

Draft – comments welcome

Paper prepared for 3<sup>rd</sup> Conference on the Capability Approach  
7-9 September 2003, Pavia, Italy

**Identifying adaptive preferences using panel data:  
subjective and objective income trajectories**

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## **Abstract**

One of the motivations frequently cited by Sen and Nussbaum for moving away from a utility metric towards a capabilities framework, is a concern about adaptive preferences. If utility is related to the satisfaction of aspirations or expectations, and if these are affected by the individual's previous experience of deprivation or wealth, then utility cannot provide a basis for assessing well-being, equality or social justice which is independent of the initial distribution.

This paper contributes to the identification of adaptive preferences by using 10 years of panel data from the British Household Panel Survey to study the process of adaptation based on the individual's own previous experience. Subjective assessments of financial well-being at time  $t$ , for individuals with a given income level, are compared according to the income trajectory of the individual over the previous 1-9 years. Descriptive statistics are followed by multivariate analysis, introducing controls for changes in need (family size and composition, disability), and other possible reference groups (parental background, local area, socio-economic status).

The results show that individuals who have experienced a recent downwards shock to their income are more likely to express dissatisfaction with their financial situation than individuals who have experienced long-term low income. The paper concludes that there is evidence of a process of subjective adaptation to material deprivation and therefore that subjective assessments of well-being are an inappropriate basis for judgements of inequality or social justice.

## **Keywords**

Adaptive preferences; subjective well-being; satisfaction; income; longitudinal.

## **Acknowledgements**

I am grateful to participants in a London School of Economics seminar for helpful comments, to Peter Krause at DIW, Berlin, for the discussions which gave rise to the idea for this paper in the first place, and to Tom Sefton for generously sharing with me his work on income trajectories. This work has been funded by the Economic and Social Research Council through the Centre for Analysis of Social Exclusion at the London School of Economics. Data from the British Household Panel Survey were provided through the Data Archive at the University of Essex. Responsibility for errors and omissions, and for the views expressed, rests with the author alone.

## Introduction

Economists, psychologists and sociologists have all examined the possibility that individuals' subjective assessments of their situation are not fixed solely by their current objective circumstances, but rather are influenced by their expectations, aspirations, previous experiences, and social reference groups. Using diverse theories, methods and terminology, the three approaches have tackled the same question of adaptation: is it the case that people become accustomed to the situation they find themselves in, and subsequently set their aspirations, form their expectations, and assess their well-being, relative to that situation?

This question is of particular interest to capability theorists, since the existence of adaptive preferences is one of the principal arguments used to demonstrate the advantages of a capabilities framework over welfarism. Sen hypothesises that someone who has never known anything other than material deprivation may not be unhappy or dissatisfied with his or her circumstances:

“The battered slave, the broken unemployed, the hopeless destitute, the tamed housewife, may have the courage to desire little, but the fulfilment of those disciplined desires is not a sign of great success and cannot be treated in the same way as the fulfilment of the confident and demanding desires of the better placed” (Sen, 1987, p.11).

If utility is the only 'object of value', the materially deprived individual could be at the same point in the distribution of well-being as someone who achieves the same degree of happiness with four holidays a year and a sports car. Sen questions whether this can be the correct conclusion. Nussbaum describes the experience of a woman who had been the victim of prolonged domestic violence, who believed at the time the abuse was being perpetrated that, although unpleasant, there was not anything wrong - this was simply a woman's lot in life. Only after having escaped from the relationship did the woman come to recognise that her rights had been violated (Nussbaum, 2001). Again, Nussbaum questions whether the individual's contemporary subjective assessment - her utility - is the relevant metric to assess the justice or injustice of the situation.

Now there are four possible responses to these observations. One is to insist that utility is indeed the only relevant information – that if an individual does not *feel* unhappy or dissatisfied, then there is nothing wrong. This is a consistent position although it leads to some unpalatable conclusions: a rational and enlightened policymaker should seek to generate long-term and widespread deprivation, in order to lower everyone's expectations and thereby be confident of being able to fulfil them.

A second response is to retreat to a counterfactual version of utility or preferences – “informed preference” or “preferences that would remain stable in changing context”. However this type of response is difficult to support without the aid of some external authority to define 'well-informed' or 'stable', an authority for which there is no justification within welfarism or utilitarianism.

A third response is to deny that these examples of adaptive preferences are typical. Sen's example is hypothetical and Nussbaum's is anecdotal. This paper contributes to addressing this concern.

A fourth and final response is to accept that adaptive preferences are widespread and non-trivial, and to conclude that measuring utility (and therefore welfarism) is not the right approach to assessing well-being, equality or social justice. Instead, we need to move to an objective normative standard (fulfilment of basic functionings), or an assessment of the choices that people have open to them (capabilities).

In a more specific form, the question of adaptation is also of interest to a committed welfarist. Utility has various interpretations but is always acknowledged to be a subjective mental state, not directly observable. Traditionally, welfarists have used income as a proxy for utility. This is on the basis that utility is equivalent to preference satisfaction, and that in the context of consumer demand theory, higher income gives greater scope for preference satisfaction. More recently, economists such as Easterlin (2001) and Oswald (1997) have explored the possibility of using subjective assessments of satisfaction or well-being as alternative proxies for utility. Intuitively, these are closer to the concept of utility than is income.

Unfortunately it turns out that the two proxies for utility, income and satisfaction (or income and subjective well-being), are only weakly correlated. Again, various possible explanations for this discrepancy have been put forward, among them the idea of adaptation (sometimes called the hedonic treadmill or habituation). Failure to find an adequate explanation for the low correlation between income and satisfaction means the welfarist must reject one or the other as a proxy for utility; to reject income would undermine large swathes of welfare economics, to reject satisfaction requires shifting the meaning of utility towards mood (affect), which makes the insistence on utility as the sole object of value an even less attractive proposition.

Hence the question of the existence and magnitude of adaptive preferences is a matter of considerable interest both for the welfarist and for the capability theorist. This paper attempts to identify and quantify the process of adaptation in one particular context, namely changes in income and satisfaction with income. As will be described in the following section, it extends previous work in the area by using longitudinal data over a ten year period, and examining income as a whole rather than specific components such as wages.

### **Existing evidence on the relationship between satisfaction and income**

A large number of studies have found that cross-sectional correlation between income and satisfaction or subjective well-being is positive but weak (DeNeve and Cooper, 1999; Easterlin, 1995). These studies have been based on comparisons across countries, within countries across time, or across people within a country at a point in time.

