression evidence for anticipation and adaptation, and Section 4 concludes.

1. Previous Literature

Over the past ten years economists have shown increasing interest in the analysis of subjective well-being data. As noted by Clark *et al.* (2008), one ECONLIT measure of this literature over the period 1960–2006 reveals that 61% of publications have appeared since 2000, and a remarkable 37% over the period 2004–6. This literature now covers a wide range of different issues, although it is probably true that the relationship of well-being to income and unemployment has been given a particular amount of attention, and there is growing interest in the relationship with marital status. Useful surveys of some of this literature can be found in Layard (2005) and Offer (2006).

The majority of the empirical literature modelling well-being has considered contemporaneous correlations;[2] this is likely to be as true in economics as in other social science disciplines such as sociology and psychology. Only a relatively few papers have used large-scale panel data to consider the time profiles of subjective well-being around the time of an event (for example, divorce, unemployment, or a rise in income): this is the approach that we take in the current article.[3]

In this broad intertemporal context, we are particularly interested in adaptation: do the good (bad) effects of positive (negative) life events dissipate over time? The psychological basis of adaptation is that judgements of current situations depend on the experience of similar situations in the past, so that higher levels of past experience may offset higher current levels of these phenomena due to changing expectations (Kahneman and Tversky, 1979; Ariely and Carmon, 2003).[4]

[2] This holds despite the increasing use of panel data in well-being research, where transitions (and thus durations) can be observed directly from previous waves. Panel data has been used more to control for a fixed effect than to analyse time profiles.

[3] Panel data also have the advantage of modelling adaptation within the same individual, rather than comparing two different individuals, one of whom has been married for two years while the other has been married for five years. Economists call the former fixed-effect analysis while psychologists refer to within-subject analysis.

[4] Adaptation produces a negative intertemporal intrapersonal externality: as Myers (1992, p. 63) notes, 'if superhigh points are rare, we're better off without them'. The notion of adaptation was present in early neoclassical economics – see Bruni and Sugden (2007, Section 2).

This article concentrates on adaptation to life events: as such we will leave to one side the vexed question of adaptation to income.[5] The concept of adaptation in the psychology literature has mostly been tested with well-being data from cross-sectional studies; see Frederick and Loewenstein (1999) for a review. However, to identify movements in well-being relative to some baseline, large-scale panel data are 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 well-being, particularly looking for evidence of adaptation. The contemporaneous correlation between well-being and unemployment would seem to be robustly negative (Blanchflower, 2001; Björklund and Eriksson, 1998; Clark and Oswald, 1994; Di Tella *et al.*, 2001; Jürges, 2007; Winkelmann and Winkelmann, 1998). The question of whether this negative correlation depends on unemployment's duration has been addressed by Clark (2006), who considers adaptation within the current unemployment spell in three panel data sets (BHPS, ECHP and GSOEP) 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. In related work, Chi *et al.* (2006) use NLSY data to show evidence that, on the contrary, job satisfaction bounces back after instances of job turnover.

A second group of papers has considered adaptation to marriage or divorce, which attract positive and negative coefficients respectively in contemporaneous analysis. Existing evidence suggests that there is an anticipation effect of marriage and a 'spike', so that the largest well-being effect occurs in the early years of marriage; there is however some disagreement as to the degree of subsequent adaptation (Lucas *et al.*, 2003; Lucas and Clark, 2006; Zimmerman and Easterlin, 2006). Stutzer and Frey (2006) consider well-being and marriage using the GSOEP data and plot out graphs that are similar to those relating to marriage presented later in this article. One of their main Figures (Figure 2, p. 337), based on a regression analysis, suggests full adaptation to marriage amongst those who remain married. Easterlin (2005) takes a different approach, and shows that aspirations regarding marriage and children do not seem to adapt totally to circumstances, so that adaptation in these domains is necessarily only incomplete at best.

Last, Lucas (2005) finds partial adaptation to divorce in hierarchical linear modelling analysis of the GSOEP, while Gardner and Oswald (2006) conclude that there is more than total adaptation to divorce in BHPS data.

[5] In the same year that Brickman and Campbell proposed the hedonic treadmill, Van Praag (1971) used large-scale survey data to identify 'preference drift', whereby the amounts of income assigned to different verbal labels (such as 'excellent', 'good', 'sufficient' and 'bad') were greater the more the individual had earned in the past. Adaptation to income is surveyed in Section 3.2 of Clark *et al.* (2008).

Existing work has therefore come to somewhat divergent conclusions about the degree of adaptation to unemployment, marriage and divorce. One natural question is the extent to which these various results reflect differences in the analytical techniques and datasets used. This article aims to contribute to this growing literature by using the same technique to model anticipation of and adaptation to unemployment, marriage, divorce, widowhood, birth of child and layoff in one long-run panel dataset. This has the advantage of providing standardised information on how individuals' well-being develops in the approach to and aftermath of a number of major life events.

2. 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 (Wagner *et al.*, 2007). We mainly focus on respondents who are between 16 and 60 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 birth of child (widowhood), we retain upper age brackets of 40 (80), producing samples of 38,215 (77,115) and 38,867 (80,066) observations for men and women respectively. As the GSOEP is panel data, there are multiple observations per individual. The data are unbalanced, in that not every person is present for all twenty waves (some enter after 1984, and some leave before 2003). As our prior is that any adaptation to life events may be different for men and women, we conduct all of our statistical analyses separately by sex.

