



Well-Being in Transition: Life Satisfaction in Urban China from 2002 to 2012

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Abstract

The improving strength of the labor market is chiefly responsible for the overall increase in life satisfaction in urban China from 2002 to 2012. This is especially true for the segment of the population most vulnerable to the negative effects of the on-going transition to a free-market based economy—people with less than a college education. Income comparison and habituation effects offset any positive effect of increased personal income during this time. The result is that increases in income are not significantly related to the increase in life satisfaction during this time. In the interest of protecting the life satisfaction of those most vulnerable, attention must be paid to maintaining a strong labor market as internal migration restrictions are loosened and the labor market is further liberalized in China. These findings are based on repeated cross-sectional data spanning from surveys used in the annual economic reports published by the Chinese Academy of Social Sciences. A modified version of the Oaxaca decomposition method is developed to take advantage of annual data and also control for adaptation to income effects. The change in life satisfaction from 2002 to 2012 is then divided into segments associated with changes in various life domains.

Keywords Life satisfaction · Urban China · Labor market · Transition

JEL Classification I31 · J64 · P20

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1 Introduction

In the past few decades, China has undergone a radical transition from a poor communist country to a rising superpower by embracing the free-market. The rapid transition has resulted in vast changes in life circumstances for over one billion people in China. Nowhere in China has this statement been truer than in the urban centers. Since the early 1990s, when the Chinese government started a transition from a centrally planned communist system to a free-market based system in urban China, average income more than quadrupled by 2010 (Chen et al. 2011). The average was not just moved by richer peoples' skyrocketing incomes; almost everyone in urban China enjoyed increasing incomes and consumption after the start of the transition (Cai et al. 2010a, b). Yet, when people were asked about how they felt about their lives during this time, there was no improvement. Between 1990 and 2010, average subjective well-being in urban China did not follow income; if anything, average subjective well-being declined (Easterlin et al. 2012, 2017; Bartolini and Sarracino 2015). Specifically, since 1990, China's subjective well-being declined sharply in 1990 then made a modest recovery after the early 2000s. These two trends resulted in an overall U-shaped pattern since the start of the transition.

It is clear from the disparate income and subjective well-being trends that simply increasing income is not enough to increase subjective well-being in urban China; there are other changes in peoples' lives that are dominating any positive effects of personal increases in income. The aim of this study is to identify what changes in the lives of urban Chinese were responsible for the trend in subjective well-being in urban China during the recovery phase of the U-shaped pattern from 2002 to 2012. We pay special attention to how conditions in the labor market and income habituation and comparison relate to the subjective well-being trend during this time.

Repeated cross-sectional individual-level data are used in the analysis. We develop a modified version of the Oaxaca decomposition method to take advantage of annual data and estimate what portion of the change in subjective well-being can be attributed to changes in various aspects of peoples' lives. The urban population is subsequently divided by level of education and separately analyzed to determine if subjective well-being trends are pushed by the same underlying changes in life circumstance for these different segments of the population.

Our analysis finds improving labor market conditions can account for 29% of the increase in subjective well-being between 2002 and 2012 in urban China. This is primarily driven by a large decrease in unemployment during this time. The improving labor market is especially important for the segment of the population whose subjective well-being is most vulnerable during the economic transition—people with less than a college education. We also find that any positive effect that increasing income had on subjective well-being was nullified by income comparison and habituation. The net result is that changes in income have no significant relationship with the increase in subjective well-being from 2002 to 2012. We also find suggestive evidence that the increasing trend in subjective well-being can partially be explained by older, less satisfied birth cohorts exiting our sample.

2 Literature Review and Our Contributions

This study's focus on conditions in the labor market is directly motivated by the findings from Easterlin et al. (2012, 2017). Both articles find that the U-shaped pattern of urban life satisfaction inversely mirrors urban unemployment rate estimates during this

time, which is taken as evidence that changes in unemployment rate are moving the pattern in subjective well-being. This finding is a valuable contribution, but still questions remain about to what extent labor market conditions are determining the subjective well-being pattern. This study builds on the findings from Easterlin and colleagues by estimating what percent of the increase in subjective well-being from 2002 to 2012 can be attributed to changes in labor market conditions.

Despite the surprising U-shaped subjective well-being pattern in urban China, there have been relatively few studies addressing this issue. Of the studies that address the pattern, several studies focus primarily on simply describing the trend in subjective well-being (Burkholder 2005; Kahneman and Krueger 2006; Crabtree and Wu 2011), and a few studies attempt to find the underlying factors moving subjective well-being, but don't specifically address labor market conditions. Brockmann et al. (2009) find that increasing income inequality and rising financial dissatisfaction contributed to the decline in subjective well-being from 1990 to 2000. Bartolini and Sarracino (2015) find that social comparisons and the loss of social capital explain the changes in subjective well-being observed between 1990 and 2007. Graham et al. (2017) find that worsening mental health, such as depression in the urban educated population could be a reason for the decline in life satisfaction during China's rapid growth. Increasing income inequality and worsening mental health could explain the overall decline in subjective well-being since 1990, but are not able to produce the U-shaped pattern. Easterlin et al. (2017) find that social trust, a measure of social capital, also follows a U-shape which is consistent with the U-shape in life satisfaction, but the correlation between subjective well-being and social capital is much weaker than the correlation between subjective well-being and labor market conditions.

We also focus on income comparison and habituation in this study. The experience in urban China during this time period presents a unique opportunity to test an explanation of why, around the world, subjective well-being trends do not follow income trends—positive effects of personal income increases on subjective well-being are undercut by social comparison and habituation/rising aspirations (Easterlin 2003; Clark et al. 2008; Keller 2018). This study specifically addresses the question, can the counterbalancing forces of social comparison and income habituation, even during a time of unprecedented income growth, help explain why there has been no long run increase in subjective well-being in urban China since 1990?

