

Accepted Manuscript

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PII: S0165-1765(15)00360-2

DOI: <http://dx.doi.org/10.1016/j.econlet.2015.09.010>

Reference: ECOLET 6893

To appear in: *Economics Letters*

Received date: 8 April 2015

Revised date: 7 September 2015

Accepted date: 8 September 2015

Please cite this article as: Gupta, P., Mishra, T., O'Leary, N., Parhi, M., The distributional effects of adaption and anticipation to ill health on subjective wellbeing. *Economics Letters* (2015), <http://dx.doi.org/10.1016/j.econlet.2015.09.010>

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Highlights

- adaption to illness differs markedly across the wellbeing distribution
- negative illness effects are moderated over time at higher distributional points
- illness persists in negatively affecting wellbeing at lower distributional points
- there is little evidence of anticipatory effects across the wellbeing distribution

ACCEPTED MANUSCRIPT

The Distributional Effects of Adaption and Anticipation to Ill Health on Subjective Wellbeing

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Abstract

Adaption and anticipation to reported illness upon subjective wellbeing is analysed across the wellbeing distribution. Anticipation effects are muted, but substantial adaption effects are apparent that differ markedly over the range of wellbeing, being most evident at the upper quartile.

Keywords: subjective wellbeing, illness, anticipation, adaption, fixed effect quantile regression

JEL codes: I10; I31

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1. Introduction

There is a rapidly expanding area of research that looks at the determinants and consequences of reported happiness or life satisfaction, commonly referred to as subjective wellbeing (hereafter SWB). Within this literature, an important question raised is how and whether individuals adapt to changing conditions. If not, this leads to the phenomenon that is commonly referred to as the hedonic treadmill (Brickman and Campbell, 1971), where circumstances (and how these change) do not matter in the long run for wellbeing. Such a proposal was investigated by Clark et al. (2008) over six aspects of employment status, marriage and child birth using longitudinal German data. Adopting a framework that allowed anticipation and adaptation to life events, they assessed the proposition that individuals return to some baseline level of satisfaction. Using a similar methodology, Clark and Georgellis (2013) have more recently analysed comparable factors using British data and Bauer et al. (2015) have used Russian data across four aspects of unemployment and marital status. However, an important dimension not investigated in these studies is the impact of ill health. Indeed, it is well-known that being in good health increases SWB, just as illness or bad health decreases it (Graham et al., 2011) and studies consistently reveal a strong relationship between health and happiness (see Dolan et al., 2008 for a review).

This current work sheds light on the temporal impact of illness on SWB but also within the context of its impact across the SWB distribution. The literature already cited has exclusively dealt with 'average' effects (by focusing on the mean of the SWB distribution) but the work of Binder and Coad (2011) has motivated a new stream of research which emphasises the whole of the SWB distribution so that the true effects of SWB and its determinants can be ascertained. Indeed, the usefulness of pan-distributional regression techniques can be gauged from theoretical insights in the economic-psychological literature that suggest that life events germinate a kind of brain activity that motivate individuals to score high or low in satisfaction measures to choice behaviour (Kahneman et al., 1993), which often results in skewed or multimodal distributions of well-being (Diener et al., 2006). In this way, regression methodologies that focus upon means might seriously misrepresent wellbeing responses to illness and a clear result that emerges in our analysis is that adaptation and anticipation effects of illness differ measurably across the SWB distribution.

2. Data

The data used are of individuals taken from 18 waves of the British Household Panel Survey (BHPS), a nationally-representative survey of households running from 1991-2008. The question used to measure SWB is taken from the General Health Questionnaire (GHQ), which was developed as a

screening instrument to identify psychological distress in primary care settings. Coded over a 0-36 point Likert scale derived from responses to twelve individual questions relating to differing aspects of mental and psychological wellbeing, we reorder it such that higher values correspond to higher reported wellbeing. While other indicators of SWB are available within the BHPS, the GHQ measure was chosen as it is continuously available in all waves.² Meanwhile, we identify an incidence of illness as any affirmative response to a series of questions asking respondents to identify whether they have been affected by specific health concerns over the course of the previous year. With prompting from a showcard, respondents are able to identify fifteen possible complaints, examples including heart problems, difficulties in hearing or cancer, through to a catch-all of some other unlisted condition. In all instances, respondents are advised that they should exclude temporary complaints. Our denotation of illness, though, makes no distinction between different aspects of illness, intensity nor frequency.

The sample is restricted in a specific way to create an illness history. This involves an initial incidence of reported ill health which is preceded by four waves in which no illness is reported. This lead-in period creates a clear measure of anticipation. After the first reported incidence of illness, individuals are retained within the sample for the next five waves regardless of whether they return to good health or not. The only proviso is that once individuals report good health after the initial illness incidence they are excluded if they subsequently re-report an illness. This again provides a clean measure of illness and any identified adaption effects will not be conflated with multiple illness spells and anticipation of them. This sample is restricted to those men and women aged 16 and over.

