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**Working Paper**

## Happiness: Revising Set Point Theory and Dynamic Equilibrium Theory to Account for Long Term Change

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**Discussion Papers**

**DIW Berlin**

German Institute  
for Economic Research

**607**

**Bruce Headey**

**Happiness: Revising Set Point Theory  
and Dynamic Equilibrium Theory  
to Account for Long Term Change**

**Berlin, July 2006**

Opinions expressed in this paper are those of the author and do not necessarily reflect views of the institute.

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**Discussion Papers 607**

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**Happiness:  
Revising Set Point Theory and Dynamic Equilibrium Theory  
to Account for Long Term Change**

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## Abstract

An adequate theory of happiness or subjective well-being (SWB) needs to link at least three sets of variables: stable person characteristics (including personality traits), life events and measures of *well-being* (life satisfaction, positive affects) and *ill-being* (anxiety, depression, negative affects). It also needs to be based on long term data in order to account for long term *change in SWB*.

By including personality measures in the 2005 survey, SOEP becomes the first available dataset to provide long term evidence about personality, life events and change in one key measure of SWB, namely life satisfaction. Using these data, the paper suggests a major revision to the *set point or dynamic equilibrium theory of SWB* in order to account for long term change (Brickman and Campbell, 1971; Costa and McCrae, 1980; Headey and Wearing, 1989; Lykken and Tellegen, 1996).

Previously, theory focused on evidence that individuals have their own equilibrium level or set point of SWB and revert to that equilibrium once the psychological impact of major life events has dissipated. But the new SOEP panel data show that small but non-trivial minorities record substantial and apparently permanent upward or downward changes in SWB. The paper aims to explain why most people's SWB levels do not change, but why a minority do. The main new result, which must be regarded as highly tentative until replicated, is that the people most likely to record large changes in life satisfaction are those who score high on the personality traits of extraversion (E) and/or neuroticism (N) and/or openness to experience (O). These people in a sense 'roll the dice' more often than others and so have a higher than average probability of recording long term changes in life satisfaction.

Data come from the 2843 SOEP respondents who rated their life satisfaction every year from 1985 onwards and then also completed a set of questions about their personality in 2005.

Keywords: Happiness Research, Theory of Happiness, SOEP

JEL Classification: I31, Z19

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## 1 Introduction

A dynamic equilibrium (DE) theory of subjective well-being (SWB) was initially proposed to account for linkages between personality, life events, well-being and ill-being (Headey & Wearing, 1989). Prior to that, Brickman and Campbell (1971; see also Brickman et al, 1978) had shown that people usually return to a baseline - or equilibrium level, or set point - of happiness following even such major life events as becoming a paraplegic and winning a large sum in a lottery. DE theory is now usually labelled set point theory. This is perhaps a clearer label, or a more immediately understandable description of one key aspect of the theory, but in itself the observation that individuals generally seem to oscillate around their own set point of SWB is just that; an observation not an explanatory theory.

DE theory and set point theory have been extended in two main ways in recent years. Evidence has been adduced about additional stabilizing factors which tend to keep people close to their happiness/SWB set point. Headey and Wearing (1989) attributed long term stability to the stable traits of extraversion (E) and neuroticism (N). Lykken and Tellegen (1996), using the Minnesota Twin Study, showed that heredity generally (and not just E and N which are substantially heritable), is a powerful influence on lifetime SWB (see also Lykken, 1999). Other researchers have investigated the effects of life events which can cause medium term and perhaps permanent change in set points. These events include the unexpected death of a child (Wortman & Silver, 1987), repeated spells of unemployment which have a 'scarring effect' (Clark et al, 2004), becoming widowed and perhaps getting married (Lucas et al, 2003). Amusingly, the only favourable or positive 'event' unambiguously shown to enhance long term SWB seems to be cosmetic surgery (Wengle, 1986; Loewenstein & Frederick, 1999).

