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. In the interest of protecting the life satisfaction of those most vulnerable, increased 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 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. The domain that is associated with the largest segment of the increase in life satisfaction is employment status.

Key words: Life satisfaction, Urban China, Labor market, transition

JEL codes: I31, J64, P20

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I. Introduction

The aim of this paper is to decompose the change in life satisfaction in urban China from 2002 to 2012 into segments related to changes in various life circumstances and to identify which parts of the population are most vulnerable during this time of transition from socialism to capitalism.

Life satisfaction is measured as self-reported responses to a survey question about how satisfied respondents are with their lives. Life satisfaction, and similar subjective measures of well-being (which have proven to be reliable and meaningful according to Stiglitz, Sen, Fitoussi 2009), describe a vastly different trend of well-being in urban China than one might expect by looking at income. Since reforms in the 1990s were implemented to transform urban China's economy from a socialist to capitalist system, while incomes skyrocketed for practically the entire urban population (Cai et al 2010), subjective well-being followed a U-shaped pattern bottoming out just after 2000 and in 2010 recovering to a point lower than in 1990 (Easterlin et al 2012). It is clear from this experience that simply increasing income does not ensure increasing well-being – other circumstances that changed in people's lives during this time must be more closely related to life satisfaction.

The studies that exist on the topic of subjective well-being in urban China are either cross-sectional (Chen and Davey 2008) or focus primarily on identifying trends at the macro level (Easterlin et al 2012, Brockmann et al 2009, Khaneman and Krueger 2006, Burkholder 2005, Crabtree and Wu 2011). Due to data limitations, the underlying mechanisms related to the trends remain largely unexplored. This study aims to fill this gap.

Specifically, the aim is to describe what variables changed along with life satisfaction from 2002 to 2012 and to give structure to the relationship between life satisfaction and the other variables over this entire period. The urban population as a whole is considered as well as with the population divided by level of education to identify the varying experiences of different segments of the population. A coherent explanation of the increase in life satisfaction is assembled using the established structure from the analysis along with knowledge from the field of subjective well-being research and historical context.

This study finds the strength of the labor market is chiefly responsible for the long term increase in life satisfaction from 2002 to 2012, especially for the segments of the population most vulnerable to the negative effects of the transition – people with less than a college education. The final conclusion of the study is, if China wants to ensure well-being is not damaged as internal migration restrictions are relaxed in the future, attention must be paid to ensuring the labor market remains strong in urban China.

2. Data

The data used in this analysis is from the Horizon Research Consultancy Group. The survey is in the form of yearly repeated cross sections. A multi-stage random sampling method was used to gather the data and sample weights are used in the analysis to assure the data are representative of the population within the characteristics of our sample.

2.1 Data Representativeness

The complete Horizon dataset is in the form of repeated cross sections spanning 2000-2012 and covers both urban and rural China. For this study's analysis, data must be gathered from an urban population that is comparable across years. To achieve this, certain segments of the dataset are omitted from the analysis. Because the focus this analysis is urban China, the rural data are dropped. In urban areas, Horizon surveyed twenty different cities from 2000-2012, but the coverage of these cities varied from year to year. Seven cities, however, were surveyed together frequently throughout this time 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 two 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.

After dropping these categories, the remaining data span 2001 to 2005 and 2007 to 2011 and are representative of people aged 18 to 60 in the following seven cities: Beijing, Shanghai, Guangzhou, Wuhan, Shenyang, Xi'an, and Chengdu. There are just under 2,000 observations each year.

2.2 Variables

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 though 1, with 5 representing very satisfied and 1 representing very unsatisfied. Neutral is an option and is coded 3. The trend in life satisfaction is illustrated by Figure 3.1.

