Time Well Spent versus a Life Considered: Changing Subjective Well-Being in China*

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Abstract

Using unique longitudinal survey data that employed the Day Reconstruction Method (DRM) to measure experienced utility in rural China, this study reveals striking differences in the trends for life satisfaction and experienced utility. We find that reported life satisfaction changed little over the period 2006 to 2009. However, experienced utility increased significantly during the same period. The improvement in experienced utility is due mainly to more positive feelings about specific activities, rather than changes in the time spent on different activities. These findings are consistent with the predictions of aspiration adaptation theory.

Keywords: subjective well-being, experienced utility, time use, day reconstruction method

JEL Codes: I31, J22

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1. Introduction

Life as you actually live it can feel different from the life that you reflect upon. The widely used survey question "Taking all things into consideration, how satisfied are you with your life?" elicits respondents' cognitive assessment of their life as a whole. Research has shown that people often adapt their expectations in response to major life events or changes in circumstances, which makes self-assessments of life satisfaction less sensitive to such changes (Clark, 2016). The Day Reconstruction Method (DRM) provides an alternative measure of subjective well-being (SWB). It asks respondents to recall the activities they experienced during the previous day, the duration of these activities, and the feelings they experienced during each activity (Kahneman et al., 2004b). By drawing upon people's recent memories while participating in specific activities of daily life, the DRM constructs a measure of experienced utility that captures the emotional components of SWB (Knabe et al., 2010). In this study, we investigate how changes in experienced utility compare with changes in life satisfaction using a unique longitudinal dataset based on DRM surveys in rural China.

Two alternative explanations—hedonic adaptation and aspiration adaptation—have been posited to explain the lack of association between life satisfaction and material well-being. According to the theory of hedonic adaptation, intense feelings caused by substantial life changes (such as disability) tend to attenuate with time (Frederick and Loewenstein, 1999; Oswald and Powdthavee, 2008). Aspiration theory, however, emphasizes that people adapt their aspirations to their current standard of living, and the change in aspirations influences their reported satisfaction with life (Frey and Stutzer, 2002; Kahneman and Kruege, 2006).[1]

[1] In order to consider how satisfied they are with their lives, respondents must first form a reference framework for what kind of life they think is satisfactory. The aspiration may depend on social comparison, past experiences, or expectation of the future (Luttmer, 2005; Clark et al. 2008b; Knight et al., 2009; Cai and Wang, 2018). Other interpretations include differential adjustments with respect to permanent versus transitory income shocks (Cai and Park, 2016), and asymmetric experiences of positive and negative economic growth (De Neve et al., 2018).

Although both life satisfaction and experienced utility may adapt hedonically, experienced utility is less likely to be affected by differences or changes in aspirations due to the specificity of questions about feelings experienced during recent activities (Knabe et al., 2010).[2] Therefore, as Kahneman and Krueger (2006) first pointed out, if aspirations are adaptive, a person's experienced utility could rise even though his or her reported global life satisfaction remains constant.

To test this hypothesis, we examine time paths of experienced utility and life satisfaction using a longitudinal household dataset from rural China which includes DRM surveys conducted in 2006 and 2009 in three Chinese provinces. The study shows stark differences in the average changes in life satisfaction and experienced utility. The level of life satisfaction barely changed during the period of study, whereas experienced utility increased significantly.[3] The results are robust to taking into account compositional differences between samples surveyed in different years as well as to controlling for individual fixed effects.

To assess the relative importance of changes in feelings experienced during specific activities and changes in time use for explaining changes in experienced utility, we conduct a decomposition analysis that is unique among studies of experienced utility using panel data. The findings suggest that the increase in experienced utility during the period 2006 to 2009 is due primarily to the more positive feelings experienced during each activity, and the increase in positive feelings is of similar magnitude across most major activities. Only about 10 percent of the increase in experienced utility is explained by changes in time allocation among different activities.

When we conduct a similar decomposition exercise to understand what underlies differences

[2] Previous studies have documented empirical evidence on the distinction between the evaluative well-being and emotional well-being in terms of their correlations with various factors, such as age, income, and unemployment (Stone et al., 2010; Kahneman and Deaton, 2010; Knabe et al., 2010).

[3] Previous studies found that life satisfaction in China declined monotonically from 1990 to around 2000-2005, and slightly increased during 2005-2010, by using data from surveys that mainly conducted in its urban areas (Kahneman and Krueger, 2006; Easterlin and Sawangfa, 2010; Knight and Gunatilaka, 2011; Easterlin et al., 2012). Analysis of the World Values survey for China which samples about 2000 individuals each wave finds that life satisfaction increased by just 0.03 standard deviations from 2007 to 2013, a change which is not statistically different from zero.

in experienced utility across individuals with different demographic characteristics (e.g. age, gender, marital status, education), we also find that the most part of inter-group differences in experienced utility are much more strongly associated with differences in feelings within activities rather than differences in time allocation across activities.

We further examine heterogeneity in the transition of both measures of SWB by baseline socio-economic status. The results show that life satisfaction declines among those in the top third of the income distribution and remains unchanged for those in the bottom and middle income groups, leading to a convergence in life satisfaction across income groups. However, experienced utility increases for all income groups, and its income gradient persists over time. For the other socio-economic characteristics such as age, gender, marital status, and education level, the patterns of change in experienced utility and life satisfaction are relatively homogeneous.

Our finding sheds light on the ability of the two aforementioned theories (i.e., hedonic adaptation and aspiration adaptation) to explain the failure of rising living standards to increase life satisfaction. The distinct patterns of change in experienced utility versus life satisfaction and the finding of increases in experienced utility mainly due to more positive feelings during specific activities are consistent with the hypothesis that the adaptation of aspirations influences how people evaluate their lives.

These findings are consistent with evidence from other countries and from urban China that shows that life satisfaction adapts to changing life circumstances. Clark et al. (2008a) find that life satisfaction adapts to events such as marriage, divorce, widowhood, birth of children and layoffs using the German Socio-Economic Panel Data, and Burchardt (2005) shows that it adapts to income changes using data from the British Household Panel Survey.[4] On China, Knight et al.

[4] See Clark (2016) for a comprehensive review of empirical evidence on adaption.

(2009) find that improved living standards compared to five years ago and expected increases in income in the next five years both significantly increase life satisfaction among rural households in China, and Appleton and Song (2008) find that life satisfaction is lower among households experiencing a decline in household income in the past five years among urban households. Both use data from the 2002 China Income Project Survey (CHIPs).[5] These findings are consistent with aspirations being an important determinant of life satisfaction in China.

To the best of our knowledge, this is the first study to use panel data on experienced utility and life satisfaction to test the aspiration adaptation hypothesis, and to find empirical support for its salience.[6] The survey is one of just a handful of panel datasets with DRM data,[7] and as far as we know it is the first longitudinal DRM survey conducted in the world's largest transition economy or any developing country.

The remainder of this study is organized as follows. In Section 2, we describe the theoretical background of this study. Section 3 introduces the survey design and measurements. Section 4 describes the empirical strategy employed in the study. Section 5 presents the results on changes in SWB. Section 6 concludes.

2. Theoretical background

[5] The two studies also show that, for both the rural and urban populations in China, life satisfaction is U-shaped in age, greater among the married (than the unmarried), female (than male), and healthier people, and increases with income and relative income position.

[6] Kahneman et al. (2004a) examined only cross-sectional data and failed to find empirical support for the aspiration adaptation hypothesis. They found that income was more correlated with life satisfaction than with experienced utility.

[7] To our knowledge, only three studies use panel data on experienced utility, including Krueger and Mueller (2012), Mowisch et al. (2019), and Wolf et al. (2019). All are from developed countries (US and Germany). In fact, even cross-sectional DRM survey data are rare, due to the high time cost of collecting such data. After the initial study by Kahneman et al. (2004b) who first collected DRM data from 909 employed women in Texas, the method was employed at Columbus in Ohio and Rennes in France in 2005 (Krueger et al., 2009; Kahneman et al., 2010). The Study on Global Ageing and Adult Health (SAGE) implemented by the World Health Organization (WHO) began to include an abbreviated DRM module (see Section 3 of this study for details) in its WAVE 1 (2007-2010) in six countries, including China, Ghana, India, Mexico, Russia, and South Africa (Ayuso-Mateos et al., 2013; Flores et al., 2015). Knabe et al. (2010) and Knabe et al. (2017) collected similar DRM data in German in 2008. In contrast, reports on life satisfaction and happiness are widely available (see Blanchflower (2009) for a comprehensive survey and Easterlin et al. (2012) for an introduction to relevant data sets on China).

2.1. Experienced Utility and Global Life Satisfaction

People experience pleasure and pain at each moment. Life can be considered to be a set of these momentary experiences. To formalize this idea, Kahneman et al. (1997) call the hedonic experience of the moment *instant utility*, which can be measured by immediate reports of subjective assessments on actual experiences. With this building block, experienced utility is then defined as the integral of profiles of instant utility. In contrast, life satisfaction is a retrospective overall evaluation of past life experiences.

Although both experienced utility and life satisfaction have been used to measure SWB, they measure different aspects of SWB. First, life satisfaction involves a cognitive judgment that may consider whether individuals have realized their aspirations for their lives, while experienced utility reflects hedonic intensity during moments of daily life and so are less likely to be influenced by aspirations which would require greater reflection (Kahneman and Krueger, 2006). Second, as a retrospective evaluation, global life satisfaction tends to be more influenced by feelings experienced during extreme and recent events and is likely to neglect the duration of experiences (Kahneman et al., 1993; Diener et al., 2001). In contrast, experienced utility weights the duration of activities in a way that is more normative (detailed below).

2.2. Hedonic Adaptation and Aspiration Adaptation

Adaptation refers to any action, process, or mechanism that reduces the effect of a given stimulus (Frederick and Loewenstein, 1999). These may include behavioural responses to reduce exposure to a stimulus, sensory adaptation to perceive a stimulus less intensely, or cognitive changes with respect to interest, attention, or aspiration. Two adaptive processes have been highlighted in the literature to explain the time-path of SWB over time—hedonic adaptation and

aspiration adaptation.[8]

Hedonic adaptation is the adaptive processes that reduce the intensity of hedonic reaction to a stimulus. Figure 1, taken from Frederick and Loewenstein (1999), illustrates the response function of SWB with respect to the *absolute* level of stimulus. As shown, hedonic adaptation involves a change in the shape of the response function. For any given level of stimulus, SWB diminishes during the process of hedonic adaptation.