DE theory and set point theory remain controversial partly because the two lines of research just described pull in different directions, although they are not necessarily contradictory. The first elucidates set point stabilizers, while the second directs attention to destabilizers. Clearly, if it were common for destabilizers to overwhelm stabilizers, then dynamic equilibrium/set point theory would not hold. The theory depends on finding that most people, most of the time, have stable levels of SWB. Some recent papers, using longitudinal data, report medium



term changes in SWB but stop short of concluding that DE/set point theory requires revision (Lucas et al, 2003; Clark et al, 2004; Fujita & Diener, 2005).

The purpose of this paper is to revise set point and DE theory, using data from the German Socio-Economic Panel (SOEP) (Wagner et al. 1993). The main outcomes are: (1) clear evidence that set point and DE theory require revision; evidence centered on finding that the stability of life satisfaction diminishes slowly over time and (2) analysis showing that the people who are most likely to record large changes in life satisfaction are those who score high on the personality traits of extraversion (E) or neuroticism (N), and also high on openness to experience (O).<sup>1</sup> These people in a sense ‘roll the dice’ more often than others and so have a higher than average probability of recording long term changes in life satisfaction.

A final introductory point: in this paper DE theory and set point theory are taken to apply not just to *well-being* (life satisfaction and positive affects), but also to *ill-being* (anxiety states and related negative affects). The theory as initially put forward related to both well-being and ill-being (Headey & Wearing, 1989, 1992), and it is suggested that this was and is a valuable aspect. In recent years the tendency has been to refer solely to a well-being or happiness set point. It will be assumed that well-being (henceforward WB) and ill-being (IB) have been shown to be distinct dimensions, which are only moderately negatively correlated, and not just opposite ends of the same dimension (Bradburn, 1969). This is not accepted by all researchers in the field, but by the large majority (Argyle, 2002; Diener et al, 1999; Headey & Wearing, 1992).<sup>2</sup> Physiological evidence backs the majority view, indicating that the centers of the brain registering pleasure/positive affect and pain/negative affect are separate, although they interact as ‘opposing systems’ (Kahneman, 1999).

## 1.1 DE theory/set point theory reformulated

A helpful way to understand DE theory and set point theory is to compare them with permanent income theory in economics.<sup>3</sup> Permanent income theory proposes that each individual has a predictable lifetime income curve; predictable on the basis of his/her human capital

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<sup>1</sup> Unlike E and N, the personality trait O appears not to be directly linked to well-being and ill-being. Its relevance lies in being positively correlated with the frequency of experiencing both positive and negative life events (see below).

<sup>2</sup> However, some researchers propose additional sub-dimensions. WB can be split into life satisfaction and positive affect. IB can be split into anxiety and depression (and other less common adverse states).

<sup>3</sup> I am grateful to Richard V. Burkhauser of Cornell University for suggesting this comparison.

(education, relevant work experience, and intangible capital like entrepreneurial skills). Most people's incomes rise during their working lifetime up to the age of about fifty, and then decline in later working years and retirement. It is clear that annual incomes fluctuate due to random shocks, but the prediction is that most people revert to long term trend. A few rise from rags to riches and a few fall from riches to rags, but the existence of these small minorities is not seen as total refutation of permanent income theory.

DE theory and set point theory are similar but simpler. The theories predict not a lifetime curve but fluctuations around a straight line in SWB. An individual SWB fluctuates from year to year, due to the fact that events and experiences are partly exogenous (as well as partly endogenous), but then return to baseline. The analogues of human capital in SWB theory are the personality traits E, N and O. By analogy, too, it should not be seen as complete refutation of DE or set point theory if small minorities register large gains or losses in SWB.

DE theory was initially put forward to account for two observations in the Australian (VQOL) Panel Survey. The first had been made before (Brickman & Campbell, 1971), the second seemed somewhat new and unexpected.