The key variable we use to measure adaptation is subjective well-being. This comes from 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

Table 1

The Distribution of Life Satisfaction in the Analysis Sample of the GSOEP

	Males		Females	
Life satisfaction	*Count*	%	*Count*	%
0	337	0.51	347	0.53
1	271	0.41	257	0.39
2	690	1.05	664	1.01
3	1,432	2.18	1,473	2.25
4	2,020	3.08	2,097	3.20
5	6,874	10.47	7,494	11.45
6	6,927	10.55	6,567	10.03
7	14,290	21.76	13,357	20.41
8	20,206	30.77	19,694	30.09
9	7,929	12.08	8,423	12.87
10	4,682	7.13	5,074	7.75
Total	65,658	100.00	65,447	100.00

Note: These numbers refer to the sample aged 16–60.

satisfaction score for the sample of men and women aged 16–60 used in the majority of the subsequent empirical analysis. The distribution of life satisfaction for the older widowhood group and the younger birth of child group is very similar to that shown in Table 1. As is very often found in subjective well-being data, there is bunching towards the top of the scale: the modal response is 8 on the 0–10 scale. However, only relatively few respondents report maximum life satisfaction of 10.

Our goal is to examine how these life satisfaction scores move around the time of a number of fairly common life experiences. In this article we concentrate on six labour market and family events (this list is obviously not intended to be exhaustive): unemployment, marriage, divorce, widowhood, birth of child, and layoff. In each case, as we are using a within-subject (fixed effect) approach, we require that the individual be observed both before and after the event in question, so that their well-being profile can be traced out. As such, the incidence of these life events is calculated directly from the panel data itself, from year-to-year changes in the individual's answers to questions about family and the labour market, rather than being constructed from retrospective information. For example, unemployment of less than one year's duration is identified by current labour force status being unemployment, whereas labour force status at the previous interview was something other than unemployment (i.e. $UN_t = 1$ but $UN_{t-1} \neq 1$). Unemployment of one to two years' duration is identified by $UN_t = 1$, $UN_{t-1} = 1$ and $UN_{t-2} \neq 1$. Longer lags are defined analogously. For the last catch-all category of unemployed five years or more, we require that the individual report unemployment at each of the last five interviews. The same procedure is used for marriage, divorce and widowhood, with the sample for the latter consisting of those aged between 16 and 80.

There is a slight novelty with respect to the year of birth of child, which we pick up by the condition $No.\ of\ Children_t > No.\ of\ Children_{t-1}$; this therefore picks up both multiple births and the presumably rare cases of multiple single births between two interview dates. The sample used to analyse adaptation to a new child consists of those who are aged between 16 and 40.

Finally, layoffs are identified from the replies given to questions on whether (and if so at which date) the individual had left a job since the beginning of the previous calendar year. If they had done so, they were asked to state why they had left. Individuals have been laid off in the past year, according to our definition, if they left their job after the date of their previous GSOEP interview and the reason for leaving was 'plant closing' or 'dismissal'. While these are arguably not quite the same thing, the GSOEP did not completely distinguish between these two until 2001, so for consistency reasons we continue to group these two reasons together.

In our analysis of adaptation, we consider only the first event per individual for which we observe the entry during the sample period. As such, to trace out any adaptation to marriage, we follow the individual's life satisfaction from the year they marry up until the year (if any) that they remarry; any observations from the latter date onwards are dropped for the analysis of marriage adaptation.

Finally, we do not use information from left-censored spells to trace out adaptation: someone who was unemployed (married) at the time of their first GSOEP interview does not figure in the analysis of adaptation to unemployment (marriage). All of our

Table 2

Number of Life Events Observed in the Analysis Sample of the GSOEP

	Males	Females
Unemployment	1,087	1,019
Marriage	1,076	1,031
Divorce	327	352
Widowhood	123	377
Birth of child	1,497	1,592
Layoff	935	669

Note: The number of events is calculated for those aged 16–60, with the exception of birth of child, which refers to the sample aged 16–40, and widowhood which refers to the sample aged 16–80.

analysis of adaptation is thus based on individuals who are observed both before and after the event in question.[6]

Even with these various restrictions, the long run of the GSOEP data yields non-negligible numbers of observations of our life events: these are summarised in Table 2. For men (women), we observe 1,076 (1,031) marriages, 1,497 (1,592) births of children, 327 (352) divorces, and 123 (377) widowhoods. For the labour market events, the respective figures are 1,087 (1,019) unemployment spells and 935 (669) layoffs. The number of marriages, divorces and births are thus fairly evenly split between men and women, as we might have hoped. Unemployment and layoff are somewhat more prevalent for men, and the number of widowhoods in our analysis sample is three times higher for women than for men.[7]

The panel nature of the data allows us to track individuals' reported life satisfaction both before and after the event in question. 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 particularly concentrate on the four years preceding the event in question with respect to anticipation, and the five individual years following the event in order to identify adaptation.

2.1. *Hypotheses*

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

[6] We have no particular reason to believe that the anticipation and adaptation processes of those who we observe getting married, say, are any different from those who are already married. Some of our restrictions are similar to those imposed by Stutzer and Frey (2006), who also base some of their results on first marriages observed within the sample period. However, their analysis drops people once the marriage ends. Our marriage adaptation results appear to be consistent with theirs.

[7] One issue we do not tackle is that of attrition. We can only guess at the marriage adaptation process, for example, of those who disappear from the sample. Note that if they disappear because they have divorced, there would be no effect on our adaptation analysis (as they would no longer appear in any of the marriage categories anyway). Attrition in the GSOEP is discussed in Kroh and Spiess (2005).

