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Abstract: Along with China becoming an upper-middle-income country from a lower-middle-income one after 2009, the happiness inequality in China has been enlarged. Based on the Chinese General Social Survey (CGSS) database (2003-2012), this paper investigates the determinants of the happiness inequality in China and explores what factors contribute to its enlargement after 2009. We find that a rise of income inequality as well as the population share of middle age cohorts can widen China's happiness inequality, while an increase in income or education level has a reducing impact. Owning a house and being in employment also have happiness inequality reducing impacts. A decomposition analysis shows that the deterioration of China's happiness inequality is mainly caused by coefficient effects, i.e., the relationships between happiness inequality and its influencing factors have changed, which reflects the dramatic change in the Chinese economy and society. Among the coefficient effects, regional heterogeneity plays an important role. Policies enhancing economic performance and education as well as reducing income inequality and regional inequality can help to reduce happiness inequality and improve social harmony in China.

Keywords: happiness inequality, income, income inequality, education, China

JEL codes: I31, I28, J17, J21, J28

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1 Introduction

In the past decade profound changes have taken place in the Chinese economy and society. Along with these changes, inequality has become one of the biggest challenges in China. In 2013, the Gini index of income in China was 0.473, which has exceeded that of most developed economies.[1] In fact, income inequality is just one dimension of inequality and can be reduced, to some degree, by income redistribution. Besides income inequality, other dimensions of inequality should also be paid attention to. Specifically, happiness inequality has caught much attention during recent years (Ott 2011; Gandelman and Porzecanski 2013; Becchetti et al. 2013). Unlike income inequality, the inequality of subjective wellbeing cannot be directly adjusted via happiness transfer. Therefore, happiness inequality might be a more challenging problem for China. This paper empirically investigates the happiness inequality in China.

Using the Chinese General Social Survey (CGSS) database (2003-2012), we explore the influencing factors of happiness inequality in China and its evolution in the period from 2003 to 2012. We try to answer three questions: (1) what is the status of happiness inequality in China and how does it change over time? (2) What are the influencing factors of happiness inequality? (3) Is the change of Chinese happiness inequality caused by the change of the influencing factors' distributions, or by the change of the relationships that connect happiness inequality and these factors?

We find that the happiness inequality in China is on the rise. We analyze the influencing factors of happiness inequality using a newly developed distribution regression method, recentered influence function (RIF) regression (Fortin et al. 2012). Our results show that happiness inequality can be reduced by an increase in people's income. In contrast, a

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[1] The data is from the Central Intelligence Agency of the U.S., and is available from its website.

deterioration of income inequality, indicated by a larger share of relatively poor or rich people can significantly increase happiness inequality. And enhancing education can considerably reduce happiness inequality. As for marital status, singlehood increases happiness inequality. Owning a house and being in employment have happiness inequality reducing impacts. Additional roles are played by a demographic effect and an increase in the population share of middle age cohorts is associated with an increase in happiness inequality.

The happiness inequality in China of Period 1 (2010-2012), measured by standard deviation, has increased by 12% compared to that of Period 0 (2003-2006). A decomposition analysis is implemented to explore the causes of the increase in happiness inequality. The widening of happiness inequality is mainly driven by coefficient effects (i.e., the significant changes of the relationships between happiness inequality and its influencing factors), while composition effects are small. Among the coefficient effects, provincial heterogeneity plays an important role. In some less-developed provinces the happiness inequality has significantly increased. After 2009 the Chinese economy reached a new development state: Chinese GDP per capita increased from 3800$ in 2009 to 4500$ in 2010,[2] which indicated that China was no longer a lower-middle-income economy but an upper-middle-income one. The deterioration of Chinese happiness inequality is associated with the dramatic changes of the Chinese economy and society.

This paper contributes to the studies on happiness in China. Based on survey data, the existing literature shows that in China the increase of both absolute and relative income will increase happiness (Guan 2010; Wang 2011). Employment status, hukou status and residence locations all have significant associations with happiness (Luo 2006; Jiang et al. 2012). For urban residents, regional features like the city size, financial situation, housing price, corruption and environment conditions etc. are all happiness influencing factors (Sun et al.

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[2] The data of GDP per capita is available from http://data.worldbank.org/indicator/NY.GDP.PCAP.CD.

2014; He and Pan 2011; Lin et al. 2012; He and Lu 2011; Luechinger 2010；Levinson 2012). However, the existing literature of China's happiness studies has not yet fully explored the happiness inequality in China.

Happiness inequality is an important dimension of inequality and this paper also contributes to the studies of inequality in China. Happiness inequality does not necessarily positively correlate with income inequality or consumption inequality. Gandelman and Porzecanski (2013) figure out that only part of happiness inequality could be explained by income inequality and thus, more attention should be paid to non-monetary inequality. Unlike income inequality, happiness inequality cannot be alleviated by direct happiness redistribution. It is commonly viewed that there is a negative relationship between happiness inequality and social cohesion. The expected return of an individual to take part in a rebellion can be represented by the happiness gap between rebellion participants and the unhappy people of the society (Guimaraes and Sheedy 2012). Therefore, studies on happiness inequality and its influencing factors are important for improving social cohesion and harmony. A more general survey of studies on happiness inequality can be found in Becchetti et al. (2013). As far as we know, this paper is the first one to thoroughly explore the happiness inequality in China.

To reduce happiness inequality as well as improve social harmony in China, our research provides some policy suggestions. Policies enhancing economic performance and education as well as reducing income inequality and regional inequality can help to reduce the happiness inequality in China. Policies that can improve the demographic structure and the stability of marriages as well as facilitate people to own a house are effective as well.

The rest of this paper is organized as follows: Section 2 describes the data and the changing distributions of Chinese residents' happiness; Section 3 introduces the econometric

method employed by this paper; Section 4 reports the RIF regression results and analyzes the causes of the increase in the happiness inequality in China; finally we conclude.