3. Methodology

Following Clark and Georgellis (2013), adaption and anticipation are captured by a set of time-specific dummy variables included within a fixed effect regression framework. Extending this framework across the SWB distribution within a quantile regression setting as suggested by Koenker (2004), illness effects for individual i at time t and percentile θ of the SWB distribution are captured by:

²While three components of the GHQ (worry-induced sleep loss; constantly under strain; depressed) might potentially be highly correlated with illness, pairwise correlations between them and illness are comparable with the other GHQ components. Alternatively, life satisfaction could be used as the dependent variable but this is not viable due to sample size concerns with the estimator described below which is run on a balanced panel. However, the use of a fixed effect OLS estimator on an unbalanced panel using life satisfaction (see O'Leary et al., 2015) produces results comparable to those at the median presented later. We therefore feel confident in an analysis based around GHQ, with the caveat that potential correlation between illness and our chosen measure of SWB may still exist away from the central parts of the distribution.

$$SWB_{it}^{\theta} = \delta_i^{\theta} + \gamma^{\theta} X_{it} + \rho_{-4}^{\theta} I_{-4,it} + \rho_{-3}^{\theta} I_{-3,it} + \rho_{-2}^{\theta} I_{-2,it} + \rho_{-1}^{\theta} I_{-1,it} + \rho_0^{\theta} I_{0,it} + \rho_1^{\theta} I_{1,it} + \rho_2^{\theta} I_{2,it} + \rho_3^{\theta} I_{3,it} + \rho_4^{\theta} I_{4,it} + \rho_5^{\theta} I_{5,it} + \varepsilon_{it}^{\theta} \quad [1]$$

where X is a vector of characteristics known to influence SWB (age, marital status, employment status, number of children, education and household income), δ an individual fixed effect, ε a disturbance term and the I are dummy variables reflecting illness duration: for anticipation ($I_{-4,it}$ to $I_{-1,it}$), these denote 4 years to 1 year *before* the initial illness incidence (I_0); for adaption ($I_{1,it}$ to $I_{5,it}$), these denote that the illness has persisted for an additional number of years ranging from 1 to 5 or more. Adaption and anticipation effects are subsequently measured by the estimated coefficients in ρ .³

4. Results

Over the entire sample average SWB is 25.9 (from a maximum of 36), confirming the commonly-found observation that wellbeing responses are positively skewed (see Table 1). Comparing across duration of illness categories shows little variation in wellbeing, with less than 1 point separating maximum and minimum averages. Nearly three-quarters of the sample have an illness that does not extend beyond the initial incidence or one extra year thereafter, with only 4.1% of individuals reporting an illness 5 or more years after the first.

Fixed effect adaption and anticipation estimates for five percentile points are shown in Table 2, with associated graphs in Figure 1. For each of the chosen percentiles with the exception of the 90th, the initial incidence of illness has a significantly negative effect upon reported SWB. These effects appear stronger at the 10th and 25th percentiles than at either the 50th or 75th. Dealing with *adaption* effects first, these differ markedly across the SWB distribution. While the over-riding impression at the 10th percentile is of little discernible movement as illness duration increases, it should be noted that the standard errors around the point estimates are considerably greater than at higher percentile points with a number of the estimated coefficients being insignificant. At the 25th percentile there is evidence of an initial partial recovery, where the estimated coefficients decrease in magnitude after 1 and 2 years of illness duration. Indeed, after the initial depressive effect upon SWB there is no statistically significant effect if illness persists over the next two years. In this sense, there is evidence of short-term adaption. However, for extended illness durations the negative effects upon SWB increase in magnitude, being both greater than the initial -1.122 estimate

³ The baseline is those who do not report illness more than four years before the initial incidence.

and statistically significant. As such, there is clear evidence that the negative influence of illness intensifies as illness duration increases in spite of initial adaption to the condition.

At the 50th percentile there is little evidence of a recovery. The initial estimate of -0.787 increases in magnitude with illness duration and subsequent estimates are statistically significant (with the exception of the 3 years duration dummy). Even though it is possible that such negative influences might be ameliorated if the time horizon was extended further, there is no evidence to suggest that individuals around the median of the SWB distribution adapt. Illness has a detrimental impact upon SWB and such effects last over an extended period of time. Such findings contrast with what happens at the 75th percentile. Initially there is no real movement in estimates over the first two duration categories but thereafter the impact of higher illness durations on SWB is statistically insignificant. The inference is that adaption to the initial illness has been complete. Estimates at the 90th percentile show no effect for either illness or adaption to it. All point estimates are negative but very close to zero with relatively narrow confidence intervals around them. Thus, for these people with some of the very highest levels of reported SWB, the onset of an episode of illness has no significant effect upon reported SWB. Similarly, increased duration of an initial illness spell has no identifiable effect upon SWB.