The existence of income comparison and/or habituation as an explanation of subjective well-being trends in China has been addressed by a handful of studies (Oshio et al. 2011; Appleton and Song 2008; Smyth and Qian 2008; Wang and Vander Weele 2011; Knight and Gunatilaka 2011). These studies, however, are based on cross-sectional data and therefore cannot address to what extent income comparison/habituation can explain trends in subjective well-being. Brockmann et al. (2009) and Bartolini and Sarracino (2015) use financial dissatisfaction as a proxy for social comparison under the assumption that the financial dissatisfaction measure reflects social comparison; an assumption is buttressed by empirical findings from Germany (D'Ambrosio and Frick 2007). They indeed find that financial dissatisfaction is an important determinant of subjective well-being change. Our study provides a complimentary method, based on the work of Clark et al. (2008), of estimating the relationship between subjective well-being and income comparison and habituation using reference group and previous income.

3 Data

3.1 Dataset Description

The data used in this analysis is from the Horizon Research Consultancy Group (HRCG). HRCG is an independent data company based in China. They have collected data since the 1990s that are used in the annual reports on China's society published by the Chinese Academy of Social Sciences. The complete HRCG dataset that we use is in the form of repeated cross sections spanning 2000–2012 and covers both urban and rural China. A multi-stage random sampling method was used to gather the data¹ and sample weights are used in the analysis to assure the data are representative of the population within the characteristics of our sample.

For this study's analysis, data must be gathered from an urban population that is comparable across years. To this end, certain segments of the dataset are omitted from the analysis. Because the focus of this analysis is urban China, the rural data are dropped.² In urban areas, Horizon surveyed twenty different cities from 2000 to 2012, but the coverage of these cities varied from year to year. Seven cities, however, were surveyed together frequently throughout this period: Beijing, Shanghai, Guangzhou, Wuhan, Shenyang, Xi'an, and Chengdu. Of the 13 years of coverage, in 11 years all these seven cities were surveyed. All cities besides the seven most frequently surveyed were dropped from the analysis. The 2 years that did not cover these seven cities, 2000 and 2006, were also dropped. Over the entire sample, ages 18–60 were sampled every year. In some years, ages outside of this range were sampled, but to keep waves comparable across years observations outside of 18–60 were dropped from the analysis. We also dropped students because it is impossible to determine their final level of education in our data.

The remaining data that we use in the analysis span 2001–2005 and 2007–2012 and are representative of people aged 18–60 in the following seven cities: Beijing, Shanghai, Guangzhou, Wuhan, Shenyang, Xi'an, and Chengdu.³ There are just under 2000 observations per year in the sample we analyze.

3.2 Variables

Subjective well-being⁴ is the focus of this study because it is a comprehensive measure of well-being based on what people deem to be important in their own lives. This is

¹ Cities of survey were determined first. Then, within each city, the central district along with other randomly selected districts were targeted for sampling. Communities within the selected districts were randomly chosen for sampling. Finally, households in a selected community were randomly chosen according to the rule of "sampling one household after passing by five households". One respondent was randomly determined within each selected household to complete the survey.

² Another reason of dropping the rural sample is that selected rural villages were generally incomparable over time, and for some years, rural surveys were not conducted.

³ The seven cities are not representative of urban China. Nevertheless, the data includes typical cities in all regions of China. Beijing, Shanghai, Guangzhou, Wuhan, Shenyang, Xi'an, and Chengdu belong to North China, East China, South China, Central-south China, Northeast China, Northwest China and Southwest China.

⁴ In this paper, the term "subjective well-being" is used to refer to self-reported evaluations of a person's happiness or satisfaction with life. These measures are considered comparable because they correlate with the same explanatory variables (Helliwell et al. 2012).

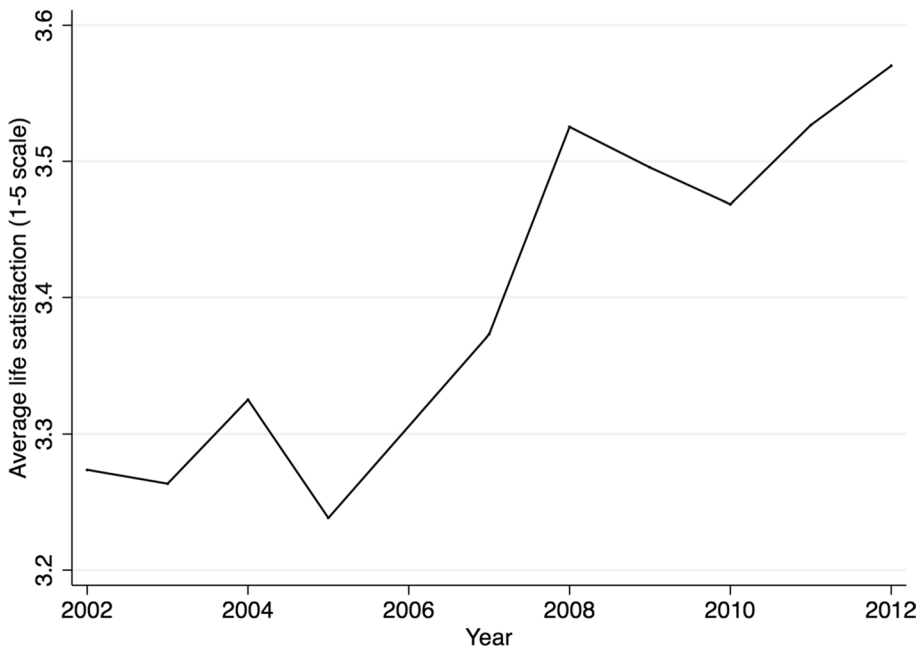


Fig. 1 Average life satisfaction in urban China from 2002 to 2012. *Source:* HRCG data used in analysis

especially important when studying the well-being of urban China during a time when so many changes are occurring. Instead of relying on an outside party to decide which life circumstance should be a proxy measure of well-being, we allow the people experiencing the changes in China to report their feeling about their lives, and then find variables that are related to the self-reported measure. Subjective well-being has been validated as a meaningful and reliable measure of well-being (Stiglitz et al. 2009), is recently being officially measured by almost all OECD countries, and the United Nations is even encouraging nations to use subjective well-being as a guide for policy (Helliwell et al. 2013).