A number of explanations have been put forward for this finding. Firstly, it has been argued that income has not been measured properly. We need to measure total resources (including savings and benefits in kind), differences in need which those resources are required to meet (for example, due to variations in household size or

disability status), and allow for diminishing marginal returns to income (Schyns, 2002). In order to address this concern, a range of income specifications are employed in this paper.

Secondly, it has been suggested that many factors not necessarily correlated with income may contribute to overall life satisfaction, such as friendship, love, and being able to fulfil your potential (Michalos, 1991). Of course, unless these factors are negatively correlated with income, one would still expect a positive correlation between income and satisfaction to come through. Nevertheless, to give the best possible chance for a strong relationship between income and satisfaction, this paper focuses on income and *satisfaction with income*, rather than life satisfaction overall.

Thirdly, some psychologists have argued that happiness is only marginally affected by current circumstances, rather the disposition to be happy is a personal trait, which may or may not have a heritable component (Abbey and Andrews, 1986; Diener and Lucas, 1999). This possibility is not directly investigated in this paper, although some of the statistical techniques employed allow for individual fixed effects, that is, unobservable differences between individuals which are constant over time.

Fourthly, sociologists have theorised that individuals are satisfied if their position is higher than, or equal to, that of a reference group, and dissatisfied otherwise (Michalos, 1991; Tomes, 1986; Davis, 1984). The reference group may be defined in a number of different ways – for example as other family members, their age cohort, social class, or neighbourhood, or the broader population. Interpretations differ as to whether the reference group merely defines what feels right for each individual, or whether it also shapes his or her expectations or aspirations. Social reference groups are not the main focus of this paper, but the possibility that an individual's satisfaction with his or her income depends on the income of a reference group is incorporated by including control variables for potential reference group identifiers, such as age and marital status, in the analysis.

It is also important to bear in mind that an individual's reference group may change over time, either as a result of individual mobility, or as a result of changes within the group.<sup>1</sup> If the former, this may be seen as special case of adaptation, discussed below.

Finally, it has been suggested that individuals assess their well-being relative to their own previous experience. Therefore while an increase in income results in an increase in satisfaction in the short term, over the medium to long-term, it is hypothesised that the individual becomes accustomed to their new standard of living and is no longer especially satisfied with it. One mechanism by which this could occur is a shift in social reference group, as described below. Conversely, an individual who experiences a drop in income may be initially very dissatisfied, but later become more content. These processes have been variously referred to as adaptation, habituation, conditioned expectations, or the hedonic treadmill. They imply that two individuals with the same level of income may express varying degrees of satisfaction with it, according to their previous income trajectory.

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<sup>1</sup> Frank (1997) describes the 'frame of reference' as a social good. Conspicuous consumption shifts the frame of reference upwards and creates unhappiness for those unable to afford the latest luxury.

A number of cross-sectional studies are highly suggestive of a process of adaptation being at work, but it cannot be shown conclusively without longitudinal data. Some authors have used retrospective data on perceived changes in income, and found that recent perceived improvements in financial circumstances are positively correlated with satisfaction (Graham and Pettinato, 2002, for Peru and Russia; Ingelhart and Rabier, 1986, for France and Belgium; Davis, 1984, for the US). In some cases, perceived change was more strongly correlated with satisfaction than current level of income. However, there are clearly conceptual drawbacks to using subjective data on changes in income.

There are a small number of studies using genuine panel data and objective income data.<sup>2</sup> Some focus on job satisfaction and wages: for Britain, Clark (1999) found that job satisfaction was more closely related to changes in wages than to levels of wages. Similarly, using German data, Clark *et al* (1998) showed that the likelihood of men quitting a job was related to the change in their wages over the last year, but not to the level of their wages. Others focus on household income. For example, Chan *et al* (2002) use two-wave panel data for Singapore and Taiwan to show that both baseline income and change in income are strongly related to change in perceived income adequacy. By contrast, Diener *et al* (1993), using two-wave panel data for the US, find that change in income does not affect overall subjective well-being independently of income level. Finally, Ravallion and Lokshin (2001) use two-wave panel data for Russia. A careful specification allowing for time-invariant unobserved individual heterogeneity, leads them to conclude that change in household income is a strong independent predictor of change in subjective economic welfare, controlling for baseline income.

This study builds on existing research by focusing specifically on the relationship between changes in objective income and subjective financial well-being, rather than relying on retrospective data or using broader measures of satisfaction. It uses ten annual waves of panel data, providing the opportunity to investigate the process of adaptation over time.

## Methodology

The central question for this paper is whether adaptation to changes in income level takes place, and if so, over what period. The analysis proceeds in three stages. The first stage examines the cross-sectional association between satisfaction and income, in order to show that the variables in these data produce similar results to those used elsewhere. For each individual  $i$ , satisfaction  $S$  is modelled as a function of current household income  $Y$ , factors such as disability and household composition which affect the rate of conversion of income in standard of living  $R$ , and factors such as ethnicity and age which might affect social reference group:

$$S_i = f(Y_i + R_i + C_i).$$

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<sup>2</sup> There are also a number of longitudinal studies on adaptation in other contexts, for example unemployment (Winkelman and Winkelman, 1998). According to a summary by Frederick and Lowenstein (1999), there is positive evidence for adaptation to incarceration and changes in health or impairment status. In other areas, the evidence is more mixed, for example with respect to marital status and bereavement. With respect to noise, there is evidence of the opposite of adaptation, that is, sensitisation.

The second stage of the analysis considers whether the satisfaction derived from a given level of income is affected by the change in income since last year. This is modelled in two ways, firstly as above with the addition of a variable for lagged income:

$$S_{it} = f(Y_{it} + R_{it} + C_{it} + Y_{it-1}),$$

and secondly, in a ‘fixed effects’ framework. The fixed effects framework allows for an unobservable factor,  $a_i$ , which is constant over time but specific to each individual, such as personality or the meaning attached to each point on the satisfaction scale:

$$S_{it} = f(Y_{it} + R_{it} + C_{it} + Y_{it-1} + a_i).$$

The third stage extends the analysis to the income trajectory  $T$  over the preceding ten years. Changes in circumstances over that period also have to be taken into account:

$$S_{it} = f(Y_{it} + \sum_{t-9}^t R_i + \sum_{t-9}^t C_i + \sum_{t-9}^{t-1} T_i + a_i).$$

The data are drawn from the first ten waves of the British Household Panel Survey (BHPS). The original BHPS sample in 1991 consisted of adults in around 5000 households, and was designed to be nationally representative of the household population of Great Britain. These original sample members have been re-interviewed in each subsequent year, together with any adults who have moved into a household containing an original sample member, and household members who turn 16. It is a general purpose survey and the questionnaire covers topics such as household composition, income, employment, education, health and impairment, and subjective well-being.