2 Data and Descriptive Statistics

2.1 Data and Distribution of Chinese Residents' Happiness

The CGSS data is from a cross-sectional survey conducted by Renmin University of China and Hong Kong University of Science and Technology. The 2003-2006 sampling design (there is no survey in 2004) is a multi-stage stratified design, which consists of 5900 urban households and 4100 rural households. In 2008, CGSS used 2005 1% national population survey data as the sampling frame and the sample size is only 6000. The 2010-present design returns to the multi-stage stratified design, which covers 12,000 households. In this paper we use the survey data from 2003 to 2012 (excluding 2008), which includes 53916 observations (observations with missing variables are excluded). The data of 2008 is not employed, since the sampling design of that year is different and the sample size is small as well.

The happiness data directly comes from the question "Generally speaking, do you think you are happy?" And the answer is chosen from: 1 (very unhappy), 2 (unhappy), 3 (normal), 4 (happy) and 5 (very happy). Two issues need to be clearly explained. First, this paper implicitly assumes that self-reported happiness is comparable among individuals. Is this assumption reasonable? Second, evaluation of happiness inequality by variance or Gini index requires the assumption of cardinality of self-reported happiness. Does this make sense? For the first issue, Frey and Stutzer (2002) argue that, although the heterogeneity in the scales used for self-reported happiness exists, such heterogeneity is random and this does not invalidate regression results. Beegle et al. (2012) empirically justify the argument of Frey and Stutzer (2002). For the second issue, as Becchetti et al. (2013) point out, in social sciences

ordinal categorical variables are often treated as cardinal, and some works prove that regarding happiness as either cardinal or ordinal leads to similar results in a regression framework.

Apart from happiness, the survey also collects other information such as gender, age, education, marriage status, household income, subjective economy status, city, house ownership, employment, number of children, CPS (Communist Party of China) membership and the feeling about social equity.

The CGSS data has been widely used to study economic and social issues in China, including the problems of consumption and tenure choice of multiple homes (Huang and Yi 2010), the emerging new middle class and the rule of law in China (Wu and Cheng 2013) and the subjective wellbeing in transitional China (Wang and Vander Weele 2011; Chyi and Mao 2012). Cheng et al. (2014) employ the data to explore the difference of happiness and job satisfaction among urban locals, first-generation migrants and new-generation migrants. They find that new-generation migrants are less satisfied with their jobs and lives than first-generation migrants, even if they have higher income. A further research on the happiness of Chinese residents finds that the differences of basic education condition, medical treatment and social security system between rural and urban areas are the main reasons for the rural-urban gap of life satisfaction (Liang and Wang 2014). There are also studies exploring how employee involvement influences workers' happiness (Cheng 2014) and how spouses' characteristics affect husbands' or wives' happiness (Qian and Qian 2015).

Table 1 describes the happiness distribution of Chinese residents from 2003 to 2012. While the mean value of happiness increases after 2009, the variance of happiness also shows an upward trend. The proportions of residents who feel "very unhappy" and "unhappy" do not change much, but the proportion of residents who feel normally happy decreases from

49.8% in 2003 to 15.5% in 2012. Meanwhile, the proportions of "happy" and "very happy" rapidly rise with the former from 32.3% in 2003 to 59.9% in 2012, which is almost doubled.

Table 1 Distribution of happiness in China: 2003-2012

Year	1=Very Unhappy （%）	2= Unhappy （%）	3= Normal （%）	4= Happy （%）	5=Very Happy （%）	Sample Size	Mean	Variance
2003	2.3	10.5	49.8	32.3	5.1	5870	3.273	0.648
2005	1.4	7.7	45.1	40.1	5.7	10336	3.410	0.593
2006	1.0	6.7	46.1	40.6	5.6	10151	3.429	0.551
2010	2.1	7.7	17.7	56.6	15.9	11648	3.764	0.778
2011	1.8	6.5	11.2	60.2	20.4	5174	3.907	0.731
2012	1.4	7.1	15.5	59.9	16.1	10737	3.821	0.696

Compared with other countries, what is the situation of Chinese residents' happiness and its inequality? The World Value Survey (WVS)[3] includes an inquiry into people's happiness around the world. By analyzing the latest data of WVS, we can find that the level of Chinese residents' happiness is, on average, lower than the world and many other countries, as shown in Table 2. The Chinese happiness inequality is also lower than the world average. Although developed countries like U.S. and Germany have a higher level of happiness on average, their happiness inequality is more severe than China.[4]

Table 2 International comparison of happiness inequality

	World	China	U.S.	Germany	Sweden	Russia	Japan	Singapore	India	Brazil
Mean	3.141	3.006	3.263	3.090	3.369	2.898	3.216	3.305	3.100	3.260
S.D.	0.743	0.585	0.641	0.642	0.584	0.665	0.652	0.614	0.828	0.626
Gini	0.121	0.090	0.099	0.101	0.087	0.115	0.102	0.093	0.139	0.096

Note: The data source of this table is from the World Value Survey (WVS), conducted from 2010 to 2014.

2.2 Descriptive Statistics

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[3] The questionnaire and data of the World Value Survey are available from http://www.worldvaluessurvey.org/wvs.jsp.

[4] Since WVS and CGSS are different surveys, the indicators of Chinese happiness inequality shown in Table 2 and Table 1 are not comparable.
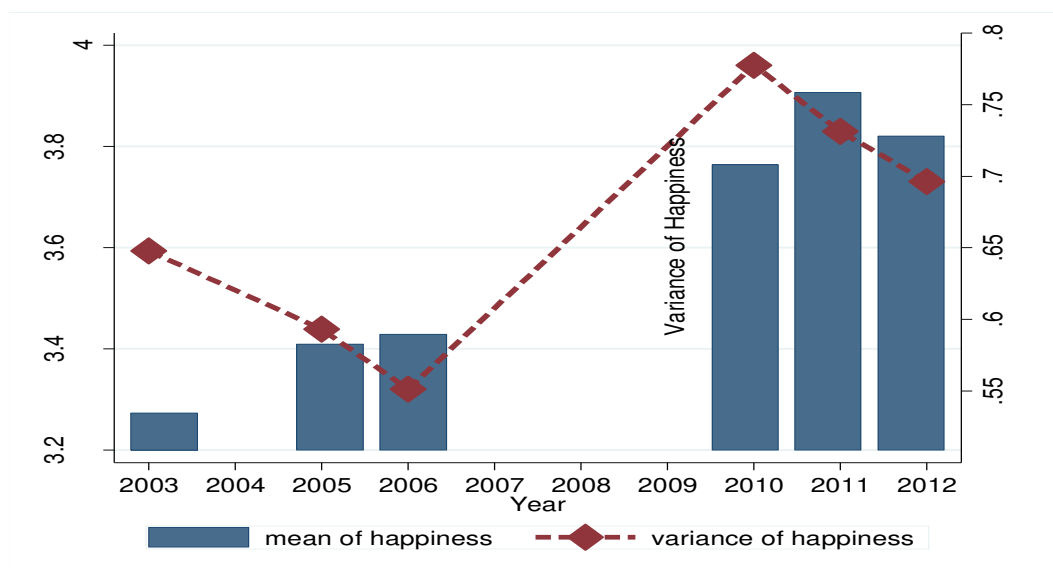
Figure 1 Happiness inequality in China: 2003-2012

