Impact of income inequality on individual’s health in China

Minya Li*

1School of Finance, Zhongnan University of Economics and Law, Wuhan, Hubei Province, 430073, China

*Corresponding author’s e-mail: minya_li@126.com

Abstract. There is a considerable number of existing literature exploring income inequality in relation to health, and a large majority of studies reported that health tended to be even worse in those more unequal societies. Our studies reexamined the relationships between health and income inequality. In more detail, we implemented both individual’s income level and family income level, and both mental health and physical, some interesting result can be seen in the later part of the research. In addition, as the individual’s income level and family income level mentioned above measured the absolute income, we also conducted the relative income as fairness into robustness check.

1. Introduction

Over the past 40 years, China's Gini coefficient increased from 0.16 to 0.47. This raises the question of whether the widening income gap will have an adverse effect on residents' health. Health involves the physical health and the mental health condition. There is a consensus on the effect of income inequality on individual health, with many studies suggesting an inverted u-shaped relationship (Elgar, 2010). It is worth noting that the residents income inequality in China of the present research on the effects of physical and mental health are very little, and it is still not clear that whether individual’s health condition is more relate to individual’s absolute income, or family income or the subjective relative inequality of income. Therefore, the relationship between them still needs further study, and this paper focuses on the impact of widening income inequality on the physical and mental health of Chinese residents.

A large number of studies have shown that absolute income is closely related to health, but in addition to the direct effect of income on health, the indirect effect of income has also attracted extensive attention from scholars, and a variety of relevant theoretical hypotheses and empirical research results have emerged. The representative theoretical hypothesis includes absolute income hypothesis, relative income hypothesis and income inequality hypothesis (Wagstaff & Van, 2016). The absolute income hypothesis suggests that increasing income improves health, but this boost diminishes as income increases (the sag effect). The relative income hypothesis suggests that an individual's health is not only related to absolute income, but also to relative income, and low relative income may lead to stress that leads to illness or impairs an individual's ability to access health-related resources (Oshio & Kobayashi, 2010; Karlsson, Nilsson, Lyttkens & Leeson, 2010). The income inequality hypothesis suggests that income inequality affects health in material and psychological ways. In general, in order to obtain the consistency and reliability of the results of the research on the relationship between income inequality and health, the existing research on the measurement of income inequality and health has gradually shifted from the data at the macro level to the data at the...
micro level, and in this research, by using the CGSS 2015 Micro Survey data, we try to explore the further relationships.

2. Methods

In the study, we set the health condition, namely, the self-reported physical health and the self-reported mental health as the dependent variables respectively, and as in the survey data the Likert quintile are implemented to measure the dependent variable health. Considering the characteristic of data, therefore in our research the main method is about Ordered Logit Model (Liu, 2013). We mainly controlled the age factor, and considering that in existing literature, the age factor was always demonstrated an U-shape with other variables (Gregorio & Lee, 2010), so we also took the age squared into the actual later research. Besides, we also controlled the gender, ethnic, religion factors, and as the Chinese household registration system may affect a lot, we considered the variable ‘area’ to measure the respondents from city or rural area, and some other factors, such as social status, whether attend the Party, personal income and family income also considered in our research. And the descriptive statistics and correlations for main variables can be seen at Table 1.

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|----------|-----|------|-----------|-----|-----|
| selfhea  | 10791 | 3.62 | 1.07 | 1.00 | 5.00 |
| dep      | 10778 | 3.84 | 0.92 | 1.00 | 5.00 |
| age      | 10796 | 50.32 | 16.87 | 18.00 | 94.00 |
| gender   | 10796 | 0.47 | 0.50 | 0.00 | 1.00 |
| ethnic   | 10779 | 0.92 | 0.27 | 0.00 | 7.00 |
| religion | 10796 | 0.88 | 0.32 | 0.00 | 1.00 |
| district | 10796 | 2.85 | 1.06 | 1.00 | 4.00 |
| area     | 10796 | 0.41 | 0.49 | 0.00 | 1.00 |
| edu      | 10769 | 3.01 | 1.29 | 1.00 | 6.00 |
| status   | 10796 | 2.47 | 0.83 | 1.00 | 5.00 |
| party    | 10796 | 0.10 | 0.30 | 0.00 | 1.00 |
| fair     | 10796 | 3.20 | 1.00 | 1.00 | 5.00 |
| ln_income| 8611  | 9.77 | 1.27 | 3.91 | 16.12 |
| ln_faincome| 9735 | 10.51 | 1.14 | 5.30 | 16.12 |

3. Empirical results

After getting the above mentioned variables controlled, we first generated the model with only the personal characteristics statistical variables as model (1) & (4), and we can see that the model (1), (2), (3) is for the self-reported physical health, and others are for the mental health. The Table 2 is only consider the main result, as the district, edu, status are all the categorical variables, we just considered them the overall impact on the dependent variable.