Figure 3.1 Average life satisfaction in urban China from 2002-2012
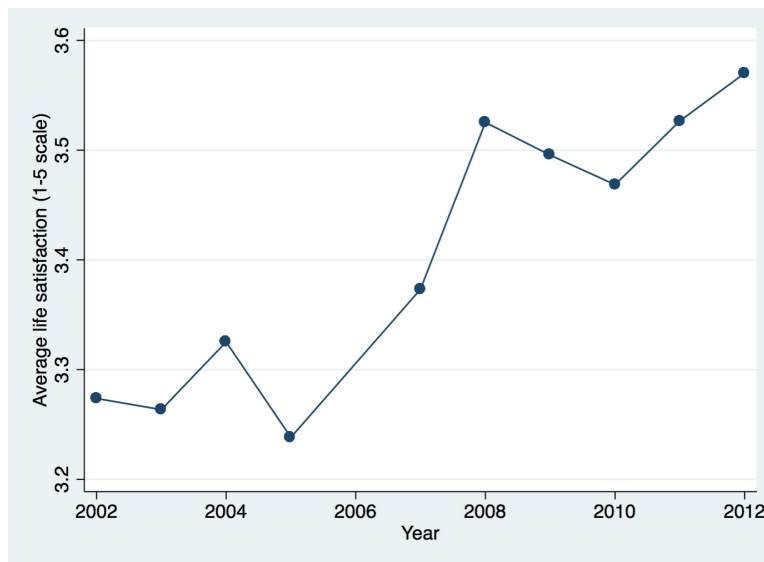
The explanatory variables included in the analysis measure income, employment status, level of education, gender, cohort, age, year, and city. These variables are by no means the only variables that are related to life satisfaction over this time period. But, when studying the average experience of millions of people, subtlety must be lost in the interest of seeing the bigger picture. The strength of

these variables together is they cover a wide range of life circumstances that, a priori, are closely related to life satisfaction during this period.

Income is commonly related to life satisfaction over time in the short run (Easterlin et al 2010). Furthermore, the rise in income in urban China over this time period is staggering: an at least doubling of per capita income occurred in urban China over this time period. In this analysis, income is measured as the categorical response to a household monthly income question. The categories are: 3,000 yuan or less, 3,001-5,000 yuan, 5,001-8,000 yuan, and more than 8,000 yuan. To ensure the categories are the same across all years, the income categories are all nominal values. Although controlling for real income is ideal, relative income variables are also included in the analysis and serve a secondary purpose of partially controlling for real income changes.

To account for the raising aspirations of respondents due to the rising income of a comparison group over time (Vendrik 2013, Clark et al 2008), a comparison group income variable is generated from the data. Comparison group income is defined as the median income category of a respondent's comparison group. A respondent's comparison group is all other people inhabiting the same city as the respondent choosing a different income response category as the respondent.

People also habituate to their own level of income (Ditella et al 2010, Vendrik 2013, Clark et al 2008). To account for habituation effects, an approximate previous year income variable is created. Because the dataset used in this study does not have a previous year income variable for each respondent, the previous year of income is defined as the median income response of a comparable group of

individuals. Specifically, 56 groups of people were created based on five individual

characteristics: city, level of education, cohort, and gender. In each year, all

respondent are assigned to one of the 56 groups. For each respondent, previous

year income is the median level of income of their group in the previous year. The

response >8000 for previous year of income was combined with the 5000-8000

category because so few groups had a median income over 8000 RMB. The

remaining categories for previous year median group income are: <3000, 3000-

5000, and >5000. Because 2006 is missing, 2005 is counted as the previous year for

respondents from 2007.

The analysis of macro-level trends provides strong evidence that the quality

of the labor market largely shaped the pattern of life satisfaction in urban China

since the early 1990s (Easterlin et al 2012). In this analysis, the quality of the labor

market is measured by employment status. Employment status is divided into four

categories: employed, unemployed, retired, and student. Employed is broadly

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. Unemployed is also

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, the broad

definition most likely better reflects the condition of the labor market during this

time because in the early 2000's there were many discouraged workers in urban

China (Cai et al 2008, Knight and Xue 2007, Lu and Gao 2011, Lu and Gao 2011).

In the experience of the European transition countries, older generations

typically faired worse than younger generations after the fall of the USSR (Easterlin

2010). Given the parallels seen in the pattern of life satisfaction during the Chinese

transition to capitalism, older cohorts may have also suffered in China.