China has experienced drastic changes during the past ten years. In the development stage of upper-middle-income, one country would encounter many economic and social challenges, which are expected to significantly affect people's subjective wellbeing. The demographic structure of Chinese society also has a tremendous change: in 2010, the ageing population of China is 178 million, which was 13.26% of the total population; but in 1982 this proportion was only 7.62%. Meanwhile, the population share of the cohort aged between 0 and 14 declined from 33.59% to 16.60%. And since 2009, the housing prices of China have risen substantially. Figure 1 indicates that the variance of happiness in the period between 2010 and 2012 increased a lot, compared to that in the period of 2003-2006.

We define 2010-2012 and 2003-2006, respectively, as Period 1 and Period 0. Table 3 shows the descriptive statistics of variables in these two periods. The sex ratio of the sample is close to 1:1. In Period 0, young people under the age of 24 make up 9% of the whole sample, while people aged 25-34, 35-44, 45-54 and over 55 make up 19%, 27%, 22% and 23%, respectively. Compared with Period 0, in Period 1, the proportion of ageing population has increased. The proportions of survey participants who are unschooled and who obtain

college and above-college degrees increased, and the proportion of people who only finish junior or senior high school decreased. The average family income has increased substantially from 23,102 Yuan to 45, 229 Yuan. In Period 1, the proportions of people who have houses and jobs both declined.

Table 3 Descriptive statistics of main variables

Variable	Notation	2003-2006		2010-2012	
		Mean	Std Dev	Mean	Std Dev
Happiness	happiness	3.387	0.770	3.813	0.860
Sex (Female=1)	sex2	0.529	0.499	0.480	0.500
Under age 24	age24	0.091	0.288	0.041	0.199
Age 25-34	age34	0.192	0.394	0.116	0.320
Age 35-44	age44	0.268	0.443	0.207	0.405
Age 45-54	age54	0.216	0.411	0.226	0.418
Age 55-64	age64	0.233	0.423	0.403	0.490
Unschooled	educ1	0.089	0.285	0.133	0.339
Primary school	educ2	0.221	0.415	0.234	0.423
Junior high school	educ3	0.315	0.464	0.292	0.455
Senior high school	educ4	0.245	0.430	0.188	0.391
College	educ5	0.127	0.333	0.147	0.355
Above college	educ6	0.003	0.054	0.006	0.080
Unmarried	single	0.168	0.374	0.196	0.397
Family income	yhincome	23102	104526	45229	109863
Logarithm of family Income	lnyhincome	9.489	0.997	10.170	1.069
Income under 60% of median	poor	0.274	0.446	0.245	0.430
Income above 200% of median	rich	0.282	0.450	0.297	0.457
Subjective economic status	xdincome	2.060	0.937	2.605	0.757
City or not	city	0.682	0.466	0.589	0.492
Housing property right or not	house	0.799	0.401	0.672	0.469
Employed or not	work	0.648	0.478	0.596	0.491
Education years	yeduc	9.074	3.511	null	null
Number of children	child	null	null	1.786	1.351
Feeling of social fairness	equity	null	null	3.071	1.075
CPC member or not	political	0.117	0.322	0.119	0.324

Note: the null entries in the table mean that the corresponding data is not available.

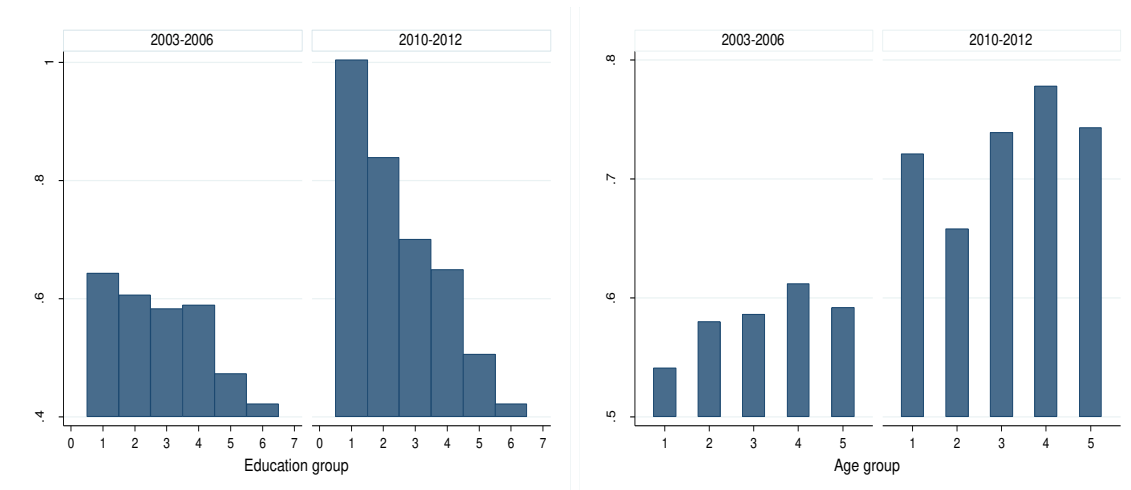2.3 Happiness Inequality: Age, Education and Income

Figure 2 Happiness inequalities within different age and education groups

(Note: In the left panel, Number 1 to 6 corresponds to different levels of education, from low to high as shown in Table 3. In the right panel, Number 1 to 5 corresponds to different age groups, from young to old as shown in Table 3.)