As with any survey, some households do not yield an interview. At the first wave of the BHPS, at least one interview was obtained in 74 per cent of eligible households, a response rate comparable to that of other large-scale British surveys. A further problem of non-response specific to panel data is attrition. Of the 9912 adults who gave full interviews at Wave 1 of BHPS, 6143 (62 per cent) also gave a full interview at Wave 10. In order to try to correct for bias that may arise from initial non-response and subsequent attrition, the obtained sample can be weighted to reflect population characteristics and original sample characteristics as closely as possible. Some longitudinal analysis does not require respondents to be present at all waves (for example, year-on-year transition probabilities can be calculated for any respondent present at at least two consecutive waves), and the strategy followed in this paper is to include as many respondents as possible in any given analysis. Where the full ten year span is required, results are weighted using the longitudinal weights supplied with the data.<sup>3</sup>

The question used to define satisfaction with income is administered as part of the self-completion questionnaire in the BHPS, to avoid any inadvertent or perceived pressure on the interviewee by the interviewer to respond in a particular way. The

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<sup>3</sup> For discussion of weights in the BHPS, see Taylor (2001).

question occurs in a short section of questions about satisfaction with various aspects of life and reads as follows:

*Here are some questions about how you feel about your life. Please tick the number which you feel best describes how dissatisfied or satisfied you are with the following aspects of your current situation.*

[...]

b) *The income of your household*

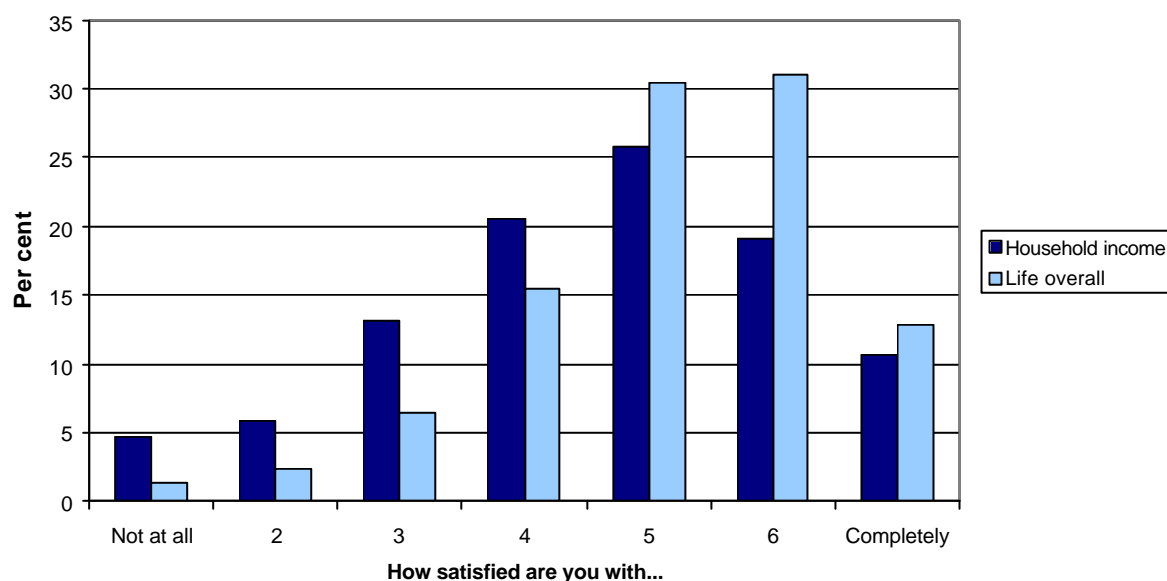
1    2    3    4    5    6    7

Not satisfied at all

Completely satisfied

A similar question was used by Ravallion and Loshkin (2001), on the grounds that a question directed towards subjective financial well-being was likely to be more closely correlated with income than a general satisfaction question, although most studies in the literature have used global satisfaction or subjective well-being indicators. For comparison, the distribution of responses to this question and to the overall satisfaction question in Wave 10 of BHPS is shown in Figure 1. Questions using these satisfaction scales have generally been found to have a degree of intra- and inter-personal comparability, but some caution is necessary in interpreting responses. In particular, it cannot be assumed that the scale is cardinal.

**Figure 1: Distribution of satisfaction scores**



Source: BHPS Wave 10

The definition of income used is current net household income, based on the derived variables deposited by Bardasi, Jenkins and Rigg (2003). Current income is based on income to the household during the month prior to interview, converted to an equivalent amount in pounds per week. Both 'before housing costs' and 'after housing costs' measures are used for preliminary investigation (an important distinction in the UK context), but the after housing costs measure is preferred for its slightly higher cross-sectional correlation with satisfaction. Most of the analysis is conducted without

equivalising for household size, but control variables for household composition are included. Where equivalisation is used, incomes are truncated at zero (otherwise negative incomes are permissible) and the McClements scale is applied.

### Cross-sectional association between income and satisfaction

Table 1 gives the cross-sectional correlation between satisfaction and four different measures of income, using data from Wave 10 of BHPS (the year 2000). There is a significant positive correlation between income and satisfaction with income, and although the correlation is not strong, it is nevertheless stronger than the correlation between income and satisfaction with life overall. There is little variation between linear income measures but the after housing costs income measure is slightly more strongly correlated with satisfaction. Taking the log of income increases the correlation substantially; this suggests diminishing marginal returns in satisfaction to income.

**Table 1: Cross-sectional correlation between income and satisfaction**

Income measure (£ per week)	Correlation between income and satisfaction with:	
	income	life overall
Before housing costs (BHC)	0.23	0.07
After housing costs (AHC)	0.24	0.08
BHC equivalised	0.24	0.07
AHC equivalised	0.24	0.07
log AHC equivalised	0.28	0.09
Unweighted N	12,233	12,194

Source: BHPS Wave 10, weighted using cross-sectional weights

Table 2 reports results from regressing satisfaction with income on current log income, and including various control variables. Satisfaction is treated as an ordinal variable; hence an ordered logit regression is appropriate. The ordered logit allows for different intercepts (cuts) for each point on the satisfaction scale, but a single coefficient for each independent variable. The coefficients reported are logistic, so the magnitudes cannot be interpreted directly. Because satisfaction is recorded at an individual level, while income is measured at household level, standard errors are corrected for clustering by household.

The first set of controls (column 1) are factors which might affect the resources available to the individual, given their household income: the number and ages of children in the household, the number and disability status of adults,<sup>4</sup> and the proportion of total household income which is from the individual's own earnings. This last is included as a proxy for the degree of control the individual has over expenditure relative to other adults in the household (see Pahl, 1989 for a discussion), in order to allow for variation in the intra-household distribution of resources.