1. *Some people were persistently happier than others.* To be more precise, some respondents rated consistently higher on measures of WB than others, and some rated consistently higher on measures of IB. Measures of WB and IB were only moderately negatively correlated, so as well as observing individuals who were high on WB and low on IB, and vice-versa, we also found people who were high on both WB and IB, and a fourth group who were low on both WB and IB.
2. *The same life events and experiences kept happening to the same people* This was a key surprise result in the Australian panel. It provided the clue that more or less fixed person characteristics, life events, WB and IB must be linked in some sort of 'dynamic equilibrium'.

## 1.2 DE theory: main propositions

DE theory accounts for these observations, using the following building blocks: personality (N, E and O), life events (positive and negative), anticipatory and adaptive mechanisms invoked by life events, and WB and IB. These building blocks are linked in five sets of propositions, which were tested and appeared to be supported by data from less long term panels

than SOEP now provides (Headey & Wearing, 1989, 1992; Magnus et al, 1993). The propositions are set out below and not further tested. They are not uncontroversial but, for the purposes of this paper, they will be taken as reflecting the state of play prior to the availability of the SOEP 1985-2005 data.

*Proposition 1: Each person has his/her own stable equilibrium levels (or set points) of WB and IB.*

*Proposition 2: Levels of WB and IB depend partly on E and N. People who rate high on E and low on N have high levels of WB and low levels of IB. People who score low on E and high on N rate low on WB and high on IB. People who score high on both E and N also score high on both WB and IB. People who rate low on both E and N score low on both WB and IB.*

*Proposition 3.1: Each person has a tendency to display repeating patterns of life events and experiences. Positive (favourable) events 'scores' (i.e. frequency of experiencing positive events) are correlated over time, as are negative (adverse) events 'scores'.*

*Proposition 3.2: Positive and negative events are also correlated over time. That is, the more positive events a person experiences, the more negative events he/she is also likely to experience (see Proposition 4.3 below for explanation of this apparently counter-intuitive proposition).*

*Proposition 4: The repeating patterns of events which people experience are driven by three personality traits – N, E, O - and stage of the life cycle.*

*H4.1 People who experience many positive events and few negative events score high on E, low on N, high on O and are relatively young.*

*H4.2 People who experience few positive events and many negative events score low on E, high on N, high on O and are relatively young.*

*H4.3 People who experience many positive and many negative events score high on E, high on N, and high on O and are relatively young*

*H4.4 People who experience few positive and few negative events score low on E, low on N, low on O, and are relatively old.*

*Proposition 5.1: To the extent that, in any given time period, a person just repeats the pattern of positive and negative life events that is normal (mean level) for him/her, then WB and IB will remain at or revert to their set points.*

*Proposition 5.2: To the extent that, in a given time period, a person deviates from his/her own normal pattern of events (i.e. relatively exogenous events happen), then WB and/or IB will deviate from their set points.*

## 2 Methods

### 2.1 Sample: SOEP (West German data only)

The West German segment of the SOEP panel is the longest-running panel in the world to collect data on WB (life satisfaction). It began in 1984 with a sample of 12,541 respondents. Interviews have been conducted annually ever since. Everyone in the household aged 16 and over is interviewed. The representativeness of the panel is maintained by interviewing ‘split-offs’ and their new families. So when a young person leaves home (‘splits off’) to marry and set up a new family, the entire new family becomes part of the panel. The main sample has also been boosted by the addition of new immigrant samples, a special sample of the rich, and recruitment of new respondents partly to increase numbers in ‘policy groups’. The main topics covered are family, income and labor force dynamics, but a question on life satisfaction has been included every year. The data used in this paper relate to the 2843 respondents who reported their level of life satisfaction every year from 1985 onwards and then also provided personality data in 2005.<sup>4</sup>

### 2.2 Measures

Two types of measures of SWB are collected by researchers: global self-reports and ‘on-line’ (experience sampling) measures. All the measures here are global self-reports; survey items requiring respondents to make summary judgments about their ‘life satisfaction’, moods or other mental states. It is acknowledged that advances in SWB theory may well require us also to collect ‘on-line’ measures (Kahneman, 1999), but for now only global self-reports are available on a multi-year basis.