(*i*) Are labour market and life events contemporaneously correlated with life satisfaction?
(*ii*) Does the past matter?
(*iii*) Does life satisfaction anticipate future events?

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

Note that the second question can potentially be broken up into two separate components for most of the events analysed here. Consider entry into unemployment for example. One question is whether past entry into unemployment affects the current life satisfaction of those who subsequently left unemployment. This is related to the idea of past unemployment 'scarring' those who subsequently return to employment, as in Clark *et al.* (2001); it is also linked to research on whether second marriages are more happy or less happy than first marriages (Vemer *et al.*, 1989).

The second part of the question refers to habituation: does the date of past entry into unemployment matter *for those who are still currently unemployed*? In other words, does the well-being effect of unemployment depend on the duration of the latter? We believe that this is what most people would intuitively understand by habituation or adaptation. The regression analysis will pick out, for example, the effect of one, two and three years of unemployment, conditional on having stayed in unemployment for three years. It can reasonably be noted that exit from unemployment is non-random. However, our analysis includes fixed effects, which will control for the phenomenon of relatively happier individuals leaving unemployment more quickly. Our adaptation coefficients are identified off of within-individual changes in well-being.

The analysis of the third question is more straightforward. Here the fixed-effect regression analysis picks up whether individuals' life satisfaction anticipates future family and labour market transitions.

2.2. *Empirical Approach*

In practice, we will pick up the presence of both anticipation and adaptation by using a series of appropriate dummies in a fixed-effects regression. To measure adaptation to unemployment, we estimate a regression of the form:

$$LS_{it} = \alpha_i + \boldsymbol{\beta}'\mathbf{X}_{it} + \theta_0 U_{0it} + \theta_1 U_{1it} + \theta_2 U_{2it} + \theta_3 U_{3it} + \theta_4 U_{4it} + \theta_5 U_{5it} + \varepsilon_{it}. \qquad (1)$$

Here, *LS* stands for life satisfaction, and $\mathbf{X}$ is a vector of fairly standard controls, to be detailed below. There are two more novel points. The first is that instead of entering a simple unemployment dummy, which picks up the average well-being effect over all of the unemployed, we split the unemployed up into six groups: those who have been unemployed 0–1 years, 1–2 years, 2–3 years, and so on up to the last group who have been unemployed five years or more. The second point is that we introduce an individual fixed effect, α_i, so that we are effectively following the same individual through different durations of unemployment.

This set-up allows us to carry out simple tests of the degree of adaptation to unemployment. If there is no adaptation, so that unemployment starts out bad and stays bad, then we would expect all of the values of θ to take roughly the same negative value;

if there is adaptation then the later values of θ will be less negative – we will observe individuals 'bouncing back' from unemployment. If adaptation is complete then later values of θ will be insignificant: being unemployed for long enough is the same as not being unemployed at all.

The first time that an individual is observed in an unemployment spell, they will thus have $U_{0it} = 1$ and all of the other 'U' variables equal to zero. If they are still unemployed one year later, then they will have $U_{1it} = 1$ and all of the other 'U' variables equal to zero. Heuristically, the test of adaptation with individual fixed effects consists in comparing, for example, the well-being of those who have been unemployed for 1–2 years to the well-being scores reported by the same individuals in their first year of unemployment.

An analogous approach is followed for the analysis of leads or anticipation effects. Here we replace the set of U dummies in (1) by a series of dummies showing whether the individual will enter unemployment in the next 0–1 years, 1–2 years, 2–3 years or 3–4 years (in practice there are few lead effects beyond three years). The same empirical approach is followed for all six life events. The estimated lead equation for unemployment is then:

$$LS_{it} = \alpha_i + \boldsymbol{\beta}'\mathbf{X}_{it} + \theta_{-4}U_{-4,it} + \theta_{-3}U_{-3,it} + \theta_{-2}U_{-2,it} + \theta_{-1}U_{-1,it} + \varepsilon_{it}. \qquad (2)$$

As in (1), $U_{-4,it}$ takes the value 1 if the individual's next entry into unemployment will occur in the following 3 to 4 years. The other leading U dummies are defined similarly. We expect the lead unemployment coefficients to be zero or negative and to be more negative the closer the unemployment spell becomes. The numbers of observations of the various lags and leads are presented in Appendix Table A1.

In order to interpret the estimated coefficients in (1) and (2) it is essential to know what other variables are controlled for in the vector **X**. Here we include marital and labour force status, years of education, number of children, age dummies, health, income (monthly gross household income), region, year and a dummy for whether the respondent is a German national. In the context of adaptation to unemployment, we therefore condition for whether the individual returns to employment. If she does so, then her life satisfaction will jump upwards at the time she finds a new job. The set of estimated θ coefficients in (1) then maps out adaptation to unemployment for those who stayed unemployed, which we feel is one natural way of approaching the problem. Alternatively, we could trace out the subsequent life satisfaction movements of all those who entered unemployment at time zero, without paying attention to whether they subsequently re-found work (i.e. create the U_{Xit} dummies solely as a function of lagged entry into unemployment, without requiring that $UN_t = 1$). While perfectly valid, this approach does confound adaptation to unemployment with the normal life satisfaction jump upon moving from unemployment to work. We would expect this latter to produce naturally more of a bounce back than the method we adopt.

For the lead regressions in (2), there is an issue of the 'risk group' to which future events might occur. In the main results presented here, we only make one restriction: the effect of future layoff and future unemployment is estimated only for those who are currently employed. We will reconsider the issue of risk groups for the family events in Section 3.2 below.