Aspiration adaptation refers to the adaptive processes that diminish SWB by altering the level of stimulus perceived as a reference point. Different from hedonic adaptation, aspiration adaptation involves changes in the position, rather than the shape, of the response function. Figure 2 shows that SWB is determined by the difference between the current level of stimulus and the aspiration level. As a result, SWB may be attenuated over time, as aspirations adapt to the current level of stimulus.

In addition to the above two types of adaptation, another mechanism that could be relevant to our study is behavioural adaptation whereby people adjust their behaviour in response to a stimulus (Knabe et al., 2010). In our study, people may reallocate time spent on different activities. However, in the empirical analyses below, we show that the behavioural adaptation is not important in accounting for change in experienced utility.

2.3. Hypotheses

To summarize, under both hedonic adaptation and aspiration adaptation, SWB will be adapted to material changes. However, experienced utility and life satisfaction measure distinct dimensions of SWB, namely affect and judgment. We expect that both measures will be influenced by

[8] See Graham and Oswald (2010) for a review of the theoretical literature on adaptation and subjective well-being.

processes of hedonic adaptation; however, life satisfaction is more likely to be affected by aspiration adaptation than experienced utility.

Thus, we propose following hypotheses, which guide our empirical tests:

H1: Under hedonic adaptation, both experienced utility and life satisfaction lack sensitivity to stimuli over time, and thus exhibit a similar time-path.

H2: Under aspiration adaptation, life satisfaction adapts more to life circumstances than does experienced utility, thus the two measures display different time paths.

3. Survey Design and Measurements

The data used in this study are from the Chinese Rural Residents Living and Health Survey, a longitudinal household survey in rural China. It was conducted in four counties in July of 2006 and 2009, and supervised by one of the authors, Winnie Yip. Two counties are in Shandong Province in Eastern China, one is in Anhui Province in Central China, and one is in Sichuan Province in Western China. Stratified random sampling was employed in each of the selected counties. Specifically, four townships were randomly selected in each county, four villages were randomly selected in each township, and households were randomly selected in each village. The number of households surveyed in each village ranges from 22 to 33 at baseline. In addition to collecting detailed information on the demographic and socio-economic characteristics of all household members, a DRM survey module was asked of family members aged between 18 and 70. To reduce the burden for respondents, the survey employed an abbreviated version of the DRM survey developed for the World Health Organization's Study on Global Ageing and Adult Health (SAGE). In this abbreviated version, respondents were asked to reconstruct only a portion of the previous day instead of the whole day as in the original DRM survey used by Kahneman et al.

(2004b). More specifically, the survey participants reconstructed a sequence of successive episodes, starting from waking up for the morning group, having lunch for the afternoon group, or having supper for the evening group, based on random assignment to one of three groups.[9,10] For each group, the abbreviated DRM survey lasted a maximum of 15 minutes. To construct diary data that is representative of people's experiences throughout the whole day, we reduced truncation bias by deleting the episodes from having lunch onwards if they were reported by respondents in the morning group. Similarly, for respondents in the afternoon group, we censored the episodes from having supper onwards if they were reported. Studies have shown that the abbreviated version of the DRM can provide measurements with properties comparable to the long version of the DRM by pooling profiles of randomly assigned participants (Miret et al., 2012; Ayuso-Mateos et al., 2013).[11]

For each episode, respondents chose a category from a list of 23 activities, reported how long the activity lasted, and how they felt during the activity.[12] Following the design in SAGE, the feelings experienced in each activity included two positive emotions (enjoyment, and being calm or relaxed) and five negative emotions (worried, rushed, irritated or angry, depressed, and tense or stressed).[13] Assessment of each emotion was converted to a 3-point scale: 0="not at all," 0.5="a

[9] If respondents in the afternoon group had not had lunch the previous day, they then began episodes at around noon. Similarly, respondents in the evening group began episodes around 6 pm if they had not had dinner the previous day, and ended the reconstruction by the episode of going to bed if they had finished reconstructing all activities within 15 minutes.

[10] The percentages of DRM respondents in the morning, afternoon, and evening groups in 2006 are 35.7%, 33.3%, and 31.2%, respectively, and those in 2009 are 35.7%, 33.1%, and 31.2%, respectively. A balance test suggests the possibility of being selected into different versions of the DRM questionnaire is statistically uncorrelated with respondents' age, gender, marital status, household income per capita, and educational categories. This justifies the randomness of the sampling. Although the morning-DRM respondents is somewhat oversampled, the distributions of the sample are similar over the two waves. To adjust for the oversampling of the morning-DRM respondents, we use the sampling weights throughout our analysis and further control for dummies indicating various types of DRM questionnaires in the regressions.

[11] Ayuso-Mateos et al. (2013) shown that the abbreviated version of the DRM is comparable to the full DRM regarding their reliability and validity based on data from seven counties including China. An alternative approach to reduce the time burden of original DRM is to adopt random episode sampling, which only ask the respondents to provide details for certain number of episodes that randomly selected from the list of all reconstructed episodes experienced in the previous day. See Anusic et al. (2017) for details.

[12] See the online appendix for details of questions on DRM.

[13] The emotions chosen are similar to those in other surveys. For instance, in the original DRM survey in Texas by Kahneman et al. (2004b), the positive emotions include happy, warm/friendly, enjoying myself, while the negative emotions contain

little" and 1="very much."[14] Following Kahneman et al. (2004a), we measured experienced utility (EU) using the formula:

$$\mathrm{EU_i} = (\sum_{j=1}^{n_i} t_{ij} \cdot \mathrm{Score_{ij}}) / \sum_{j=1}^{n_i} t_{ij}, \quad (1)$$

where i indexes individuals, j indexes episodes, n_i is the number of episodes reconstructed by individual i, t_{ij} is the duration of the episode, and $\mathrm{Score_{ij}}$ is the score of the various assessments of feelings experienced during the episode.[15] We construct scores for both positive affect and negative affect by averaging the ratings among positive emotions and negative emotions. A score for net affect is then defined as the discrepancy between the average rating on positive affect and the average score of negative affect. The duration-weighted experienced utility measured in equation (1) echoes Edgeworth's concept of utility—an integral of momentary well-being (Kahneman et al., 2004a). By construction, the score for net affect ranges from -1 to 1, with higher values reflecting a more pleasant state.

To reduce the concern regarding assigning cardinal values in above construction, we use an alternative measure of experienced utility proposed by Kahneman and Krueger (2006), namely, the U-index (for "unpleasant" or "undesirable"). This is defined as the fraction of time an individual spends in an unpleasant state during a day, where an episode is classified as an unpleasant episode if a negative feeling was assigned a strictly higher rating than all of the positive feelings. The U-index relies on the ordinal ranking of affections within a person, so it can reduce interpersonal differences in the interpretation of scales. Given that the measurement of net affect contains more information about the strength of positive and negative feelings than the U-index,

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frustrated/annoyed, depressed/blue, hassled/pushed around, angry/hostile, worried/anxious, criticized/put down. In their study, there are three other emotions, including competent, impatient, and tired.

[14] One concern about assigning cardinal values to the three-point scale is that "very much" is not twice "a little". We discuss about this below soon.

[15] Diener and Tay (2014) suggest weighting the experience by time in log units to better represent the declining marginal utility. This does not affect the trend of experienced utility in our study.

we use both net affect and U-index to measure experienced utility in the analysis below.[16]

According to equation (1), we can also compute the activity-specific experienced utility as duration-weighted scores assessing emotions during episodes that relate to certain activities. For convenience of presentation, we regroup the activities into five broader categories: work, housework, social activity, leisure, and self-care.[17]

The survey also includes the following question about life satisfaction: "Taking all things into considerations, how satisfied are you with your life?" There are five possible answers: 1=very dissatisfied, 2=dissatisfied, 3=just so so, 4=satisfied, and 5=very satisfied. This allows us to detect the differences, if any, between global life satisfaction and experienced utility.

Overall, 7,172 individuals in 1,810 households were surveyed in 2006, among which 4,863 individuals in 1,499 households were successfully followed in 2009.[18] As for the DRM respondents, among 5,415 family members who were eligible (i.e., between the ages of 18 and 70) for the DRM survey in 2006, 2,848 actually took the DRM survey that year. The discrepancy is mainly because some family members were not at home at the time of the survey and thus were not able to answer the DRM questions in person. Among the 2,848 DRM respondents in 2006,

[16] With individual panel data, we can alleviate the concern of personally specific scale effect by comparing experienced utility of the same individual at different points of time.

[17] We aggregate the activities by following Flores et al. (2015) with some adjustment according to the context of our study. Specially, the category "work" includes working and farming activities. Housework consists of preparing food, doing housework, watching children, shopping, providing care to someone, walking somewhere, travelling by bicycle, and travelling by car, bus, or train. Social activity incorporates chatting with someone, playing (includes cards/*mahjong*), and religious activity. Leisure combines resting, reading, listening to radio, watching TV, exercising or leisurely walk, and other leisure activity. Self-care subsumes grooming or bathing and eating. None of the respondents reported the activity "intimate relations or sex" and thus it is excluded from the analyses. The activity "went to sleep for the night" is also excluded, because emotions associated with this activity were not asked in the survey by design. In addition to the 23 activities, respondents were allowed to categorize the reported activity as "other activities" in the survey, although very few of them done so (3.6%). We exclude it as well in analyses below. Unlike Flores et al. (2015), we combine traveling and commuting (including walking somewhere, travelling by bicycle, and travelling by car, bus, or train) with other housework, given they were rarely reported in our sample (2.4%, 2.1%, and 1.3%, respectively). Ayuso-Mateos et al. (2013) shown that the three activities are similar to housework in terms of activity-affect relationship according to their cluster analysis using data from SAGE-China.

[18] The missing households were replaced by other new households from the same village with similar household structure, economic conditions, and age of household head. This contains a sample of 300 households with 2,229 individuals. Eventually, 7,092 individuals in 1,799 households were surveyed in 2009.

1,549 (54%) also completed the DRM survey in 2009.[19] Some 64 observations contain missing values for global life satisfaction or some variables of demographics. Therefore, the analysis sample explored below comprises 1,485 individuals with complete information for both years.

Table A1 in the online appendix compares the mean differences in baseline SWB and socio-demographic characteristics between the total sample and the analysis sample. As shown in columns (1) and (2) in Panel A, the average SWB measurements (experienced utility and global life satisfaction) for the two sample are very similar, indicating that the sample attrition is not correlated with the outcomes of interest, which should reduce concern about sample selection bias. However, Panel B shows that the socio-demographic characteristics of the two samples have significant differences. Specifically, those in the analysis sample are older, less likely to be men, less educated, and more likely to be in smaller households compared to the full sample. To correct for potential bias caused by the selection and attrition of DRM respondents, we use the inverse probability weighting (IPW) method proposed by Wooldridge (2002).[20] Table A1 shows that the normalized differences in characteristics between the two samples is reduced substantially (all are less than one tenth) after using IPW (comparing columns (4) and (6) in Panel B), although some of the differences remain statistically significant. We also find that none of the main results change if we do not correct for selection, suggesting that they are not strongly influenced by selection bias.

