



# The Impact of Income Inequality on Subjective Well-Being: The Case of China

Jiawen Ding<sup>1</sup> · Javier Salinas-Jiménez<sup>1</sup> · Maria del Mar Salinas-Jiménez<sup>2</sup>

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## Abstract

The growing literature on happiness economics suggests that, together with absolute income, individual well-being is affected by relative income both horizontally (i.e. because of differences between an individual's income and that of others to whom she compares) and vertically (i.e. compared to changes in individuals' own income). Moreover, the way in which individuals value their relative situation and the distribution of income will determine how inequality affects individual well-being. This paper aims to examine the relationship between these variables in the case of China, focusing mainly on how income inequality affects subjective well-being. Using data from the CGSS, the results suggest that both absolute and relative income affect subject well-being, and that an inverted-U shaped relationship between income inequality and individual well-being appears at least for urban residents, whereas this relationship tend to be negative in the case of people living in rural areas.

**Keywords** Subjective wellbeing · Inequality · Interpersonal preferences

**JEL Classification** D31 · D6 · I30 · I31 · O53

## 1 Introduction

The study of subjective well-being knew a great interest after the pioneering work of Easterlin (1974), who was one of the first economists who studied the relationship between real GDP per capita and subjective well-being. When studying the temporal evolution of these two variables in advanced economies like the United States, he observed that even though income levels multiplied in the decades following the World War II, the average levels of satisfaction barely varied. This paradox (so-called the 'Easterlin Paradox') has also been confirmed for other developed countries (Frey and Stutzer 2002; Clark et al. 2008) as well as for European transition countries or China (Easterlin et al. 2012).

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✉ Maria del Mar Salinas-Jiménez  
msalinas@unex.es

<sup>1</sup> Universidad Autónoma de Madrid, Madrid, Spain

<sup>2</sup> Departamento de Economía, Universidad de Extremadura, Avda. Elvas s/n. 06006, Badajoz, Spain

Looking at the total economic product, China is already the second largest economy in the world and, in the last twenty years, China's national income and per capita income have known a remarkable increase, with a GDP per capita rate of growth of around 730%.<sup>1</sup> However, despite the fact that material conditions, quality of life and life expectancy have dramatically improved in China over the past two decades, the sense of happiness has not grown as much as per capita GDP and, according to the World Happiness Report, China ranks 93rd among 156 countries in 2018.<sup>2</sup>

Some authors blame this situation on income inequality.<sup>3</sup> Brockmann et al. (2009) attempt to explain this paradox for the case of China and find that the income distribution has become more skewed towards the upper income groups whereas the relative position of other groups has worsened. Based on the relative deprivation theory (and the idea of the 'frustrated achievers first introduced by Graham and Pettinato 2002), these authors claim that income inequality has become a significant factor in depressing individuals' well-being. Wu and Li (2013) also find that income inequality at the local level has a negative impact on subjective well-being. However, the relationship between inequality and individual well-being could be non-linear, as suggested by Wang et al. (2015), who find an inverted-U relationship between income inequality and individual well-being in China, a result that is taken as supporting the tunnel effect hypothesis proposed by Hirschman and Rothschild (1973), which states that perceived well-being increases with inequality up to a certain threshold and then decreases as inequality continues to rise.

In summary, it is observed that a significant increase in income and income inequality has occurred in China in the last decades, while stagnation in subjective well-being is observed. The empirical evidence on different periods and countries shows that the relationship between wealth, economic inequality and happiness is complex and can be non-linear and differ depending on socio-economic conditions. In this context, the aim of the present study is to analyze how income inequality affects subjective well-being in China,<sup>4</sup> taking into account the levels of both absolute and relative income and other variables referring to individual characteristics and the socio-economic context. To this end, the following section offers a brief review of the related literature, whereas Sect. 3 presents the methodology, the database and the variables used in the empirical analysis. Section 4 shows the results obtained for the whole sample and focusing on the dual rural–urban structure of China. Finally, the paper closes with a discussion of the main results found in this study.

<sup>1</sup> National Bureau of Statistics of China (NBS): <https://data.stats.gov.cn/english/easyquery.htm?cn=C01>.

<sup>2</sup> The World Happiness Report is an annual publication of the United Nations containing rankings of national happiness based on individuals' ratings of their own lives. <https://worldhappiness.report/ed/2019/>.

<sup>3</sup> The World Inequality Report 2018 shows that income inequality has notably increased in China since 1980, with its transition from communism to a capitalist economy. Furthermore, despite the general downward trend observed in the last decade, China's Gini coefficient remains higher than 0.4, which is considered to be the emergency threshold. <https://wir2018.wid.world/>.

<sup>4</sup> The literature on well-being bases on individuals' self-reported data about life satisfaction, happiness or subjective well-being. Although these terms are often used indistinctly (Ferrer-i-Carbonell, 2005; Deaton, 2008), there are significant differences among these constructs, some of them connoting emotion or mood whereas other refer to a broad evaluation of life. For a comparison of different measures of subjective well-being used in China, see Hsu et al. (2017).

## 2 Literature Review

The paradox that substantial increases in income do not go with increases in declared levels of happiness has greatly encouraged research into the impact of income on subjective well-being.<sup>5</sup> The question arising from this paradox is to identify what neutralizes the positive effect of income as a country gets richer. Next we focus on those explanations based on the role of income and income comparisons.

Several explanations highlight the role of absolute and relative income on subjective well-being, suggesting that individuals' satisfaction is positively affected by their own income, but negatively affected by the income of others. Easterlin (1974) already suggested that the utility obtained by the individuals derives from the comparison of their income with that of other individuals they take as reference. In this way, an increase in the absolute level of income of an individual who does not change her position in the distribution will not alter her subjective well-being.<sup>6</sup> Another idea suggested by Easterlin (1995) bases on income adaptation; the habit causes individuals to become used to their circumstances, so that changes in income only have transient effects on well-being, without permanent effects being observed once the individual has adapted to their new income.<sup>7</sup> In any case, these ideas are modeled in a similar way by considering that income is assessed in comparison with others (social comparison) or with oneself at a given time (adaptation), pointing to the role that the relative income plays in individual's well-being.

In general, the results obtained in the empirical literature reveal the importance of social comparison and relative income both in the case of developed countries (Clark and Oswald 1996; Ferrer-i-Carbonell 2005) and in the case of China (Knight et al. 2009; Asadullah et al. 2018). According to this, proposed models in the field of happiness economics usually assume that an increase in the income of others has a negative effect on perceived individual well-being, so that the relationship between inequality and individual well-being could be positive. These ideas contrast with models of inequality aversion, which assume a negative relationship between inequality and happiness (Fehr and Schmidt 1999).