We know that after 2009 the average level of happiness as well as the happiness inequality in China has increased. Figure 2, dividing survey participants into groups by age and education, reveals the dynamic of happiness inequality within groups. After 2009 the happiness inequality within almost all of the age and education groups has experienced a significant increase.

Many researchers have analyzed the influence of income level on happiness. We also examined the relationship between the average family income and happiness in different years and provinces in China and discovered that there is indeed a positive correlation between them. Since this paper focuses on happiness inequality, we want to establish a relationship between the variance of happiness and the average family income in different years for different provinces. The regression exercise in Figure 3 shows that an increase in income can help to reduce happiness inequality. Apart from income, what are the other factors that can enlarge or reduce the happiness inequality in China?
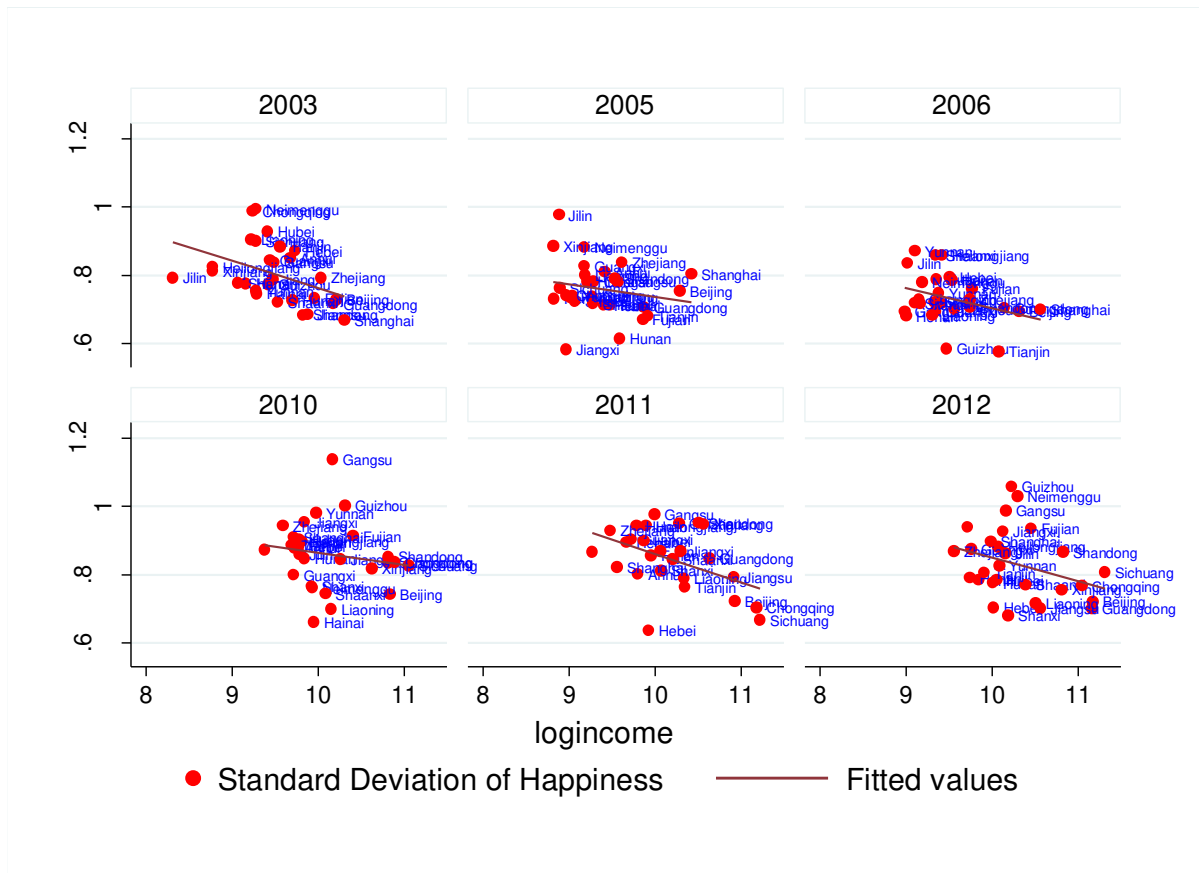
Figure 3 Income and happiness inequality of different provinces in China

3 The Econometric Method

What factors drive happiness inequality in China? Why did happiness inequality increase so much from Period 0 to Period 1. To answer these questions, we employ a distribution regression method (i.e., RIF) and implement the decomposition analysis of happiness inequality. Becchetti et al. (2013) use similar methods to discuss the German happiness inequality. They find that trends in happiness inequality in Germany are mainly driven by composition effects, while coefficient effects are negligible. Here, we give a brief introduction to our econometric methods.

Suppose that an outcome variable is denoted by Y and assume that F represents its distribution. $v(F)$ is a statistic of Y (such as mean, variance, quantile, etc.). Distribution regressions aim to discuss how the explanatory variable X influences $v(F)$. Specifically, two questions need to be answered: how does $v(F)$ change with X? And how much does the difference of $v(F)$ between two groups come from the difference in X? The first question is called the partial effect problem and the second is the policy effect problem. When $v(F)$ represents the mean, the problem can be solved using the classical regression methods. However, when $v(F)$ represents other statistics, the problem is not that simple (Firpo et al. 2009).

The existing literature mainly uses two distribution regression methods. The first one is the RIF regression, mainly developed by Firpo et al. (2009). This is a linear method. Suppose $v(F) = E_X E[RIF(y; v, F)|X]$ and RIF denotes the recentered influence function. Here it is assumed that the expectation of RIF is a linear function. The problem is then converted to the classical linear regression. It is easy to implement, but has some limitations like that the linear hypothesis as well as the local approximation may be problematic. The second method is indirect modelling of the distribution function (Machado and Mata 2005; Chernozhukov et al. 2013). This method tries to obtain the distribution F, which enables us to calculate all kinds of $v(F)$ [5]. We know that $F(y) = \int F_X(y)h(x)dx$ and suppose that the marginal distribution of X, $h(x)$, is already known. Then the key is to obtain the conditional distribution $F_X(y)$. Usually numerical simulation methods are used to calculate the conditional distribution, which are rather complicated and time-consuming.