Life satisfaction is the subjective well-being measure we use in this study. Life satisfaction is measured by the question (translated from Chinese): “Overall, how satisfied are you with your life now? Very satisfied, fairly satisfied, neutral, fairly unsatisfied, or very unsatisfied? [choose one].” The response options are coded 5 through 1, with 5 representing very satisfied and 1 representing very unsatisfied. Neutral is coded 3. The trend in life satisfaction that we analyze in this analysis is illustrated by Fig. 1. The increasing trend in life satisfaction between 2002 and 2012 found in our HRCG data is similar to the increasing trends reported in previous studies that use other datasets (Easterlin et al. 2012, 2017; Bartolini and Sarracino 2015).

Easterlin (2010, pp. 160–161) suggests a theoretical framework for analyzing the determinants of personal happiness, where life satisfaction is the outcome of satisfaction with various life domains. The domains Easterlin specifically mentions are material living

Table 1 Monthly household income, percent of sample over income response options (yuan)

Year	2002	2012
0–3000	82.5	9.2
3001–5000	12.2	29.5
5001–8000	3.7	43.6
> 8000	1.6	17.7
Total	100.0	100.0

Data from HRCG. The sample includes households that are included in the primary analysis

conditions, family life, health, and work. The four life domains highlighted by Easterlin were previously found to be the most influential factors affecting people's happiness in different cultures (Cantril 1965).

Satisfaction with a life domain is a product of both objective outcomes and subjective aspirations within the domain. The advantage of this framework is the integration of objective determinants, emphasized by economics, and subjective factors, underscored by psychology (Easterlin 2010, p. 160). Easterlin (2010, pp. 171–172) finds that actual life circumstances are dominant in determining satisfaction with family life, health, and work, while aspirations play crucial roles in shaping satisfaction with living conditions.

In accordance with the framework, the explanatory variables include actual income and income aspirations measured by reference income and previous year income as a proxy. For the work domain, we included employment status. Unfortunately, we do not have consistent measures of family life and health. As Easterlin (2010, p. 168) points out, the formation and dissolution of unions are essential to determine satisfaction with family life, and the incidence of disability and disease drives the life-course trail of satisfaction with health; all the objective circumstances can be roughly predicted by individual characteristics, such as gender, age, birth cohort, level of education, which have all been included in as explanatory variables. Furthermore, year and city were included to account for time and location specific determinants on life satisfaction, along with any other effects that are not captured by the other explanatory variables.⁵

In this analysis, income is measured as the categorical response to a household monthly income question.⁶ The categories are: 3000 yuan or less, 3001–5000 yuan, 5001–8000 yuan, and more than 8000 yuan.⁷ To ensure the categories are the same across all years, which is required by our analysis, the income categories are all nominal values. Although controlling for real income is ideal, converting income to real values would result in inconsistent income categories across years. Table 1 illustrates that the HRCG data show evidence of dramatic income increases from 2002 and 2012 in this study's sample. In 2002, the vast majority of respondents (82.5%) reported earning less than 3001 yuan per month.

⁵ City dummies and year dummies capture all regional and temporal factors, including demographic structures, socio-economic development, public policies, and so on, that might be related to individual subjective well-being. For example, Huang (2018) finds that city-level income inequality significantly affects individual happiness.

⁶ Household size is not controlled in analyses because only a couple of years of surveys include this variable. For the years with household size, results are similar no matter if household size is considered or not.

⁷ Original income categories varied by year, and were unified to the same set of categories. Continuous measures of income were not recorded in the data.

By 2012, the majority of respondents (61.3%) reported household incomes over 5000 yuan per month.

Previous studies have shown that income aspirations due to social comparison affect the relationship between income and subjective well-being (Clark et al. 2008; Vendrik 2013; D'Ambrosio and Frick 2012). To account for the increasing income aspirations of respondents due to the rising income of a comparison group over time, we generate a reference group income variable from the data. The reference group variable is generated as follows. For each wave, we place every observation in a category defined by male/female, high/low education, old/young cohorts, and city.⁸ The reference income for each observation is defined as the median income of the category in which the observation is assigned.

People also habituate to their own level of income (Di Tella et al. 2010; Vendrik 2013; Clark et al. 2008). To account for habituation effects, we generate an approximate previous year income variable using the following procedure. We run an ordered logit regression of income categories on gender, education dummies, city dummies and cohort dummies in the previous year. Previous year income is created by predicting an individual's income category in the previous year using their characteristics of the survey respondent in the current year.⁹ The characteristics used to predict previous year income are chosen because they were either fixed or unlikely to change from year to year for respondents in our sample.

The methods we use to generate reference income and previous year income have both been used in the subjective well-being literature.¹⁰ We use different methods to generate reference and previous year income because of the accuracy of each method. The categorical method used to generate reference income is less precise than the ordered logit prediction method. We argue that this is preferable for reference income under the assumption that people tend to compare themselves to others somewhat similar to themselves. The accuracy of the ordered logit prediction method is used to predict previous year income because we want to estimate the previous year category for each survey respondent as accurately as possible.

The analysis of macro-level trends provides strong evidence that the labor market conditions largely shaped the pattern of life satisfaction in urban China since the early 1990s (Easterlin et al. 2012, 2017). Furthermore, unemployment is commonly found to be an important determinant of subjective well-being (Blanchflower and Oswald 2004; Clark et al. 2001; Kassenboehmer and Haisken-DeNew 2009; Winkelmann and Winkelmann 1998). In our analysis, employment status is divided into three categories: employed, unemployed, and retired. Employed is defined as anyone responding they are formally or informally working. For example, a respondent formally working for a company and a housewife informally working for a household would both be considered employed. The unemployed category in our study is defined more broadly than the traditional definition; a respondent is considered unemployed if they respond they don't have a job, lost their job, are looking for a job etc. In this broad definition, discouraged workers are also categorized as unemployed. Compared to the traditional definition of unemployment, our broad definition likely better reflects labor market conditions during this time because in the early 2000s there were many discouraged workers in urban China (Cai et al. 2010a, b; Knight and Xue 2006; Lu and Gao 2011).