Among the empirical studies that analyze the relationship between inequality and subjective well-being we find different results. Clark (2003) notes that subjective well-being shows an inverse relationship with the average income of the reference group. Moreover, by introducing variables related to income inequality the results suggest that individual well-being positively correlates with income inequality observed in the reference group. This result is at first opposite to assumptions of inequality aversion, although it is observed that those individuals who experienced greater income variability in recent years are those who are more favorable to inequality, suggesting that income inequalities might have a signaling effect about income opportunities. Alesina et al. (2004) examine the effects of inequality in Europe and the United States. Controlling for individual income, they find that individuals tend to declare less satisfaction when income inequality is greater, but

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<sup>5</sup> Other explanations that are commonly suggested in the literature refer to externalities that may go with higher levels of income, such as a worsening of social capital which could have a negative impact on individuals' well-being (for the case of China, see for example Bartolini and Sarracino 2015).

<sup>6</sup> The economic analysis of interdependent preferences or relative income is already found in Duesenberry (1949), or more recently in Pollak (1976) or Frank (1985).

<sup>7</sup> This interpretation is in line with the Set-Point theory in the psychological literature, which suggests that individuals tend to relatively stable levels of happiness ('hedonic treadmill'). See Diener et al. (2009) for a critical review of the psychological literature on adaptation and reference levels.

with differences between groups. The negative effect of inequality on well-being is higher among lower-income individuals in Europe, while in the United States there seems to be a greater tolerance for inequality because it tends to be perceived as a sign of income mobility. In the case of Latin America, Graham and Felton (2006) find a negative relationship between Gini coefficients and happiness (although this relationship tend to be positive for higher-income individuals), suggesting that people perceive inequality as an indicator of persistence in social differences and poverty traps. Similar mechanisms appear in the case of China, where increasing inequality leads individuals to perceive a more disadvantageous relative position, despite income gains, which in turns translate into lower subjective well-being (Brockmann et al. 2009). Income inequality also seems to be associated to subjective well-being of Chinese residents in a non-linear manner, with differences among people living in urban or rural areas (e.g. with city-level inequality being positively correlated to life satisfaction as a sign of social mobility in urban China, Jiang et al. 2012) and with an inverted U-shaped relationship between income inequality and individual well-being, with happiness decreasing when income inequality crosses a threshold (Wang et al. 2015).

Consequently, the empirical results found in the literature suggest that different attitudes towards inequality, depending on the fact that it is perceived as a persistent phenomenon linked to discrimination and poverty or, on the contrary, as a reflection of mobility and therefore of opportunities for improvement, will affect individuals' subjective well-being.

### 3 Empirical Framework

#### 3.1 Methodology

This study uses a multiple regression model for the econometric analysis with the aim of analyzing the influence of different variables on subjective well-being, paying special attention to the effect that income inequality has on individual well-being. In particular, the model to be estimated is as follows:

$$SW_i = \beta_0 + \beta_1 Gini_i + \beta_2 Gini_i^2 + \beta_3 X_i + \mu$$

where SW refers to subjective well-being, Gini is an indicator of income inequality (assuming an inverted-U shaped effect of inequality on well-being one would expect a positive coefficient for  $\beta_1$  and a negative one for  $\beta_2$ ), and  $X_i$  is a vector of variables referring to different individual characteristics and other socio-economic factors that may affect subjective well-being.

Since the measure of subjective well-being used in this study is an ordinal variable, an ordered latent response model should be used for the analysis. However, numerous studies assume the cardinality of the indices of well-being and use the Ordinary Least Squares (OLS) regression method (Knight et al. 2009; Brockmann et al. 2009; or Jiang et al. 2012). In fact, according to Ferrer-i-Carbonell and Frijters (2004), there is little difference to results between assuming the ordinality or the cardinality of the measures of happiness. For the sake of simplicity in the interpretation of the results, OLS estimators are used in this study.<sup>8</sup>

<sup>8</sup> Ordered probit regressions have also been run and the results are similar to those obtained with OLS regressions both in the sign and significance of the coefficients, which is in line with the conclusions of Ferrer-i-Carbonell and Frijters (2004). These estimates are not presented in the paper due to space limitations but are available upon request.

## 3.2 Database and Variables

Data used in this study come from the last wave of the Chinese General Social Survey (2015 CGSS)<sup>9</sup> and cover information on nearly 12,000 households in China mainland. The CGSS is a national representative continuous cross-sectional general survey that was launched in 2003 jointly by the Renmin University and the Hong Kong University of Science and Technology with the aim of collecting a wide range of socio-economic data to analyze the quality of life of Chinese residents. The 2015 CGSS follows a multi-stage stratified design and use the 2010 sampling design.<sup>10</sup> In accordance with international standards, the CGSS survey adopts a methodology similar to that of the World Values Survey<sup>11</sup> and uses face-to-face interviews with adults aged 18 and above. After cleaning the data ("rejection, not applicable or not knowing" answers were removed), the final sample size in this study reaches 9442 observations.

### 3.2.1 Dependent Variable

The dependent variable, subjective well-being (SW), is measured in CGSS by answers to the question "Generally speaking, how do you personally feel about your life?", with answers on a scale of 1 to 5 (where 1=very unhappy, and 5=very happy).<sup>12</sup> Figure 1 shows the distribution of subjective well-being among Chinese residents: with 60%, those who feel 'happy' represent the highest proportion, while around 18% of the respondents claim to feel 'very happy'. The average value of subjective well-being is 3.87, so the assessment of Chinese residents about their life is quite positive.<sup>13</sup>

### 3.2.2 Independent Variables

The main explanatory variables include absolute income, relative income and income inequality. Absolute income can be obtained from the questions in CGSS "What was your total income last year?" and "What was your family's total income last year?". By looking at the first question, it is found that there are 1637 individuals with a personal income equal to zero, of which 145 are students and the rest is mainly maintained with their family's financial support. Taking into account this large number of lost values, and that members