Furthermore, Wang and Zhou (2014) find that urban Chinese who would be

classified as belonging to 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 account for especially because the age cutoff in the sample is

60 every year; the increase in life satisfaction could be largely explained by older,

less satisfied cohorts leaving the sample by 2012. Cohort is controlled for by one-

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 five-year age

group dummies to break the age, period, cohort control collinearity problem. City,

education level, and sex dummies are also included in the analysis as controls.

3. Methodology

The general analysis is divided into two steps. First, the relationship

between life satisfaction and explanatory variables is established by a 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 decomposed into portions related to the change in each explanatory variable.

The available data and the unwillingness of the authors to make absurd assumptions prohibit this statistical analysis from having causal interpretations. Instead of focusing on precisely identifying a small effect, the aim is to broadly describe a massive phenomenon for which there is currently little descriptive knowledge.

3.1 Methodological details

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

$$\widehat{LS}_{i,t} = \boldsymbol{x}_{i,t}\widehat{\boldsymbol{\beta}}, \tag{3.1}$$

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

In the second step of the analysis, the parameter estimates from the linear regression are used to decompose the change in life satisfaction from 2002 to 2012. According to equation (3.1), the average life satisfaction of year t, $\overline{LS}_t$, can be expressed as

$$\overline{LS}_t = \overline{\widehat{LS}}_t = \overline{\boldsymbol{x}}_t\widehat{\boldsymbol{\beta}} = \sum_{k=1}^{K} \bar{x}_{k,t}\hat{\beta}_k, \tag{3.2}$$

where the first equality holds because the survey year variables in the linear

regressions are in the form of year dummies.[1] The year dummies absorb any year to

year effects that are not captured by the other control variables.

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

$$c_k = \frac{(\bar{x}_{k,2012} - \bar{x}_{k,2002})\widehat{\beta}_k}{\Delta \overline{LS}} \times 100\%. \tag{3.3}$$

It's easy to check that $\sum_{k=1}^{K} c_k = 100\%$.

This method is essentially an Oaxaca decomposition modified to take

advantage of yearly data (see Appendix A.2). 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.

The primary statistic of interest, the percent contribution of the change in a

variable, c_k, should be interpreted as the percent of the change in life satisfaction

that can be attributed to a change in explanatory variable k under the assumption

that the relationship between the explanatory variable k and life satisfaction does

not change over time.

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[1] In the pooled cross-sectional regression $\widehat{LS}_{i,t} = x_{i,t}\widehat{\beta} = z_{i,t}\widehat{\gamma} + \sum_{t=2001}^{2012} d_t \widehat{\delta}_t$, where d_t is a dummy for year t, $\widehat{\delta}_t$ will be chosen, according to linear regression theories, such that $\overline{\widehat{LS}}_t = \overline{LS}_t$ for each t.

4. Results and Discussion

4.1 Contribution of the change in variable values to the life satisfaction increase

between 2002 and 2012

Of the variables that are included in this analysis, the change in employment status from 2002 and 2012 contributed most to the increase in life satisfaction during this time. The large decrease in the number of people unemployed is chiefly responsible for the high contribution of change in employment status indicating the improving strength of the labor market was closely related to the increase in life satisfaction. Income is also related to the increase in life satisfaction, but to a lesser extent. Because of some assumptions of the analysis conflict with established findings in the subjective well-being literature, the contribution of changing income should be thought of as an upper bound estimate.

Table 4.1 Contribution of the change in variable values to the life satisfaction

increase between 2002 and 2012

Variables	Δx	$\Delta \overline{LS} = 0.267$ Contribution (%)
Male	0.033	**-0.7**
Education		**3.1**
middle school	-0.041	-0.2
high school	0.018	0.6
college	0.044	2.7
Employment status		**29.7**
unemployed	-0.182	32.1
student	-0.052	-0.7
retired	-0.088	-1.7
Income		**14.7**
Own income		
3,001-5,000	0.115	5.2
5,001-8,000	0.406	32.6
> 8,000	0.185	12.3
Previous income		
3,001-5,000	0.356	-14.7
> 5,001	0.644	-23.8
Comparison group income		
3,001-5,000	-0.493	10.7
5,001-8,000	0.510	-13.8
> 8,000	0.196	-16.0
Age		**-3.4**
Cohort		**8.3**
City		**8.3**
Year		**39.9**