4. Empirical Strategy

[19] For the other 1,299 DRM respondents those only surveyed at baseline, some 62 were older than 70 in 2009 and thus ineligible for the DRM survey in that year, 426 were in households only surveyed at baseline. The remaining 811 were not at home at the time of the survey in 2009.

[20] Specifically, we first estimate a probit model for the selection of DRM respondents among household member aged 18-67 in 2006. The inverse of the predicted probability is then used as a weight in all cross-sectional regressions. For panel analysis, we further estimate a probit model for the attrition of DRM respondents. The predicted probability of attrition is multiplied by the probability of selection. The inverse of the product is then used as a weight in all panel regressions. The explanatory variables in the aforementioned probit regressions include dummies for age categories, male, marital status, educational categories, household size, log of household income per capita, and village fixed effects.

To investigate changes in SWB, we model the determinants of SWB as follows:

$$SWB_{it} = \alpha_0 + \alpha_1 \cdot \tau_t + \alpha_2 \cdot X_{it} + \alpha_3 \cdot Z_{it} + \varepsilon_{it} \quad (2)$$

$$SWB_{it} = \beta_0 + \beta_1 \cdot \tau_t + \beta_2 \cdot X_{it} + \beta_3 \cdot Z_{it} + \eta_i + \delta_{it} \quad (3)$$

where i indexes individuals, t is the year of the survey, and SWB is measured by either experienced utility or global life satisfaction. Equation (2) is used for pooled cross-sectional analysis. τ_t is a year dummy, which equals one if the observation is surveyed in 2009. X_{it} are socio-demographic characteristics of individual i in year t, including dummies for age categories, male, married, and education categories. Z_{it} is the other control variables, including household size, dummies for the type of DRM questionnaires the respondents were assigned, and village fixed effects. The standard errors are adjusted for clustering at the village level.[21] To take account of unobservable individual characteristics that remain unchanged over time (such as personal traits), we further control for individual fixed effects (η_i) in equation (3).[22] We are interested in the parameters α_1 and β_1. Whereas α_1 indicates the difference between average SWB of the sample in 2006 and that in 2009 conditional on the same socio-demographic composition, β_1 indicate the average change in SWB over the period between 2006 and 2009 given the changes in socio-demographic characteristics are fixed.[23] Similarly, the parameter α_2 indicates how SWB differs across respondents with various socio-demographic characteristics, while parameter β_2 indicates how SWB changes over time associated with changes in characteristics of the same person, such as marital status.[24] We estimate these parameters by

[21] The results are robust to the adjustment of clustered standard errors (available upon request).
[22] We do not directly test for the impact of household income on SWB because we consider it to be just one mediating variable among many family and environmental factors that may change over time. Income also is known to be measured with considerable error, especially in panel studies. The higher noise-signal ratio of income in panel data is one explanation for why the literature generally finds that the income-SWB association is very weak in panel analysis in contrast to much stronger relationships found in cross-sectional studies. For these reasons, we did not include income as an explanatory variable in estimating equations (2) and (3).
[23] If there are no other control variables in equations (2) and (3), namely $\alpha_2 = \alpha_3 = \beta_2 = \beta_3 = 0$, α_1 should be equal to β_1 given individual fixed effects are unchanged over time. However, α_1 and β_1 could be different if the assumption above is not true. We examine this in the empirical analysis below.
[24] The dummies of male and villages are absorbed by individual fixed effects in equation (3).

weighted least square regressions to adjust for the unequal sampling of various types of DRM questionnaires and differences in the probability of being included in the analysis sample because of selection and attrition.

To assess the relative contribution of changes in time allocation across activities and changes in feelings experienced during specific activities to changes in experienced utility over time, we conduct a decomposition of the form:

$$EU_{2009} - EU_{2006} = \sum_{a=1}^{n} \theta_{a,2009} \cdot Score_{a,2009} - \sum_{a=1}^{n} \theta_{a,2006} \cdot Score_{a,2006}$$

$$= \sum_{a=1}^{n} \left(\theta_{a,2009} - \theta_{a,2006}\right) \cdot \overline{Score_a} + \sum_{a=1}^{n} \overline{\theta_a} \cdot \left(Score_{a,2009} - Score_{a,2006}\right) \quad (4)$$

where a indexes activities, n indexes the number of categories of activity (equals five according to the broader grouping of activities), θ is the percentage of time spent on the activity, and $Score$ is the rating of feelings experienced during the activity. The subscripts 2006 and 2009 indicate that the corresponding variables were measured in 2006 and 2009, respectively. By construction, $\overline{\theta_a} = \frac{1}{2}(\theta_{a,2006} + \theta_{a,2009})$ and $\overline{Score_a} = \frac{1}{2}(Score_{a,2006} + Score_{a,2009})$.

The former component of equation (4) is the *time composition effect*, that is, the effect of changes in time allocation across activities given fixed activity-specific experienced utility. The latter component is the *affective (or feeling) effect* corresponding to the "saddening effect" in Knabe et al. (2010); that is, the effect of changes in activity-specific experienced utility given fixed time profile. The two components can be calculated directly from the data by averaging over the whole sample. Alternatively, we follow the approach used in Flores et al. (2015) to calibrate conditional changes in time allocation (i.e., $\theta_{a,2009} - \theta_{a,2006}$) and changes in activity-specific feelings (i.e., $Score_{a,2009} - Score_{a,2006}$) by estimating the coefficient of the year dummy from a regression that replaces the outcome variable in equation (3) with activity-specific time share (θ_a)

or experienced utility ($Score_a$), respectively.[25]

To evaluate the quantitative importance of differences in time use and differences in activity-specific experienced utility for individuals from different socio-economic groups for explaining the observed disparity in their experienced utility, we conduct the following decomposition, following Knabe et al. (2010) and Flores et al. (2015):

$$EU_l - EU_0 = \sum_{a=1}^{n} \theta_{la} \cdot Score_{la} - \sum_{a=1}^{n} \theta_{0a} \cdot Score_{0a}$$
$$= \sum_{a=1}^{n} (\theta_{la} - \theta_{0a}) \cdot \overline{Score_a} + \sum_{a=1}^{n} \overline{\theta_a} \cdot (Score_{la} - Score_{0a}). \quad (5)$$

θ_{la} is the percentage of time spent on activity a of a representative individual in group l and $Score_{la}$ is the assessment of experience in activity a of the average individual in group l, where $l = 0$ refers to the reference group. $\overline{\theta_a} = \frac{1}{2}(\theta_{la} + \theta_{0a})$ and $\overline{Score_a} = \frac{1}{2}(Score_{la} + Score_{0a})$. Other parameters are defined as before.

Similar to the decomposition in change of SWB, the first term of equation (5) captures the disparity in experienced utility that is due to group differences in time use by fixing activity-specific experienced utility, which is the *time composition effect*. The second term represents inequality in experienced utility that is due to differences in experienced utility across groups maintaining the same time profile, which is the *affective effect*. We calibrate group differences in time allocation (i.e., $\theta_{la} - \theta_{0a}$) and disparity in activity-specific experienced utility (i.e., $\text{Score}_{la} - \text{Score}_{0a}$) by estimating the coefficient of the indicator variable for the corresponding socio-demographic group based on multivariate regression analysis as in equation (2). Following Flores et al. (2015), we use the average proportion of time and utility experienced in activity a in the whole sample as an estimator for $\overline{\theta_a}$ and $\overline{\text{Score}_a}$, respectively.

[25] To address the concern that the time profile and diurnal pattern of net affect could be different for respondents answering different types of DRM questionnaire, in a robustness check, we restrict the sample among respondents who took the same DRM questionnaire in both years. The results are nearly the same as what we presented below using the whole sample (available upon request).

5. Results

5.1. Descriptive Statistics

Panel A of Table 1 presents the summary statistics of the main variables of interest for both 2006 and 2009. All the statistics are estimated using inverse probability weights to adjust for sample selection. As shown, the average score of positive affect in 2006 is 0.63 on a scale from 0 to 1. It increased by 0.13 in 2009, about 43 percent of the standard deviation in 2006. The *p*-value reported in the last column suggests that the increase in positive affection over the period 2006-2009 is different from zero at the 1% significance level. Consistent with Kahneman et al. (2004b), the evaluations of people in our sample on negative affections are much more moderate than positive affections. The average score of negative affect in 2006 is only 0.09 on the same scale from 0 to 1. Different from positive affect, negative affect does not change significantly over time. The net affect's score increased significantly from 0.55 in 2006 to 0.67 in 2009. The average U-index among respondents in our sample indicates people in rural China spend, on average, 13 percent of their time in an unpleasant state. This decreased by five percentage points in 2009, which is statistically significant.[26] The average score of global life satisfaction was 3.75 in 2006 on a scale from 1 to 5 and declined slightly in 2009, and the difference is statistically insignificant. To sum up, the descriptive statistics suggest that experienced utility increased significantly over the period 2006 to 2009. However, global life satisfaction did not change significantly. We dig deeper into these patterns below.

Panel B provides summary statistics for demographic and socio-economic characteristics. The average age of the respondents in 2006 was 41 years. Some 54 percent of respondents were

[26] Using data from the first wave of SAGE-China that surveyed between 2008 and 2010, Ayuso-Mateos et al. (2013) reported that the mean and standard deviation of the U-index are 0.13 and 0.29, respectively.

male, and 82 percent were married at baseline. Like people in most developing areas, the highest level of completed education is low in our sample. Twenty-five percent of the respondents did not complete primary school education, and only four percent finished college education or above. The average household size was 3.46. The log of household annual income per capita was 8.20 (3,641 *yuan*) in 2005.[27] Comparison between 2006 and 2009 suggests that the household income per capita increased by 40% in real terms over the period (using provincial CPI to correct for inflation). As expected, the average age of respondents in the sample increased by three. The respondents were more likely to be married and the household size tended to increase, while the highest level of completed education was almost unchanged.