The coefficient on log income is positive as expected: higher income is associated with higher satisfaction. The household composition variables are also in accordance with expectations: individuals in households with greater needs (for example, more

<sup>4</sup> The number of disabled children would ideally also be included but this information is not available in the dataset.

children, or a disabled adult) express lower satisfaction with a given level of income than a household with fewer needs. The proxy for intra-household distribution is not of the expected sign, but this is corrected in the second regression, once age is controlled for.

The second set of controls (added in column 2) represent characteristics which might define a social reference group. Of course, some of the demographic characteristics already included in column 1 might also contribute to the definition of a reference group.

Here we find that for those individuals who report their main status as ‘employed’ (including self-employed), where a greater proportion of household income is from the individual’s own earnings, they express greater satisfaction with the household income. This could be a direct effect – income you yourself have earned is more satisfying – or an indirect effect, via the control over expenditure which being the principal earner may bring.

Other results for employment status are shown relative to the omitted category of being unemployed. Being long-term sick or disabled is not significantly different from being unemployed; either status is significantly less satisfactory than being out of the labour force for other reasons. (For unemployment this is a common finding in the literature; see for example Winkelman and Winkelman, 1998). In particular, students express greater satisfaction with a given level of income than those in other statuses, presumably reflecting a combination of an expectation of higher future income, and peer group influences.

The results for age are in line with findings in previous studies (for example, Lelkes, 2002): the young and the old are happier than the middle-aged, for a given level of income. Few of the differences by ethnic group are significant (possibly due to small numbers of ethnic minority respondents in the BHPS), but it does appear that people from a Pakistani or Bangladeshi background are more satisfied than their white counterparts, controlling for income. This could indicate a social reference group effect: since Pakistani and Bangladeshi communities are the poorest ethnic groups in Britain (Modood *et al*, 1997), the expectations of individuals from those backgrounds for financial wealth may be lower.

With respect to gender and marital status, it appears that divorced or separated women are less satisfied than married or cohabiting women with the same income, but divorced men are more satisfied. On the other hand, married men are significantly less satisfied than their female counterparts. In general, marriage has been found to be associated with higher overall life satisfaction, especially for men (for example, Lelkes, 2002), but here the question is more specifically related to financial well-being.

Finally, tenants, and in particular tenants in social housing, are less satisfied than owner-occupiers in otherwise similar circumstances. Bearing in mind that income is measured here as *after* housing costs income, this result could be explained by owner-occupiers feeling that some of their income has already been spent on an investment rather than purely on consumption.

**Table 2: Cross-sectional ordered logit regressions on ‘satisfaction with income’**

		(1)	robust	(2)	robust
		coefficient	s.e.	coefficient	s.e.
Log income		0.835***	0.049	0.873***	0.057
Number of children aged	0-2	-0.462***	0.083	-0.355***	0.092
	3-4	-0.376***	0.086	-0.257***	0.088
	5-11	-0.190***	0.039	-0.031	0.042
	12-15	-0.155***	0.060	-0.019	0.063
Single non-disabled adult		ref		ref	
Single disabled adult		-0.733***	0.159	-0.707***	0.156
2 non-disabled adults		-0.512***	0.086	-0.434***	0.118
2 adults, 1 disabled, 1 not		-1.067***	0.107	-1.072***	0.131
2 adults, both disabled		-1.524***	0.197	-1.418***	0.197
3+ non-disabled adults		-1.154***	0.111	-0.924***	0.135
3+ adults, 1 disabled		-1.390***	0.141	-1.162***	0.161
3+ adults, 2+ disabled		-1.952***	0.184	-1.682***	0.199
% total hh income from own earnings		-0.632***	0.068		
if ‘employed’ main status				0.751**	0.391
if ‘employed’ not main status				-0.500	0.376
Status	employed			0.113	0.165
	unemployed			ref	
	retired			0.340*	0.185
	family care			0.448***	0.168
	education/training			0.566***	0.181
	long-term sick/disabled			-0.284	0.199
	other			0.321	0.316
Age	16-24			0.242***	0.088
	25-34			ref	ref
	35-44			-0.04*	0.067
	45-54			0.041	0.079
	55-64			0.293***	0.095
	65-74			0.759***	0.138
	75+			1.578***	0.164
Ethnicity	white			ref	
	black african/caribbean			-0.076	0.368
	indian			-0.109	0.228
	pakistani/bangladeshi			0.907**	0.427
	other			0.247	0.266
Woman	married/cohabiting			ref	
	widowed			-0.009	0.164
	divorced/separated			-0.813***	0.140
	never married			-0.152	0.106
Man	married/cohabiting			-0.156***	0.047
	widowed			0.252	0.238
	divorced/separated			0.470**	0.197
	never married			0.253***	0.102
Tenure	owner-occupier			ref	
	social tenant			-0.273***	0.081
	private tenant			-0.185**	0.096
Intercepts	cut 1	0.452	0.257	1.156	0.336
	cut 2	1.388	0.253	2.225	0.334
	cut 3	2.479	0.253	3.358	0.336
	cut 4	3.512	0.256	4.432	0.338
	cut 5	4.754	0.260	5.718	0.342
	cut 6	6.144	0.268	7.158	0.348

N	7447	7365
Pseudo R <sup>2</sup>	0.03	0.05

Significant at \*\*\* 99% \*\* 95% \* 90% Source: BHPS Wave 10, unweighted data

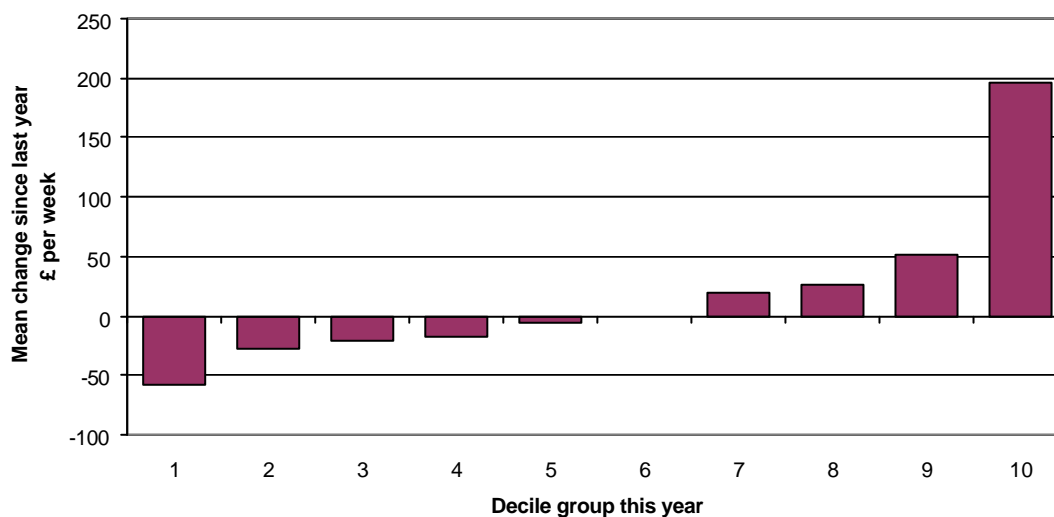
Various other characteristics were included in other versions of the models, including educational qualifications, region, and further interaction terms, but they were not found to be significant.