The right column of Table 4.1 shows the contribution of the change in

variable values to the life satisfaction increase between 2002 and 2012 and the

center column shows the change in the average variable value. The regression used

to compute the percent contribution is included in the appendix (Table A-1). 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 comes from the sum of the contribution of three employment status dummies. Table 4.2 segments the variables involving multiple dummies with horizontal lines and lists the contribution of variables as a whole in bold.

From 2002 to 2012, life satisfaction increased 0.267 points on a 5 point scale. The changes in sex, education levels, and age contributed minimally to this increase. This was not because sex, education, and age are not significantly related to life satisfaction, but because the education levels and sex ratio in urban China did not change much during this period.

The change in employment status contributed to 27.9% of the increase in life satisfaction primarily due to the decrease on the number of people unemployed – an 18.2 percent change. 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 2002 in urban china in other datasets, thereafter a sharp decrease in unemployment rate was recorded (OECD 2010, Gustafsson and Ding 2011). Secondly, the definition of unemployed used in this analysis is much more broad than the traditional definition and therefore will count more people as unemployed.

Previous studies from the subjective well-being literature support the finding that change in unemployment status is important. Unemployment is consistently found to have a substantial negative impact on subjective well-being (Ditella et al. 2003, Wolfers 2003, Arampatzi et al. 2014, Carr and Chung 2014), 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 (Ditella et al 2003, Bjornskov 2012, Wolfers 2003), presumably because people who remain employed worry about loosing their job in times of high unemployment. The analysis in this paper only factors in the individual effects of unemployment so the positive effects of the decrease in the unemployment rate on employed people is not counted in the percent contribution of change in employment status.

Increasing income is found to contribute to 14.7% of the increase in life satisfaction after factoring in the negative association of rising comparison group and previous year income. Findings from the subjective well-being literature and consideration of the assumptions implicit in this study's methodology need to be considered before interpreting the percent contribution of income result.   It should be kept in mind the methodology implicitly assumes that there is no change in the relationship between life satisfaction and income over this time period. Many studies find the opposite; they show that the relationship between level of income and life satisfaction changes as incomes grow over time. This occurs primarily through two channels. First, as the income of a comparison group grows, aspirations increase due to social comparison and individuals are less satisfied with the same level of income (Vendrik 2013, Clark et al 2008). Second, habituation to higher levels of consumption due to higher income also occurs (Ditella et al 2010, Vendrik 2013, Clark et al 2008). The comparison group income variable and previous year income of a comparable group variable are included in this analysis to

address these two issues. But due to data limitations, both of these control variables are very rough and therefore it should not be assumed that these two variables completely control for comparison and habituation effects.

Neither of these arguments proves income did not play a role in the change in life satisfaction from 2002 onwards. In the short run, income is commonly found to be related the changes in subjective well-being (Easterlin et al 2010). The issue at hand here is to what degree. The evidence from outside this study provides reason to think of the percent contribution of income as an upper bound estimate.

The largest percent contribution is by the year variable. Because of the way the year dummies are included in the model, the interpretation of this variable is the contribution of all variables not included as controls in the model. During a time of such tremendous change in policy, culture, environment, health, preferences etc, it is no surprise that the control variables in our model are not explaining a large part of the change in life satisfaction from 2002 to 2012.

4.2 Analysis by education level

The population is also divided by level of education and the analysis is repeated. This division is motivated by vastly different experience of groups with different levels of education from 2001 to 2012, as illustrated by Figure 4.1. The less educated segments of the population were worse off initially, but recovered to a point closer to the college educated segment of the population by 2012.