Figure 3 illustrates the diurnal rhythm of the net affect by hour of day measured in the two years. As shown by the solid line, experienced utility is relatively low and stable early in the morning of the day surveyed in 2006. Then it increases and achieves its first peak around lunch time, with a gradual decline in the afternoon. After dinner time, experienced utility increases steadily throughout the evening, and reaches its highest level at the end of the day. The dashed line in the figure displays the diurnal cycle of net affect measured in 2009. The pattern of variation is remarkably similar to that in 2006. The diurnal variation of net affect shown here is also similar to that observed by Ayusi-Mateos et al. (2013) using data from SAGE on China, which includes both rural and urban residents. These confirm the internal and external validity of the measurement of experienced utility. Another remarkable feature suggested by Figure 3 is that the level of net affect in 2009 is higher than that in 2006 at every time of the day, suggesting that the improvement in average experienced utility over the period between 2006 and 2009 is more likely to be general in

[27] Household income is the total income of the household during the year prior to the survey, including revenues from home business (in crop farming, animal husbandry, etc.), wages, transfers, remittances, asset revenue, and others. Migrants who are away for most of the year are not counted when calculating income per capita.

nature rather than contingent on activities.

Figure A1 illustrates the diurnal patterns of positive and negative feelings by hour of day. As illustrated in Panel A and Panel B, positive feelings, namely enjoyment and being calm or relaxed, show similar diurnal variation as that of net affect. Panel C through Panel G show the diurnal pattern of five negative affections (worried, busy, irritated, depressed, and tense). They are more common in the morning and afternoon compared to lunch time and in the evening, which echoes the pattern found by Kahneman et al. (2004b) of employed women in Texas.[28] Meanwhile, in concurrence with their findings, the evaluations of people in rural China on negative feelings are much more moderate than evaluations of positive feelings. This indicates that people's experienced utility measured by net affect was dominated by positive feelings, which explains the similarity of patterns by time of day between net affect and positive affect. The diurnal pattern of both positive and negative feelings is consistent between the two survey years. While negative feelings remain nearly unchanged over time for most hours of day, positive feelings increase over time throughout the day.

Table 2 summarizes the mean of net affect, the U-index, and time use by activity and year. Activities are ranked in increasing order by net affect in 2006. As expected, net affect of working is relative low, with a value of 0.31 on a scale from -1 to 1, while that of leisure and engaging in social activity are among the highest, with values of 0.75 and 0.78, respectively. Net affect during each activity improves in 2009 compared to 2006. Formal Wald tests indicate that respondents rated net affect significantly higher in 2009 than in 2006 when engaged in work, housework, and self-care. The increases in net affect of engaging in social activity and leisure are not significant, possibly due to fixed scale for reporting experienced feelings and net affect of the two activities

[28] Figure A1 also shows that people agree more about being "busy" than being "worried," "irritated," "depressed," or "tense." In addition, the feeling of "busy" is more volatile than those of other negative affections.

were already very high in 2006.

Turning to the U-index, it reverses the rank of activities seen for net affect. Specifically, on average, in 2006 respondents spent 25 percent of their time in an unpleasant state when they worked. The frequency of being in an unpleasant state diminished when they engaged in other activities. For instance, the average respondent spent only about three to four percent of his or her time in an unpleasant state when they were engaged in social activities or leisure.[29] Similar to findings presented earlier, the percentage of time in an unpleasant state decreased in 2009 for all activities, particularly when people engaged in work, housework, and self-care.

The last two columns report the average percentage of time the respondents spent on each category of activity while awake. As shown, people in the sample on average spent 28 percent and 17 percent of their time on work and housework, respectively. They also spent a substantial share of their time on leisure (27 percent) and self-care (20 percent), respectively. The share of time spent on social activity is the lowest at just nine percent, although people experienced the highest net affect in this activity. The distribution of time use in 2009 is almost the same as in 2006. We cannot reject the null hypothesis that the mean time shares for each activity between 2006 and 2009 are equal, even at the 10% significance level.

5.2. Regression Analysis

Table 3 presents the results of regression analysis of changes in SWB, measured by net affect, U-index, and life satisfaction. Columns (1), (3) and (5) show regression results when controlling for socio-demographic characteristics as specified in equation (2). Conditioning on compositional

[29] These numbers are similar to that reported in the literature. For instance, Kahneman et al. (2004b) reported the U-index of working and relaxing among the working women in Texas are 0.211 and 0.078, respectively. Knabe et al. (2010) shown the U-index among the employed in Germany when they engaged in working, relaxing/walk, and socializing are 0.21, 0.08, and 0.05, respectively.

differences in demographics between the samples of the two years does not change the estimates for the changes in SWB over time very much using each measure of SWB, compared to those indicated by the descriptive statistics in Table 1. As shown, net affect increased by 0.14 over the period, about 35 percent of the standard deviation measured in 2006 (corresponding to Table 1). This is statistically different from zero at the 1% significance level. Correspondingly, the U-index decreased by 0.06 (or 21 percent of the standard deviation measured in 2006) and the coefficient is statistically significant. For global life satisfaction, the average score of decreased by 0.09 over the three-year period, equivalent to 9.6 percent of the standard deviation measured in the baseline year. It is a much smaller change than that of net affect or U-index. Meanwhile, the estimate is not statistically significantly different from zero. Consistent with the findings of Knabe et al. (2010), age is correlated with net affect in a U-shape. Respondents with a higher completed education generally reported higher net affect and spent less fraction of time in an unpleasant state. They were also more satisfied with their lives, although the gradient is statistically insignificant except for college education or above.

In columns (2), (4) and (6), we further include individual fixed effects as specified in equation (3). The estimated change in net affect is slightly smaller after controlling for individual fixed effects, and stays positive and significant. Similarly, including individual fixed effects almost does not affect the estimate of change in U-index or life satisfaction. These results indicate selection bias caused by unobservable personal trait is not a serious problem in our estimation of change in SWB over time. To summarize, the panel regression analyses suggest that experienced utility significantly increases from 2006 to 2009, while life satisfaction does not change significantly over the same period. This should reduce the concern that the differential transition pattern between experienced utility and life satisfaction is driven by selection bias or unobservable personal traits.

5.3. Decomposition of Changes in Experienced Utility

To assess the relative importance of changes in time allocation and changes in activity-specific affections in explaining the change in experienced utility, we conducted the decomposition analysis as described in Section 4. Panel A of Table 4 reports the mean value of time allocation and net affect by category of activity among the pooled sample; that is, the weights $\overline{\theta_a}$ and $\overline{Score_a}$ in equation (4). The first block of Panel B presents the changes in the percentage of time spent on each activity and the changes in activity-specific net affect over the period. Following equation (4), we estimate the *time composition effect* by summarizing the change in time use weighted by the average activity-specific net affect, i.e., 0.01 as shown in column (6). Similarly, the *affective effect* is calculated by summarizing the change in net affect of each activity weighted by the share of time spent on corresponding activity, i.e., 0.10. These indicate that the affective effect explains 90% of the change in net affect over the three-year period, while changes in time allocation accounts for only 10% (see the last column).

The second block of Panel B reports the change in the share of time allocated to each activity and the change in activity-specific net affect after partialling out compositional differences in demographics (including age, gender, marital status, and education), household size, type of DRM questionnaire and individual fixed effects. Including these control variables matters very little for the estimates, except that the conditional results show the net affect of engaging in social activity improved significantly, while it previously was not significantly different from zero based on the simple difference between the two years. The coefficient of time spending on social activity also turn to be statistically significant at the level of 10%, although its magnitude is the same as that of unconditional change. The contribution of change in time use rises to 14%.

Table A2 in the online appendix reports the results of the decomposition analyses on change in U-index. Consistent with the findings of net affect, 89% of the unconditional change in U-index can be attributed to affective effect. By conditioning on demographic characteristics and individual fixed effects, the affective effect still accounts for 82% of the change in the U-index.

All in all, the decomposition analysis suggests that the increase in experienced utility from 2006 to 2009 is due mainly to increases in experienced utility in specific activities. The shift of time use from work to social activity or leisure contributes only a minor part of the overall increase in experienced utility.

5.4. Decomposition of Disparity in Experienced Utility

The multivariate regression analysis suggests significant disparity in experienced utility among respondents from different socio-demographic groups. To investigate how much of the disparity is due to differences in time use across individuals and how much is due to differences in activity-specific affections, Tables A3 and A4 in the online appendix report the results of decomposition of disparity among socio-economic groups (defined by age, gender, marital status, and completed education level) of net affect and U-index, respectively.

As shown in Table A3, column (1) reports the estimated coefficients of the corresponding group dummies in a regression explaining net affect with the same set of control variables as in column (1) of Table 3. The results illustrate the difference in net affect between each socio-demographic group and its corresponding reference group by controlling for other characteristics. Column (2) reports the aggregation of estimated coefficients in regressions on share of time spent on each activity with the same control variables as in column (1), where the coefficients are weighted by the average activity-specific experienced utility as reported in Panel A of Table 4.

Similarly, column (3) reports the aggregation of coefficients in regressions on activity-specific net affect weighted by the average proportion of time spent on each activity. The last column reports the sum of values in columns (2) and (3).[30]

As found earlier, net affect changes with age in a U-shaped pattern. Differences in time use and that of activity-specific affection contribute more or less equally to the disparity in experienced utility among age groups. Regarding other socio-economic characteristics, however, the observed differences in net affect is due primarily to the affective effect, while the time composition effect is nearly zero. For instance, the higher experienced utility of those with a primary or middle school education compared to illiterate people is due primarily to their higher assessment of experienced utility in specific activities. This is clearer when we look at the results of decomposition of across-group differences in U-index. As shown by Table A4, for all demographic groups, the disparity in U-index are mainly driven by differences of their experienced utility in specific activity, rather than the time they spend on each activity. These results imply, if the rise in experienced utility is caused by difference in some characteristics of the sample in two years, it might be mainly because of better feelings during daily activity of the respondents in 2009 than those in 2006, instead of difference in time allocation between respondents of the two years.

5.5. Heterogeneity in the Transition of SWB

To better understand the different transition patterns between life satisfaction and experienced utility, we examine heterogeneity in their changes by socio-economic groups. In Table 5, we break down the sample by terciles of household income per capita at baseline. The results show a substantial income gradient of SWB. As indicated in Panels A and C, both net affect and global

[30] The values in column (4) of Table A3 are not exactly the same as the regression coefficients reported in the first column, although they are very similar.

life satisfaction increase with income levels in 2006. The latter is consistent with Knight et al. (2009), who found that life satisfaction is positively associated with log of household income per capita among the rural population of China, using data from the CHIPs in 2002. Panel B shows that people with high level of income also spend less time in an unpleasant state.