### Annual changes in income

Thus far, the associations examined have been cross-sectional. But in order to test for adaptation, it is necessary to investigate change in income over time. In this section, we ask whether respondents who have experienced an increase in income are more satisfied than those with the same current level of income who have experienced no change.

Figure 2 shows the average change in income between the current interview and the previous interview (approximately one year previously), by current income decile group. As previously, income is defined as after housing costs income and expressed in pounds per week. Data are drawn from waves 6 to 10 of BHPS; incomes are not deflated but year dummies are included in the multivariate analysis which follows.<sup>5</sup>

**Figure 2: Change in income since last year**



Source: BHPS Waves 6-10. Cross-sectional weights applied. Unweighted N = 35,455

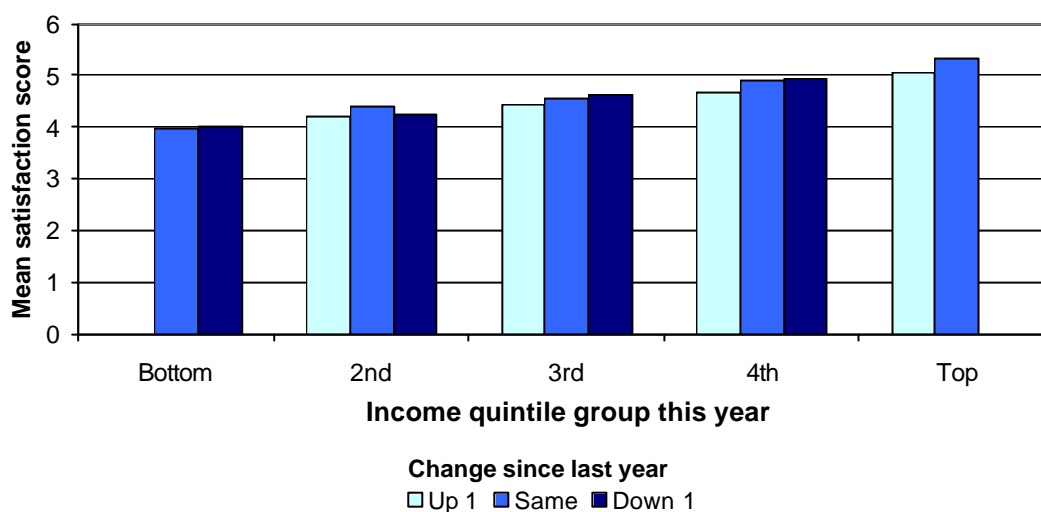
There are two points to note. Firstly, and not surprisingly, those in lower income deciles this year have experienced bigger falls in income since last year than those in higher income deciles. This correlation between current income and change in income is a feature which needs to be taken into account in subsequent analysis. Secondly,

<sup>5</sup> It was decided not to deflate incomes (a) because there may be a ‘money illusion’, by which nominal incomes are more salient than incomes in real terms, (b) it is not known how ‘objective’ deflators relate to subjective deflation. In any case, inflation in Britain over this period was low.

there is a wide dispersion of changes in income. The range is even larger than indicated by the decile group means, from -8147 to +9062, and the distribution is strongly suggestive of problems of measurement error. This too needs to be reflected in later analysis.

To further describe the underlying data, Figure 3 illustrates the relationship between satisfaction this year (vertical axis), current income (groups of bars on horizontal axis) and change in income (individual bars).

**Figure 3: Satisfaction this year, by change in income quintile group**



This simple breakdown casts some doubt on the hypothesis that those who have experienced a fall in income will be less satisfied with their current income than those who have had constant income; if anything the opposite appears to be the case. For example, among those currently in the third income quintile group, those who have moved up from the second to the third income group are *less* satisfied than those who have remained in the same position, who are in turn *less* satisfied than those who have moved down a group. The pattern is similar for the other income quintile groups (except the second).

This is intriguing, but not too worrying for the adaptation hypothesis at this stage: income quintile groups are broad bands and moving across a quintile could represent either small or a large change in absolute income. We have not yet controlled for changes in characteristics which might represent a change in needs or resources, or a change in social comparison group. Those who have move income groups might be different kinds of people to those who remain on constant income. Furthermore, in a dynamic context, current income may not reflect the true availability of resources: those who have recently been poor may still be paying off debts, while those who have recently been rich may still be living off accumulated assets. Further discussion of this last point will be reserved for section on longer-run income trajectories, but the other criticisms can be addressed by multivariate analysis, controlling for annual change in income.

The regression results reported in Table 3 are based on pooled data from waves 6-10 of BHPS. Each individual appears for each pair of consecutive waves at which they were a respondent in the survey. For this reason standard errors are adjusted for clustering on individuals (over time), as well as within households (at a point in time).<sup>6</sup> The dependant variable is the same as previously – satisfaction with income in the current year – but here the explanatory variables include both the log of current income and *change* in log income since the previous year. Dummy variables for wave (or year: wave 6 is 1996) were included to allow for variation in inflation rates over the period and other time-specific effects.