The dependent variable used here is a single item; a 0-10 scale of life satisfaction. Clearly, single item scales are not the most valid measures of WB available, but they have been reviewed as having reasonably adequate reliability and validity (Diener et al, 1999).

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<sup>4</sup> Like some other researchers we prefer not to use the 1984 data on life satisfaction. It has been shown that life satisfaction scores were ‘inflated’ that year by respondents giving their first interview (Frijters, Haisken-DeNew and Shields, 2004).

The SOEP introduced an extensive set of personality measures for the first time in 2005. The main focus was on the so-called ‘Big Five’ personality domains (Costa and McCrae, 1991). These are NEO-AC: neuroticism, extraversion, openness, agreeableness and conscientiousness. There is a semi-consensus among personality psychologists that these five domains (or traits) capture most of what we need to know about ‘normal’ personality. Normally, psychologists use very long batteries of items to measure each personality trait. This makes sense when the aim is to ‘diagnose’ individual clients. But the aim in SOEP was simply to rate or rank respondents according to personality traits, so that ‘personality’ could be used in statistical analyses. So 3-item scales were developed after taking advice from psychologists familiar with previous attempts to construct short versions of the NEO-AC. Gerlitz and Schupp (2005) report that the 3-item scales appear to do an adequate job, for survey purposes, of replicating the well validated longer scales. In this paper it was found that one of the extraversion (E) items (‘reserviert’) did not covary in the expected way with life satisfaction, so it was dropped in the analyses reported below.

In this paper personality is treated *as if* it is completely stable. This assumption is not completely true; personality can be modified by surgery, by trauma, by major life events and, perhaps, by psychiatric counseling. However, for this paper, we need to assume that traits are stable and affect levels of life satisfaction. So, in a sense, we treat the traits as if they were measured in the first not the latest wave of SOEP.

### 3 Results

#### 3.1 Evidence that DE theory and set point theory require some revision

The first issue is how to assess whether long term life satisfaction is completely stable, despite transitory fluctuations, or whether some people's set points or equilibrium levels appear permanently to change. In tackling this issue, we will divide the 20 annual measures of life satisfaction into four five-year blocks: 1985-89, 1990-94, 1995-99 and 2000-04. By taking five-year averages we avoid being at the mercy of annual fluctuations in satisfaction and we get a clearer sense of how many people are recording substantial and potentially longer term changes (Fujita and Diener, 2005). The comparison between the satisfaction ratings of respondents in the last five-year period (2000-04) compared with first period (1985-89) is of particular interest, because it gives a straightforward indication of how many of the 2843 respondents became much more or much less satisfied with life over the long term (permanent change?).

In the event 5.5% (N=172) of respondents recorded an upward change of two or more points on the 0-10 life satisfaction scale and 11.4% (N=357) recorded a change of two or more points downwards. A shift of this magnitude must be regarded as substantial. It is just under 1.5 standard deviations, which means that those respondents whose life satisfaction increased 'overtook' almost 50% of their fellow respondents, whereas those who became less satisfied fell behind about 50% of the sample.

The asymmetry of change – the fact that more than twice as many people became less happy as became more so – is a finding of potential interest. The asymmetry occurred in the context of only a very small decline in average satisfaction for the total sample in this long period – from 7.2 on the 0-10 scale in 1985-89 to 7.0 in 2000-04. It is possible that the asymmetry is due to sample bias – respondents who have remained in SOEP for two decades are plainly a highly self-selected group – but, in general, survey researchers would tend to expect people who were becoming less happy to drop out of a panel at a greater rate than people who were becoming happier, and not the other way round.