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[5] For example, mean $\mu = \int yf(y)dy = \int ydF(y)$, variance $V(y) = \int (y-\mu)^2 dF(y)$, quantile $Q_\tau(y) = F^{-1}(\tau)$ 。

Now we explain how the RIF regression method can be used to analyze the partial effect and policy effect. In term of the happiness inequality in China, we want to explore the marginal effect of X on happiness inequality, as well as that how much of the increase in happiness inequality after 2009 can be explained by the change of X.

According to Hampel (1974), the influence function of the distributional statistic $v(F)$ is defined as: $IF(y;v,F) = \lim_{\varepsilon \downarrow 0} \frac{v((1-\varepsilon)F + \varepsilon\Delta_y) - v(F)}{\varepsilon}$. Assume $v(F) = \int \varphi(y)dF(y)$, and then we get $IF(y;F) \equiv \varphi - \int \varphi(y)dF(y)$. When $v(F)$ is mean, $\varphi(y) = y$ and the influence function of mean is $IF(y;\mu,F) = y - \mu$. The influence function of variance is $IF(y;\sigma^2,F) = (y-\mu)^2 - \sigma^2$.

The RIF is defined as $RIF(y;F_Y) = v(F) + IF(y;F_Y)$. By definition, $E[IF(y;F)] = 0$. For linear functions we can get $RIF(y;F_Y) = \varphi(y)$. This leads to two important results: (1) $E[RIF] = v(F)$, i.e., any statistics of interest can be regarded as a kind of expectation. (2) Using the law of iterative expectations, the relationship between the statistics $v(F)$ and the explanatory variable X can be established as:

$$v(F_Y) = \int RIF(y,F_Y)dF_Y$$
$$= \int \left[\int RIF(y,F_Y)dF_{Y|X}(y|X=x)\right]dF_X(x)$$
$$= \int E[RIF(y,F_Y)|X=x]dF_X(x)$$

Since $v(F) = E[E(RIF|X)]$, we can evaluate how the distributional statistic of interest changes with X's marginal change. If it is assumed that the RIF is linear, then we can use the OLS regression method to analyze the relationship between X and $v(F)$ .When $v(F)$ is mean, RIF equals Y. When $v(F)$ is variance, RIF equals to $(y-\mu)^2$. Of course, there is no sufficient evidence that $v(F)$ is X's linear function. But at least this method provides a kind of linear approximation (Firpo et al. 2009). So if we are interested in the partial effect of X on

happiness variance, we can perform a regression of the corresponding RIF on X.

We now suppose that there is a difference in $v(F)$ between Period 1 and Period 0:

$\Delta_O^v \triangleq v(F_1) - v(F_0) = v_1 - v_0$, which can be decomposed into two parts

$\Delta_O^v = (v_1 - v_c) + (v_c - v_0) = \Delta_S^v + \Delta_X^v$. Δ_S^v is the coefficient effect and it represents the

contribution of the change of the function itself. The second part Δ_X^v is the composition

effect. It is the contribution of the change in X to the difference in $v(F)$. Now write the RIF

regression as $m_t^v(x) \equiv E[RIF(y_t; v_t) | X, T = t]$, $t=0,1$. $m_c^v(x) \equiv E[RIF(y_0; v_c) | X, T = 1]$. We

can get $v_t = E[m_t^v(x) | T = t], t = 0,1$ and $v_c = E[m_c^v(x) | T = 1]$. Now we can rewrite the

coefficient effect and composition effect as:

$$\Delta_S^v = E[m_1^v(x) | T = 1] - E[m_c^v(x) | T = 1]$$

$$\Delta_X^v = E[m_c^v(x) | T = 1] - E[m_0^v(x) | T = 0]$$

Consider a linear case: $m_t^v(x) = X' \beta_t^v$, $m_c^v(x) = X' \beta_c^v$. After the OLS regression of RIF

on X, we can get:

$$\beta_t^v = (E[XX' | T = t])^{-1} E[RIF(Y_t; v_t) X | T = t], t = 0,1$$

$$\beta_c^v = (E[XX' | T = 1])^{-1} E[RIF(Y_0; v_c) X | T = 1]$$

Then we get:

$$\Delta_S^v = E[X | T = 1] \cdot (\beta_1^v - \beta_c^v) ,$$

$$\Delta_X^v = E[X | T = 1] \beta_c^v - E[X | T = 0] \beta_0^v ,$$

If we further suppose $\beta_c^v = \beta_0^v$, we can apply the Oaxaca-Blinder decomposition method to

any distributional statistic of interest. More details about RIF regression and Oaxaca-Blinder

decomposition are provided in Firpo et al. (2009).

4 What Determines the Happiness Inequality in China?

In this section we will use the RIF regression to analyze the influencing factors of happiness inequality in China, decompose the happiness inequality difference between Period 1 and Period 0 and then try to uncover the reasons for its deterioration after 2009.

4.1 Regression Analysis of Happiness Inequality – RIF Method

We use the variance of happiness to reflect happiness inequality. We also employed the happiness Gini index as the inequality indicator in a robustness check. Given the RIF regression method, we try to estimate the happiness inequality function as below:

$$RIF(Happiness\_variance) = \alpha + \beta_1 sex_{it} + \beta_2 age_{it} + \beta_3 edu_{it} + \beta_4 income_{it} + \beta_5 city_{it}$$
$$+ \lambda_1 single_{it} + \lambda_2 house_{it} + \lambda_3 work_{it} + year_t + province_j + \varepsilon_{it}$$

The explained variable is happiness inequality, measured by variance or Gini index[6]. The explanatory variables include gender, age, education, income, urban-rural dummy, marital status, housing ownership and employment status. We have also controlled the survey year and the province of survey participants as fixed effects.

The first column of Table 4 lists the RIF regression result for the sample variance. It is shown that a rise in females' proportion can reduce happiness inequality. Becchetti et al. (2013) use German data and find a similar result of the influence of female towards happiness inequality.