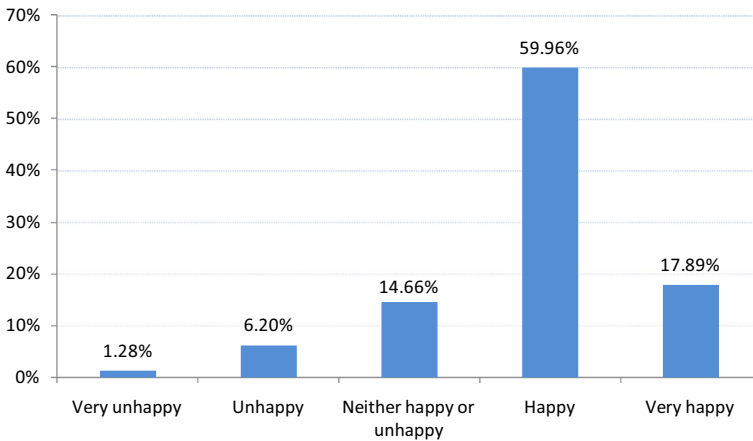
<sup>9</sup> Chinese General Social Survey: <https://cgss.ruc.edu.cn/index.php?r=index/index&hl=en>.

<sup>10</sup> Since 2003, the CGSS has used three different sampling designs and three sets of sampling frames: 2003–2006, 2008 and 2010–present. See details in: <https://cgss.ruc.edu.cn/index.php?r=index/sample>.

<sup>11</sup> Much of the studies on subjective well-being at the international level use data from the World Values Survey (WVS), which comes from interviews with almost 400,000 respondents from different countries. However, the last available data (WVS, round 2010–2014) only contains 2300 individuals from China, resulting in a relatively small sample. World Values Survey: <https://www.worldvaluessurvey.org/wvs.jsp>.

<sup>12</sup> The use of a 5-point Likert scale for the life satisfaction variable is common in the happiness literature, as is the case of works based on the Chinese General Social Survey (CGSS). Other surveys, such as the World Values Survey, use a 10-points scale (from 1 to 10) or a 11-point scale (from 0 to 10), such as the Gallup poll data used in the World Happiness reports. For a comparison of data on different representative samples implemented in China see Li and Raine (2014).

<sup>13</sup> When analyzing the responses about subjective well-being for different subsamples, no statistically significant differences were found between men and women. However, the T-test results indicate that there are statistically significant differences between urban and rural residents, being the average subjective well-being of urban residents significantly higher than that of the rural ones.



**Fig. 1** Distribution of subjective well-being. *Source:* CGSS 2015

of a family generally share wealth, it seems more appropriate to opt for the household income per capita to measure the absolute income variable.<sup>14</sup>

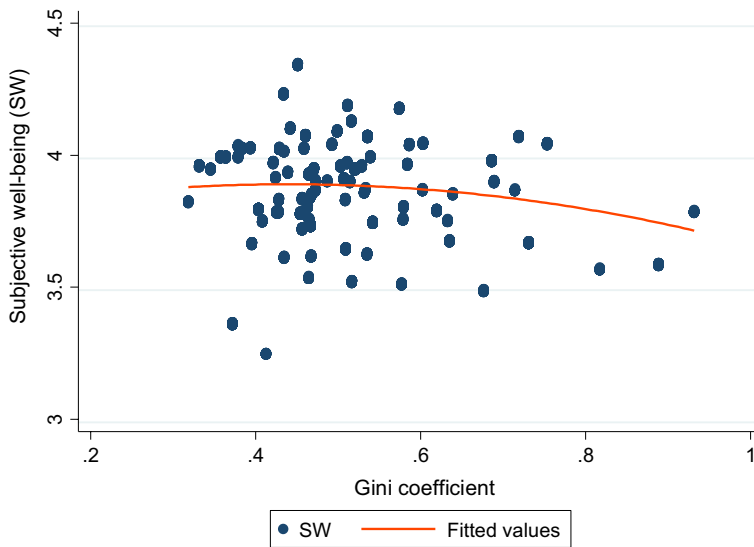
Although the relative income is generally more difficult to measure, the CGSS raises two questions that allow one to approximate the relative income both horizontally and vertically. Answers to the question “How does your socioeconomic status compare with that of your peers?” is used to measure the relative horizontal income whereas vertical comparisons are considered through answers to the question “How has your socioeconomic status changed compared to three years ago?”.

Income inequality is measured through Gini coefficients, based on the residents’ annual income at the municipal level.<sup>15</sup> Figure 2 presents a scatter plot, with the Gini indices along the x-axis and average subjective well-being at the municipal level along the y-axis. Fitting a quadratic polynomial to the data points, it is observed that subjective well-being first increases up to a Gini value between 0.4 and 0.5 and it decreases afterward. Based on this result, the initial hypothesis is that the relationship between income inequality and subjective well-being may adopt an inverted-U shape.

Other control variables that may affect individual well-being are introduced in the analysis. Variables considered at the microeconomic level refer to gender, age, education level, religion, health, marital status, being employed, or having participated in social security projects, whereas the provincial GDP per capita is considered at the macroeconomic level. Moreover, because of the dual urban–rural structure in China, the type of residence (rural

<sup>14</sup> Besides the annual household income, the CGSS also provides the resident population of the household, so the per capita income of the household can be directly obtained.

<sup>15</sup> Gini coefficients can also be calculated at the provincial or county level, but the coverage is too large at the provincial level, so resulting in less Gini indices, whereas it is too narrow and contains insufficient size samples at the county level.



**Fig. 2** Income inequality and subjective well-being

or urban) and the household registration or Hukou<sup>16</sup> are also introduced in the analysis. All variables used in this study are summarized in Table 1.

## 4 Empirical Results

Table 2 shows the results of the OLS regression for the full sample. Different models are specified by including only the main explanatory variables (columns 1 and 2) and then adding other control variables (columns 3 and 4). Also, the non-linearity of the relationship between income inequality and subjective well-being is analyzed by introducing a quadratic term for the Gini variable (columns 2 and 4). At first, a negative relationship between income inequality and subjective well-being is observed (columns 1 and 3). However, when the quadratic term for inequality is introduced, a positive coefficient is estimated for the Gini variable whereas a negative one is obtained for the squared term, thus supporting the hypothesis of an inverted-U shape relationship between income inequality and subjective well-being. In particular, when all control variables are considered, the estimated coefficient for the Gini variable is 1.257 and that

<sup>16</sup> Hukou is a household registration system in China that was formally created in 1958. According to this registration system, all Chinese citizens hold either an agricultural or non-agricultural Hukou in a particular location (rural or urban), and residents with different type of Hukou have different access to government-provided social programs, such as pensions, education, and health care, with greater benefits associated to non-agricultural Hukou. Since the 1990s, the Hukou system has known significant reforms and has evolved towards a weakening of the rural–urban division, although the distance between the area of residence and the type of Hukou is still significant. Also, restrictions on internal migration within China have been gradually removed, but most rural migrant workers still maintain their agricultural Hukou status (these people with an agricultural Hukou but living in urban areas are usually known as ‘migrant workers’). For a detailed description of the Hukou system and its impact on the China’s economy, see Song (2014).