If the asymmetry is ‘real’, rather than a measurement artifact, we need to ask why it is harder to become substantially more satisfied with life than it is to suffer a serious decline in happiness. The explanation offered by Selye (1950) may hold. Selye, the psychologist who first developed stress theory in the 1930s, showed that all major life events, even putatively favourable ones (e.g. getting married; getting promoted at work) are stressful and increase the risk of mental and physical health problems. So Selye would not be surprised by the life satisfaction results reported here. He would say that favourable events and experiences may result in some gain in happiness, but at the cost of some stress, whereas adverse events (e.g. the death of a family member; being sacked) are unambiguously stressful.

Aside from individuals who recorded large changes in life satisfaction, the SOEP data provide two further pieces of evidence which indicate that set point theory and dynamic equilibrium theory are in need of revision. Table 1 shows the over-time correlations of life satisfaction in the four five-year periods, and Table 2 shows the relationship between the personality traits E and N measured in 2005 and life satisfaction in earlier periods.<sup>5</sup> If set point theory and dynamic equilibrium theory were correct in the most literal and exact sense, there would be no diminution over time in correlations among life satisfaction measures, or between personality traits and life satisfaction.

Table 1  
**Diminishing Over-time Correlations: Life Satisfaction Measures<sup>a</sup>**

LS <sub>1985-89</sub>	1.00			
LS <sub>1990-94</sub>	0.67	1.00		
LS <sub>1995-99</sub>	0.55	0.72	1.00	
LS <sub>2000-04</sub>	0.48	0.59	0.74	1.00

a. Pearson correlations

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<sup>5</sup> In this paper, as in much recent research on life satisfaction, the 0-10 scale is treated as an interval scale even though strictly speaking it is ordinal. So Pearson correlations and OLS regression are used, even though it could be claimed that ordinal correlations and regression would be more appropriate. Andrews and Withey (1976) provided the first detailed demonstration that substantively results do not change for life satisfaction measures if interval level rather than ordinal level assumptions are made.



Table 2  
**Diminishing Over-time Correlations: Personality Traits and Life Satisfaction<sup>a</sup>**

	LS <sub>2000-04</sub>	LS <sub>1995-99</sub>	LS <sub>1990-94</sub>	LS <sub>1985-89</sub>
Extraversion <sub>2005</sub>	0.16	0.14	0.13	0.10
Neuroticism <sub>2005</sub>	-0.28	-0.23	-0.21	-0.17

a. Pearson correlations

The evidence here is quite unambiguous. Previous shorter term data had shown little or no apparent diminution in correlations over time (e.g. Costa and McCrae, 1980; Headey and Wearing, 1989). But the longer term SOEP dataset shows that correlations among life satisfaction measures steadily diminish over time, as do correlations between life satisfaction and traits E and N. The second result is particularly interesting, but needs replication and checking with repeated measures of personality. It appears to mean that, even though E and N are known to be stable over long periods (Costa, McCrae and Zonderman, 1987), they do not always hold life satisfaction close to equilibrium.

### 3.2 Revising DE and set point theory

The next step is to try and revise DE and set point theory to account for finding that, while most people's life satisfaction is stable, significant minorities register long term change. The following hypotheses are offered as modifications and extensions of the propositions listed earlier.

*Hypothesis 1: Even in the long term, the large majority of people do not deviate much from their own equilibrium level or set point for LS. They are particularly unlikely to deviate if they score near the mean or below on E, N and O.*

*Hypothesis 2: High levels of E and O, combined with low N, are associated with high 'upside risk' of favourable life events and substantial gains in long term LS.*

*Hypothesis 3: High N and O, combined with low E, are associated with high 'downside risk' of adverse life events and substantial decline in long term LS.*

*Hypothesis 4: High E, high N and high O increase both upside and downside risk of major life events and long term change in LS.*