The division of age groups follows the literature such as Becchetti et al. (2013). We use the old group (55-64) as the control age group. The increase of young people population

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[6] Can happiness inequality be well measured by Gini index? Having examined nine indices of happiness inequality, Kalmijn and Veenhoven (2005) concluded that Gini index, which is designed for variables indicating "capacity" like income, is not suitable for variables measuring "strength", like happiness. Variance is relatively more appropriate for measuring happiness inequality of one country. Standard deviation is also frequently used to measure happiness inequality (Ovaska and Takashima 2010; Ott 2011; Clark et al. 2012).

share can reduce happiness inequality. However, along with an increase in the proportion of middle-age people (including those aged between 25 and 54), the happiness inequality will increase. This is consistent with the social reality of modern China: for middle-age people, they feel more life pressures (i.e., they have to take care of both kids and old parents) and the income and wealth inequality among them is more severe than other age groups; therefore, the happiness inequality within this age group seems to be quite large.

As for education, we use the uneducated as the control group. An increase in educational level can reduce happiness inequality considerably. The regression coefficients of primary school, middle school, high school, college and above-college are 0.105, 0.144, 0.156, 0.215 and 0.22, respectively, which are monotonely increasing. This indicates that enhancing higher education is more effective in reducing the happiness inequality of the society. The separate RIF Regressions for Period 0 and Period 1 imply the same result.

Income, either absolute or relative, is important. The absolute income is the logarithmic family income, while the relative income or income inequality is represented by dummy variables, which indicate whether a participant is relatively poor (income below 60% of the median level) or rich (income higher than 200% of the median). We also use the subjective economic status of the survey participants to measure income inequality. Our results show that an increase in absolute income can significantly reduce the level of happiness inequality, while relative poverty and relative affluence have a happiness inequality enlarging impact. And a higher perceived economic status can reduce happiness inequality as well. In general, the increase of income inequality indicated by either more relatively poor people, or more relatively rich people or more people feeling that their relative economic status is low, can increase happiness inequality.

Table 4 RIF regression results of the happiness inequality in China: 2003-2012

Variables	(1) Full Sample RIF (variance)	(2) Period 0 RIF (variance)	(3) Period 1 RIF (variance)
sex	-0.0232**	-0.0209	-0.0181
	(0.0106)	(0.0156)	(0.0167)
age24	-0.0502*	-0.0271	0.0133
	(0.0257)	(0.0375)	(0.0498)
age34	0.0477**	0.0597**	0.0536*
	(0.0194)	(0.0287)	(0.0306)
age44	0.0749***	0.0567***	0.0808***
	(0.0166)	(0.0217)	(0.0242)
age54	0.0870***	0.0506**	0.101***
	(0.0164)	(0.0224)	(0.0219)
educ2	-0.105***	-0.0791**	-0.123***
	(0.0251)	(0.0335)	(0.0352)
educ3	-0.144***	-0.109***	-0.180***
	(0.0261)	(0.0336)	(0.0332)
educ4	-0.156***	-0.0938**	-0.202***
	(0.0265)	(0.0376)	(0.0370)
educ5	-0.215***	-0.150***	-0.254***
	(0.0265)	(0.0385)	(0.0393)
educ6	-0.220***	-0.103	-0.263***
	(0.0626)	(0.112)	(0.0709)
single	0.205***	0.164***	0.206***
	(0.0180)	(0.0290)	(0.0272)
lnyhincome	-0.0553***	-0.0557***	-0.0522***
	(0.0132)	(0.0197)	(0.0195)
poor	0.151***	0.111***	0.163***
	(0.0227)	(0.0280)	(0.0334)
rich	0.125***	0.158***	0.119***
	(0.0180)	(0.0242)	(0.0287)
xdincome	-0.168***	-0.0235***	-0.294***
	(0.00774)	(0.00796)	(0.0155)
city	0.0172	0.0325	0.0267
	(0.0161)	(0.0236)	(0.0209)

house	-0.0328**	-0.0451**	-0.00179
	(0.0131)	(0.0210)	(0.0219)
work	-0.0853***	-0.102***	-0.0586***
	(0.0145)	(0.0190)	(0.0180)
Constant	1.719***	1.376***	1.982***
	(0.136)	(0.180)	(0.199)
Year	Controlled	Controlled	Controlled
Province	Controlled	Controlled	Controlled
Observations	41,692	17,717	23,975
R-squared	0.053	0.028	0.066

Note：Bootstrap standard errors are in parentheses. ***，** and * indicate significance at the significance levels of 1%，5% and 10% , respectively.

Since the coefficient of the city dummy is insignificant, the urbanization of China does not have a significant impact on reducing the national happiness inequality. Housing is also an important factor. Lin et al. (2012) find that the housing ownership can increase the level of happiness, and we find that when more people own their houses, the happiness inequality of Chinese society can be significantly reduced. People cannot be very happy without their own houses, especially in the Chinese culture. Finally, improving the employment rate can greatly reduce happiness inequality, while a larger proportion of unmarried people can widen it.

In Column (2) and (3) of Table 4, we show the RIF regression results for Period 0 and Period 1, respectively, and we want to see whether the influences of the explanatory factors on the happiness inequality in China change over time, since after 2009 the Chinese economy has reached a new development stage. The influences of age, education, absolute and relative income, marital status and employment status are qualitatively the same as the overall sample analysis indicates; however, quantitatively the corresponding coefficients change more or less. The distinct differences include: (1) The effect of females' population share becomes insignificant. (2) The happiness inequality reducing impact of owning a house in Period 1 is

not significant. We have also used the happiness Gini index as the explained variable, and the results are similar to those in Table 4.

4.2 Why Did the Happiness Inequality in China Increase after 2009?

We know that after 2009 the happiness inequality in China has increased much, and also China has reached a new development phase with more social and economic challenges. This part tries to decompose the happiness inequality difference between Period 0 and Period 1 and figure out the concrete causes of the increase in happiness inequality.

Table 5 provides the results of Oaxaca-Blinder decomposition exercise. In a robustness check, an alternative measure of happiness inequality, the Gini index, is employed and the results are similar to those in Table 5. We can see that the increase of happiness variance from Period 0 to Period 1 is mainly caused by the coefficient effect. The coefficient effect has increased the happiness variance by 0.18, while the composition effect has reduced it by 0.048. This result is different from the case for Germany (Becchetti et al. 2013), which is not hard to understand given the rapid change of the Chinese economy and society. Therefore, the increase of the happiness inequality in China after 2009 is mainly due to the significant changes of the relationships between happiness inequality and its influencing factors.