**Table 1** Variables definition

Variable	Definition
<i>Dependent variable</i>	
SW: subjective well-being	Very happy, happy, neither happy nor unhappy, Unhappy, and very unhappy (with values of 5 to 1)
<i>Main explanatory variables</i>	
Income: absolute income	Household per capita income
RI (horizontal): relative income (comparison with peers)	Higher income level than that of their peers: value of 1; similar: value of 0; lower: value of - 1
RI (vertical): relative income (time comparison)	Compared to the income of three years ago, an increase: value of 1; no change: value of 0; a decrease: value of - 1
Gini: income inequality	Gini coefficient calculated by the annual income of residents at the municipal level
<i>Other control variables</i>	
GDPpc: per capita GDP	Per capita GDP at the provincial level
Area: type of area	Residents in urban areas: value of 1; rural areas: value of 0
Hukou: household registration	Registration as non-agricultural household: value of 1; agricultural household registration: value of 0
Gender	Women: value of 1; otherwise: value of 0
Age	Age
Married: marital status	Married: value of 1; otherwise: value of 0
Health: perceived health	If the self-assessment of own health is very satisfied or satisfied: value of 1; otherwise: value of 0
Education	Years of education estimated according to the highest level of education achieved
Religion	Having religious beliefs: value of 1; otherwise: value of 0
Politics	Member of the Communist Party of China: value of 1; otherwise: value of 0
Employed	Having a formal employment: value of 1; otherwise: value of 0
Social sec.: social security	Participation in Social Security projects: value of 1; otherwise: value of 0
Inc. satisf.: income satisfaction	Think that their current income is reasonable: value of 1; otherwise: value of 0

for the Gini squared is 1.221, both being significant at the 1% level. This means that, for the full sample, subjective well-being increases as income inequality increases, with a peak around 0.51, and then subjective well-being tends to decrease. Looking at the full sample, it is observed that 43% of the municipalities are above that peak, so a negative relationship between individual well-being and inequality is found in almost half of the municipalities.

All income-related variables show a positive and highly significant effect on subjective well-being. Absolute income appears to be a relevant factor affecting subjective well-being, although its effect is lower than that of relative income. Both horizontal and vertical relative income show a significant positive effect on individual well-being, with



**Table 2** OLS regression results for full sample

Variables	(1) SW	(2) SW	(3) SW	(4) SW
Gini	-0.213*** (0.0687)	1.332*** (0.458)	-0.158** (0.0674)	1.257*** (0.449)
Gini <sup>2</sup>		-1.333*** (0.397)		-1.221*** (0.389)
Income (Ln)	0.0544*** (0.00752)	0.0572*** (0.00755)	0.0416*** (0.00875)	0.0437*** (0.00877)
RI (horizontal)	0.337*** (0.0158)	0.337*** (0.0158)	0.249*** (0.0160)	0.249*** (0.0160)
RI (vertical)	0.169*** (0.0138)	0.169*** (0.0138)	0.148*** (0.0137)	0.148*** (0.0137)
GDPpc			-0.0125 (0.0139)	-0.0146 (0.0140)
Area			-0.0612*** (0.0215)	-0.0605*** (0.0215)
Hukou			0.0371* (0.0225)	0.0394* (0.0225)
Gender			0.0754*** (0.0160)	0.0757*** (0.0160)
Age			-0.0239*** (0.00319)	-0.0238*** (0.00319)
Age <sup>2</sup>			0.000256*** (2.90e-05)	0.000256*** (2.90e-05)
Married			0.184*** (0.0230)	0.182*** (0.0230)
Health			0.261*** (0.0174)	0.262*** (0.0174)
Education			0.00923*** (0.00246)	0.00937*** (0.00246)
Religion			0.0980*** (0.0258)	0.0937*** (0.0258)
Politics			0.0672*** (0.0240)	0.0640*** (0.0240)
Employed			-0.0291 (0.0230)	-0.0289 (0.0229)
Social sec.			0.0886*** (0.0304)	0.0885*** (0.0304)
Inc. satisf.			0.117*** (0.0171)	0.117*** (0.0171)
Constant	3.521*** (0.0836)	3.071*** (0.155)	3.629*** (0.188)	3.236*** (0.221)
Observations	9383	9383	9353	9353
R-squared	0.098	0.099	0.143	0.144

Robust standard errors in parentheses

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

an increase of well-being when the income level improves over time (vertical comparison) and even more when the individuals feel that their socioeconomic status is higher than that of their peers (horizontal comparison).

The estimates for other control variables are in line with those obtained in the previous literature.<sup>17</sup> In particular, it is found that those individuals who are married, more educated, enjoy good health, are satisfied with their income, have religious beliefs, are members of the Communist Party of China, or participate in Social Security projects tend to enjoy greater subjective well-being. In addition, other things being equal, women tend to be happier than men and the relationship between age and well-being is U-shaped, with the perception of well-being decreasing until the age of 46 or 47 years, when it starts to increase as the individuals get older. Finally, it is found that living in urban areas has a significant negative impact on subjective well-being whereas the influence of the type of Hukou is less significant, with a slightly positive effect of being registered as a non-agricultural household.

#### 4.1 Interaction Analysis

The analysis is extended with the objective of studying possible interactions between the explanatory variables. Table 3 shows the regression results when introducing these interaction terms.<sup>18</sup> The first three columns offer the results when the absolute income variable interacts with education, per capita GDP, and health. In the first case, it is observed that both the education and income variables have a positive and significant effect on well-being, although the impact of the interaction term is significantly negative, indicating that an increase in one of the two variables leads to a decrease in the marginal effect of the other. Similar results are found for the interaction between income and health, with a positive effect of both variables but a negative interaction in terms of marginal effects. Looking at the interaction between absolute income and per capita GDP, it is observed that the per capita GDP coefficient becomes significant and show a positive effect on individual well-being. Nevertheless, the interaction between the two variables shows a negative impact on well-being, so the decrease of the marginal effect of one variable when the other increases could cause the effects to cancel each other. It should also be noted that the influence of these interactions does not come with changes in the effect of the other explanatory variables and that the inverted-U shaped impact of the Gini coefficient on well-being is maintained.