In considering these hypotheses, remember that the traits E, N and O are more or less uncorrelated. So just as an aid to clear thinking, it can be useful and is not misleading to conceive of people as falling into ‘types’. At the same time, scores on each trait form a normal curve with the majority bunched around the mean. Hypothesis 1 says that the large majority of people, who score near the mean or below it on traits E, N and O, are unlikely to deviate much from their equilibrium level of life satisfaction. But there are three ‘types’ of people who ‘roll the dice’ more often than others and so have a higher probability than average of long term change in LS. Hypothesis 2 relates to people who rate high on E and O, and low on N. They generally score high on life satisfaction, but their extraversion and openness to experience mean that they roll the dice a lot. They induce and experience many favourable events. Usually, these events will be ‘normal’ for them (endogenously driven) and their LS will not change. However, there is a moderate upside risk that a more or less exogenous favourable event will occur and produce a long term gain in LS. Hypothesis 3 relates to unhappy people who rate high on N and O, and low on E. Their neuroticism and openness mean that they experience many adverse events. They are at high ‘downside risk’ of a long term loss of life satisfaction. Finally, hypothesis 4 says that people who are high scorers on all three personality traits run high upside and high downside risks and may show either big long term gains or big losses in LS.

In making preliminary tests of these hypotheses, using the SOEP data, we can only look at linkages between personality traits and long term LS outcomes. SOEP does not yet provide adequate life events data, so evidence about the kinds of life events that repeatedly happen to different ‘types’ of people has to be taken on trust from previous research using shorter term panels (Headey and Wearing, 1989; Magnus et al, 1993).

Note that in testing these hypotheses, we predict statistically significant but not very strong relationships between personality traits and long term changes in life satisfaction. If relationships were strong, hypothesis 1 and, by implication DE and set point theory, would be falsified. Table 3 gives the key results. The dependent variable is our measure of long term change in life satisfaction, namely  $LS_{2000-04}$  minus  $LS_{1985-89}$ . On the right hand side are the personality traits E, N and O. Gender, age and age squared are included as ‘controls’.  $LS_{1985-89}$

is also included on the right hand side, since it is correlated quite strongly with the long term change measure. Ordinary least squares regression (OLS) is used.

Table 3  
Upside and Downside Risk of Long Term Change in Life Satisfaction: OLS regression

	Dependent variable: LS <sub>2000-04</sub> - LS <sub>1985-89</sub>
<b>Extraversion</b>	<b>0.11***</b>
<b>Neuroticism</b>	<b>-0.24***</b>
<b>Openness</b>	<b>0.06**</b>
Female	0.03
Age	0.01
Age <sup>2</sup>	-0.00
LS <sub>1985-89</sub>	-0.54***
R <sup>2</sup>	28.7%
N	2843

\*\*\* significant at 0.001    \*\* significant at 0.01.

The evidence is in line with the interpretation that the more extraverted and open to experience a person is, the higher the probability of a gain in long term LS. Conversely, the more neurotic and open to experience a person is, the greater is his/her downside risk of a decline in long term LS. Overall, neuroticism appears to have the greatest effect in predisposing a person to long term change. Extraversion has a moderate effect, while, on this evidence, the effect of openness is small, although statistically significant at the 0.01 level.

Table 4 addresses a related but somewhat different issue. The idea that some people ‘roll the dice’ more than others, implies that the high rollers will display greater fluctuations in LS over time than those whose approach to life is more cautious. Table 4 reports results from a panel regression random effects model in which the dependent variable is LS in the four five-year periods. So the coefficients can be interpreted as the effect of the variable in question on *change* (or fluctuations) in LS from period to period.

Table 4

**Upside and Downside Risk of Changes in Life Satisfaction in the Periods 1985-89, 1990-94, 1995-99 and 2000-04: panel regression random effects model**

	<b>Dependent variable: LS in four five-year periods</b>
<b>Extraversion</b>	<b>0.10***</b>
<b>Neuroticism</b>	<b>- 0.26***</b>
<b>Openness</b>	<b>0.03*</b>
Female	0.07
Age	- 0.03***
Age <sup>2</sup>	0.00***
R <sup>2</sup>	9.5%
N	13925

\*\*\* significant at 0.001 \* significant at 0.05.