Table 5 Decomposition of the happiness inequality difference between two periods

	$\Delta_X^v = (E[X\|T=1] - E[X\|T=0])\beta_0^v$		$\Delta_S^v = E[X\|T=1]\cdot(\beta_1^v - \beta_0^v)$	
Explained by	Composition Effect	Standard Error	Coefficient Effect	Standard Error
sex	0.0010	0.0006	0.0035	0.0108
age24	0.0011	0.0013	0.0022	0.0023
age34	-0.0041***	0.0017	0.0002	0.0047
age44	-0.0027***	0.0011	0.0069	0.0072
age54	0.0009***	0.0004	0.0119	0.0075
educ2	-0.0024**	0.0010	-0.0098	0.0101

educ3	0.0014**	0.0006	-0.0219*	0.0133
educ4	0.0069***	0.0025	-0.0212**	0.0090
educ5	-0.0018***	0.0007	-0.0165**	0.0076
educ6	-0.0002	0.0004	-0.0010	0.0010
single	-0.0007	0.0006	0.0075	0.0051
lnyhincome	-0.0425***	0.0108	0.0216	0.2429
poor	-0.0003	0.0005	0.0085	0.0108
rich	-0.0043***	0.0009	-0.0037	0.0079
xdincome	-0.0036	0.0039	-0.7418***	0.0394
city	-0.0101**	0.0045	-0.0130	0.0180
house	0.0045**	0.0022	0.0256	0.0188
work	0.0003	0.0005	0.0214	0.0160
groupprov	0.0086***	0.0031	0.1388***	0.0497
constant			0.7634***	0.2377
Total	-0.0481***	0.0141	0.1827***	0.0178

Note：***，** and * indicate significance at the significance levels of 1%，5% and 10% , respectively.

The negative composition effect between two periods can be understood by combining Table 4 which estimates the happiness inequality function and Table 3 which gives the distributional changes of all the explanatory variables. Table 5 shows that the specific composition effects with respect to (w.r.t) age groups 25-34 and 35-44 are negative and that w.r.t age group 45-54 is positive. This is because the population shares of age groups 25-34 and 35-44 decreased and the share of age group 45-54 increased, and the increase in the population share of middle-age people (aged between 25 and 54) can enlarge happiness inequality. The net composition effect w.r.t the distributional change of demographic structure is negative. In contrary, the net composition effect w.r.t education is positive, in which the rise in the population shares of primary school and college reduced happiness inequality and the decline in the shares of junior and senior high school had an opposite effect. The overall negative composition effect mainly comes from the impact of absolute income: the large increase in people's average income after 2009 reduced the happiness inequality in China a lot. The increase in the population share owning housing properties contributed to an increase

of Chinese happiness inequality, but this specific composition effect is relatively less important.

Although the overall coefficient effect is positive and dominates the composition effect, the specific coefficient effects w.r.t education and subjective economic status have reduced happiness inequality. Comparing Columns (2) and (3) of Table 4, we can find that in Period 1 the reducing impacts of education levels on happiness inequality have systematically increased much, which implies that a same increase in education levels in Period 1 could reduce happiness inequality much more than in Period 0. The coefficient indicating the influence of subjective economic status on happiness inequality in Period 1 has also increased considerably in absolute value. Given the increase of the average subjective economic status in Period 1, as shown in Table 3, the corresponding reducing impact on happiness inequality would naturally be large.

The overall positive coefficient effect mainly comes from the contributions of provincial dummies and the regression constant. The variable *Groupprov* in Table 5 represents the set of provincial dummy variables, and its overall coefficient effect is positive, which indicates that the happiness inequality among provinces has greatly increased after 2009. This is partly shown in Figure 3: after 2009 happiness inequality in some provinces has largely widened and the happiness inequality of different provinces distributes in a more disperse way. The large positive coefficient effect w.r.t the regression constant reflects that the explanatory variables examined by this paper cannot fully explain the happiness inequality in China and there are some other important factors that are worth examining. It also reflects, in some sense, the dramatic change of the Chinese economy and society; and thus, non-linear effects may exist and cannot be well captured by our linear model.

5   Conclusion

Liu et al. (2012), among others, discuss the evolution of Chinese residents' happiness along with the economic growth of China. The literature on the happiness in China ignores the problem of Chinese happiness inequality. In some sense, it is happiness inequality, rather than income inequality, that determines the degree of social harmony. And some researchers suggest using happiness inequality as the indicator of social inequality (Veenhoven 2005). On one hand, income inequality is not equivalent to the inequality of subjective wellbeing. Investigating happiness inequality enables us to comprehensively understand the social welfare distribution. On the other hand, unlike income, happiness cannot be directly transferred. Studies on happiness inequality are beneficial to social policy making and social harmony promotion.

This paper employed the RIF regression method to analyze the happiness inequality in China. Happiness inequality can be reduced by an increase in people's income and a deterioration of income inequality can significantly increase happiness inequality. Enhancing education as well as promoting employment can considerably reduce happiness inequality. An increase in the population share of people who own housing properties also has a happiness inequality reducing impact. Singlehood as well as an increase in the population share of middle age cohorts is associated with an increase in happiness inequality. Given these results, clear-cut policy suggestions to improve social harmony can be made.

The deterioration of China's happiness inequality after 2009 is mainly caused by coefficient effects, i.e., the relationships between happiness inequality and its influencing factors have changed much, which reflects the dramatic change in the Chinese economy and society. Among the coefficient effects, the enlarged dispersion of different provinces' happiness inequality plays an important role. However, the overall composition effect on Chinese happiness inequality is negative and it mainly comes from the huge increase of people's absolute income after 2009.

There are certainly other factors that have not been discussed by this paper but can influence the happiness inequality of China. In fact, our decomposition exercise has implied the possible existence of other influencing factors as well as non-linear effects. Evidences from international data show that economic fluctuation can increase happiness inequality (Chin-Hon-Foei 1989; Veenhoven 2005) and the improvement of national health conditions and institutional quality can also reduce happiness inequality (Ovaska and Takashima 2010; Ott 2011). We leave these issues for future studies about China's happiness inequality.