Columns 4 to 7 show the estimates when the Gini coefficient interacts with other explanatory variables. Looking at the interaction between the Gini coefficient and the area of residence or the type of Hukou, it is observed that both interactions show a positive effect on well-being, suggesting that living in urban areas, or being registered as a non-agricultural household, significantly reduces the negative effect of the income inequality on well-being. However, these interaction effects are only significant in the linear relationship between the Gini coefficient and the subjective well-being. Additionally, it is found that when the income inequality increases, the marginal effect of

<sup>17</sup> See Dolan et al. (2008) for a comprehensive review on the determinants of wellbeing. In the case of China, see Appleton and Song (2008), Han (2015), or Asadullah et al. (2018).

<sup>18</sup> Due to space limitations, only those estimates for which the interactions variables show a significant effect on well-being are presented. Complete estimates are available upon request.

**Table 3** OLS regression results (full sample) with interaction variables

Variables	(1) SW	(2) SW	(3) SW	(4) SW	(5) SW	(6) SW	(7) SW
Gini	1.327*** (0.450)	1.327*** (0.451)	1.266*** (0.449)	-0.369*** (0.111)	-0.308*** (0.0917)	1.546*** (0.467)	1.114** (0.449)
Gini <sup>2</sup>	-1.277*** (0.389)	-1.280*** (0.390)	-1.224*** (0.388)			-1.300*** (0.388)	-1.142*** (0.388)
Income (Ln)	0.0771*** (0.0156)	0.368*** (0.138)	0.0646*** (0.0132)	0.0418*** (0.00874)	0.0421*** (0.00875)	0.0446*** (0.00879)	0.0436*** (0.00876)
RI (horizontal)	0.250*** (0.0160)	0.248*** (0.0160)	0.248*** (0.0160)	0.247*** (0.0160)	0.248*** (0.0160)	0.248*** (0.0160)	0.249*** (0.0160)
RI (vertical)	0.148*** (0.0137)	0.147*** (0.0137)	0.148*** (0.0137)	0.149*** (0.0137)	0.148*** (0.0137)	0.148*** (0.0138)	0.148*** (0.0137)
GDPpc	-0.0143 (0.0140)	0.294** (0.134)	-0.0147 (0.0139)	-0.0118 (0.0139)	-0.0117 (0.0139)	-0.0150 (0.0139)	-0.0156 (0.0139)
Area	-0.0623*** (0.0215)	-0.0619*** (0.0216)	-0.0618*** (0.0215)	-0.253*** (0.0753)	-0.0619*** (0.0215)	-0.0620*** (0.0215)	-0.0591*** (0.0215)
Hukou	0.0424* (0.0225)	0.0405* (0.0225)	0.0391* (0.0224)	0.0388* (0.0225)	-0.142* (0.0726)	0.0405* (0.0225)	0.0362 (0.0225)
Gender	0.0787*** (0.0160)	0.0751*** (0.0160)	0.0754*** (0.0160)	0.0751*** (0.0160)	0.0752*** (0.0160)	0.0763*** (0.0160)	0.0762*** (0.0160)
Age	-0.0242*** (0.00318)	-0.0238*** (0.00318)	-0.0237*** (0.00318)	-0.0236*** (0.00319)	-0.0237*** (0.00319)	-0.0239*** (0.00318)	-0.0237*** (0.00318)
Age <sup>2</sup>	0.000260*** (2.89e-05)	0.000255*** (2.89e-05)	0.000255*** (2.89e-05)	0.000255*** (2.90e-05)	0.000255*** (2.90e-05)	0.000257*** (2.90e-05)	0.000255*** (2.90e-05)
Married	0.180*** (0.0230)	0.182*** (0.0229)	0.180*** (0.0229)	0.183*** (0.0230)	0.183*** (0.0230)	0.182*** (0.0229)	0.181*** (0.0230)

Table 3 (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	SW	SW	SW	SW	SW	SW	SW
Health	0.260*** (0.0174)	0.260*** (0.0174)	0.625*** (0.143)	0.262*** (0.0174)	0.261*** (0.0174)	0.427*** (0.0742)	0.261*** (0.0174)
Education	0.0513*** (0.0149)	0.00925*** (0.00246)	0.00929*** (0.00245)	0.00954*** (0.00246)	0.00947*** (0.00246)	0.00947*** (0.00246)	0.00946*** (0.00246)
Religion	0.0929*** (0.0258)	0.0972*** (0.0256)	0.0934*** (0.0258)	0.0976*** (0.0258)	0.0950*** (0.0259)	0.0941*** (0.0258)	-0.194 (0.119)
Politics	0.0705*** (0.0241)	0.0639*** (0.0240)	0.0642*** (0.0240)	0.0670*** (0.0240)	0.0658*** (0.0241)	0.0628*** (0.0240)	0.0641*** (0.0240)
Employed	-0.0148 (0.0230)	-0.0272 (0.0229)	-0.0226 (0.0229)	-0.0281 (0.0229)	-0.0285 (0.0230)	-0.0305 (0.0229)	-0.0295 (0.0229)
Social sec.	0.0875*** (0.0304)	0.0900*** (0.0304)	0.0866*** (0.0304)	0.0899*** (0.0304)	0.0907*** (0.0305)	0.0874*** (0.0304)	0.0900*** (0.0304)
Inc. satisf.	0.118*** (0.0171)	0.117*** (0.0171)	0.117*** (0.0171)	0.117*** (0.0171)	0.117*** (0.0171)	0.117*** (0.0171)	0.117*** (0.0171)
c.Income#c.edu	-0.00437*** (0.00150)						
c.Income#c.GDPpc		-0.0322*** (0.0136)					
c.Income#c.Health			-0.0383*** (0.0148)				
c.Gini#c.Area				0.368*** (0.139)			
c.Gini#c.Hukou					0.351*** (0.136)		

**Table 3** (continued)

Variables	(1) SW	(2) SW	(3) SW	(4) SW	(5) SW	(6) SW	(7) SW
c.Gini#c.Health						-0.323** (0.142)	
c.Gini#c.Religion							0.555** (0.220)
Constant	2.909*** (0.257)	0.118 (1.377)	3.042*** (0.243)	3.718*** (0.191)	3.684*** (0.189)	3.107*** (0.230)	3.296*** (0.221)
Observations	9353	9353	9353	9353	9353	9353	9353
R-squared	0.145	0.145	0.145	0.144	0.144	0.145	0.145