The results here confirm that the LS of people who are more extraverted, more neurotic and more open to experience fluctuates more than is the case for people who rate low on these traits.

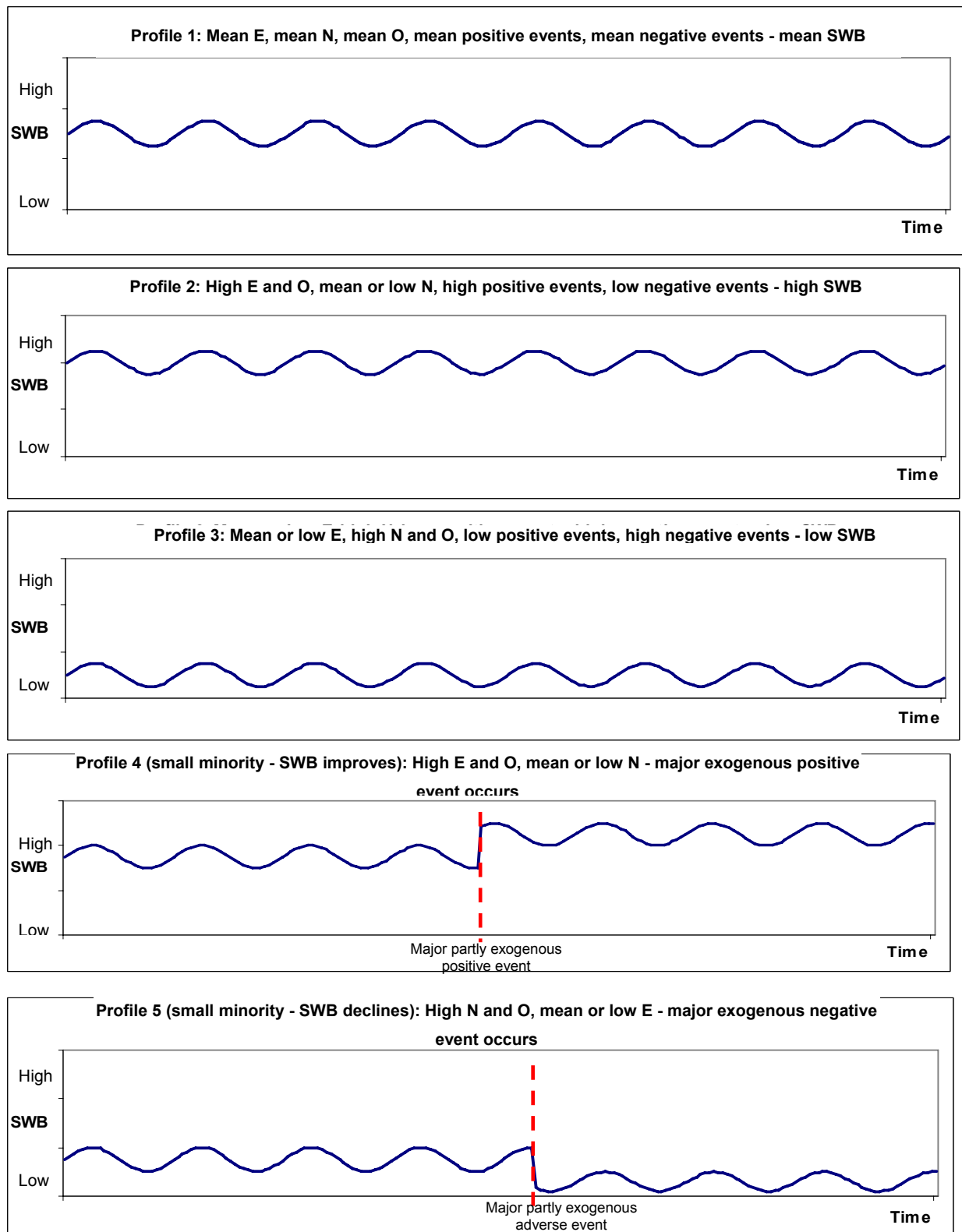
## 4 Discussion

### 4.1 Five profiles: developments in SWB over time

The new data in this paper relate only to personality traits and long term changes in one indicator of Well-Being (WB), namely life satisfaction. No new evidence has been given for life events or for measures of Ill-Being (IB). Nevertheless it is suggested that the results may have important implications for theories of SWB, which can be understood as theories which seek to link stable person characteristics to the occurrence of life events and to outcomes related to IB as well as WB. To draw out these implications, five profiles can be given of characteristic developments in SWB over time (see figure 1).

Profile 1 shows the most common pattern – no change with only quite small fluctuations around an individual's own equilibrium levels or set points of SWB. This individual is near the mean on E, N and O and continually experiences life events which are fairly normal or typical for him/her; there are few exogenous shocks. Profiles 2 and 3 can be viewed together and show the next most common patterns; stability of SWB over time but with quite wide short term fluctuations. Individual 2 is a quite a 'happy' person, being high on E and O and middling or low on N. He/she continually experiences quite a lot of favourable events and few negative events. Most of these events are of a kind which are normal for him/her (given the personality profile), but because of high risk ('rolling the dice' more often than average) fluctuations around his/her mean SWB are quite large. However, as it transpires, no major shock occurs in the time period portrayed, so no permanent upward (or downward) change in SWB occurs. Profile 3 is of an individual who is quite 'unhappy', being middling or low on E and high on N and O. Events are mainly negative and fluctuations around his/her mean SWB are quite large. However, no permanent downward change has actually occurred.

Figure 1  
Five Profiles: Developments in Subjective Well Being Over Time\*



\* SWB scores can be thought of here as standardized (mean of 0, standard deviation of 1.0).