⁸ There are 56 groups in each year. Groups cannot be smaller as the sample size of a group would be too small to generate reliable statistics.

⁹ The previous income of respondents in 2007 is their predicted income in 2005.

¹⁰ Clark et al. (2008) offer a review.

In the experience of the European transition countries, older generations typically fared worse than younger generations after the fall of the USSR (Easterlin 2010, Chapter 4). Given the parallels seen in the pattern of life satisfaction during the transition to capitalism in urban China, older cohorts may have also suffered in China. Furthermore, Wang and Zhou (2017) find that older cohorts in this sample are less satisfied with their lives due to participating in Mao's "send-down movement." Cohort is therefore an important variable to control for especially because the age cutoff in our sample is 60; the increase in life satisfaction could be largely explained by older, less satisfied cohorts leaving the sample by 2012. Cohort is controlled for by 1-year cohort dummies. To isolate the effect of cohort, age and year are included as controls. Year dummies are included, and age is controlled for by 2-year age group dummies to break the age, period, cohort control collinearity problem.¹¹ City, education level, and gender dummies are also included in the analysis as controls.

4 Methodology

The general analysis is divided into two steps. First, the relationship between life satisfaction and explanatory variables is established by linear regression. Second, using the parameter estimates and the change in the average values of the explanatory variables from 2002 to 2012, the change in life satisfaction from 2002 to 2012 is divided into portions related to the change in each explanatory variable.¹² Our method is essentially an Oaxaca decomposition modified to take advantage of yearly data (see "Appendix 2" for details). Using yearly data has a few advantages over using only start and end dates (which the Oaxaca decomposition typically requires). Using yearly data provides a larger sample size and allows for this analysis to include age and cohort effects along with previous year income effects.

In the first step of the analysis, data from all years is pooled together and life satisfaction is regressed on all the explanatory variables. The estimated linear equation is expressed as

$$\widehat{LS}_{i,t} = \mathbf{x}_{i,t} \widehat{\boldsymbol{\beta}}, \quad (1)$$

where i indicates an individual, t represents a year, \widehat{LS} is fitted life satisfaction, \mathbf{x} is a vector of K explanatory variables and $\widehat{\boldsymbol{\beta}}$ denotes the parameter estimates.

In the second step of the analysis, the parameter estimates from the linear regression and the change in explanatory variables are used to divide the change in life satisfaction from 2002 to 2012 into portions attributed to changes in each variable. According to Eq. (1), the average life satisfaction of year t , $\overline{\widehat{LS}}_t$, can be expressed as:

$$\overline{\widehat{LS}}_t = \overline{\widehat{LS}}_t = \overline{\mathbf{x}}_t \widehat{\boldsymbol{\beta}} = \sum_{k=1}^K \overline{\mathbf{x}}_{k,t} \widehat{\beta}_k, \quad (2)$$

¹¹ Different age group dummies were inserted into the analysis for robustness checks. The results did not change.

¹² The sample of year 2001 will be only used to generate the previous income of year 2002.

where the first equality holds because the survey year variables in the linear regressions also act as year dummies.¹³ The year dummies absorb any year to year effects that are not captured by the other control variables.

The increase in life satisfaction from 2002 to 2012 is $\Delta \overline{LS} = \overline{LS}_{2012} - \overline{LS}_{2002}$, and the percent contribution of the change in x_k to $\Delta \overline{LS}$ is defined as:

$$c_k = \frac{(\bar{x}_{k,2012} - \bar{x}_{k,2002})\hat{\beta}_k}{\Delta \overline{LS}} \times 100\%. \quad (3)$$

This method does not impose any restriction on the sign of c_k . Therefore, if the change in a variable is associated with a decreasing impact on subjective well-being during this time, the corresponding c_k would be negative. That is to say, our model allows for counteracting effects on subjective well-being. The only restriction we impose on this size of c_k is that all the percent contribution variables sum to 100%. Therefore, the percent contribution results can be interpreted as follows: the percent contribution of a variable is large and significant if, 1—variable is closely related to subjective well-being, and 2—the variable changed greatly between 2002 and 2012.

Our model imposes one restrictive assumption—the relationship between explanatory variables and subjective well-being does not change over time. In our model, any changes that cannot be explained by the included explanatory variables are captured by the year dummies. This includes changes in life satisfaction that are due to changes in the relationship between the explanatory variables and life satisfaction (proof in “Appendix 2”). For this reason, the interpretation of the year dummies is percent change in life satisfaction unexplained by changes in other explanatory variables.

5 Results

Table 2 presents the OLS regression results from the first step of the analysis. The first step identifies the relationship between the explanatory variables and life satisfaction that we use to compute the percent contribution results in step two. The relationships have the expected signs and levels of significance. Males are less satisfied with life than females, more educated people are more satisfied with life, unemployed people are much less satisfied than employed people, and life satisfaction is increasing in own income.

The relationship between previous year income and life satisfaction is evidence of income habituation to a point. That is, if in the previous year the survey respondent had higher income up to > 8000 yuan, they are less satisfied with their life in the current year. The previous year > 8000 yuan dummy is positive (the opposite of what we expect), but not significant. Similar to previous year income, the relationship between reference income shows income comparison negatively affects life satisfaction up to a point. If a respondent's reference group has higher income, the respondent has lower life satisfaction up until the reference income is > 8000 yuan. The relationship between > 8000 reference group income

¹³ In the pooled cross-sectional regression $\widehat{LS}_{i,t} = \mathbf{x}_{i,t}\hat{\beta} + \sum_{t=2001}^{2012} d_t\hat{\delta}_t$, where d_t is a dummy for year t , $\hat{\delta}_t$ will be chosen, by construction, so $\widehat{LS}_t = LS_t$ for each t .