In examining the changes of SWB by income group, some interesting findings emerge. On the one hand, net affect improves for all income groups. Similarly, the U-index decreases for all income groups, even though it is not significantly different from zero for people in the middle-income group. On the other hand, global life satisfaction declines over time among the high-income group, while it does not change significantly for those in the bottom and middle-income groups.[31] This is probably because people in high-income group had expected a greater improvement in their life circumstances than the actual change. The differential transition patterns of life satisfaction by income group indicate a tendency of convergence across income groups. This echoes the results of Clark et al. (2019), who find that the gap in happiness across different income groups in China narrows in the second decade of this century. However, our results also suggest that the gradients in experienced utility persist over time.

To quantify the distributional feature of the change in SWB of each income group, the last three columns of the table report the percentage of the population of each income group that experienced an increase or decrease in experienced utility and life satisfaction over the period. As shown, the majority of respondents in each income group reported higher net affect in 2009 than in 2006. Consistently, for people of all income groups, their U-index are more likely to decline than increase over the period 2006 to 2009, although U-index of most respondents remained unchanged over the period. While high-income person are more likely to experience a decline than

[31] Table 5 also shows that the results are robust to controlling for demographic characteristics and individual fixed effects, except that the decline of global life satisfaction among high-income groups turns to be statistically insignificant.

an increase in life satisfaction, for person of other income groups, the percentage of respondents reporting an increase in life satisfaction was similar to those who reported a decrease in life satisfaction. The distributional statistics confirm the average change in SWB of each income group reported above.

We also examine the heterogeneity of change in SWB along other demographic characteristics, including age, gender, marital status, and education level. The results of net affect, U-index, and life satisfaction are reported in Tables A5, A6 and A7 in the online appendix, respectively. As shown by Table A5, for most demographic groups, net affect increases significantly over the period.[32] Table A6 shows that U-index decreases for each demographic group although the coefficients sometimes are insignificant. Different from the improvement in experienced utility throughout the population, Table A7 show that life satisfaction did not change significantly between 2006 and 2009 for most demographic groups. In sum, the changes in experienced utility and global life satisfaction are considerably homogeneous across the population by the other demographic characteristics.

6. Conclusion

To uncover the actual feelings during daily life, we apply the Day Reconstruction Method in a longitudinal household survey in rural China. Using this unique data, we find stark differences between the transition patterns of life satisfaction and experienced utility. Specifically, we find that reported life satisfaction remains more or less unchanged during the period 2006 to 2009. However, experienced utility increases significantly during the same time span. The findings are robust to

[32] The exception includes those aged between 18 and 30 years old, those unmarried, and those with completed education level of high school or a vocational school in 2006. For these people, their net affect does not change significantly on both magnitude and statistics. This is probably due to that their net affect were already at very high level at baseline.

controlling for compositional difference and individual fixed effects.

The results from decomposition analyses suggest that the increase in experienced utility over the period is due mainly to more positive feelings during daily activities. Changes in time allocation account for only a minor part. The difference in the integration of experiences between experienced utility and life satisfaction thus is unlikely to be the main explanation for the differences in trends of the two SWB measures.

Additional heterogeneity analyses indicate that the distinct patterns of change in experienced utility and life satisfaction were seen among population by most socio-demographic characteristics, except for income. The results show a tendency of a narrowing gap in life satisfaction by income group, whereas the gap in experienced utility by income group persists over time.

The results are consistent with predictions of aspiration adaptation. According to the theory, people adjust their aspiration with improved life circumstances, which makes them report the same level of satisfaction with life, even while their experienced utility rises. Whereas this study is the first to examine the changes in experienced utility in transition countries, it has certain limitations—the survey was only implemented in rural China and contained two time points. It would be worthwhile for future research to incorporate the (abbreviated version) DRM in other household surveys, and to extend the examination over a longer period of time and in other transition or developing countries.

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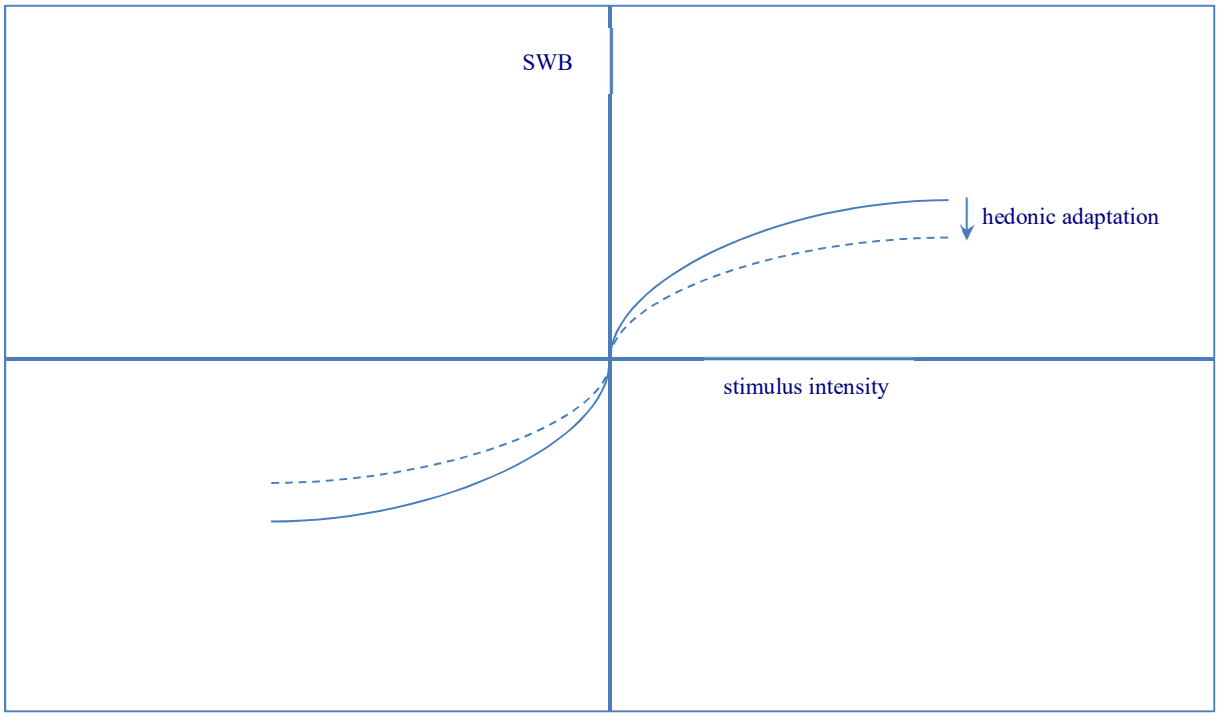
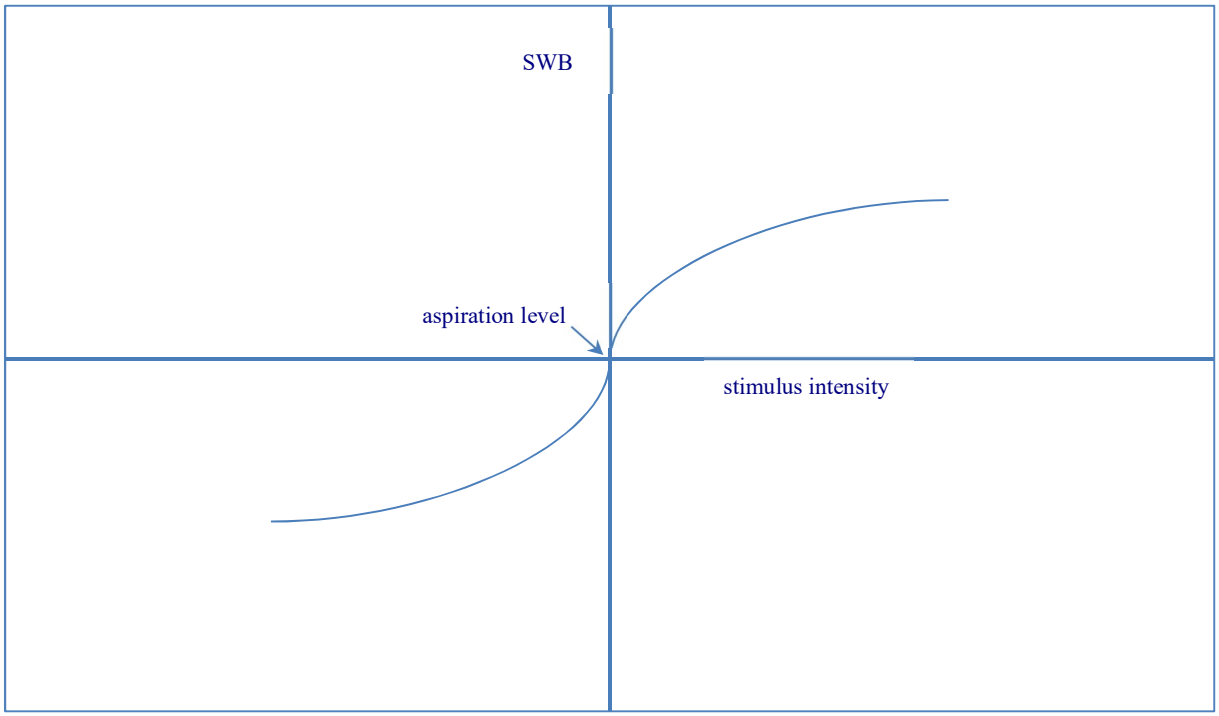
Figure 1: Hedonic Adaptation