With regard to *anticipation*, there is no evidence of a depressing effect at any stage for any of the percentile points. At the median and above, all anticipation effects are effectively zero in each of the four years prior to illness and looking at the magnitudes of these estimates and their associated standard errors we can be confident that the lack of anticipation effects is not a conclusion drawn from imprecise estimates. While there is a suggestion that there is an anticipatory wellbeing enhancement associated with not reporting an illness four years prior to the event at the 25th and 10th percentiles, it is nothing more than a suggestion and the point estimates are insignificant at conventional levels of acceptance. This apart, we can conclude that any movements in wellbeing are restricted to those years after the onset of an illness, which in itself may be viewed as a random event with no anticipatory effects.

5. Conclusions

The effect of illness on SWB differs markedly across the SWB distribution. In particular, there is no evidence that illness exerts any sort of influence at time of onset for those who report the very highest levels of wellbeing, but it has a significantly negative impact upon wellbeing at points below the 90th percentile. Furthermore, while there is little evidence of anticipation to illness at any point

of the SWB distribution, adaption effects are pronounced and these have heterogeneous effects over the wellbeing distribution. A corollary of the results would suggest there is little evidence of long term adaption at the median of the wellbeing distribution and below, but that the negative effect of illness is moderated over time at the upper quartile of the SWB distribution.

Rather than treating illness as a single homogeneous event, some authors have investigated the impact of more detailed health conditions (see Graham et al., 2011 *inter alia*) and paradoxically suggest that mental health problems have stronger effects on SWB than physical health problems. Such evidence contrasts with preference elicitation studies where individuals value physical health more than mental health (see Wilson and Gilbert, 2005). Indeed, Binder and Coad (2013) show that mental conditions lead to more pronounced declines in life satisfaction and conclude that adaption is easier for physical conditions than for chronic pain or psychological conditions such as anxiety. While detailed illness indicators are available within the BHPS, sample size considerations mean that it is not possible to conduct a separate analysis over individual illness categories. Future research could conceivably further this important area of research across the SWB distribution.

Acknowledgements

The BHPS was sponsored by the ESRC and made available for use by the UK Data Archive but responsibility for the analysis and interpretation of the data lies solely with the authors. Financial support from the ESRC (grant no: RES-591-28-0001) is gratefully acknowledged by O'Leary.

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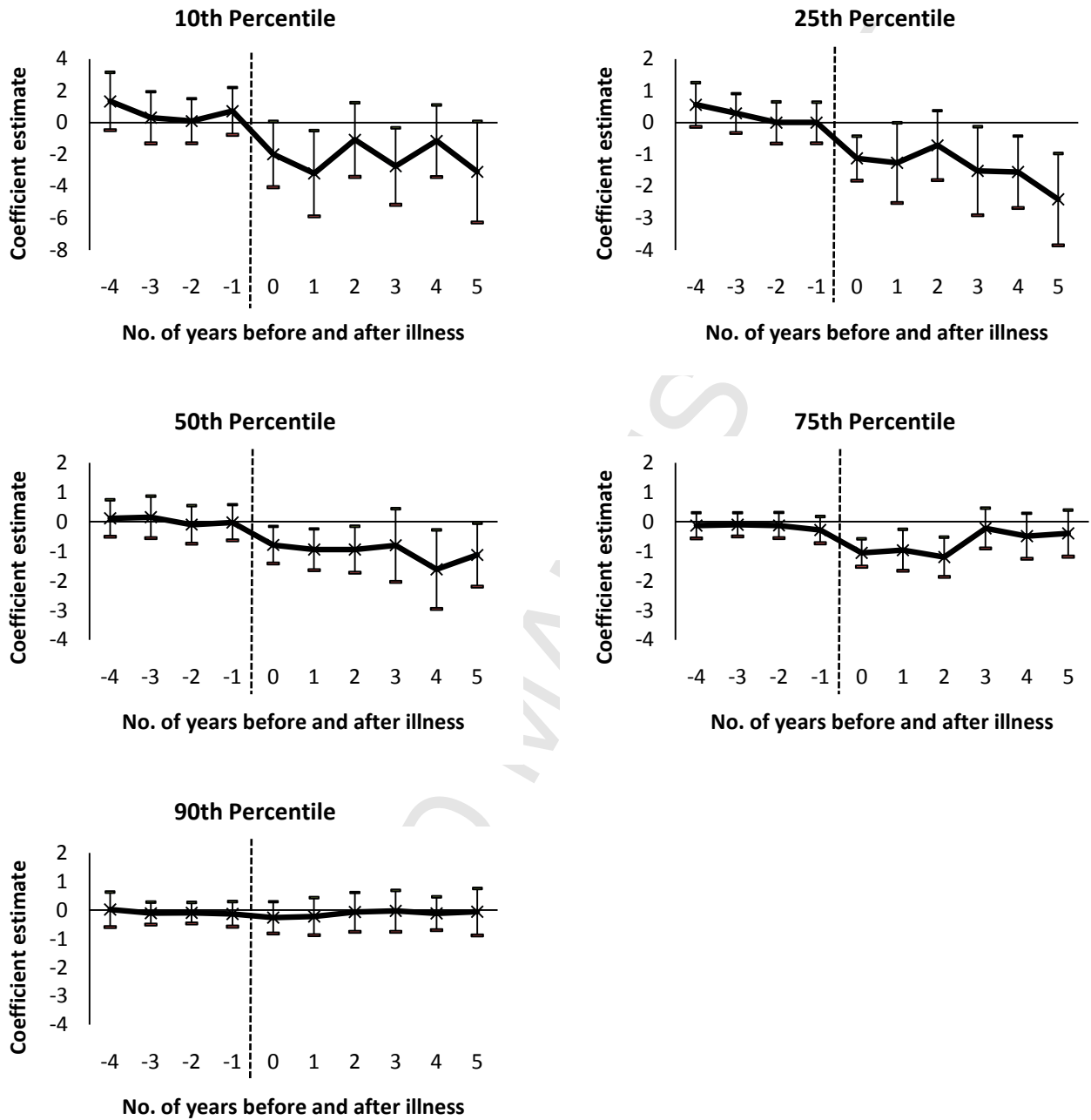
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Figure 1
Adaption and Anticipation to Illness at Selected Percentiles