Table 2 Step 1 OLS regression results

	Dependent variable: life satisfaction (1–5 scale)
Male	–0.054*** [0.020]
Middle school	0.028 [0.024]
High school	0.129*** [0.041]
College	0.237*** [0.089]
Unemployed	–0.469*** [0.027]
Retired	0.076*** [0.025]
<i>Own income (yuan)</i>	
3001–5000	0.205*** [0.032]
5001–8000	0.320*** [0.054]
> 8001	0.327*** [0.050]
<i>Previous year income (yuan)</i>	
3001–5000	–0.025 [0.144]
5001–8000	–0.648** [0.293]
> 8000	0.281 [0.254]
<i>Reference income (yuan)</i>	
3001–5000	–0.108*** [0.033]
5001–8000	–0.177** [0.086]
> 8000	–0.062 [0.176]
2-year age dummies	Included
1-year cohort dummies	Included
City dummies	Included
Year dummies	Included
R squared	0.1029
N	18,139

The omitted base categories are: female, less than middle school education, employed, and for all income categories less than or equal than 3000 yuan. The table includes all data from 2002 to 2012

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3 Contribution of the change in variable values to the life satisfaction increase between 2002 and 2012

Variables	$\overline{\Delta LS} = 0.292$	
	Δx	Contribution (%)
Male	0.03	-0.6** ($p = 0.0345$)
Education		4.5** ($p = 0.0277$)
Middle school	-0.05	-0.4
High school	0.01	0.5
College	0.05	4.4
Employment status		29.0*** ($p = 0.0000$)
Unemployed	-0.20	31.5
Retired	-0.09	-2.5
Income		-55.4 ($p = 0.4695$)
Own income		
3001–5000	0.12	8.4
5001–8000	0.40	44.4
> 8000	0.18	20.4
Previous income		
3001–5000	0.21	-1.9
5001–8000	0.39	-86.5
> 8000	0.15	14.0
Reference income		
3001–5000	0.24	-9.0
5001–8000	0.74	-44.9
> 8000	0.02	-0.4
Age		-10.5 ($p = 0.1586$)
Cohort		66.4 ($p = 0.1570$)
City		9.4** ($p = 0.0478$)
Year		57.0 ($p = 0.4501$)

Bolded numbers indicate whole contribution of variable categories

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

and life satisfaction is negative, but not significant and also smaller in magnitude than the relationships identified for reference income between 3001 and 8000 yuan.

The incongruent relationship identified for the > 8000 yuan previous year and reference income are most likely due to small sample size. Only 5.9% of the sample had a previous year income of > 8000 yuan, and only 0.25% of the sample had reference income > 8000 yuan. Due to the small sample size fitting into either of these categories, the incongruent relationship is unlikely to significantly affect our results during the decomposition in step two.

The right column of Table 3 shows the contribution of the change in variable values to the life satisfaction increase between 2002 and 2012. The center column shows the change in the average variable value. The contribution of one variable may involve the contribution of more than one dummy. The sum of all dummies within every such variable is contribution of the variable as a whole. For example, the contribution of changing employment status as a whole is the sum of the contribution from both employment status dummies. Table 3 lists the contribution of variables as a whole in bold. The bolded contribution is

followed by p values which represent the statistical significance of the contribution of the variable as a whole.¹⁴

From 2002 to 2012, life satisfaction increased 0.292 points on a 5-point scale. The change in employment status, the largest statistically significant variable, contributed to 29.0% of the increase in life satisfaction primarily due to the large decrease on the number of people unemployed (-0.20). One might be skeptical about such a dramatic drop in unemployment, but two things must be kept in mind. First, peak levels of unemployment are observed around 2000–2002 in urban China in other datasets, thereafter a sharp decrease in unemployment rate was recorded (Knight and Xue 2006; OECD 2010; Gustafsson and Ding 2013). Both Knight and Xue (2006) and Gustafsson and Ding (2013) report peak unemployment levels just under 12%. Secondly, the definition of unemployed used in this analysis includes discouraged workers and therefore will count more people as unemployed than the common definition.

Previous studies from the subjective well-being literature support our finding that change in unemployment status is a large and significant contributor to the change in life satisfaction between 2002 and 2012. Unemployment is consistently found to have a substantial negative impact on subjective well-being at an aggregate level (Di Tella et al. 2003; Wolfers 2003), and studies show people don't adapt to being unemployed (Lucas et al. 2004). In fact, there is even reason to think the contribution of employment status change is a lower bound estimate. High unemployment rate is commonly found to have negative spillover effects for those who remain employed (Di Tella et al. 2003; Wolfers 2003; Arampatzi et al. 2015), presumably because people who remain employed worry about losing their job in times of high unemployment. The analysis in this paper only estimates the individual effects of unemployment, so the spillover effects of the decrease in the unemployment rate on employed people is not accounted for in the percent contribution of change in employment status.

Change in population distribution between cities explains a statistically significant 9.4% increase in life satisfaction between 2002 and 2012, which implies that the population shares of happier cities have been rising. The increasing level of education in the urban population accounted for a statistically significant 4.5% increase in life satisfaction over time.

Change in own income is positively related to the increase in life satisfaction, but the overall contribution of income turns negative and statistically insignificant once previous income and reference income are taken into account. While the finding that increasing incomes did not significantly contribute to the increase in life satisfaction might shock some, our result is consistent with findings on financial dissatisfaction from previous studies. Both Brockmann et al. (2009) and Bartolini and Sarracino (2015) find that financial dissatisfaction increased in urban China during rapid income growth after 1990. Also, our finding that changes in income are not related to the changes of subjective well-being are consistent with the U-shaped pattern of subjective well-being in urban China since 1990 (Easterlin et al. 2012, 2017) and the finding that globally, long run changes in income are not related to long run changes in subjective well-being (Easterlin et al. 2010).

The effect of birth cohort change in our sample is large, 66.4%, but insignificant. Significance is difficult to interpret in this case because we control for both age and year along with birth cohort. Because these three variables are highly correlated, the standard errors

¹⁴ "Appendix 3" details how p values were calculated.