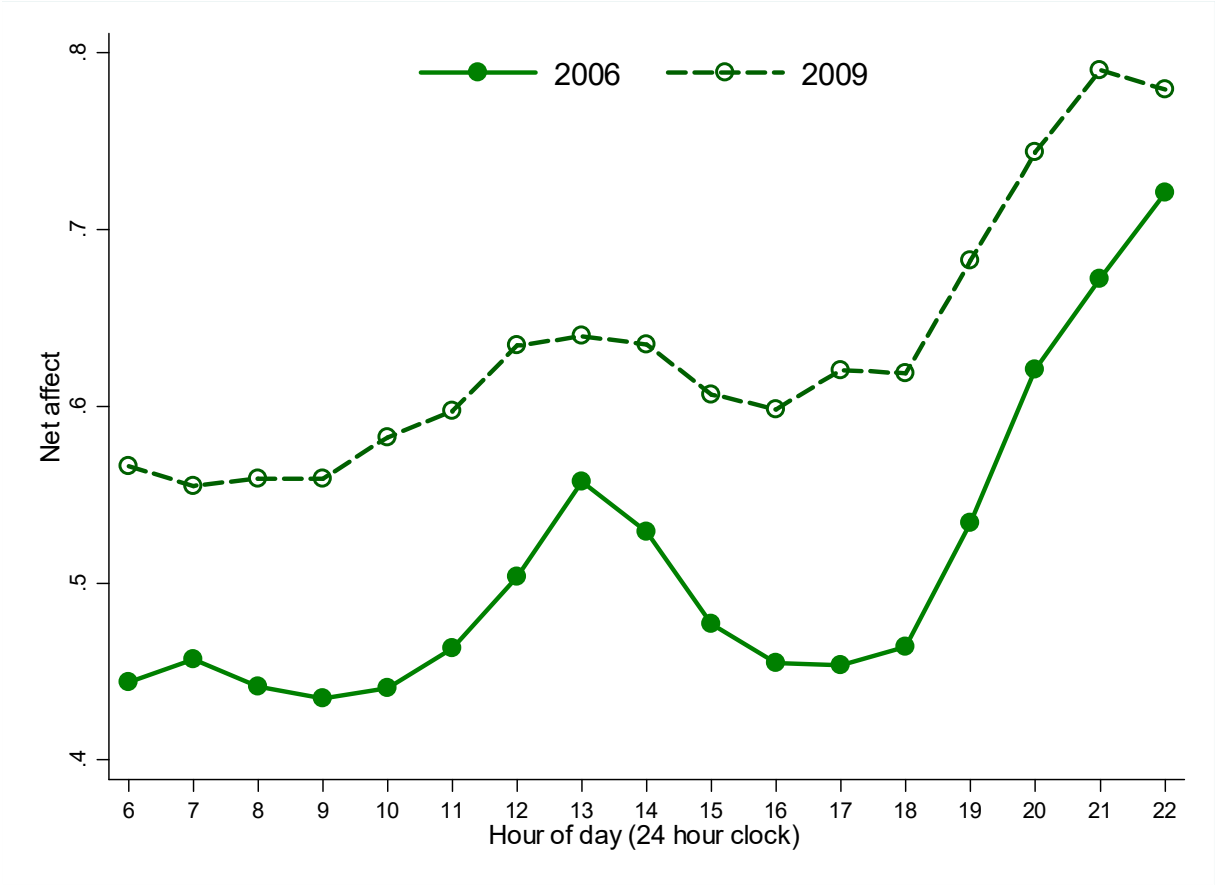
Notes: The figure illustrates the process of hedonic adaptation. The curves represent response functions of SWB with respect to absolute level of stimulus. Hedonic adaptation involves a change in the *shape* of response function.

Figure 2: Aspiration Adaptation



Notes: The figure illustrates the process of aspiration adaptation. The curve represents response function of SWB with respect to difference between current level of stimulus and the aspiration level which is adapted over time. Aspiration adaptation involves a change in the *position* of response function.

Figure 3. Diurnal Pattern of Net Affect by Year



Note: The figure illustrates the diurnal variation of net affect in 2006 and 2009. Net affect is measured on a scale from -1 to 1.

Table 1. Descriptive Statistics

	Year 2006		Year 2009		*p* -value
	Mean	S.D.	Mean	S.D.	
Panel A					
Positive affect (0-1)	0.63	0.30	0.76	0.27	0.000
Negative affect (0-1)	0.09	0.14	0.08	0.14	0.624
Net affect (-1-1)	0.55	0.40	0.67	0.37	0.000
U-index (0-1)	0.13	0.28	0.08	0.23	0.000
Global life satisfaction (1-5)	3.75	0.94	3.70	0.88	0.568
Panel B					
Age	41.48	13.64	44.48	13.64	0.000
Male	0.54	0.50	0.54	0.50	1.000
Married	0.82	0.39	0.87	0.33	0.070
Less than primary school education	0.25	0.43	0.26	0.44	0.710
Primary school education	0.28	0.45	0.30	0.46	0.365
Middle school education	0.33	0.47	0.31	0.46	0.333
High/Vocational school education	0.10	0.30	0.08	0.28	0.322
College education or above	0.04	0.20	0.05	0.23	0.346
Household size	3.46	1.22	3.61	1.40	0.089
Log of household income per capita	8.20	0.90	8.60	0.95	0.000

Notes: The table reports the summary statistics of the variables. Panel A includes the outcome variables, namely the measures of subjective well-being. Panel B includes the variables of demographic and socio-economic characteristics. The income is measured using 2005 prices as a base (adjusted by provincial CPI). The sample includes 1,485 respondents who participated in the DRM survey in both 2006 and 2009. The last column reports the *p*-values for testing the null hypothesis that the mean values between 2006 and 2009 are equal. All the statistics are estimated using inverse probability weights to adjust for sample selection.

Table 2. Experienced Affect and Time Use by Activity and Year

Activity	Net affect		U-index		Time allocation (%)	
	2006	2009	2006	2009	2006	2009
Work	0.31	0.45***	0.25	0.18**	28.3	25.9
Housework	0.47	0.63***	0.12	0.09**	16.5	16.4
Self-care	0.65	0.76***	0.08	0.04**	19.8	20.0
Leisure	0.75	0.79	0.03	0.01	27.0	25.7
Social activity	0.78	0.83	0.04	0.02	8.5	12.0

Notes: The sample includes 1,485 respondents who participated in the DRM survey in both 2006 and 2009. Columns (1) through (4) report the average net affect and U-index conditional on engaging in corresponding activity. The last two columns report the average percentage of time spent on each activity. The mean values are estimated using inverse probability weights to adjust for sample selection. * significant at 10%; ** significant at 5%; *** significant at 1%, based on the *p*-values for testing the null hypothesis that the mean values between 2006 and 2009 are equal.

Table 3. Regression Analysis of Change in Subjective Well-Being

Dependent Variables	Net affect		U-index		Global life satisfaction	
	(1)	(2)	(3)	(4)	(5)	(6)
Year 2009	0.14***	0.13***	-0.06***	-0.05***	-0.09	-0.08
	(0.02)	(0.02)	(0.01)	(0.01)	(0.08)	(0.07)
Age group (omitted: 18-30)						
31-40	-0.08**	-0.02	0.08***	0.08	0.10	0.01
	(0.04)	(0.09)	(0.02)	(0.06)	(0.16)	(0.29)
41-50	-0.07	0.11	0.08**	0.02	0.19	0.38
	(0.04)	(0.11)	(0.03)	(0.07)	(0.15)	(0.30)
51-60	-0.10**	0.10	0.09***	0.02	0.38***	0.56
	(0.04)	(0.13)	(0.03)	(0.08)	(0.14)	(0.34)
61-70	-0.03	0.14	0.04	-0.00	0.54***	0.72*
	(0.05)	(0.15)	(0.03)	(0.10)	(0.14)	(0.38)
Male	0.02	n.a.	-0.02	n.a.	-0.03	n.a.
	(0.02)	n.a.	(0.01)	n.a.	(0.05)	n.a.
Married	0.01	-0.05	-0.01	0.01	-0.01	-0.38
	(0.05)	(0.06)	(0.02)	(0.04)	(0.22)	(0.53)
Education (omitted: illiterate)						
Primary school	0.10***	0.02	-0.05***	-0.02	-0.02	-0.31
	(0.02)	(0.04)	(0.01)	(0.03)	(0.08)	(0.21)
Middle school	0.06**	-0.04	-0.05**	-0.02	-0.00	-0.43
	(0.03)	(0.05)	(0.02)	(0.03)	(0.12)	(0.35)
High/Vocational school	0.09**	0.07	-0.07***	-0.04	0.11	-0.60*
	(0.04)	(0.10)	(0.02)	(0.06)	(0.10)	(0.34)
College or above	0.04	0.08	-0.03	-0.07	0.34**	-0.47
	(0.14)	(0.20)	(0.07)	(0.08)	(0.16)	(0.46)
Village fixed effect	×		×		×	
Individual fixed effect		×		×		×
Observations	2,970	2,970	2,970	2,970	2,970	2,970
R-squared	0.184	0.149	0.111	0.056	0.125	0.042
Number of individuals		1,485		1,485		1,485

Note: The sample includes respondents who participated in the DRM survey in both 2006 and 2009. The regressions in all columns also control for household size, dummies of the type of DRM questionnaires, and a constant term, which are not reported in the table. All regressions are estimated using inverse probability weights to adjust for sample selection. The standard errors are clustered by village. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4. Decomposition of Change in Net Affect over Time

	By activity						
	Work	Housework	Social activity	Leisure	Self-care	Sum	Percentage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A							
Average in the whole sample							
Time allocation	0.27	0.16	0.10	0.26	0.20		
Net affect	0.38	0.55	0.81	0.77	0.70		
Panel B							
Unconditional change							
Time allocation	-0.02	0.00	0.03	-0.01	0.00		
Net affect	0.13***	0.16***	0.05	0.04	0.11***		
Time composition effect						0.01	9.7
Affective effect						0.10	90.3
Conditional change							
Time allocation	-0.04	-0.01	0.03*	0.00	0.01		
Net affect	0.13***	0.14***	0.13***	0.04	0.12***		
Time composition effect						0.02	13.5
Affective effect						0.11	86.5

Note: Panel A reports the average proportion of time and utility experienced in each activity in the whole sample. Panel B reports the estimates of unconditional change in time allocation and activity-specific net affect for each activity, and the estimates of change conditional on demographic characteristics (including dummies of age categories, male, married, and education categories), household size, dummies of the type of DRM questionnaire, and individual fixed effects. Inverse probability weights are used in all estimations to adjust for sample selection. * significant at 10%; ** significant at 5%; *** significant at 1%, based on the *p*-values for testing the null hypothesis that the estimate equals 0. Each time composition effect is computed as the sum of (partial) effect of year dummy on time allocation of each activity weighted by the average net affect during corresponding activity, and each affective effect is computed as the sum of (partial) effect of year dummy on net affect during each activity weighted by the average proportion of time spent on corresponding activity.

Table 5. Change in Subjective Well-being by Income Group

Baseline income group	Initial SWB		Unconditional change		Conditional change		Transition pattern (row %)		
	Mean	S.D.	Coeff.	*p* -value	Coeff.	*p* -value	Increased	Decreased	Unchanged
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Net affect									
Low-income group	0.49	0.44	0.15	0.001	0.11	0.099	61	34	5
Middle-income group	0.55	0.37	0.10	0.003	0.10	0.028	58	40	2
High-income group	0.60	0.36	0.12	0.000	0.09	0.061	63	33	4
Panel B: U-index									
Low-income group	0.17	0.31	-0.08	0.000	-0.08	0.009	11	26	63
Middle-income group	0.13	0.26	-0.03	0.267	-0.02	0.367	14	21	65
High-income group	0.11	0.25	-0.04	0.008	-0.06	0.014	9	19	73
Panel C: Global life satisfaction									
Low-income group	3.56	0.93	0.08	0.333	0.01	0.899	30	26	44
Middle-income group	3.73	0.98	-0.05	0.794	-0.07	0.554	27	34	38
High-income group	3.98	0.86	-0.18	0.083	-0.15	0.291	23	37	40

Note: Panel A, B, and C report the statistics of net affect, U-index, and global life satisfaction, respectively. Columns (1) and (2) report the mean and standard deviation of initial SWB of each income group. Column (3) shows the unconditional change in SWB between 2006 and 2009, while column (5) reports change in SWB conditional on the same control variables as in Table 4. Columns (4) and (6) report the *p*-value on testing the coefficient equals 0. Columns (7) through (9) report the percentage of respondents in each income group who experienced an increase, decrease, or the same SWB during the period 2006 to 2009, respectively.