A last point is that we will treat life satisfaction as a cardinal construct in our regressions: our fixed effect analysis of (1) and (2) is carried out via 'within' regressions. There are two practical reasons for assuming cardinality: first, linear analysis renders the results easier to interpret; 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 well-being often produces similar results, as emphasised by Ferrer-i-Carbonell and Frijters (2004), and we will check below that ordinal panel estimation produces the same qualitative results.

3. Regression Results

All of the results concerning lags and leads come from regression analysis of the GSOEP data. This produces fairly dense tables of statistical results. For ease of presentation, we present our method in detail for only one of the life events above, unemployment, followed by the summary results for the other five life events.

3.1. *Main Results*

The life satisfaction regressions in Table 3, which refer to unemployment, have two particular characteristics. First, they control for individual fixed effects. Second, they control for the state variables, which are the subject of this article (here, unemployment), according to the date at which the transition into the state occurred.

The first and third columns of Table 3 deal with lagged effects of unemployment for men and women respectively. These include a set of six dummy variables describing unemployment of different durations: these indicate whether the individual entered unemployment within the past year, 1–2 years ago and so on. These variables inform us about the unemployment experience of those who remain unemployed. Someone who entered unemployment three years ago but is now employed will have all of the U variables equal to zero, with the well-being effect of finding work again being picked up by the dummy variable for 'Employment'. The estimated coefficients in Table 3 show that unemployment is generally associated with significantly lower well-being, whatever its duration. The separate coefficients on unemployment of different duration (θ_0 to θ_5 in (1)) are mostly not different from each other. Unemployment of five or more years duration does seem to be associated with a somewhat smaller life satisfaction effect but in general there is little strong evidence of quick adaptation to unemployment, for both men and women: unemployment starts off bad and pretty much stays bad; see also Clark (2006). The insignificant effect of unemployment of over four years' duration for women should be read circumspectly: as Appendix Table A1 makes clear, we are now moving into very small cell sizes, as reflected in the widening confidence intervals in the top-left panel of Figure 2.

Columns 2 and 4 of Table 3 present the effect of *future* unemployment on current life satisfaction (lead effects). There is no estimate on the 'employment' dummy in these regressions as the risk group for future unemployment consists only of the

Table 3

Fixed Effect Life Satisfaction Regressions. Anticipation of and Adaptation to Unemployment

	Males		Females	
	Lags	*Leads*	*Lags*	*Leads*
Employed	0.231**		0.020	
	(0.025)		(0.018)	
Unemployed 3–4 years hence		−0.153**		−0.079
		(0.059)		(0.074)
Unemployed 2–3 years hence		−0.079		−0.064
		(0.057)		(0.071)
Unemployed 1–2 years hence		−0.196**		−0.086
		(0.055)		(0.068)
Unemployed within the next year		−0.271**		−0.233**
		(0.054)		(0.067)
Unemployed 0–1 years	−0.763**		−0.527**	
	(0.048)		(0.048)	
Unemployed 1–2 years	−0.781**		−0.335**	
	(0.080)		(0.082)	
Unemployed 2–3 years	−0.586**		−0.342**	
	(0.112)		(0.126)	
Unemployed 3–4 years	−0.667**		−0.493**	
	(0.160)		(0.173)	
Unemployed 4–5 years	−0.846**		−0.344	
	(0.224)		(0.281)	
Unemployed 5 or more years	−0.520**		−0.147	
	(0.192)		(0.274)	
German national	−0.032	0.156	0.096	0.123
	(0.079)	(0.146)	(0.083)	(0.177)
Education (years)	−0.016*	0.003	0.022**	−0.000
	(0.007)	(0.021)	(0.008)	(0.030)
Number of children	−0.024*	−0.037**	−0.059**	−0.106**
	(0.010)	(0.014)	(0.011)	(0.021)
Age 16–20	0.277**	0.120	0.051	−0.240*
	(0.048)	(0.085)	(0.050)	(0.102)
Age 21–30	0.013	−0.010	−0.029	−0.082^{+}
	(0.028)	(0.036)	(0.029)	(0.049)
Age 41–50	−0.065*	−0.081*	−0.038	−0.040
	(0.029)	(0.037)	(0.030)	(0.047)
Age 51–60	−0.112*	−0.120*	−0.049	−0.014
	(0.047)	(0.060)	(0.050)	(0.078)
Household income/1000	0.003**	0.021**	0.002**	0.010*
	(0.001)	(0.004)	(0.001)	(0.004)
Medium health problems	−0.261**	−0.294**	−0.284**	−0.293**
	(0.020)	(0.026)	(0.020)	(0.031)
Major health problems	−0.817**	−0.763**	−0.876**	−0.678**
	(0.039)	(0.054)	(0.038)	(0.062)
Married	0.185**	0.197**	0.187**	0.098^{+}
	(0.030)	(0.042)	(0.033)	(0.056)
Separated	−0.431**	−0.422**	−0.342**	−0.085
	(0.059)	(0.079)	(0.061)	(0.098)
Divorced	0.099^{+}	0.045	0.027	0.094
	(0.052)	(0.073)	(0.054)	(0.087)
Widowed	−0.274*	−0.204	−0.248**	0.010
	(0.133)	(0.176)	(0.082)	(0.137)
Constant	7.502**	7.444**	7.084**	7.367**
	(0.205)	(0.396)	(0.222)	(0.632)

Table 3
Continued

	Males		Females	
	Lags	*Leads*	*Lags*	*Leads*
Number of observations	61,519	32,813	61,595	22,272
Number of individuals	7,160	4,427	7,111	3,528

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 are out-of-the labour force, age 31–40, no health problems, and never married.

currently employed. Women who will enter unemployment within the next year report significantly lower levels of life satisfaction. There are substantial lead effects for men, with unemployment up to four years in the future significantly reducing current life satisfaction.