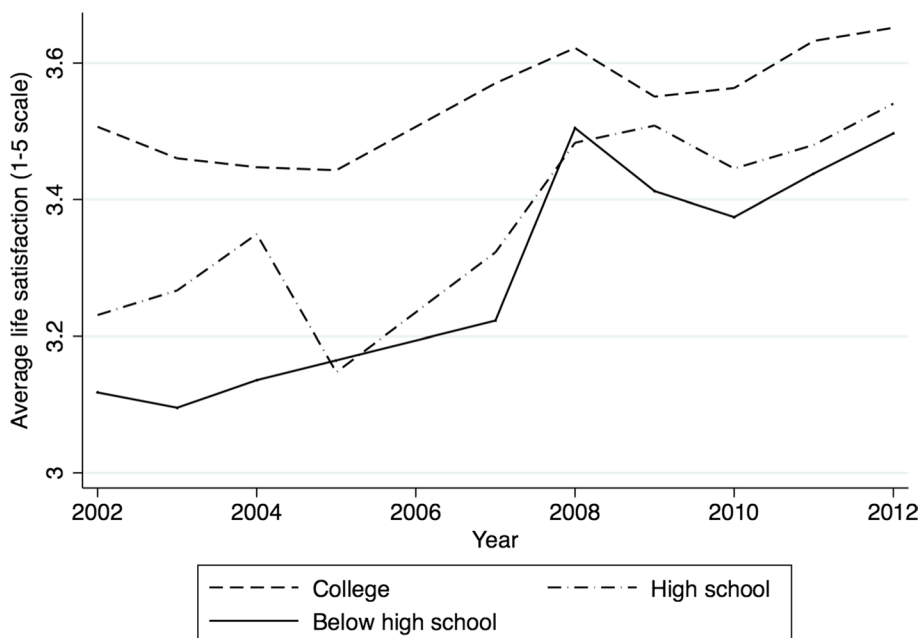


Fig. 2 Life satisfaction patterns by level of education from 2002 to 2012

on the estimated relationship between life satisfaction and cohort, year, and age are large. Because of the large standard errors, we lack the statistical power to gain a statistically significant result or accurate estimate for the contribution of cohort change. Keeping these statistical limitations in mind, the size of the contribution of cohort change implies a large part of the increase in life satisfaction between 2002 and 2012 is potentially explained by older cohorts exiting our sample.

Finally, the large percent contribution of year indicates that the variables included in our model only can explain a portion of the increase in life satisfaction between 2002 and 2012. As mentioned previously, the contribution of year will reflect the change in life satisfaction that is unexplained by changes in other explanatory variables. Due to the vast changes occurring in urban China during this time, and our limited number of variables, we expect that our model cannot completely explain the change in life satisfaction during this period.

The population is also divided by level of education, people with a college education and people without a college education, and the analysis is repeated. This division by having or not having a college education is motivated by vastly different life satisfaction experience of groups with different levels of education from 2002 to 2012, as illustrated by Fig. 2. The less educated segments of the population, people with less than a college degree, were worse off initially, but recovered to a point closer to the college educated segment of the population by 2012. The analysis divided by level of education will address the question, are the trends in life satisfaction for the more and less educated driven by the same factors?

Although the primary focus of this study is the analysis of trends between 2002 and 2012, the initial starting point of these three groups in 1990 is also of considerable importance. In 1990, before the transition started, life satisfaction levels were evenly distributed

Table 4 Contribution of the change in variable values to the life satisfaction increase between 2002 and 2012, by level of education

Variables	High school or below $\overline{\Delta LS} = 0.347$		College $\overline{\Delta LS} = 0.125$	
	Δx	%	Δx	%
Male	0.04	-0.6* ($p=0.08$)	0.00	0.2* ($p=0.09$)
Education		2.6*** ($p=0.00$)		
Middle school	-0.04	-0.4		
High school	0.07	3.0		
Employment status		33.3*** ($p=0.00$)		8.1 ($p=0.11$)
Unemployed	-0.25	35.2	-0.04	10.2
Retired	-0.10	-1.9	-0.07	-2.1
Income		-77.9 ($p=0.29$)		117.0 ($p=0.51$)
Own income				
3001–5000	0.22	14.0	-0.11	-13.5
5001–8000	0.43	41.5	0.33	75.7
> 8000	0.12	10.2	0.30	82.2
Previous income				
3001–5000	0.31	-22.2	0.00	0.0
5001–8000	0.39	-65.5	0.39	-162.0
> 8000	0.10	-4.6	0.23	167.5
Comparison group income				
3001–5000	0.32	-12.0	0.08	-1.7
5001–8000	0.67	-39.6	0.88	-29.6
> 8000	0.01	0.3	0.03	-1.6
Age		-3.4*** ($p=0.01$)		-3.0 ($p=0.93$)
Cohort		64.8 ($p=0.23$)		52.3 ($p=0.76$)
City		14.0*** ($p=0.00$)		4.7 ($p=0.14$)
Year		67.3 ($p=0.29$)		-79.3 ($p=0.76$)

Bolded numbers indicate whole contribution of variable categories

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

throughout the population and the average satisfaction level was higher than in 2012 (WVS 2014). If the starting points of these different education groups are viewed in terms of the transition as a whole, it is clear the less educated segments of the population suffered greatest during the initial phases of the transition from the early 1990 to 2002.

Table 4 displays the results of the primary analysis divided by level of education. All the results in Table 4 were calculated the same way as the results in Table 3. The linear regression results used to calculate the percent contributions are located in Table 6 in the “Appendix 1”. Comparing the percent contribution to increase in life satisfaction of changing employment status between the two groups, the results show that changing employment status is a relatively more important contributor for people with less than a college education. This is due to two factors. First, the linear regression results of Table 6 show the negative association

Table 5 Robustness to reference income and previous year income generation method

Panel	[A]		[B]		[C]		[D]	
	%	<i>p</i> value	%	<i>p</i> value	%	<i>p</i> value	%	<i>p</i> value
Male	-0.6**	0.0345	-0.5**	0.0313	-0.5**	0.0290	-0.6*	0.0506
Education	4.5**	0.0277	6.8***	0.0075	7.2**	0.0130	3.9**	0.0122
Employment status	29.0***	0.0000	29.0***	0.0000	29.2***	0.0000	29.1***	0.0000
Income	-55.4	0.4695	-112.8	0.1252	-131.6	0.1229	-24.6	0.6913
Age	-10.5	0.1586	-9.6	0.2035	-9.6	0.1927	-10.8	0.1614
Cohort	66.4	0.1570	61.7	0.1903	60.4	0.1831	70.2	0.1561
City	9.4**	0.0478	10.4	0.5352	10.6	0.3185	9.2	0.2920
Year	57.0	0.4501	115.0	0.1348	134.3	0.1566	23.5	0.6310

Panel	Previous income	Reference income
[A]	Ordered logit prediction	Cell median
[B]	Cell median	Ordered logit prediction
[C]	Ordered logit prediction	Ordered logit prediction
[D]	Cell median	Cell median

Method of reference income and previous year income generation by panel

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

between being unemployed and life satisfaction is larger for people with less than a college education. Second, the decrease in people reporting they were unemployed was much greater for the lesser educated.