Figure 4.1 Life satisfaction patterns by level of education from 2001 to 2012
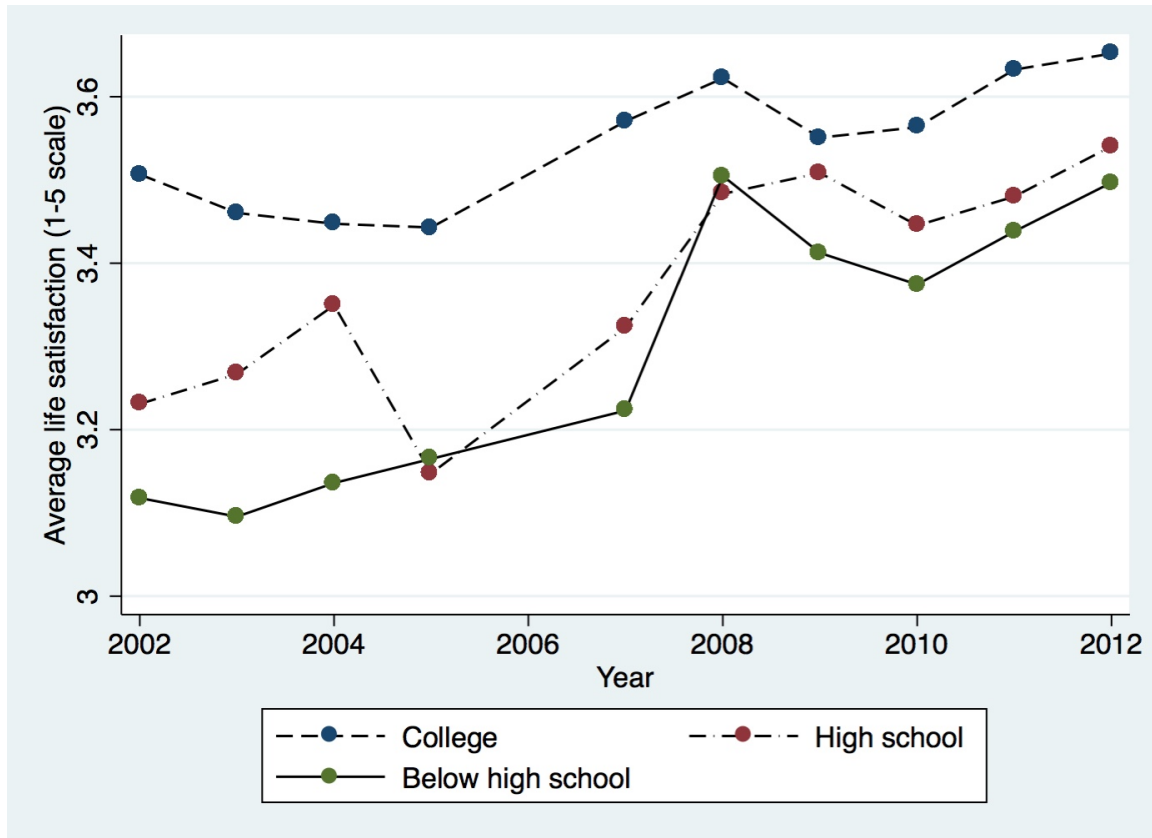
Although the primary focus of this study is the analysis of trends, the initial

starting point of these three groups is also of considerable interest. In 1990, before

the transition started and also the year the first available life satisfaction data in

urban China are available, life satisfaction levels were evenly distributed 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 1990s to

2001. This is despite the fact that almost all people in urban China were materially

better off in the early 2000s compared to the early 1990's (Cai et al 2010). The

experience of the less educated segments of the population clearly shows yet again

that relying on increasing incomes alone is not enough to protect well-being, even

for the least materially rich people in the population.