ONLINE APPENDICES

Time Well Spent versus a Life Considered: Changing Subjective Well-Being in China

Shu Cai, Albert Park, Winnie Yip

Appendix: Survey Questions about Experienced Utility and Global Life Satisfaction

A.1 Questions of a sampling episode from Day Reconstruction

Q7050	昨天上午你接下来做什么呢？ What was the next thing you did yesterday morning? *调查员: （如果调查对象同时做几件活动，就请问哪件事情需要他更多得留心和努力，答案只能**选一个**）* *INTERVIEWER: If the respondent mentions more than one activity, probe with "Which of these activity were you paying most attention to or required most effort." Circle only ONE activity.*		
	1 干活（有工资） working 2 干活（没有工资） farming 3 做饭 preparing food 4 做家务 doing housework 5 看孩子 watching children 6 买东西/赶集 shopping 7 步行出门 walking somewhere 8 骑自行车出门 traveling by bicycle 9 外出，乘坐汽车/公共汽车/火车 traveling by car/bus/train	10 休息 (包括喝茶/咖啡) resting 11 和人聊天 chatting with someone 12 玩 (包括打牌/打麻将等) play (including cards/mahjong) 13 读书看报 reading 14 听收音机 listening to radio 15 看电视 watching TV 16 锻炼身体/散步，闲逛 exercising or leisurely walk 17 其他休闲活动 other leisure activity	18 洗刷或洗澡 grooming or bathing 19 吃饭/吃东西 eating 20 宗教活动 religious activity 21 照顾别人 providing care to someone 22 亲密关系/性活动 intimate relations or sex 23 晚上睡觉 went to sleep for the night 24 其他 other activities

Q7051	这项活动持续了多长时间? How long did this activity last? *调查员：如果调查对象不记得，就请他/她估计一下* *INTERVIEWER: If respondent has trouble with exact duration, get estimate or approximate.*	□□:□□ 小时 ：分钟 Hours : Minutes *8888 不知道 Don't know*

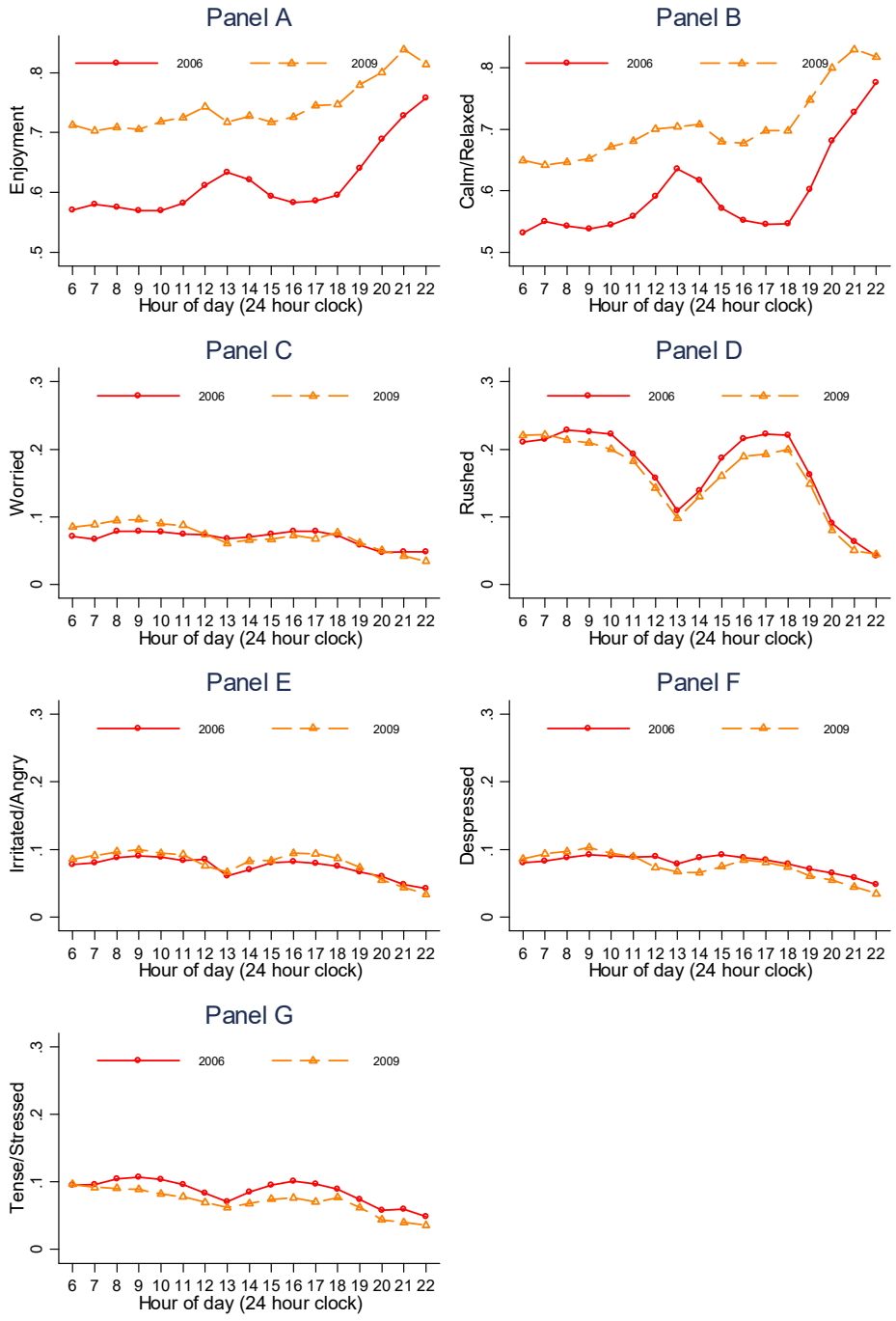
一天之中，在不同时间里我们常有不同的感受。有时候感觉不错，有时候感觉不太好。有些活动令人感到愉快，有些令人不太高兴。现在请您回忆一下昨天做这项活动时的感觉如何。
We often have different feelings at different time of the day. Sometimes it feels good, sometimes it feels bad. Some activities are pleasant, some are not pleasant. Now, please think about how you felt yesterday during that time of the day.
读选项 Read the items.

		完全没有 Not at all	有点儿 A little	很 Very much
Q7053	您有没有感到担心? How worried were you feeling?	**1**	**2**	**3**
Q7054	您有没有感到忙活? How rushed were you feeling?	**1**	**2**	**3**
Q7055	您有没有感到烦躁或生气? How irritated or angry were you feeling?	**1**	**2**	**3**
Q7056	您有没有感觉情绪低落/心情不好？ How depressed were you feeling?	**1**	**2**	**3**
Q7057	你有没有感觉紧张或有压力？ How tense or stressed were you feeling?	**1**	**2**	**3**
Q7058	您有没有感到心情放松？ How calm or relaxed were you feeling?	**1**	**2**	**3**
Q7059	做这项活动时，您觉得享受/舒服/喜欢吗？ How much were you enjoying what you were doing?	**1**	**2**	**3**

A.2 Question on global life satisfaction

总的来说，你对生活满意吗？
Taking all things into considerations, how satisfied are you with your life?
1 很不满意　2 不满意　　3 一般　4 比较满意　　5 非常满意
1 very dissatisfied, 2 dissatisfied, 3 just so so, 4 satisfied, 5 very satisfied.

Figure A1. Diurnal Pattern of Positive and Negative Affections by Year



Note: The figure illustrates the diurnal variation of affections in 2006 and 2009, including two positive affections (enjoyment-Panel A, calm/relaxed-Panel B) and five negative affections (worried-Panel C, rushed-Panel D, irritated/angry-Panel E, depressed-Panel F, tense/stressed-Panel G). Both positive affections and negative affections are measured on a scale from 0 to 1.

Table A1. Mean Difference between (Un)weighted Analysis Sample and Total Sample

	Total sample		Analysis sample unadjusted		Analysis sample adjusted		Normalized Differences			
	mean	obs.	mean	obs.	mean	obs.	(1) - (3)	*p*-values	(1) - (5)	*p*-values
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A										
Positive affect (0-1)	0.62	2,848	0.63	1,485	0.63	1,485	-0.006	0.783	-0.025	0.278
Negative affect (0-1)	0.09	2,848	0.10	1,485	0.09	1,485	-0.011	0.639	0.023	0.315
Net affect (-1-1)	0.53	2,848	0.53	1,485	0.55	1,485	-0.001	0.972	-0.027	0.238
U-index (0-1)	0.14	2,848	0.15	1,485	0.13	1,485	-0.028	0.205	0.009	0.693
Global life satisfaction (1-5)	3.76	2,876	3.80	1,485	3.75	1,485	-0.031	0.168	0.009	0.688
Panel B										
Age	39.55	5,415	48.10	1,485	41.48	1,485	-0.479	0.000	-0.097	0.000
Male	0.51	5,415	0.40	1,485	0.54	1,485	0.153	0.000	-0.035	0.088
Married	0.77	5,413	0.96	1,485	0.82	1,485	-0.406	0.000	-0.077	0.000
Less than primary school education	0.22	5,405	0.36	1,485	0.25	1,485	-0.210	0.000	-0.044	0.031
Primary school education	0.27	5,405	0.30	1,485	0.28	1,485	-0.054	0.009	-0.017	0.401
Middle school education	0.36	5,405	0.25	1,485	0.33	1,485	0.168	0.000	0.046	0.028
High/Vocational school education	0.11	5,405	0.08	1,485	0.10	1,485	0.079	0.000	0.032	0.130
College education or above	0.03	5,405	0.01	1,485	0.04	1,485	0.123	0.000	-0.027	0.175
Household size	3.38	5,415	3.27	1,485	3.46	1,485	0.059	0.005	-0.050	0.017
Log of household income per capita	8.21	5,405	8.18	1,485	8.20	1,485	0.020	0.325	0.005	0.822

Notes: The table reports the unadjusted mean values of the total sample and analysis sample, and adjusted mean values of the analysis sample using inverse probability weights. All data refers to the baseline survey. Normalized differences are computed as the difference in means between the total sample and analysis sample (adjusted or unadjusted) divided by the square root of the sum of the variances of the two samples. Columns (8) and (10) report *p*-value on testing the hypothesis that the normalized difference is equal to 0.