Changes in income were not significantly related to changes in life satisfaction for either group. While these results should be interpreted cautiously due to the lack of statistical significance, it is of interest that the percent contribution estimate for people with less than a college degree is large and negative, and for people with a college degree the estimate is large and positive. These results may indicate that increasing incomes have some benefit for the richer people in society, but come at a cost to the poorer members of society.

6 Robustness Checks: Reference and Previous Year Income

One of the most important findings from our analysis is that the effects of income comparison and habituation offset any positive effects of personal income increases on life satisfaction from 2002 and 2012. It is important to verify that this finding, and our other findings, are robust to different methods of generating income comparison and reference income variables. As mentioned in the Variables Sect. 3.2, there are two different methods for generating comparison and previous year income of a respondent—median income of observations in the same category defined by characteristics, and ordered logit prediction based on characteristics. Our primary analysis uses the category method for reference income, and the ordered logit method for previous year income. To test if our results from the primary analysis are robust to our choice of methods, we re-did the analysis defining

reference income and previous year income in all possible combinations. This robustness check provides three more decompositions to compare to our primary results. The three additional decompositions are presented in Table 5. Panel A in Table 5 presents the results from the primary analysis. Panels B, C, and D present the results for all other reference and previous year income variable generation method combinations. The percent contribution for variable categories as a whole are presented for each combination. In all alternative combinations, the contribution of income changes between 2002 and 2012 are negative and statistically insignificant. Furthermore, the percent contribution of employment status ranges from 29.0 to 29.2% and remains highly statistically significant throughout all combinations. We therefore conclude that our primary results on the contribution of income changes and employment status changes are robust to how reference and previous year income are defined.

7 Conclusion and Limitations

This study has two main findings. First, improving labor market conditions, indicated by the drop in number of unemployed people, contributed most to the increasing life satisfaction in urban China from 2002 to 2012. This is primarily due to the segments of the population that had the largest increase in life satisfaction during this time—the people with less than a college degree—greatly reducing their levels of unemployment. Second, when income comparison and habituation are accounted for, increasing incomes did not significantly contribute to the increase in life satisfaction. Although this finding might sound shocking to some because of the rapid income growth during this period, it is consistent with rising financial dissatisfaction in China found by other studies (Brockmann et al. 2009; Bartolini and Sarracino 2015) and the finding that worldwide, long run growth in income is not related to increasing subjective well-being (Easterlin et al. 2010).

The time period this analysis covers is a middle segment of a larger transition towards a capitalist economy that still continues through the 2010s. It is important to frame the results from this analysis in a historical context in order to draw the correct conclusions from this study.

The starting point of this analysis occurs after the first phase of the transition away from a communist system, the massive downsizing and diminishing of the state-owned enterprises and the creation of a labor market in urban China (Knight and Song 2005). The rapid reduction of the urban labor force employed by state owned enterprises combined with the troubles of transitioning to a market to allocate labor resulted in high unemployment (Gustafsson and Ding 2013; OECD 2010) and low life satisfaction in the early 2000s compared to 1990 (Easterlin et al. 2012, 2017; Bartolini and Sarracino 2015). The period thereafter, which this study covers, was a time of labor market and life satisfaction recovery. The results for this analysis should therefore not be viewed as potential ways to make the urban Chinese population happier, but instead as a reflection of what is important in people's lives as they recover from the adjustment pains of a large and rapid transition.

While the labor market was improving during the years of this study, this trend will not necessarily continue in the near future. China is currently continuing to liberalize its

labor market by relaxing internal migration restrictions. In 2013, the Chinese government announced their goal is to move 100 million more people into cities by 2020 (OECD 2015). The government plans to accomplish their goal by encouraging rural, less educated, people to move to cities—exactly the people who are most vulnerable during times of transition. In 2003, the only year we have respondent hukou status¹⁵ and during the start of the life satisfaction recovery, our data show that rural hukou holders are indeed less educated than urban hukou holders and also have lower levels of life satisfaction. If migration to the cities results in a surplus of low skill labor, a drop in urban life satisfaction is likely as the rural migrants may face larger risks of being unemployed. Furthermore, a large increase in supply of low skill labor from outside the city may negatively affect the job prospects of low skill workers who currently are urban residents. If the goal of the government is to safeguard the well-being of its entire population over the upcoming years, much attention should be directed towards ways of ensuring lesser educated segments of the population in urban China can find jobs in cities.

There are a few limitations of this study that need to be considered when interpreting our findings and conclusions. This study is limited by the scope of our data. First, our dataset does not stretch back to the early 1990s and therefore it is impossible for us to explore the determinants of life satisfaction over the entire transition. Our conclusion would be strengthened if micro-level evidence supports the idea that rising unemployment in the 1990s explains a large portion of the decrease in life satisfaction during that period. Unfortunately, we did not find any dataset that allowed us to test this hypothesis. Second, variables for family life and health are missing in the data. Although individual characteristics are included to make up for the missing variables, it will be helpful for further studies to check the robustness of our results by directly controlling for family life and health domains.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

¹⁵ Hukou status reflects if a person is registered as an urban or rural resident. People residing in urban areas with rural hukou status are migrants from rural areas in China.

Appendix 1

See Table 6.