**Table 3: Ordered logit regressions on ‘satisfaction with income’, controlling for change in income since last year**

	(3)	robust	(4)	robust
	coefficient	s.e.	coefficient	s.e.
Log equivalised income	0.925***	0.029	0.420***	0.022
Change in log equivalised income	-0.288***	0.022	0.126***	0.028
Satisfaction last year			0.880***	0.013
Wave 6	ref		ref	
7	0.092***	0.024		
8	0.153***	0.025	-0.029	0.034
9	0.039*	0.026	-0.188***	0.030
10	-0.103***	0.026	-0.304***	0.031
Intercepts				
cut 1	2.182	0.166	2.328	0.119
cut 2	3.051	0.164	3.399	0.118
cut 3	3.975	0.163	4.612	0.119
cut 4	4.948	0.165	5.894	0.122
cut 5	6.102	0.168	7.432	0.127
cut 6	7.382	0.174	9.028	0.134
N		34,516		27,398
Pseudo R <sup>2</sup>		0.03		0.14

Significant at \*\*\* 99% \*\* 95% \* 90% Source: BHPS Waves 6-10, pooled, unweighted data

Income is equivalised for household size to allow for changes in household composition between periods. An alternative specification was tried, including controls for number and ages of children and for number and disability status of adults, and restricting to households whose composition did not change between waves. The coefficients on income and change in income were similar to those for model 3 in the table.<sup>7</sup>

In model 3, the coefficient on log (equivalised) income is positive, indicating that as before, a higher current income is associated with greater satisfaction. The coefficient on change in income is negative: for a given current income, those who have experienced an *increase* in their income since last year are less satisfied. This is consistent with Figure 3, but does not support the adaptation hypothesis.

<sup>6</sup> Strictly speaking, the clusters are defined as all members (in any wave) of the original household in which respondents entered the survey.

<sup>7</sup> 1.050 and -0.280 respectively.

There are a number of possible concerns about the specification in model 3. One is the problem of measurement error: incomes are measured with error and this can be compounded where first differences are taken. The range of change in equivalised income is -6914 to +6566 with 1<sup>st</sup> and 99<sup>th</sup> percentiles at -479 and +553 respectively. Accordingly, an alternative specification was tried using change in log equivalised income trimmed symmetrically by 1 per cent. The coefficient on change in income was -0.266, similar to that in model 3, and the pseudo R-squared was the same.

Another potential issue is colinearity between income and change in income. However, although the correlation between equivalised income and change in equivalised income is 0.47, the correlation between log equivalised income and change in log equivalised income is only 0.36, not a level which would normally give rise to concern. In any case, alternative specifications using income and percentage change in income were tried, and produced similar conclusions to model 3: the coefficient on income was always positive, and coefficient on change in income was always negative.

It is of course possible that satisfaction levels do not respond immediately to changes in income; that satisfaction is ‘sticky’. To try to allow for this, model 4 includes ‘satisfaction with income last year’ as an additional control variable. This is equivalent to modelling change in satisfaction.

The results show a large positive coefficient on satisfaction last year, supporting the idea that satisfaction is ‘sticky’, a smaller positive coefficient on current income, and a *positive* coefficient on change in income. In other words, for a given level of income and a given initial level of satisfaction, those who have experienced an increase in income are more satisfied.

But what does this really mean? One implication is that the individuals who are being compared in this regression are dissimilar kinds of people: they have the same current income, the same previous satisfaction, but different previous incomes (otherwise there would be no difference in their change in income). Thus they were previously equally satisfied with a different level of income. The possibility that individuals scale satisfaction differently was canvassed in the introduction and it was noted that one way to accommodate these differences is to compare each individual to him or herself over time, rather than making comparisons across individuals. This is made possible by the panel structure of the data.

Table 4 therefore reports results from fixed effects regressions on satisfaction with income. Each observation is a person-at-a-wave and the variation which is explained is the variation in the satisfaction of that individual from his or her average satisfaction over the period of observation. The fixed effects framework also allows time-varying covariates to be taken into account, hence controls for number and ages of children, number and disability status of adults, marital status, employment status, housing tenure and year are also included. The coefficients on explanatory variables relate to the association between satisfaction and a higher-than-average value of that variable for that individual at a particular point in time. Only variables which vary over time have explanatory force; all other characteristics are fixed effects, including, for example, baseline satisfaction for each individual.

**Table 4: Fixed effects regressions on ‘satisfaction with income’**

		(5) Satisfaction with income (score 1-7)		(6) Above average satisfaction with income	
		OLS		Logit	
		coefficient	s.e.	coefficient	s.e.
Log income		0.397***	0.024	0.702***	0.065
Change in log income		-0.049***	0.015	-0.050	0.041
Number of children aged	0-2	-0.143***	0.032	-0.390***	0.082
	3-4	-0.088***	0.032	-0.314***	0.081
	5-11	-0.041*	0.026	-0.061	0.067
	12-15	-0.009	0.028	-0.071	0.074
Single non-disabled adult		ref		ref	
Single disabled adult		-0.209***	0.049	-0.410***	0.135
2 non-disabled adults		-0.115***	0.056	-0.534***	0.146
2 adults, 1 disabled, 1 not		-0.201***	0.060	-0.676***	0.154
2 adults, both disabled		-0.283***	0.078	-0.851***	0.204
3+ non-disabled adults		-0.275***	0.062	-0.743***	0.159
3+ adults, 1 disabled		-0.344***	0.067	-0.980***	0.174
3+ adults, 2+ disabled		-0.560***	0.089	-1.377***	0.238
Status	self-employed	ref		ref	
	employed	-0.096**	0.050	0.028	0.133
	unemployed	-0.661***	0.070	-0.828***	0.190
	retired	-0.364***	0.065	-0.419**	0.176
	family care	-0.338***	0.062	-0.287*	0.163
	education/training	-0.288***	0.076	-0.330*	0.202
	long-term sick/disabled	-0.440***	0.083	-0.436**	0.216
	other	-0.255*	0.145	0.100	0.379
Age		-0.046	0.036	-0.031	0.096
Age squared		0.001***	0.000	0.001***	0.000
Marital status	married/cohabiting	ref		ref	
	widowed	-0.072	0.096	-0.547**	0.244
	divorced/separated	-0.276***	0.071	-0.783***	0.181
	never married	-0.089	0.065	-0.428***	0.163
Tenure	owner-occupier	ref		ref	
	social tenant	-0.145***	0.058	-0.084	0.151
	private tenant	-0.005	0.050	0.038	0.126
Wave 6		ref		ref	
7		0.110***	0.038	0.248**	0.248
8		0.162**	0.070	0.408**	0.188
9		0.066	0.103	0.147	0.276
10		-0.051	0.137	-0.102	0.367
Constant		3.129**	1.500		
N		34,472		17,200	
R <sup>2</sup> within		0.04			
R <sup>2</sup> overall		0.12			

Significant at \*\*\* 99% \*\* 95% \* 90%  
Observations are person-waves.

Source: BHPS Waves 6-10, unweighted data.

Model 5 is an ordinary least squares fixed effects regression, treating the satisfaction score as continuous and cardinal. This is not ideal but is necessary because a fixed effects ordered logit is computationally very demanding. An alternative specification, reducing the satisfaction scale to a binary ‘above or below average’ indicator, and using a fixed effects logit regression, is presented as model 6. The latter loses much data because only those observations at which the value of the dependant variable changes can be used, and in the case of a binary satisfaction indicator, this entails moving across the mean satisfaction threshold. Only a minority of observations fit this criterion, as can be seen by comparing the number of observations for models 5 and 6.