Table A2. Decomposition of Change in U-index over Time

	By activity					Sum	Percentage
	Work	Housework	Social activity	Leisure	Self-care		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A							
Average in the whole sample							
Time allocation	0.27	0.16	0.10	0.26	0.20		
U-index	0.22	0.11	0.03	0.02	0.06		
Panel B							
Unconditional change							
Time allocation	-0.02	0.00	0.03	-0.01	0.00		
U-index	-0.06**	-0.04**	-0.02	-0.02	-0.04**		
Time composition effect						0.00	10.8
Affective effect						-0.04	89.2
Conditional change							
Time allocation	-0.04	-0.01	0.03*	0.00	0.01		
U-index	-0.07*	-0.02	-0.02	0.00	-0.04***		
Time composition effect						-0.01	18.3
Affective effect						-0.03	81.7

Note: Panel A reports the average proportion of time and U-index in each activity in the whole sample. Panel B reports the estimates of unconditional change in time allocation and activity-specific U-index for each activity, and the estimates of change conditional on demographic characteristics (including dummies of age categories, male, married, and education categories), household size, dummies of the type of DRM questionnaire, and individual fixed effects. Inverse probability weights are used in all estimations to adjust for sample selection. * significant at 10%; ** significant at 5%; *** significant at 1%, based on the *p*-values for testing the null hypothesis that the estimate equals 0. Each time composition effect is computed as the sum of (partial) effect of year dummy on time allocation of each activity weighted by the average U-index during corresponding activity, and each affective effect is computed as the sum of (partial) effect of year dummy on U-index during each activity weighted by the average proportion of time spent on corresponding activity.

Table A3. Decomposition of Disparity in Net Affect between Demographic Groups

	Conditional difference	Time composition effect	Affective effect	Sum of the two effects
	(1)	(2)	(3)	(4)
Age group (reference group: 18-30)				
31-40	-0.08	-0.03	-0.06	-0.09
41-50	-0.07	-0.05	-0.03	-0.08
51-60	-0.10	-0.04	-0.07	-0.11
61-70	-0.03	-0.03	0.01	-0.02
Gender (reference group: female)				
Male	0.02	0.00	0.01	0.01
Marital status (reference group: unmarried)				
Married	0.01	0.00	0.04	0.04
Education (reference group: illiterate)				
Primary school	0.10	-0.01	0.08	0.08
Middle school	0.06	-0.01	0.05	0.04
High/Vocational school	0.09	0.01	0.04	0.06
College or above	0.04	0.02	0.08	0.10

Note: Column (1) reports the estimated coefficient of the corresponding dummy in the pooled cross-sectional regression on net affect in column (1) of Table 3. Column (2) reports the sum of estimated coefficients in the pooled cross-sectional regressions on share of time spent on each activity weighted by activity-specific average net affect. Column (3) reports the sum of estimated coefficients in the pooled cross-sectional regressions on activity-specific affects weighted by the average proportion of time spent on each activity in the whole sample. Column (4) reports the sum of columns (2) and (3).

Table A4. Decomposition of Disparity in U-index between Demographic Groups

	Conditional difference	Time composition effect	Affective effect	Sum of the two effects
	(1)	(2)	(3)	(4)
Age group (reference group: 18-30)				
31-40	0.08	0.02	0.07	0.08
41-50	0.08	0.02	0.06	0.09
51-60	0.09	0.02	0.08	0.10
61-70	0.04	0.01	0.04	0.05
Gender (reference group: female)				
Male	-0.02	0.00	-0.02	-0.01
Marital status (reference group: unmarried)				
Married	-0.01	0.00	-0.02	-0.02
Education (reference group: illiterate)				
Primary school	-0.05	0.00	-0.04	-0.03
Middle school	-0.05	0.00	-0.03	-0.02
High/Vocational school	-0.07	-0.01	-0.03	-0.04
College or above	-0.03	-0.01	-0.03	-0.04

Note: Column (1) reports the estimated coefficient of the corresponding dummy in the pooled cross-sectional regression on U-index in column (3) of Table 3. Column (2) reports the sum of estimated coefficients in the pooled cross-sectional regressions on share of time spent on each activity weighted by activity-specific average U-index. Column (3) reports the sum of estimated coefficients in the pooled cross-sectional regressions on activity-specific U-index weighted by the average proportion of time spent on each activity in the whole sample. Column (4) reports the sum of columns (2) and (3).

Table A5. Change in Net Affect by Demographic Group

Baseline demographic characteristics	Initial net affect		Unconditional change		Conditional change		Transition pattern (row %)		
	Mean	S.D.	Coeff.	*p*-value	Coeff.	*p*-value	Increased	Decreased	Unchanged
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Age group									
18-30	0.62	0.34	0.04	0.571	0.04	0.561	53	45	3
31-40	0.50	0.38	0.20	0.000	0.17	0.000	68	29	3
41-50	0.54	0.42	0.11	0.000	0.12	0.003	58	36	5
51-60	0.50	0.44	0.16	0.000	0.16	0.000	63	33	4
61-70	0.55	0.40	0.18	0.000	0.19	0.000	65	30	5
Male	0.56	0.39	0.12	0.001	0.12	0.001	59	37	4
Female	0.52	0.41	0.13	0.000	0.12	0.000	62	35	4
Married	0.54	0.40	0.14	0.000	0.13	0.000	60	35	5
Unmarried	0.59	0.38	0.07	0.426	0.11	0.312	60	40	0
Education category									
Illiterate	0.44	0.46	0.17	0.000	0.14	0.000	64	34	2
Primary school	0.59	0.38	0.12	0.000	0.10	0.016	60	36	4
Middle school	0.56	0.35	0.12	0.001	0.13	0.001	59	36	5
High/Vocational school	0.65	0.34	-0.03	0.803	0.07	0.254	41	55	4
College or above	0.51	0.44	0.31	0.002	0.39	0.000	97	2	1

Note: Columns (1) and (2) report the mean and standard deviation of initial net affect of each demographic group. Column (3) shows the unconditional change in net affect between 2006 and 2009, while column (5) reports change in net affect conditional on the same control variables as in Table 4. Columns (4) and (6) report the *p*-value on testing the coefficient equals 0. Columns (7) through (9) report the percentage of respondents in each demographic group who experienced an increase, decrease, or the same net affect during the period 2006 to 2009, respectively.

Table A6. Change in U-index by Demographic Group

Baseline demographic characteristics	Initial U-index		Unconditional change		Conditional change		Transition pattern (row %)		
	Mean	S.D.	Coeff.	*p*-value	Coeff.	*p*-value	Increased	Decreased	Unchanged
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Age group									
18-30	0.08	0.22	-0.04	0.267	-0.08	0.070	7	14	79
31-40	0.15	0.28	-0.08	0.001	-0.04	0.066	13	28	59
41-50	0.14	0.29	-0.03	0.171	-0.02	0.343	15	23	62
51-60	0.18	0.31	-0.07	0.000	-0.07	0.002	12	27	61
61-70	0.11	0.27	-0.04	0.166	-0.05	0.105	8	17	75
Male	0.11	0.26	-0.04	0.020	-0.05	0.017	9	18	72
Female	0.16	0.30	-0.06	0.000	-0.05	0.001	14	26	60
Married	0.14	0.29	-0.04	0.000	-0.04	0.000	13	22	65
Unmarried	0.11	0.23	-0.08	0.057	-0.14	0.024	3	22	74
Education category									
Illiterate	0.22	0.34	-0.09	0.000	-0.08	0.003	14	31	56
Primary school	0.12	0.26	-0.04	0.024	-0.03	0.224	13	19	68
Middle school	0.10	0.24	-0.02	0.320	-0.02	0.256	10	18	72
High/Vocational school	0.08	0.20	-0.04	0.142	-0.01	0.783	9	20	72
College or above	0.18	0.31	-0.18	0.260	-0.21	0.083	0	27	73

Note: Columns (1) and (2) report the mean and standard deviation of initial U-index of each demographic group. Column (3) shows the unconditional change in U-index between 2006 and 2009, while column (5) reports change in U-index conditional on the same control variables as in Table 4. Columns (4) and (6) report the *p*-value on testing the coefficient equals 0. Columns (7) through (9) report the percentage of respondents in each demographic group who experienced an increase, decrease, or the same U-index during the period 2006 to 2009, respectively.

Table A7. Change in Global Life Satisfaction by Demographic Group

Baseline demographic characteristics	Initial life satisfaction		Unconditional change		Conditional change		Transition pattern (row %)		
	Mean	S.D.	Coeff.	*p*-value	Coeff.	*p*-value	Increased	Decreased	Unchanged
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Age group									
18-30	3.83	0.76	-0.51	0.013	-0.40	0.023	17	50	33
31-40	3.48	1.12	0.24	0.167	0.00	0.965	35	28	37
41-50	3.66	0.99	0.10	0.088	0.12	0.067	31	25	45
51-60	3.85	0.88	0.08	0.100	0.08	0.134	29	24	47
61-70	4.09	0.87	-0.02	0.746	-0.03	0.745	26	28	46
Male	3.75	0.94	-0.06	0.659	-0.13	0.172	25	32	43
Female	3.74	0.94	-0.03	0.485	0.03	0.706	29	32	39
Married	3.74	0.93	0.04	0.353	0.04	0.450	30	28	42
Unmarried	3.80	0.98	-0.44	0.204	-0.60	0.002	13	50	38
Education category									
Illiterate	3.77	0.97	-0.05	0.455	-0.05	0.552	28	31	41
Primary school	3.73	0.95	0.05	0.527	0.07	0.490	29	30	41
Middle school	3.64	0.93	-0.03	0.883	0.00	0.975	31	35	34
High/Vocational school	3.83	0.85	-0.01	0.900	-0.13	0.242	16	19	65
College or above	4.43	0.67	-0.95	0.063	-1.10	0.000	3	65	33

Note: Columns (1) and (2) report the mean and standard deviation of initial global life satisfaction of each demographic group. Column (3) shows the unconditional change in global life satisfaction between 2006 and 2009, while column (5) reports change in global life satisfaction conditional on the same control variables as in Table 4. Columns (4) and (6) report the *p*-value on testing the coefficient equals 0. Columns (7) through (9) report the percentage of respondents in each demographic group who experienced an increase, decrease, or the same global life satisfaction during the period 2006 to 2009, respectively.