References

Becchetti, L., Massari, R., & Naticchioni, P. (2013). The drivers of happiness inequality: suggestions for promoting social cohesion. IZA Discussion Paper, No.7153, 1-34.

Beegle, K., Himelein, K., & Ravaillon, M. (2012). Frame-of-reference bias in subjective welfare regressions. *Journal of Economic Behavior & Organization*, 81(2), 556-570.

Cheng, Z. (2014). The effects of employee involvement and participation on subjective well-being: Evidence from urban China. *Social Indicators Research*, 118(2), 457-483.

Cheng, Z., Wang, H., & Smyth, R. (2014). Happiness and job satisfaction in urban China: A comparative study of two generations of migrants and urban locals. *Urban Studies*, 51(10), 2160-2184.

Chernozhukov, V., Fernández-Val, I., & Melly, B. (2013). Inference on counterfactual

distributions. *Econometrica*, 81(6), 2205–2268.

Chin-Hon-Foei, S. (1989). Life satisfaction in the EC countries, 1975-1984. in: Veenhoven, R. (ed.): *Did the Crisis Really Hurt*?. Universitaire Pers Rotterdam, Netherlands, 24-43.

Chyi, H., & Mao, S. (2012). The Determinants of happiness of China's elderly population. *Journal of Happiness Studies*, 13(1), 167-185.

Clark, A E., Flèche, S., & Senik, C. (2012). The great happiness moderation. IZA Discussion Paper, No.6761, 1-53.

Firpo, S., Fortin, N. M., & Lemieux, T. (2009). Unconditional quantile regressions. *Econometrica*, 77(3), 953–973.

Fortin, N., Lemieux, T., & Firpo, S. (2012). Decomposition methods in economics. *Handbook of Labor Economics*, 4, 1-102.

Frey, B.S., & Stutzer, A. (2002). What can economists learn from happiness research? *Journal of Economic Literature*, 40, 402—435.

Gandelman, N., & Porzecanski, R. (2013). Happiness inequality: How much is reasonable? *Social Indicators Research*, 110(1), 257-269.

Guan, H. (2010). The impact of income on happiness: Absolute and relative measures. *Nankai Economic Studies*, 05, 56-70 (in Chinese).

Guimaraes, B., & Sheedy, K. D. (2012). A Model of Equilibrium Institutions. CEPR Discussion Papers, No.8855.

Hampel, F. R. (1974). The influence curve and its role in robust estimation. *Journal of the American Statistical Association*, 69(346), 383-393.

He, L. X., & Pan, C. Y. (2011). Uncover the "Easterlin Paradox" of China: Income gap, inequality of opportunity and happiness. *Management World*, 08, 11-22 (in Chinese).

He, L. Y., & Lu, Y. P. (2011). Corruption, social trust and subjective well-being. *The 11th China Institutional Economics Conference Proceedings Working Paper*, 340-353. doi: http://cpfd.cnki.com.cn/Article/CPFDTOTAL-BJDT201110002031.htm (in Chinese).

Huang, Y., & Yi, C. (2010). Consumption and tenure choice of multiple homes in transitional urban China. *European Journal of Housing Policy*, 10(2), 105-131.

Jiang, S. Q., Lu, M., & Sato, H. (2012). Identity, inequality, and happiness: Evidence from urban China. *World Development*, 40(6), 1190-1200.

Kalmijn, W., & Veenhoven, R. (2005). Measuring inequality of happiness in nations: In search for proper statistics. *Journal of Happiness Studies*, 6(4), 357–396.

Levinson, A. (2012). Valuing public goods using happiness data: The case of air quality. *Journal of Public Economics*, 96(9), 869-880.

Liang, Y., & Wang, P. (2014). Influence of Prudential Value on the Subjective Well-being of Chinese Urban–rural Residents. *Social Indicators Research*, 118(3), 1249-1267.

Lin, J., Zhou, S. J., & Wei, W. Q. (2012). Price of urban real estate, housing property and subjective well-being. *Finance & Trade Economics*, 05, 114-120 (in Chinese).

Liu, J. Q., Xiong, M. L., & Su, Y. (2012). National sense of happiness in the economic growth period: A study based on CGSS data. *Social Sciences in China*, 12(5), 82-102 (in Chinese).

Luechinger, S. (2010). Life satisfaction and transboundary air pollution. *Economics Letters,* 107(1), 4-6.

Luo, C. L. (2006). Urban-rural divide, employment, and subjective well-being. China *Economic Quarterly*, 5(3), 817-840 (in Chinese).

Machado, J. A. F., & Mata, J. (2005). Counterfactual decomposition of changes in wage distributions using quantile regression. *Journal of Applied Econometrics*, 20(4), 445–465.

Ott, J. C. (2011). Government and happiness in 130 nations: Good governance fosters higher level and more equality of happiness. *Social indicators research*, 102(1), 3-22.

Ovaska, T., & Takashima, R. (2010). Does a rising tide lift all the boats? Explaining the national inequality of happiness. *Journal of Economic Issues*, 44(1), 205-224.

Qian, Y., & Qian, Z. (2015). Work, Family, and Gendered Happiness among Married People in Urban China. *Social Indicators Research*, 121(1), 61-74.

Sun, S. B., Huang, W., Hong, J. J, & Wang, J. H. (2014). City size, happiness and spatial optimization of migration. *Economic Research Journal*, 49(1), 97-111 (in Chinese).

Veenhoven, R. (2005). Return of inequality in modern society? Test by dispersion of life-satisfaction across time and nations. *Journal of Happiness Studies*, 6(4), 457–487.

Wang, P. (2011). The impact of income inequality on subjective well-being: Evidence from Chinese general social survey data. *Chinese Journal of Population Science*, 03, 93-112 (in Chinese).

Wang, P., & Vander Weele, T. J. (2011). Empirical research on factors related to the subjective well-being of Chinese urban residents. *Social indicators research*, 101(3), 447-459.

Wu, X., & Cheng, J. (2013). The Emerging New Middle Class and the Rule of Law in China. *China Review*, 13(1): 43-70.