Our conclusions from the analysis of anticipation of and adaptation to unemployment are therefore threefold:

- Unemployment reduces life satisfaction, as is typically found;
- There is little evidence that the size of the above effect depends systematically on the duration of unemployment, certainly over the first five years. We find little evidence of habituation; and
- Future unemployment significantly reduces both men's and women's current well-being, and more so for the former.

These estimated coefficients should be interpreted bearing in mind that these regressions include fixed effects, so that the results do not represent selection of unhappy types into unemployment. All of Table 3's regressions also include a full set of controls. 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 same technique is applied to our five other life events. This produces a lot of numbers. We have decided to illustrate the main thrust of our results graphically, rather than by constantly referring to regression tables.[8] Figures 1 and 2 thus illustrate the results of our fixed-effects regression analysis of the degree of anticipation and adaptation to six life events in German panel data. The dashed horizontal line is at zero, which corresponds to no effect on life satisfaction. The vertical scale is the same in all six graphs, allowing the respective impact of the six life events to be gauged. The vertical bars around each point refer to the 95% confidence interval. The estimated coefficient shown five years after the event actually refers to all durations of five years and more, and can be considered as a 'long-run' effect. The ten points in each graph refer to the estimated values of the coefficients θ_{-4}, θ_{-3}, ..., θ_4, θ_5 in (1) and (2).

[8] The key estimated coefficients on the lags and leads, which are used to construct our Figures, appear in Appendix Table A2. 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.

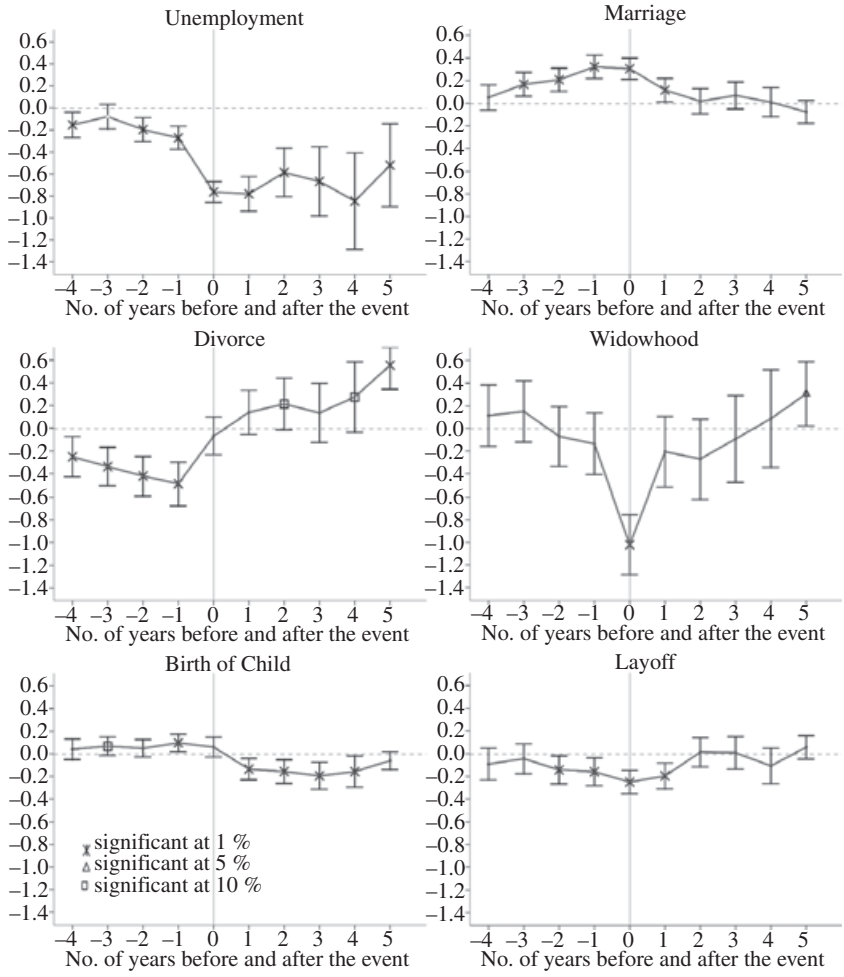

Fig. 1. *The Dynamic Effect of Life and Labour Market Events on Life Satisfaction (Males)*

The top-left graph in Figures 1 and 2 refers to unemployment. The coefficients illustrated are therefore those found in Table 3. As discussed previously, there is little strong evidence of habituation, and lower life satisfaction precedes the transition from employment to unemployment, especially for men.

The next graph, at the top right of Figures 1 and 2, refers to a positive event: marriage. As might be expected (or hoped), the correlation between marriage and life satisfaction is positive. The peak life-satisfaction effect of marriage occurs around the year that it happens. However, this well-being boost is not permanent in nature. In this data, we cannot reject the hypothesis of full adaptation to marriage.[9] There is evidence of lead effects, especially for men.

[9] To be clear, the pattern traced out here refers to those who marry and stay married. The estimated effect of divorce or widowhood will be to move the individual off of this profile and onto the new profile in question.