Robust standard errors in parentheses

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$

**Table 4** Type of residence and Hukou distribution

Hukou	Residence			
	Urban (5532)		Rural (3910)	
Non-agricultural Hukou (4176)	3906	70.6%	270	6.9%
	93.5%		6.5%	
Agricultural Hukou (5266)	1626	29.4%	3640	93.1%
	30.9%		69.1%	

**Table 5** Average Income by type of residence and Hukou

Hukou	Residence	
	Urban (40,372.57)	Rural (20,002.01)
Non-agricultural Hukou (44,636.13)	45,484.93	32,356.76
Agricultural Hukou (21,756.05)	27,730.06	19,086.7

being religious on individual well-being increases whereas the marginal effect of having good health decreases. In short, it is observed that when income inequality increases, those people who live in urban areas, have a non-agricultural household, have religious beliefs, or do not enjoy a good health, are the least affected by the negative impact of inequality.

## 4.2 Stratification Analysis

Given the dual urban–rural structure in China, the influence of income inequality on subjective well-being by area of residence and Hukou is next analyzed in more detail. As shown in Table 4, most people with a non-agricultural Hukou live in urban areas (93.5%). However, it is also observed that near 31% of those individuals with an agricultural Hukou also live in urban areas as migrant workers, being difficult for them to access many of the social security services or benefits that local residents may enjoy. Table 5 offers the average income by area of residence and Hukou. As can be noted, living in urban areas and having a non-agricultural Hukou go with a higher average income. It is also to be noted that although migrant workers enjoy higher incomes than people with an agricultural Hukou in rural areas, their income is clearly below than the average income of those with a non-agricultural Hukou.

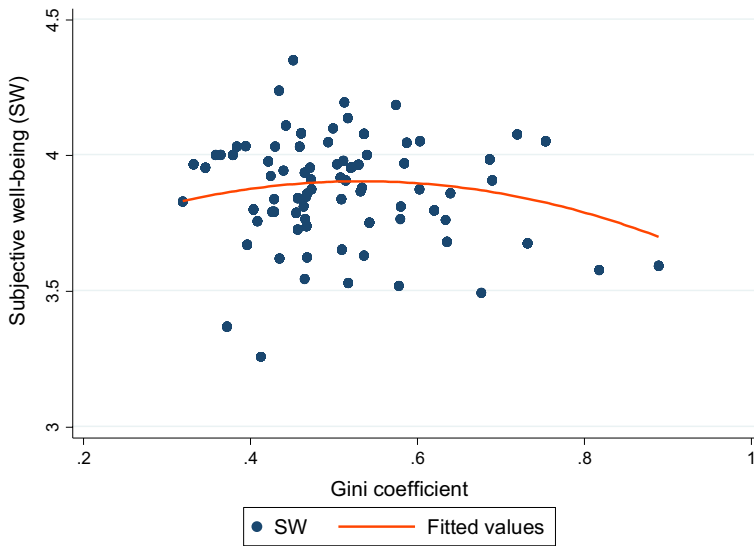
A T-test shows that there are significant differences in income between urban and rural residents, as well as between people with non-agricultural and agricultural Hukou. One also finds significant differences in income among people who live in urban areas but with different types of Hukou. Likewise, when the Gini variable is calculated separately for urban and rural areas, and for different types of Hukou, significant differences also appear. All this, together with the existence of significant differences in the levels of well-being noted in Sect. 3 between urban and rural residents, suggests that the relationship between income inequality and subjective well-being can be affected by the urban–rural structure.

**Table 6** OLS regression results for stratified sample: urban

Variables	(1) SW	(2) SW	(3) SW	(4) SW
Gini	-0.110 (0.0850)	1.820*** (0.487)	0.0216 (0.0837)	1.948*** (0.474)
Gini <sup>2</sup>		-1.783*** (0.440)		-1.781*** (0.424)
Income (Ln)	0.0742*** (0.0113)	0.0739*** (0.0113)	0.0460*** (0.0124)	0.0465*** (0.0124)
RI (horizontal)	0.299*** (0.0201)	0.302*** (0.0201)	0.211*** (0.0204)	0.214*** (0.0204)
RI (vertical)	0.188*** (0.0179)	0.189*** (0.0179)	0.165*** (0.0178)	0.166*** (0.0178)
GDPpc			-0.0170 (0.0172)	-0.0194 (0.0172)
Hukou			0.0603** (0.0258)	0.0597** (0.0257)
Gender			0.0722*** (0.0202)	0.0730*** (0.0201)
Age			-0.0256*** (0.00407)	-0.0254*** (0.00407)
Age <sup>2</sup>			0.000263*** (3.67e-05)	0.000262*** (3.67e-05)
Married			0.207*** (0.0281)	0.203*** (0.0281)
Health			0.241*** (0.0228)	0.243*** (0.0228)
Education			0.00670** (0.00318)	0.00652** (0.00318)
Religion			0.0743** (0.0336)	0.0707** (0.0337)
Politics			0.0935*** (0.0270)	0.0897*** (0.0270)
Employed			-0.0305 (0.0258)	-0.0314 (0.0257)
Social sec.			0.140*** (0.0382)	0.141*** (0.0382)
Inc. satisf.			0.121*** (0.0217)	0.124*** (0.0217)
Constant	3.247*** (0.118)	2.763*** (0.164)	3.492*** (0.240)	3.019*** (0.256)
Observations	5495	5495	5475	5475
R-squared	0.096	0.098	0.145	0.147

Robust standard errors in parentheses

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$



**Fig. 3** Gini coefficient and subjective well-being (urban areas)

### 4.3 Stratification Analysis: Urban Areas

Table 6 shows the OLS results for individuals living in urban areas. Columns 1 and 3 examine the linear relationship between the income inequality and subjective well-being, with no significant effect of the Gini variable on well-being. Columns 2 and 4 examine the nonlinear relationship between these two variables, with a positive coefficient being estimated for the Gini variable and a negative coefficient for its square term. Thus, an inverted-U shaped relationship between income inequality and subjective well-being appears, with a peak around 0.55 of the Gini coefficient. This peak is above that estimated for the whole sample, pointing out to greater tolerance for income inequality among residents in urban areas. Moreover, only 20% of the urban areas in the sample have a Gini coefficient greater than this peak, which means that in most urban areas income inequality has a positive effect on subjective well-being. This relationship is also observed in Fig. 3.