Table 6 OLS regression results of life satisfaction equation, by level of education

	Dependent variables: life satisfaction	
	High school or below	College
Male	-0.052** [0.025]	-0.057** [0.028]
Middle school	0.039* [0.022]	
High school	0.160*** [0.036]	
Unemployed	-0.481*** [0.031]	-0.348*** [0.023]
Retired	0.067*** [0.024]	0.039 [0.082]
<i>Own income (yuan)</i>		
3001–5000	0.224*** [0.033]	0.154*** [0.052]
5001–8000	0.333*** [0.067]	0.285*** [0.062]
> 8000	0.293*** [0.038]	0.340*** [0.070]
<i>Previous income (yuan)</i>		
3001–5000	-0.252** [0.100]	0.610*** [0.178]
5001–8000	-0.589 [0.484]	-0.520 [0.347]
> 8001	-0.154 [0.514]	0.902*** [0.275]
<i>Reference income (yuan)</i>		
3001–5000	-0.130*** [0.044]	-0.026 [0.049]
5001–8000	-0.206* [0.107]	-0.042 [0.058]
> 8000	0.116 [0.130]	-0.057 [0.111]
2-year age dummies	Included	Included
1-year cohort dummies	Included	Included
City dummies	Included	Included
Year dummies	Included	Included
R squared	0.1091	0.0692
N	12,968	5171

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix 2: Equivalence of Oaxaca Decomposition and This Paper’s Approach

The specification of the pooled cross-sectional regression used in the paper is

$$\widehat{LS}_{i,t} = x_{i,t}\widehat{\beta} = z_{i,t}\widehat{\gamma} + \sum_{t=2001}^{2012} d_t\widehat{\delta}_t, \tag{4}$$

where d_t is a dummy for year t .

To implement Oaxaca decomposition, we run regressions for the years of 2002 and 2012, respectively, based on the same specification as in Eq. (4). Then, we have

$$\begin{aligned} \widehat{LS}_{i,2002} &= z_{i,2002}\widehat{\gamma}_{2002} + \widehat{\alpha}_{2002}, \\ \widehat{LS}_{i,2012} &= z_{i,2012}\widehat{\gamma}_{2012} + \widehat{\alpha}_{2012}, \end{aligned} \tag{5}$$

where $\widehat{\alpha}$ is the estimate of constant.

Then, the Oaxaca decomposition can be expressed as

$$\begin{aligned} \Delta\overline{LS} &= \overline{LS}_{2012} - \overline{LS}_{2002} = \bar{z}_{2012}\widehat{\gamma}_{2012} - \bar{z}_{2002}\widehat{\gamma}_{2002} + (\widehat{\alpha}_{2012} - \widehat{\alpha}_{2002}) \\ &= (\bar{z}_{2012} - \bar{z}_{2002})\widehat{\gamma}_{2012} + \bar{z}_{2002}(\widehat{\gamma}_{2012} - \widehat{\gamma}_{2002}) + (\widehat{\alpha}_{2012} - \widehat{\alpha}_{2002}) \\ &= (\bar{z}_{2012} - \bar{z}_{2002})\widehat{\gamma}_{2002} + \bar{z}_{2012}(\widehat{\gamma}_{2012} - \widehat{\gamma}_{2002}) + (\widehat{\alpha}_{2012} - \widehat{\alpha}_{2002}) \\ &= (\bar{z}_{2012} - \bar{z}_{2002})\widehat{\gamma} + \bar{z}_{2002}(\widehat{\gamma} - \widehat{\gamma}_{2002}) + \bar{z}_{2012}(\widehat{\gamma}_{2012} - \widehat{\gamma}) + (\widehat{\alpha}_{2012} - \widehat{\alpha}_{2002}) \end{aligned} \tag{6}$$

where the second and third lines of Eq. (6) represent the Oaxaca decomposition with different base years, and the last line is an improved version of Oaxaca decomposition which avoids the issue of double base years. We assume $\widehat{\gamma}$ is obtained from Eq. (4).

According to Eq. (4),

$$\Delta\overline{LS} = \overline{LS}_{2012} - \overline{LS}_{2002} = (\bar{z}_{2012} - \bar{z}_{2002})\widehat{\gamma} + (\widehat{\delta}_{2012} - \widehat{\delta}_{2002}), \tag{7}$$

By comparing Eqs. (6) and (7), we can find that, the contribution of survey year dummies in (7), $\widehat{\delta}_{2012} - \widehat{\delta}_{2002}$, is equivalent to the contribution of the regression coefficients in (6), and the rest parts, the contribution of the change in the values of variables are identical between (6) and (7).

The shortcoming of the approach in the paper compared to Oaxaca decomposition is that the former cannot distinguish the contribution of the change in *each* regression coefficient. However, the former could be acceptable if the total contribution of regression coefficients is relatively small, which is the case in the paper, or the study cares more about the contribution of the change in variable values.

Appendix 3: Calculation of p Values Reported in Tables 3 and 4

The p value of the percent contribution of variable x_k is derived from the following test.

H_0 percent contribution of $x_k = 0$.

HI percent contribution of x_k is not 0.

As the contribution of x_k is calculated from $c_k = \frac{(\bar{x}_{k,2012} - \bar{x}_{k,2002})\hat{\beta}_k}{\Delta\bar{L}S} \times 100\%$, it is equivalent to test if $\hat{\beta}_k$ is 0, conditional on the changes in life satisfaction ($\Delta\bar{L}S$) and in explanatory variables ($\bar{x}_{k,2012} - \bar{x}_{k,2002}$), or treating the two as constant.

If the percent contribution is calculated from the summation of many c_k (e.g., the percent contribution of age is equal to the summation of contributions of each age dummy), i.e., $\sum c_k = \frac{\sum(\bar{x}_{k,2012} - \bar{x}_{k,2002})\hat{\beta}_k}{\Delta\bar{L}S} \times 100\%$, then the p value is from the test whether $\sum(\bar{x}_{k,2012} - \bar{x}_{k,2002})\hat{\beta}_k$ is 0, assuming $\Delta\bar{L}S$ and each $(\bar{x}_{k,2012} - \bar{x}_{k,2002})$ are constant (or conditional on them).

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