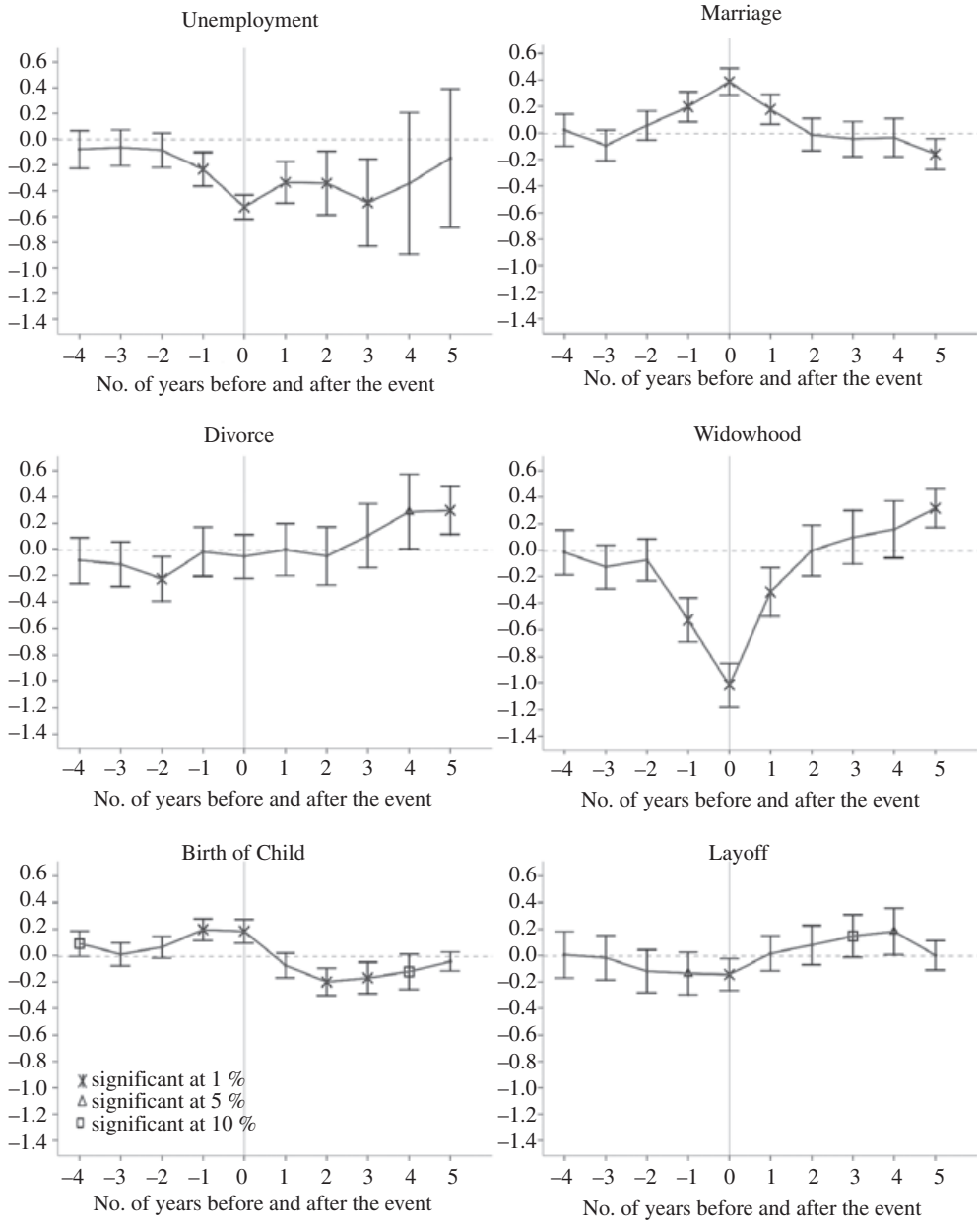

Fig. 2. *The Dynamic Effect of Life and Labour Market Events on Life Satisfaction (Females)*

The dynamic effect of divorce is to some extent the mirror image of that of marriage. Habituation to divorce would appear to be both fairly rapid and complete.[10] There is even evidence that both men and women who divorced five or more years ago are

[10] As the late Bon Scott presciently remarked, 'Come tomorrow, come to grips, with being all alone' (*Gimme a Bullet*).

currently significantly more satisfied with their lives. There are strong lead effects: two years for women and four years for men.[11]

The next set of results refers to widowhood. Whilst the longer-run effect is zero, or even positive, the short-run effects are large and negative for both sexes. The figures show that widowhood has a sharp impact effect (the largest of the effects considered here), which however largely dissipates after two years. 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 out as negative before becoming positive. The one-year lead effect is significant for women but not men (perhaps due to small sample sizes).

The next event is more positive: birth of child. While a recent arrival has a positive effect on women's life satisfaction but no significant effect on men's, by the time the child is 2–3 years old, the estimated coefficients turn negative for both sexes and remain so thereafter. There are significant one-year lead effects of birth of child for both men and women.

Last, we find no long lag effects for layoffs for either men or women. Layoffs do reduce well-being in the year in which they occur and the year beforehand. However, their effect on well-being is not long-lasting.[12]

3.2. *Robustness Tests*

It is likely problematic for everyone to agree on what is the best way of looking for evidence of anticipation and adaptation. We therefore investigated the robustness of our main results in Figures 1 and 2 by considering a number of different specifications of the regression model. These are listed in turn below.