Profiles 4 and 5 are of individuals representing small minorities. Profile 4 is a high E, high O and low N person who is shown to have experienced a sharp rise in SWB. For a while, at the beginning of the period, this person experienced events which were normal for him/her. But then some partly exogenous positive event or combination of events happened and produced a sharp rise. Although this event(s) was somewhat unpredictable, the fact that the person was high E, high O and low N made it not all that unlikely. Finally, Profile 5 shows a developmental pattern for a low E, high N, high O person to whom a major partly exogenous negative event happens.

It is important to say which logically possible patterns of SWB development are predicted by DE and set point theory to be very *unlikely*. It is unlikely that a person who scores near the mean or below on E, N and O will experience major exogenous events of a drastic enough kind to move him/her permanently away from his/her equilibrium levels of WB and IB. Of course, it could happen. As previously noted, it has been shown that some events, most notably the death of one's child, are so dreadful as to permanently lower SWB, and obviously that could happen to any parent. Another prediction that follows from DE theory is that a one-off upward or downward change in SWB is more likely than (say) ten or twenty years of continuous gain or decline. This is simply because of the improbability of major events of a kind which are abnormal for a particular person repeatedly happening to him/her.

## 4.2 Possible future developments

If DE theory and set point theory have value, it will be important to try and keep improving their scope and specification, so they do a better job of accounting for change. This paper has only made a start in accounting for medium to long term changes in SWB. It may be that in order to understand such changes, we need to conceive of slow changes in personality accompanied by slow changes in individuals' patterns of life events. Such changes might best be modeled using moving average specifications. Such models, sometimes labeled ARMA models, are available, but they would require better quality long term data than we have at present. Inclusion of personality measures and reasonably detailed life events inventories in existing national panel studies are one way forward. It would also be ideal if the self-report measures of SWB in these surveys could be supplemented by high quality 'on line' data.

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