The principal interest of these models is in the coefficients on income and change in income. In both models, the coefficient on log income is positive, indicating that for individual *i*, in those years when her income is higher than average, she is more satisfied than her own average satisfaction score over the whole period. Once again, though, the coefficients on change in log income are negative (although not significant in model 6). This implies that for individual *i*, comparing two periods with identical current income, the period which is preceded by an increase in income is associated with *lower* satisfaction. This is directly contrary to the adaptation hypothesis.

Various other specifications were tried to test the robustness of this result. Since change in income might have a linear rather than a log-linear effect, change in income was entered without logs, but the coefficient was either not significant, or was very small and positive (if a 1 per cent symmetrically trimmed version was used). Percentage change in income was not significant, unless it was trimmed and included alongside a linear current income term rather than log income (in which case the coefficient was very small and positive). Model 5 remains the preferred specification.

So it appears that as far as annual changes in income are concerned, there is no convincing evidence to support the hypothesis that increases in income result in greater satisfaction than constant income (or indeed that decreases in income result in lower satisfaction than constant income). However, this is not the end of the road for the adaptation hypothesis. We know from work on income dynamics (for example, Gardiner and Hills, 1999) that some incomes fluctuate from year to year without any overall trend. For these individuals, an increase in income may not bring the expectation of the same or higher income in the following year, and hence may not enhance satisfaction significantly. If the increase were sustained over a longer period of time it might make more of a difference. Similarly, expenditure is often thought to be smoother than income, and if it is expenditure rather than income itself that produces satisfaction, then an increase in income might take longer than a year to translate into an increase in satisfaction. The BHPS does not contain comprehensive expenditure data, but it does allow us to observe individuals over periods of up to ten years. In so doing, we may be able to detect the process of increase in income, followed some time later by increase in satisfaction, followed subsequently by adaptation to the new standard of living and a gradual diminution of satisfaction.

### **Income trajectories over ten years**

The trajectory types used in this analysis are a simplified version of those developed by Gardiner and Hills (1999) for the BHPS and extended by Rigg and Sefton (2003).

Using a balanced 10-wave panel, three trajectory types are defined on the basis of percentiles of the distribution:<sup>8</sup>

*Flat* relatively stable position in the income distribution over all ten waves: all observations within a band of plus or minus 15 percentiles from the mean.

*Rising* a move of at least 15 percentiles up the income distribution over the ten waves. Downwards movements may occur but the overall trend is positive and significant.<sup>9</sup>

*Falling* a move of at least 15 percentiles down the income distribution over the ten waves. Upwards movements may occur but the overall trend is negative and significant.

All other trajectories, most of which involve more fluctuation than those described above, are classified as a residual ‘other’ category.

**Table 5: Income trajectories over 10 waves, current income and satisfaction**

	Trajectory types (column %)	Income, wave 10 (mean £ pw)	Satisfaction with income, wave 10
Flat	23	347	4.80
Rising	20	512	4.81
Falling	8	234	4.30
Other	48	323	4.54
All (N = 3,932)	100	360	4.64

Source: BHPS Waves 1-10, balanced panel, weighted using longitudinal weights

Just over one-fifth of the sample follow what is classified as a flat trajectory and another fifth have generally rising incomes. Around 1 in 10 experience a falling income trajectory, and just under half the sample have a more erratic pattern of income over the 10-year period. To what extent this is due to measurement error and to what extent it is a true reflection of income dynamics is hard to gauge, but it is consistent with previous efforts at classification.

Not surprisingly, those who have experienced rising incomes have higher current incomes, on average, than those who have had flat trajectories, who in turn have higher average income than those who have experienced falling income. This ranking corresponds to the ranking of average satisfaction scores for the three trajectory types too, although interestingly the difference between the satisfaction scores for the ‘flat’

<sup>8</sup> A balanced panel means selecting only those individuals who were part of full respondent households at all 10 waves. N = 3932. Following Rigg and Sefton (2003), percentiles are defined on the wave 1 distribution and then up-rated in line with average income growth for each subsequent wave (to create ‘quasi-percentiles’). If the income distribution had not changed over the period, there would therefore be 1 per cent of the sample at each wave in each quasi-percentile group. In practice, there is a slightly higher proportion of the sample in the lower quasi-percentile groups by the end of the panel.

<sup>9</sup> Significance is determined by regressing income (deflated to 2000 prices using the Retail Prices Index) against year, using ordinary least squares estimation. If the coefficient on income is positive and significant at the 90 per cent level, this is taken to indicate rising income. A similar procedure is applied to identify falling trajectories.

and ‘rising’ groups is much less than would be expected on the basis of the difference between their incomes.<sup>10</sup>

One might expect the impact of previous income trajectory on current satisfaction to vary according to the individual’s position in the income distribution. A breakdown by current income quintile group indicates particularly low satisfaction scores for those in the bottom income quintile who have experienced falling income (3.88) compared to those who have flat low income profiles (4.42). If we take the bottom quintile to approximate poverty, this suggests that those who have fallen into poverty are very much less satisfied than those who have been poor over the longer-term. This is strongly suggestive of a process of adaptation.

Turning to multivariate analysis, table 6 shows two specifications of an ordered logit regression on satisfaction with income at wave 10. The first includes log of current income and income trajectory over the full 10 wave period as the main explanatory variables, plus controls for household composition and social reference group. Only those control variables which were found to be significant consistently across different specifications are included.

The coefficient on current log income is positive and significant, as in previous models. The only trajectory type with a significant coefficient (compared to the flat trajectory) is the ‘other’ category, the bulk of which is made up by fluctuating income patterns. This negative coefficient could indicate that for a given level of income, those who face uncertainty about their future income are less satisfied than those who have stable incomes.

The second estimation (model 8) includes ‘baseline satisfaction’ as an additional explanatory variable. Unfortunately the ‘satisfaction with income’ question has been asked on a consistent basis only since wave 6 of the survey, so the baseline is wave 6 rather than wave 1. Baseline satisfaction is included to allow for differences in the meaning individuals attach to the satisfaction scale, which was noted earlier to be important. Its inclusion does not raise the same difficulties as were discussed in the previous section, since the baseline for change in income and for satisfaction are different years in this case. A fixed effects approach cannot be adopted here because income trajectory type is itself a time-invariant characteristic and would be differenced-out in a fixed effects regression. Including baseline satisfaction on the right-hand-side of the regression effectively means that ‘change in satisfaction’ is being measured, and the results must be interpreted in this light.