Table 4.2 Contribution of the change in variable values to the life satisfaction

increase between 2002 and 2012, by education levels

Variables	Below high school, $\Delta\overline{LS} = 0.420$		High school, $\Delta\overline{LS} = 0.267$		College, $\Delta\overline{LS} = 0.102$	
	Δx	%	Δx	%	Δx	%
Male	0.063	**-0.7**	0.031	**-0.6**	-0.001	**0.0**
Middle school	0.063	**0.4**				
Employment status		**34.3**		**33.5**		**1.7**
unemployed	-0.317	36.4	-0.193	35.1	-0.030	10.0
student	-0.003	0.0	-0.050	-0.6	-0.109	-5.8
retired	-0.158	-2.1	-0.053	-1.0	-0.056	-2.6
Income		**12.8**		**1.5**		**41.9**
Own income						
3,001-5,000	0.346	7.6	0.134	9.9	-0.089	-11.8
5,001-8,000	0.391	23.7	0.456	61.7	0.338	87.7
> 8,000	0.056	1.0	0.158	14.9	0.299	89.3
Previous income						
3,001-5,000	0.568	-21.9	0.291	-14.2	0.300	-15.1
> 5,001	0.432	2.8	0.709	-38.0	0.700	-55.8
Comparison group income						
3,001-5,000	-0.689	21.4	-0.574	11.6	-0.213	12.0
5,001-8,000	0.586	-14.1	0.492	-12.4	0.482	-43.7
> 8,000	0.162	-7.7	0.256	-31.9	0.144	-20.8
Age		**-3.2**		**-4.7**		**10.5**
Cohort		**5.7**		**-10.0**		**23.0**
City		**19.8**		**4.7**		**7.8**
Year		**31.0**		**75.6**		**15.1**

Table 4.2 displays the results of the primary analysis divided by level of

education. All the results in table 4.2 were calculated the same way as the results in

table 4.1. The linear regression results used to calculate the percent contributions

are located in Table A-2 in the appendix. Comparting the percent contribution to

increase in life satisfaction of variables across education groups, it is clear

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 A-2 show the negative association between being unemployed and

life satisfaction is greater for people will less than a college education. Second, the

decrease in people reporting they were unemployed was much greater for the lesser

educated. When considering before the transition started unemployment rate was

practically zero (Knight and Song 2005), the fact that unemployment rate was so

high for the less educated people additionally illustrate that these groups also

suffered the most in terms of labor outcomes during the initial part of the transition.

Although all groups enjoyed increasing income levels, increasing income

contributed to the increase in life satisfaction much more for the college educated

segment of the population. But, even though the percent contribution of increase in

income were much greater for the college educated, their absolute increase in life

satisfaction was much less than the other groups.

5. Discussion

5.1 Historical context

The narrative that emerges from the results is the improving labor market,

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 - the people with less than a college degree - greatly reducing their levels of unemployment.

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 is ending, 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 2011, OECD 2010) and low life satisfaction in the early 2000s (Easterlin et al 2012). The period there after, 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 peoples 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 aggressively continuing to liberalize their labor market by relaxing internal migration restrictions. In 2013, the 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. As of 2010, last data on rural life satisfaction in the Horizon dataset, average life satisfaction in rural China is slightly higher than in urban China. If migration to the cities occurs too quickly resulting in a surplus of low skill labor, a massive drop in national life satisfaction is likely as relatively happy rural people move to cities and struggle to find jobs. Furthermore, a large increase in supply of low skill labor from outside the city will negatively affect the job prospects of 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 a strong labor market for the lesser educated segments of the population in urban China.

6. Conclusion

This study has two main findings. First, people with less than a college education were the most vulnerable in terms of life satisfaction and labor market outcomes during urban China's transition. Second, the improvement of the labor market was the main contributor to the increase in life satisfaction in urban China from 2002 to 2012, and furthermore this was especially important for people with less than a college degree. These two findings about what has occurred over the past years imply a very clear warning for the coming years in China as a massive wave of less educated workers migrate to cities from rural areas: a large drop in life

satisfaction is likely if the strength of the labor market is compromised by the increase in the supply of low skilled workers. To protect the well-being of people in urban China, especially the most vulnerable segments of the population, it is crucial to make sure unemployment rates don't rise sharply as the national labor market is liberalized.

The findings from this study are broad, but they are meant to give a general overview of a relatively unexplored area – life satisfaction in China during transition. As it becomes more and more clear that simply relying on increasing incomes will not bring about greater well-being in urban China, this study provides direction for future research and policy directed towards protecting and enhancing well-being.