(*A*) *Life satisfaction is ordinal, not cardinal.* Figures 1 and 2 show the results from linear 'within' models of life satisfaction. A statistically more apt technique would respect the ordinality of the dependent variable. We therefore re-ran all of the analysis using conditional fixed effect logits. To do so, we recoded life satisfaction into a binary variable (0–7 vs. 8–10: this cuts the sample roughly in half). This throws a fair amount of information away and, consequently, the standard errors rise. The results are qualitatively very similar in this ordinal estimation.

(*B*) *Not all of the right-hand side variables are exogenous.* Looking at Table 3, this criticism can in particular be applied to income and health. For example, if unemployment affects health, or marriage affects income, then we are only tracing out some conditional component of subjective well-being, instead of the total relationship. We thus re-estimated all of the regressions behind Figures 1 and 2 without controlling for income and health. The results were qualitatively unchanged. This does not of course mean that

[11] The worst moment for men is the actual year preceding the divorce; the worst moment for women is two years before the divorce, with no significant life satisfaction effect the year preceding the divorce. Some may see in this pattern a reflection of the fact that the majority of divorces are initiated by the wife (Brinig and Allen, 2000).

[12] 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 we are picking up the non-pecuniary psychological impact of past layoffs.

unemployment categorically does not affect health but rather that any such relationship is not behind the time profile of life satisfaction at the top-left of Figures 1 and 2.

(*C*) *Schizophrenia in the treatment of marital status*. While we are careful to distinguish the time profile of marriage at the top-right of Figures 1 and 2, the regression that analyses the time profile of divorce simply enters marriage as a single dummy variable. It can be argued that the time profile of marriage and divorce should be jointly estimated. We did so in one regression as a test, and found the same time profiles of adaptation as mentioned in Section 3.1 above.

(*D*) *Who is in the risk group*? As mentioned above, the risk group (in the analysis of 'leads' consists of the employed for the analysis of future unemployment and future layoffs. We made no such distinction for the analysis of future marriage, divorce, widowhood or birth of child. As a check, we re-ran the lead analysis of marriage on the sample of singles only, the analyses of divorce and widowhood on the sample of married only, and the analysis of birth of child on the sample of those with no children. The qualitative results remained unchanged.

(*E*) *One or many unemployment spells*? There is one potential issue regarding unemployment, the event that is of the shortest duration of those we consider here. When we observe the same individual in unemployment year after year, there is a possibility that this reflects a series of shorter-duration unemployment spells, rather than one continuous spell. One over-arching question is the extent to which two unemployment spells separated by a short period of something else are different from one long unemployment spell. As a check, we re-estimated the unemployment lag results in Table 3, only using information on continuous spells (matched in from the GSOEP spells file). As a result of the reduced number of observations in some of the long duration cells, we combined the 4–5 and 5 or more years unemployment duration dummies. As in Table 3, the estimated results show no evidence of adaptation to unemployment for men but adaptation for women after four years of unemployment.

3.3. *Overview*

A number of general points stand out in Figures 1 and 2. First, there are indeed significant life satisfaction movements associated with the six events analysed in this article. 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 remarkably similar between men and women.

In terms of our research questions in Section 2, we arguably already knew the answer to Number 1, and Figures 1 and 2 show that, as expected, unemployment and widowhood reduce life satisfaction, while the married report higher levels of life satisfaction. However, the size, and in some cases even the sign, of these effects is not independent of the event's duration. Table 4 summarises our findings with respect to anticipation and adaptation. These numbers come from Appendix Table A2, and include significance at the 10% level for the lead (anticipation) figures.

Question 2 specifically asked about habituation. In the figures, habituation means that more recent events have larger (in absolute value) life satisfaction effects than

Table 4

A Summary of Anticipation and Adaptation

	Men		Women	
	Anticipation	Adaptation	Anticipation	Adaptation
Unemployment	4 years	Little	1 year	Some, after 4 years
Marriage	3 years	Full	1 year	Full
Divorce	4 years	Full	2 years	Full
Widowhood	0 years	Full	1 year	Full
Birth of child	1 year	Full	4 years	Full
Layoff	2 years	Full	1 year	Full

more distant ones. The method we use here controls for both observed and unobserved heterogeneity: the estimated coefficients reveal the movements of life satisfaction of the same individual who, for example, marries and stays married.[13] This seems a natural way of addressing the issue of adaptation.

We conclude that there is at least some habituation for all of the events we have analysed, bar one. In fact, we find full adaptation by both sexes to five of the six events. The exception is unemployment. We also see anticipation – question (3) – in that there are most often significant movements in life satisfaction before the event occurs, although the length of the anticipatory period varies.

The comparison of Figures 1 and 2 reveals that men are broadly more affected by labour market events than are women in terms of the size of the associated movements in life satisfaction. Also the birth of a child provides a larger satisfaction boost to women than to men when it happens but four years later both sexes are equally unhappy. However, in general the patterns for men and women are remarkably similar, even if the degree of anticipation and adaptation differs sharply between events. A useful area of future research should consider whether there are certain groups of individuals who adapt differently to events. This can be explored either by analysing groups defined *a priori* (by sex, age or education, for example: see Stutzer and Frey (2006) for an application), or by allowing the data to identify such groups endogenously via a latent class analysis; see Clark *et al.* (2005) and Pinquart and Schindler (2007), for an analysis of retirement.