In this regression, current income is once again positively and significantly associated with an increase in satisfaction. The results for trajectory type are intriguingly asymmetric. The ‘other’ trajectory type comes through again as being associated with lower satisfaction, but in this case the falling trajectory type is also associated with lower satisfaction than the flat trajectory. In other words, holding current income and baseline satisfaction constant, those who have experienced a fall in income over the period are less satisfied than those with a stable income. This indicates that those whose incomes are falling are *not* adapting to their changing circumstances, at least

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<sup>10</sup> The difference between ‘flat’ and ‘rising’ mean satisfaction scores is not statistically significant at the 95% level. The differences between ‘flat’ and ‘falling’, and between ‘flat’ and ‘other’, are significant.

not completely. Perhaps they retain some expectations or aspirations relating to their previous level of income.

**Table 6: Ordered logit regressions on ‘satisfaction with income’, controlling for ten-wave income trajectory**

		(7)		(8)	
		coefficient	robust s.e.	coefficient	robust s.e.
Log income		0.920***	0.083	0.618***	0.073
Income trajectory	flat	ref		ref	
	rising	-0.073	0.097	0.075	0.098
	falling	-0.071	0.144	-0.209*	0.142
	other	-0.128*	0.085	-0.138*	0.084
Baseline satisfaction (wave 6)				0.636***	0.026
Number of children aged	0-2	-0.430***	0.158	-0.288*	0.188
	3-4	-0.352***	0.112	-0.406***	0.122
	5-11	-0.098*	0.052	-0.030	0.052
	12-15	-0.179**	0.075	-0.137**	0.073
Single non-disabled adult		ref		ref	
Single disabled adult		-0.426**	0.191	-0.083	0.199
2 non-disabled adults		-0.629***	0.169	-0.529***	0.161
2 adults, 1 disabled, 1 not		-1.195***	0.184	-0.915***	0.175
2 adults, both disabled		-1.345***	0.282	-0.899***	0.294
3+ non-disabled adults		-1.196***	0.182	-0.942***	0.180
3+ adults, 1 disabled		-1.634***	0.240	-1.376***	0.233
3+ adults, 2+ disabled		-2.158***	0.337	-1.972***	0.331
Status	self-employed or employed	ref		ref	
	unemployed or long-term sick	-0.427***	0.151	-0.369**	0.163
	all other	0.300***	0.092	0.263***	0.093
Age	16-34	ref		ref	
	35-64	-0.026	0.087	0.063	0.093
	65+	0.624***	0.139	0.450***	0.140
Woman	married/cohabiting	ref		ref	
	widowed	0.134	0.212	0.218	0.202
	divorced/separated	-0.937***	0.179	-0.702***	0.187
	never married	-0.232	0.205	-0.255	0.202
Man	married/cohabiting	-0.141***	0.054	-0.082	0.056
	widowed	0.160	0.295	-0.130	0.267
	divorced/separated	0.258	0.255	0.238	0.271
	never married	0.114	0.211	-0.009	0.205
Intercepts	cut 1	0.979	0.484	1.893	0.427
	2	1.892	0.481	2.895	0.425
	3	3.059	0.481	4.214	0.427
	4	4.038	0.483	5.366	0.430
	5	5.325	0.488	6.894	0.438
	6	6.718	0.498	8.490	0.450
N		3,851		3,832	
Pseudo R <sup>2</sup>		0.05		0.12	

Significant at \*\*\* 99% \*\* 95% \* 90%

Source: BHPS Waves 1-10, balanced panel, unweighted data. Observations are unique individuals. Standard errors adjusted for clustering by household.

By contrast, the rising trajectory type has a small positive coefficient, not significantly different from the reference category (the flat trajectory). Those who have experienced an increase in income over the ten year period to reach their current income have not experienced an increase in their satisfaction, relative to those who have had more or less constant income over the period. One possible explanation is that their expectations and aspirations *are* adapting to their improved financial circumstances – the so-called hedonic treadmill.

Various other specifications of the estimation were tried. In particular, an interaction between current income and trajectory type (and between current income quintile and trajectory type) were tested, but the interactions were not significant. Thus no support was found in the multivariate analysis for the earlier result suggesting a particularly strong relationship between low satisfaction and falling income, for those now in the bottom income quintile group.

## Discussion

Some economists have suggested that questions about satisfaction are not the right way to measure utility, because they implicitly invite respondents to use cognition and comparison, rather than assessing moment-by-moment affect or mood (Kahneman *et al*, 2003). Differences between the two types of measure are certainly of interest, but it is far from clear that utility should be interpreted as some aggregation of affect rather than drawing on the distinctively human faculty of critical reflection on, and appraisal of, our own lives. Indeed, the narrower the definition of utility which is adopted, the harder it is to motivate the utilitarian ethic altogether: why should we regard the maximisation of the sum of momentary pleasures to be the be-all and end-all of social arrangements? It seems clear that individuals take many other factors into account in assessing their own lives, and frequently make prolonged sacrifices of positive affect for the sake of uncertain gains.

Satisfaction with life, broadly understood, is thus a more plausible interpretation of utility for the welfarist or utilitarian. But as this study has shown, investigating the dynamics of satisfaction in one particular domain - income - and its relationship to objective income brings some surprising patterns to light. Not only is satisfaction with a given level of income influenced by who you are (as shown in previous studies and in table 2 above), it is also affected by who you have been. A decrease in income from one year to the next does not appear to adversely affect satisfaction (tables 3 and 4); in fact if anything the residual benefits of having had a higher income appear to carry through to the following year. But over the longer term, income trajectories matter (table 6). For the same outcome in terms of level of income, an unstable income is less satisfactory than a stable one. Moreover, adaptation to a steadily increasing income appears to be more pronounced than adaptation to a falling trajectory. Those who have experienced rising incomes do not experience a greater increase in satisfaction than those who have had constant incomes, while those who have experienced falling incomes do become significantly less satisfied.

So income appears to be a flawed proxy for satisfaction. Satisfaction itself is influenced not only by the current situation but also by the individual's previous experience. Those who have become poor are less satisfied than those who have been

poor for a long time, while those who are upwardly mobile are not in general any better satisfied than those who have experienced a higher income over a long period. These past experiences may have been shaped by all sorts of injustice and inequality, and the fact that they influence individuals' current satisfaction, implies that satisfaction - the best proxy we have for the concept of utility - is unsuitable for assessing current well-being, justice or equality. Instead we need an objective normative standard of assessment, such as is offered by the capabilities framework.

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