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Appendix A. Supplimentary Tables

Table A-1 shows the regression results for the first step of the analysis. The constant is included, but is not shown. Standard errors are clustered at city-year levels.

Table A-1. OLS regression results of life satisfaction equation

	Dependent variable: Life satisfaction
Male	-0.058***
	[0.014]
Middle school	0.011
	[0.044]
High School	0.093**
	[0.047]
College	0.161***
	[0.052]
Unemployed	-0.473***
	[0.039]
Student	0.035
	[0.047]
Retired	0.052
	[0.032]
OWN INCOME (yuan)	
3,001-5,000	0.165***
	[0.052]
5,001-8,000	0.306***
	[0.054]
> 8,000	0.270***
	[0.073]
PREVIOUS INCOME (yuan)	
3,001-5,000	-0.110***
	[0.041]
> 5,001	-0.099
	[0.071]
REFERENCE INCOME (yuan)	
3,001-5,000	-0.058
	[0.049]
5,001-8,000	-0.072
	[0.058]
> 8,000	-0.218***
	[0.072]

Five-year age dummies	Y
One-year cohort dummies	Y
City dummies	Y
Year dummies	Y
R squared	0.1022
N	18340

Figure A-1. Partial effects of age and birth cohort dummies on life satisfaction
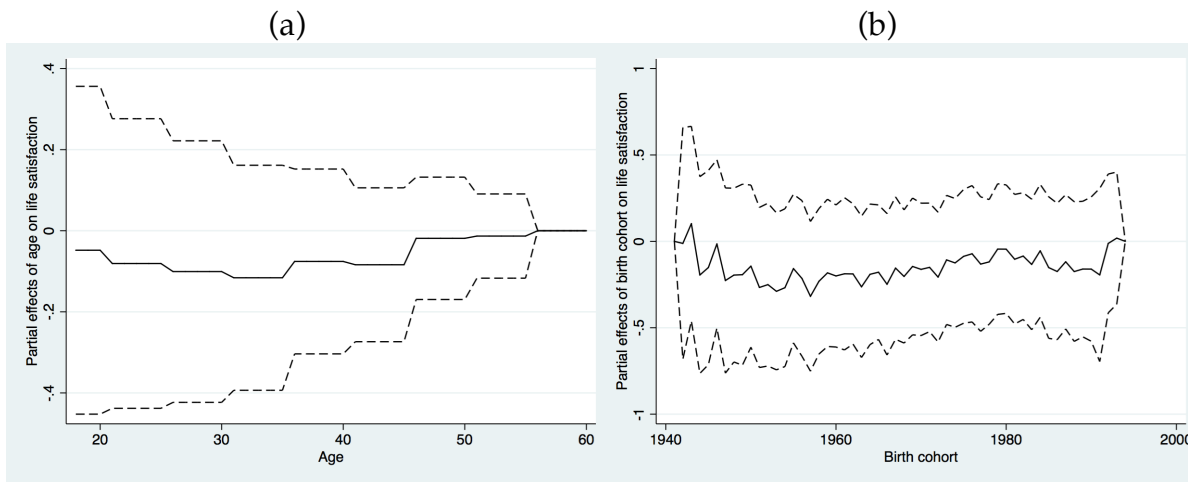
(a)   (b)

Table A-2. OLS regression results of life satisfaction equation, by level of education

	Dependent variable: Life satisfaction		
	Middle school or below	High School	College
Male	-0.047*	-0.051**	-0.068***
	[0.028]	[0.022]	[0.026]
Middle school	0.024		
	[0.051]		
Unemployed	-0.481***	-0.486***	-0.339***
	[0.044]	[0.051]	[0.073]
Student	-0.003	0.034	0.054
	[0.370]	[0.106]	[0.069]