4. Conclusion

This article uses twenty waves of German panel data 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 child and layoff. The results provide strong evidence of both lag and lead effects on current life satisfaction. There are, however, differences in time scales. For some events, there is a

[13] Had we not done so, then any 'bouncing back' from unemployment would pick up both adaptation and returning to employment. Equally, falling life satisfaction after marriage would pick up both habituation to marriage and separation/divorce.

rapid return to baseline satisfaction, while unemployment would appear to 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 well-being. We believe that this represents some of the first large-scale standardised evidence of habituation and anticipation in life satisfaction with respect to a variety of important life events.

We have only started to scratch the surface of what can be done with long-run panel data including subjective well-being 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.

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Appendix Tables

Table A1

Number of Observations of Lags and Leads

	Unemployment		Marriage		Divorce		Widowhood		Birth of child		Layoff	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Leads												
3–4 years hence	769	669	640	589	255	269	110	302	1,047	1,040	575	466
2–3 years hence	949	827	760	715	292	289	113	335	1,391	1,415	731	547
1–2 years hence	1,117	1,024	934	886	316	342	126	370	1,781	1,844	896	643
Within the next year	1,328	1,228	1,140	1,104	377	400	131	407	2,174	2,272	1,112	776
Lags												
0–1 years	1,089	1,017	1,077	1,030	327	352	123	377	1,498	1,591	935	669
1–2 years	337	333	879	850	225	232	88	302	1,247	1,353	684	520
2–3 years	164	138	775	733	166	187	69	265	930	1,046	535	414
3–4 years	78	72	694	621	123	154	57	239	651	739	420	348
4–5 years	39	27	612	539	85	110	45	205	471	565	348	290
5 or more years	70	33	3,685	3,088	293	521	180	1,024	2,616	4,184	1,637	1,317

Table A2

The Effect of Life and Labour Market Events on Life Satisfaction. Fixed Effect 'Within' Regressions

	Unemployment		Marriage		Divorce		Widowhood		Birth of child		Layoff	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Leads												
3–4 years hence	−0.153**	−0.079	0.052	0.022	−0.252**	−0.085	0.114	−0.018	0.041	0.090^{+}	−0.091	0.006
	(0.059)	(0.074)	(0.056)	(0.062)	(0.090)	(0.089)	(0.138)	(0.086)	(0.046)	(0.049)	(0.072)	(0.090)
2–3 years hence	−0.079	−0.064	0.167**	−0.094	−0.338**	−0.114	0.149	−0.128	0.067	0.009	−0.044	−0.018
	(0.057)	(0.071)	(0.054)	(0.059)	(0.086)	(0.087)	(0.137)	(0.084)	(0.042)	(0.044)	(0.067)	(0.085)
1–2 years hence	−0.196**	−0.086	0.208**	0.057	−0.421**	−0.226**	−0.070	−0.075	0.049	0.062	−0.142*	−0.119
	(0.055)	(0.068)	(0.052)	(0.056)	(0.087)	(0.087)	(0.135)	(0.081)	(0.040)	(0.042)	(0.064)	(0.083)
Within the next year	−0.271**	−0.233**	0.322**	0.198**	−0.489**	−0.018	−0.137	−0.525**	0.097*	0.196**	−0.159*	−0.135^{+}
	(0.054)	(0.067)	(0.053)	(0.057)	(0.096)	(0.095)	(0.139)	(0.084)	(0.039)	(0.042)	(0.063)	(0.082)
Lags												
0–1 years	−0.763**	−0.527**	0.305**	0.387**	−0.069	−0.054	−1.021**	−1.016**	0.059	0.183**	−0.250**	−0.144*
	(0.048)	(0.048)	(0.048)	(0.052)	(0.085)	(0.085)	(0.135)	(0.084)	(0.045)	(0.046)	(0.052)	(0.061)
1–2 years	−0.781**	−0.335**	0.116*	0.178**	0.140	−0.002	−0.206	−0.316**	−0.135**	−0.075	−0.196**	0.015
	(0.080)	(0.082)	(0.053)	(0.057)	(0.100)	(0.102)	(0.159)	(0.093)	(0.048)	(0.048)	(0.058)	(0.068)
2–3 years	−0.586**	−0.342**	0.018	−0.013	0.214^{+}	−0.051	−0.270	−0.003	−0.156**	−0.199**	0.014	0.079
	(0.112)	(0.126)	(0.057)	(0.062)	(0.115)	(0.113)	(0.179)	(0.098)	(0.053)	(0.053)	(0.065)	(0.075)
3–4 years	−0.667**	−0.493**	0.069	−0.045	0.136	0.104	−0.093	0.098	−0.194**	−0.170**	0.008	0.147^{+}
	(0.160)	(0.173)	(0.061)	(0.068)	(0.133)	(0.124)	(0.196)	(0.103)	(0.062)	(0.061)	(0.073)	(0.082)
4–5 years	−0.846**	−0.344	0.010	−0.035	0.275^{+}	0.287*	0.087	0.156	−0.157*	−0.122^{+}	−0.107	0.182*
	(0.224)	(0.281)	(0.065)	(0.073)	(0.158)	(0.145)	(0.220)	(0.110)	(0.071)	(0.068)	(0.080)	(0.089)
5 or more years	−0.520**	−0.147	−0.075	−0.159**	0.555**	0.296**	0.306*	0.317**	−0.060	−0.045	0.057	0.001
	(0.192)	(0.274)	(0.051)	(0.059)	(0.108)	(0.093)	(0.144)	(0.075)	(0.040)	(0.037)	(0.053)	(0.057)

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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