Other income-related variables (both absolute and relative income) maintain similar coefficients as those for the whole sample, with a positive and significant effect on well-being. Also, the regression results for other control variables remain similar to those of the whole sample, so we do not extend in their comments hereinafter. It should be noted, however, that the registration of households or Hukou gains significance ( $p < 0.05$ ), with a positive effect on well-being. This indicates that having a non-agricultural Hukou is relevant for people living in urban areas, being the urban residents with agricultural Hukou (migrant workers) those who manifest lower levels of well-being.

### 4.4 Stratification Analysis: Rural Areas

Table 7 shows the OLS results for people living in rural areas. Looking at the linear relationship between the Gini variable and subjective well-being (columns 1 and 3), it is

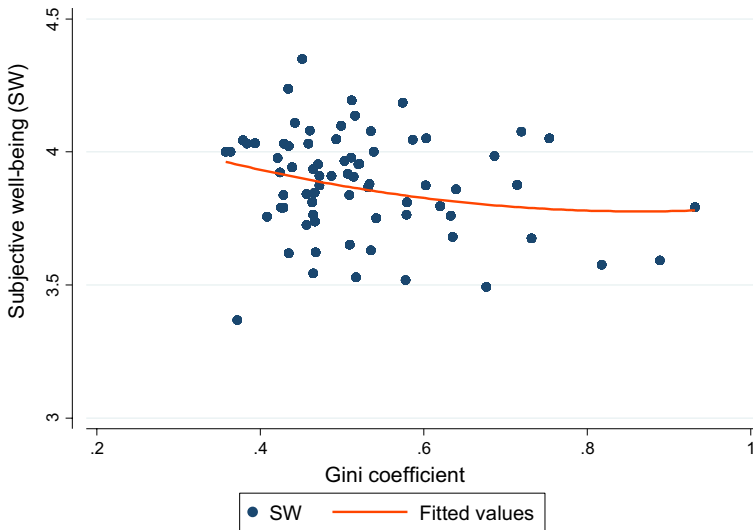


**Table 7** OLS regression results for stratified sample: Rural

Variables	(1) SW	(2) SW	(3) SW	(4) SW
Gini	-0.327*** (0.0982)	-0.855 (0.686)	-0.320*** (0.0973)	-1.260* (0.673)
Gini <sup>2</sup>		0.433 (0.562)		0.769 (0.551)
Income (Ln)	0.0454*** (0.0123)	0.0440*** (0.0125)	0.0379*** (0.0126)	0.0357*** (0.0127)
RI (horizontal)	0.385*** (0.0257)	0.385*** (0.0257)	0.300*** (0.0258)	0.299*** (0.0258)
RI (vertical)	0.142*** (0.0220)	0.143*** (0.0220)	0.125*** (0.0216)	0.126*** (0.0216)
GDPpc			-0.00784 (0.0237)	-0.00580 (0.0237)
Hukou			-0.0208 (0.0499)	-0.0251 (0.0500)
Gender			0.0834*** (0.0266)	0.0841*** (0.0266)
Age			-0.0210*** (0.00524)	-0.0211*** (0.00525)
Age <sup>2</sup>			0.000242*** (4.81e-05)	0.000244*** (4.82e-05)
Married			0.151*** (0.0400)	0.152*** (0.0400)
Health			0.286*** (0.0269)	0.286*** (0.0269)
Education			0.0133*** (0.00400)	0.0134*** (0.00401)
Religion			0.120*** (0.0398)	0.122*** (0.0398)
Politics			-0.00869 (0.0532)	-0.00807 (0.0532)
Employed			-0.0599 (0.0540)	-0.0608 (0.0541)
Social sec.			-0.00118 (0.0503)	0.000248 (0.0504)
Inc. satisf.			0.112*** (0.0280)	0.112*** (0.0280)
Constant	3.696*** (0.125)	3.858*** (0.243)	3.689*** (0.299)	3.952*** (0.357)
Observations	3888	3888	3878	3878
R-squared	0.102	0.103	0.146	0.147

Robust standard errors in parentheses

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$



**Fig. 4** Gini coefficient and subjective well-being (rural areas)

observed that income inequality has a negative and significant impact on subjective well-being in rural areas. However, columns 2 and 4, where a nonlinear relationship between these variables is considered, show no significant effect of income inequality, suggesting that there is not an inverted-U shaped relationship between income inequality and individual well-being in rural areas (this relationship is also shown in Fig. 4). Two facts may lie behind the negative linear relationship between inequality and well-being in rural areas. First, the average Gini coefficient is greater in rural areas than in the urban ones (0.52 vs. 0.46), so the threshold of tolerance for inequality may be exceeded in rural areas. And also, these results suggest that residents in rural areas do not perceive the opportunity to take advantage of inequality to ascend in the social scale, what consequently leads them to manifest lower levels of well-being.

Related to other income variables, it is noted that both absolute and relative income maintain a positive and highly significant effect on subjective well-being, although it is observed that the effect of absolute income is lower in rural areas than for the whole sample (the coefficient for this variable falls from 0.044 for the whole sample to 0.036 for residents in rural areas). Besides, it is observed that residents in rural areas are more affected by income comparisons with their peers (relative horizontal income). Finally, related to the registration of households, the estimates show that the type of Hukou does not have a significant impact on the subjective well-being in rural areas (a result which is not surprising since, as shown in Table 4, only 6.9% of people living in rural areas had a non-agricultural Hukou).