It is noteworthy that the gender factor have a significant impact on the health, and from what the data label set, we can get the preliminary finding about this is for female, they tend to consider they are healthier than male, and the social status can affect the health conditions as well, but as it is a categorical variable, we have to segment it in the later as robust test. And as to the income, in Table 2, we only considered the absolute income as individual actual income and the family actual income, and here we implemented the logarithmic approach, and we can find that only the direct individual actual income and the family actual income are significantly positive to individual’s health condition, and the U-shaped effect is not adapted in our research.
Table 2. Main regression result for the study

|        | (1) selfhs | (2) selfhs | (3) selfhs | (4) dep | (5) dep | (6) dep |
|--------|-----------|-----------|-----------|--------|--------|--------|
| age    | -0.076*** | -0.073*** | -0.072*** | -0.022*** | -0.023** | -0.020** |
|        | (0.006)   | (0.007)   | (0.008)   | (0.006) | (0.007) | (0.008) |
| age_2  | 0.032***  | 0.030***  | 0.029***  | 0.013*  | 0.017*  | 0.015*  |
|        | (0.006)   | (0.007)   | (0.007)   | (0.006) | (0.007) | (0.007) |
| gender | 0.258***  | 0.219***  | 0.245***  | 0.171*** | 0.119** | 0.150*** |
|        | (0.037)   | (0.042)   | (0.043)   | (0.037) | (0.042) | (0.043) |
| ethnic | 0.046     | 0.009     | 0.022     | 0.030   | -0.014 | -0.033  |
|        | (0.067)   | (0.076)   | (0.079)   | (0.068) | (0.077) | (0.079) |
| religion | 0.193***  | 0.197**   | 0.233***  | 0.145*  | 0.104  | 0.134*  |
|        | (0.057)   | (0.065)   | (0.066)   | (0.057) | (0.065) | (0.067) |
| district | 0.066***  | 0.021     | 0.012     | 0.093** | 0.087** | 0.079** |
|        | (0.018)   | (0.020)   | (0.020)   | (0.018) | (0.020) | (0.021) |
| area   | -0.105**  | 0.003     | 0.020     | -0.140*** | -0.016 | 0.002   |
|        | (0.041)   | (0.049)   | (0.050)   | (0.041) | (0.049) | (0.050) |
| edu    | 0.075***  | 0.024     | 0.015     | 0.162*** | 0.111*** | 0.099*** |
|        | (0.019)   | (0.022)   | (0.022)   | (0.019) | (0.022) | (0.023) |
| status | 0.322***  | 0.293***  | 0.278***  | 0.345*** | 0.313*** | 0.300*** |
|        | (0.022)   | (0.026)   | (0.026)   | (0.023) | (0.026) | (0.027) |
| party  | 0.174***  | 0.152**   | 0.141*    | 0.137*  | 0.094  | 0.075   |
|        | (0.063)   | (0.066)   | (0.068)   | (0.064) | (0.068) | (0.069) |
| ln_income | 0.146***  | 0.085**   | 0.169***  | 0.086** |        |        |
|        | (0.021)   | (0.027)   | (0.021)   | (0.027) | (0.026) | (0.026) |
| income_2 | -0.000    | 0.000     | -0.000    | -0.000 | -0.000 | -0.000 |
|        | (0.000)   | (0.000)   | (0.000)   | (0.000) | (0.000) | (0.000) |
| ln_faincome | 0.112***  | 0.141***  | 0.112***  | 0.141*** |        |        |
|        | (0.028)   |          | (0.028)   | (0.028) |        |        |
| faincome_2 | 0.000    |         | 0.000     | -0.000 | -0.000 | -0.000 |
|        | (0.000)   |          | (0.000)   | (0.000) | (0.000) | (0.000) |

N: 10748 8575 8187 10736 8566 8179
PseudoR2: 0.073 0.069 0.069 0.030 0.031 0.032

Considering that the Table 2 is only about the absolute income as the actual income of individual’s and family’s, and the relative income hypothesis suggests that an individual's health is not only related to absolute income, but also to relative income, and low relative income may lead to stress that leads to illness or impairs an individual's ability to access health-related resources. So in the Table 3, we replaced the ln_income and the ln_faincome into fair, the variable fair is generated by respondents answer the survey question ‘do you feel the income you get is reasonable’, and we put them in the main regression models, and the results are shown at Table 2, some variables are categorical variable, to be more specific, the education situation is classified as 6 categories and the social status situation is classified as 5 categories, we considered all the segmented type into the model. In addition, as the squared absolute income is not U-shaped related to the health condition, so in the Table 3 we only put the individual’s and family’s income in model (8) & (10) as the control reference model.