Note: vertical bars denote 95% confidence intervals.

Table 1
Subjective Wellbeing and Illness Duration: BHPS (1991-2008)

	Count	%	Average SWB
Initial illness incidence only	1,620	34.7	25.7
Illness duration 1 extra year only	2,060	44.1	25.7
Illness duration 2 extra years only	420	9.0	26.2
Illness duration 3 extra years only	240	5.1	26.3
Illness duration 4 extra years only	140	3.0	26.1
Illness duration 5 or more years	190	4.1	25.9
All illness durations	4,670	100.0	25.9

Table 2
Fixed Effect Quantile Regression Results: Adaption and Anticipation to Illness

	Percentile				
	10th	25th	50th	75th	90th
Illness in 4 years (I_{-4})	1.339 (0.928)	0.565 (0.355)	0.118 (0.320)	-0.134 (0.221)	0.019 (0.310)
Illness in 3 years (I_{-3})	0.315 (0.828)	0.295 (0.314)	0.158 (0.365)	-0.101 (0.206)	-0.112 (0.199)
Illness in 2 years (I_{-2})	0.099 (0.715)	0.001 (0.334)	-0.097 (0.329)	-0.125 (0.223)	-0.100 (0.186)
Illness in next year (I_{-1})	0.717 (0.756)	0.000 (0.329)	-0.023 (0.309)	-0.279 (0.232)	-0.140 (0.223)
Initial incidence of illness (I_0)	-1.991* (1.053)	-1.122*** (0.356)	-0.787** (0.321)	-1.056*** (0.241)	-0.263 (0.283)
Illness duration 1 extra year (I_1)	-3.193** (1.372)	-1.262** (0.642)	-0.942*** (0.356)	-0.964*** (0.358)	-0.221 (0.332)
Illness duration 2 extra years (I_2)	-1.081 (1.185)	-0.715 (0.556)	-0.941** (0.402)	-1.196*** (0.343)	-0.073 (0.350)
Illness duration 3 extra years (I_3)	-2.743** (1.230)	-1.518** (0.710)	-0.798 (0.633)	-0.224 (0.349)	-0.033 (0.368)
Illness duration 4 extra years (I_4)	-1.153 (1.153)	-1.551*** (0.576)	-1.618** (0.683)	-0.488 (0.394)	-0.118 (0.295)
Illness duration 5 or more extra years (I_5)	-3.095* (1.617)	-2.413*** (0.735)	-1.126** (0.550)	-0.396 (0.403)	-0.063 (0.418)

Notes: figures refer to coefficient estimates; standard errors in parenthesis; */**/** denotes significance at 90/95/99% confidence level; additional controls included for age, marital status, number of children, employment status, education, equivalent household income, and returning to good health but which are not reported.