#### 4.5 Stratification Analysis: Type of Hukou

Table 8 presents the OLS estimates for people with different types of Hukou. These results partly correspond with the analysis by area of residence. In particular, it is observed that the effects of income inequality and absolute and relative income on well-being remain

**Table 8** OLS regression results for stratified sample by Hukou

Variables	(1)	(2)	(3)	(4)
	Non-Agricultural	Non-Agricultural	Agricultural	Agricultural
	SW	SW	SW	SW
Gini	0.0872 (0.0960)	1.962*** (0.511)	-0.247*** (0.0857)	-0.318 (0.669)
Gini <sup>2</sup>		-1.843*** (0.493)		0.0588 (0.547)
Income (Ln)	0.0470*** (0.0146)	0.0468*** (0.0146)	0.0429*** (0.0112)	0.0427*** (0.0112)
RI (horizontal)	0.210*** (0.0233)	0.212*** (0.0233)	0.281*** (0.0220)	0.281*** (0.0220)
RI (vertical)	0.165*** (0.0204)	0.167*** (0.0203)	0.131*** (0.0187)	0.131*** (0.0187)
GDPpc	-0.0321 (0.0197)	-0.0351* (0.0197)	0.00233 (0.0196)	0.00236 (0.0196)
Area	-0.00537 (0.0492)	-0.00698 (0.0488)	-0.0807*** (0.0243)	-0.0806*** (0.0243)
Gender	0.0766*** (0.0228)	0.0757*** (0.0228)	0.0814*** (0.0226)	0.0814*** (0.0226)
Age	-0.0255*** (0.00460)	-0.0256*** (0.00460)	-0.0230*** (0.00457)	-0.0230*** (0.00457)
Age <sup>2</sup>	0.000256*** (4.09e-05)	0.000257*** (4.09e-05)	0.000262*** (4.25e-05)	0.000262*** (4.25e-05)
Married	0.191*** (0.0318)	0.191*** (0.0318)	0.187*** (0.0337)	0.187*** (0.0337)
Health	0.249*** (0.0256)	0.255*** (0.0256)	0.264*** (0.0238)	0.264*** (0.0238)
Education	0.00314 (0.00367)	0.00280 (0.00367)	0.0145*** (0.00342)	0.0145*** (0.00342)
Religion	0.0731* (0.0390)	0.0802** (0.0391)	0.101*** (0.0343)	0.101*** (0.0343)
Politics	0.0962*** (0.0278)	0.0926*** (0.0278)	0.0322 (0.0508)	0.0322 (0.0508)
Employed	-0.0565* (0.0289)	-0.0588** (0.0288)	0.00774 (0.0412)	0.00761 (0.0412)
Social SEC.	0.118** (0.0463)	0.120*** (0.0461)	0.0803** (0.0406)	0.0804** (0.0406)
Inc. satisf.	0.0981*** (0.0249)	0.101*** (0.0249)	0.132*** (0.0236)	0.132*** (0.0236)
Constant	3.775*** (0.274)	3.369*** (0.292)	3.425*** (0.257)	3.446*** (0.317)
Observations	4126	4126	5227	5227
R-squared	0.141	0.144	0.143	0.143

**Table 8** (continued)

Robust standard errors in parentheses

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$ 

significant for people with a non-agricultural Hukou. Besides, it is noted that the area of residence does not have a significant impact on their well-being. However, for individuals with an agricultural Hukou, living in urban areas has a negative and significant impact on well-being, reflecting the difficulties of migrant workers living in urban areas (e.g. lower access to public-provided services and housing, differences in lifestyle, long-term family separation, etc.). Finally, it should be noted that the inverted-U shaped relationship between income inequality and individual well-being is found only for people with a non-agricultural Hukou, whereas people with an agricultural Hukou, as it was the case with those living in rural areas, do not perceive that income inequality is likely to bring opportunities to progress, so it comes with a negative impact on their subjective well-being.

## 5 Discussion and Conclusions

The main objective of this paper was to analyze the role of income and income inequality in subjective well-being in China. Using the 2015 CGSS database, the results show that most of the determinants of individual well-being found at the international level are also relevant in the case of China (e.g. income, gender, age, health, education). Moreover, some specific factors of the Chinese society, such as being member of the Communist Party or participating in Social Security projects also contribute to subjective well-being. Among these specific elements of China which contributes to explain individual well-being, the area of residence and the register of households or Hukou appear to have a major role, so especial attention has been paid to the dual urban–rural structure of China when analyzing how income and income inequality affect individual well-being.

Looking at the income variables, it is found that both absolute and relative income are relevant in explaining individual well-being, a result which is in line with previous studies for the case of China (Knight et al. 2009). However, absolute income and vertical comparisons (i.e. how individuals' own income evolves over time) show a greater impact in urban areas, whereas horizontal or social comparisons play a major role in rural areas. These different attitudes towards absolute and relative income might be reflected in different attitudes towards inequality. In particular, when the focus is placed on vertical comparisons, inequality can be seen as a way to ascend in the social scale, offering opportunities for improvement and consequently being positively valued. However, if these opportunities are not evenly distributed or the income distribution is skewed towards certain groups, income inequality could be perceived as a sign of discrimination and persistence of social differences (a result in line with the idea of the 'frustrated achievers' found for China by Brockmann et al. 2009). In this case, the unequal distribution of income could have a negative impact on well-being because of social comparisons, so even if absolute income increases the relative position in the income distribution could worsen.

In general, income inequality in China shows a negative impact on subjective well-being, although the relationship between inequality and well-being is not linear and significant differences appear between urban and rural areas. Similarly to Wang et al. (2015), we find an inverted-U shaped association between income inequality and well-being for

the whole sample, with a peak around a Gini of 0.51. Almost half of the municipalities are placed above this peak, so a negative relationship between inequality and well-being is observed. However, one finds greater tolerance towards inequality among urban residents, where subjective well-being increases with inequality until a Gini around 0.55. The average Gini coefficient in urban areas is around 0.46 and only 20% of the municipalities places above that peak, so most people living in urban areas tend to positively value income inequality as a way to progress and improve their income opportunities. On the contrary, residents in rural areas clearly perceive income inequality as negatively affecting their subjective well-being.

The analysis by type of Hukou runs parallel to that by area of residence, with a negative impact of inequality on well-being for those individuals registered with an agricultural Hukou whereas the relationship between inequality and well-being shows an inverted-U shape relationship for those with a non-agricultural Hukou. Besides, it is worth noting that having a non-agricultural Hukou in rural areas has no impact on well-being whereas having an agricultural Hukou in urban areas affects subjective well-being in a negative way, what indicates that migrant workers in urban areas do not perceive income inequality as a sign of social mobility.

These results reinforce the interaction analysis, which suggested that there exist different mechanisms of influence of income inequality within different groups, pointing out that living in urban areas or having a non-agricultural Hukou tend to reduce the marginal negative impact of inequality on individual well-being. In short, it is observed that the impact of income inequality differs depending on the area of residence and the register of households, which makes it necessary to consider the main problems faced by each group to try to avoid the existence of 'frustrated achievers' among rural residents and migrant workers who find it difficult to take advantage of the rapid economic growth experienced by the Chinese economy.

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