From Table 3, although the age, age’s squared, gender, religion and district factors almost the same as Table 2, we can still get something different from the formal Table. Firstly, after we classified more detailed education conditions, then the education factor becomes no longer significant. Secondly, for higher social status groups, it seems that they tend to think they are healthy, the possible reason lead to this may be they are optimistic. Satisfied with the status, and satisfied with everything. Thirdly, as for the relative income, individuals with higher fairness level also consider they are healthy.
### Table 3. Robust Check by relative income

|   | (7)          | (8)          | (9)          | (10)         | (11)         | (12)         |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| age| -0.082***    | -0.073***    | -0.033***    | -0.023**     | -0.074***    | -0.019**     |
|   | (0.006)      | (0.008)      | (0.006)      | (0.008)      | (0.006)      | (0.006)      |
| age_2| 0.037***     | 0.031***     | 0.019***     | 0.019**      | 0.030***     | 0.010*       |
|   | (0.006)      | (0.007)      | (0.006)      | (0.007)      | (0.006)      | (0.006)      |
| gender| 0.289***     | 0.249***     | 0.231***     | 0.143***     | 0.267***     | 0.175***     |
|   | (0.036)      | (0.043)      | (0.036)      | (0.043)      | (0.036)      | (0.037)      |
| religion| 0.219***     | 0.233***     | 0.187***     | 0.109        | 0.196***     | 0.144**      |
|   | (0.055)      | (0.065)      | (0.055)      | (0.066)      | (0.055)      | (0.056)      |
| district| 0.105***     | 0.009        | 0.142***     | 0.079***     | 0.073***     | 0.106***     |
|   | (0.017)      | (0.020)      | (0.017)      | (0.021)      | (0.018)      | (0.018)      |
| area| -0.227***    | 0.023        | -0.336***    | -0.000       | -0.135***    | -0.178***    |
|   | (0.037)      | (0.050)      | (0.037)      | (0.050)      | (0.041)      | (0.041)      |
| 2.edu| 0.092        | 0.193**      |              |              |              |              |
|   | (0.075)      | (0.075)      |              |              |              |              |
| 3.edu| 0.162*       | 0.461***     |              |              |              |              |
|   | (0.080)      | (0.080)      |              |              |              |              |
| 4.edu| 0.200*       | 0.451***     |              |              |              |              |
|   | (0.088)      | (0.088)      |              |              |              |              |
| 5.edu| 0.116        | 0.459***     |              |              |              |              |
|   | (0.099)      | (0.099)      |              |              |              |              |
| 6.edu| 0.083        | 0.583*       |              |              |              |              |
|   | (0.222)      | (0.227)      |              |              |              |              |
| 2.status| 0.376***     | 0.375***     |              |              |              |              |
|   | (0.068)      | (0.069)      |              |              |              |              |
| 3.status| 0.691***     | 0.718***     |              |              |              |              |
|   | (0.066)      | (0.068)      |              |              |              |              |
| 4.status| 0.752***     | 0.862***     |              |              |              |              |
|   | (0.104)      | (0.105)      |              |              |              |              |
| 5.status| 0.713**      | 0.585*       |              |              |              |              |
|   | (0.258)      | (0.258)      |              |              |              |              |
| status|             |              |              |              | 0.307***     | 0.315***     |
|   |              |              |              |              | (0.023)      | (0.023)      |
| ln_income| 0.085**      | 0.076**      |              |              |              |              |
|   | (0.026)      | (0.026)      |              |              |              |              |
| ln_faincome| 0.117***     | 0.139***     |              |              |              |              |
|   | (0.028)      | (0.028)      |              |              |              |              |
| 2.fair|              |              |              |              | 0.176*       | 0.197*       |
|   |              |              |              |              | (0.086)      | (0.089)      |
| 3.fair|              |              |              |              | 0.129        | 0.246**      |
|   |              |              |              |              | (0.086)      | (0.089)      |
| 4.fair|              |              |              |              | 0.352***     | 0.535***     |
|   |              |              |              |              | (0.083)      | (0.085)      |
| 5.fair|              |              |              |              | 0.406**      | 0.652***     |
|   |              |              |              |              | (0.132)      | (0.132)      |

| N  | 10791        | 8199         | 10778        | 8191         | 10764        | 10751        |
|----|--------------|--------------|--------------|--------------|--------------|--------------|
| PseudoR2| 0.063        | 0.070        | 0.016        | 0.033        | 0.074        | 0.033        |

### 4. Conclusion

In the context of China's middle-income trap and the further long run development, it is of great practical significance to explore the relationship between income inequality and personal physical and mental health to improve the life satisfaction of Chinese residents. This paper analyzed the absolute
income inequality, relative income inequality and the influence of different education levels and social status on individuals physical and mental health from the micro level. We found that the age_squared factor is roughly U-shaped in relation to physical and mental health condition. Besides, compared with the individual’s absolute income, the absolute income from the family has a greater impact on health, and this may because Chinese places more emphasis on families, and the income is tend to be measured in units. Since social status is also an important indicator of relative income level in the existing literature, after considering social class segmentation, we also found that people with high social class have better self-rated health, which may be due to their more optimistic personality.

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