Retired	0.055	0.050	0.047
	[0.052]	[0.038]	[0.094]
OWN INCOME (yuan)			
3,001-5,000	0.092	0.196***	0.135*
	[0.076]	[0.065]	[0.075]
5,001-8,000	0.254***	0.361***	0.266***
	[0.080]	[0.060]	[0.078]
> 8,000	0.071	0.251***	0.306***
	[0.147]	[0.086]	[0.088]
PREVIOUS INCOME (yuan)			
3,001-5,000	-0.162***	-0.130**	-0.052
	[0.059]	[0.059]	[0.059]
> 5,001	0.027	-0.143	-0.082
	[0.102]	[0.099]	[0.100]
REFERENCE INCOME (yuan)			
3,001-5,000	-0.130*	-0.054	-0.058
	[0.074]	[0.060]	[0.068]
5,001-8,000	-0.101	-0.067	-0.093
	[0.071]	[0.064]	[0.079]
> 8,000	-0.198**	-0.332***	-0.148
	[0.099]	[0.090]	[0.102]
Five-year age dummies	Y	Y	Y
One-year cohort dummies	Y	Y	Y
City dummies	Y	Y	Y
Year dummies	Y	Y	Y
R squared	0.1292	0.1062	0.0640
N	4500	8268	5572

Appendix B. Equivalence of Oaxaca decomposition and this paper's approach

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

$$\widehat{LS}_{i,t} = x_{i,t}\widehat{\beta} = z_{i,t}\widehat{\gamma} + \sum_{t=2001}^{2012} d_t\widehat{\delta}_t, \tag{A.1}$$

where d_t is a dummy for year t.

To implement Oaxaca decomposition, we run regressions for the years of 2001 and 2012, respectively, based on the same specification as in equation (A.1). Then, we have

$$\widehat{LS}_{i,2001} = z_{i,2001}\widehat{\gamma}_{2001} + \widehat{\alpha}_{2001},$$

$$\widehat{LS}_{i,2012} = z_{i,2012}\widehat{\gamma}_{2012} + \widehat{\alpha}_{2012}, \tag{A.2}$$

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

Then, the Oaxaca decomposition can be expressed as

$$\Delta\overline{LS} = \overline{LS}_{2012} - \overline{LS}_{2001} = \bar{z}_{2012}\widehat{\gamma}_{2012} - \bar{z}_{2001}\widehat{\gamma}_{2001} + (\widehat{\alpha}_{2012} - \widehat{\alpha}_{2001})$$

$$= (\bar{z}_{2012} - \bar{z}_{2001})\widehat{\gamma}_{2012} + \bar{z}_{2001}(\widehat{\gamma}_{2012} - \widehat{\gamma}_{2001}) + (\widehat{\alpha}_{2012} - \widehat{\alpha}_{2001})$$

$$= (\bar{z}_{2012} - \bar{z}_{2001})\widehat{\gamma}_{2001} + \bar{z}_{2012}(\widehat{\gamma}_{2012} - \widehat{\gamma}_{2001}) + (\widehat{\alpha}_{2012} - \widehat{\alpha}_{2001}) \tag{A.3}$$

$$= (\bar{z}_{2012} - \bar{z}_{2001})\widehat{\gamma} + \bar{z}_{2001}(\widehat{\gamma} - \widehat{\gamma}_{2001}) + \bar{z}_{2012}(\widehat{\gamma}_{2012} - \widehat{\gamma})$$

$$+ (\widehat{\alpha}_{2012} - \widehat{\alpha}_{2001})$$

where the second and third lines of equation (A.3) 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 equation (A.1).

According to the approach in the paper,

$$\Delta\overline{LS} = \overline{LS}_{2012} - \overline{LS}_{2001} = (\bar{z}_{2012} - \bar{z}_{2001})\widehat{\gamma} + (\widehat{\delta}_{2012} - \widehat{\delta}_{2001}), \tag{A.4}$$

By comparing equations (A.3) and (A.4), we can find that, the contribution of survey year dummies in (A.4), $\hat{\delta}_{2012} - \hat{\delta}_{2001}$, is equivalent to the contribution of the regression coefficients in (A.3), and the rest parts, the contribution of the change in the values of variables are identical between (A.3) and (A.4).

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.