

## **W**hose Income Matters for Health in China? Examination of Relative Income Hypothesis

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**Whose Income Matters for Health in China?**  
**Examination of Relative Income Hypothesis**

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**Abstract**

We are concerned about two potential problems of previous studies on the relative income hypothesis. First, previous studies assume that reference groups are geographically defined, because data are readily available for geographical reference groups. We examine non-geographical reference groups for the first time in the literature on the relative income hypothesis by utilizing subjective responses to the questions asking individuals to compare their own living standard with the living standard of others in multiple potential reference groups. The second motivation of our study is that previous estimates of the effect of relative income on health could be biased due to unobserved community characteristics that may be correlated with both health and the typical measures of relative income such as mean income and income inequality within communities. We address this potential bias by making use of township fixed effects. We show by comparing the results with and without township fixed effects that our subjective measures of relative income are unlikely to be correlated with unobserved community characteristics affecting health. Further, we address a potential weakness of our subjective measures of relative income by estimating individual dispositions (pessimism/optimism) and controlling for them in our empirical exercises. Our findings support the relative income hypothesis and reveal that relatives, villagers, and others in the same county would be important reference groups when people compare their living standard with someone else's.

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# **Whose Income Matters for Health in China? Examination of Relative Income Hypothesis**

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## **Introduction**

Why does health inequality exist? Previous studies consistently find a health “gradient” which is a strong association between health status and socioeconomic status, but we remain almost ignorant about mechanisms through which the health gradient occurs. The only pathway that is largely agreed with significant accumulation of evidence is that higher income produces better health potentially through improved material conditions and greater purchasing power including for health-care services in low-income countries, but this pathway is less convincing in rich countries (for example, see Duleep 1986; Duflo 2000; Case 2001; Case, Lubotsky, and Paxson 2002; Lindahl 2005; Pritchett and Summers 1996; Ettner 1996). Especially for rich countries, it is also evident that income inequality causally creates at most partial health inequality, and the rest of health inequality largely remains unexplained. Examining the sources of health inequality is, of course, important from the policy perspective, because the welfare of individuals is largely influenced by health status.

One promising hypothesis that has begun to attract attention recently is the relative deprivation hypothesis: it is social rank in a reference group that determines health, especially in rich countries where material conditions such as clean water, good sanitation, adequate nutrition, and adequate housing and warmth are mostly satisfied (Wilkinson 1996; Deaton, 2001 and 2002; Marmot 2002). One idea behind this hypothesis is that people in lower social status are more exposed to stress than others in upper social status, and that continued exposure to stress could incrementally ruin health. Numerous medical studies have established correlations between stress and the incidence and progression

of many illnesses (Lovallo 1997 and Sapolsky 1998 for reviews). However, empirically testing the relative deprivation hypothesis has been plagued with the difficulty in observing reference groups in which people rank themselves. Previous empirical studies have assumed that the reference groups are mainly geographically defined solely because data are more easily available for geographical reference groups (Eibner and Evans 2001; Mellor and Milyo 2002; Gerdtham and Johannesson 2004). However, there are other potential reference groups that may be more important when people compare their living standards with someone else's, such as relatives, co-workers, and classmates. Further, even for geographical reference groups, few attempts have been made to determine which district level approximates the area of the appropriate geographical reference group. In our study, we address these problems, utilizing survey questions from China. Unlike previous surveys, the survey directly asks respondents' perceptions of their own living standards relative to others in multiple reference groups such as co-workers, relatives, classmates, and multiple regional levels of neighbors (village, county, province, and nation). Also, as far as we know, our study is the first study that examines the relative deprivation hypothesis outside of industrialized countries. China is a particularly interesting case because it is a country where income inequality has increased at a very rapid rate as China has transformed itself from a socialist planned economy to a market-based system. The World Bank (1997) finds that China's overall gini coefficient grew from 0.288 in 1981 to 0.388 in 1995, from 0.176 to 0.275 in urban areas and from 0.242 to 0.333 in rural areas.

We are also concerned that the measures of relative deprivation in previous studies could be correlated with unobservable regional characteristics affecting health, which could bias the estimates. Specifically, previous studies typically use some inequality measures (such as gini coefficient) or mean income within a region as the measures of relative deprivation. It is possible, for example, that a higher mean income or more equal income distribution within a region is correlated with better medical facilities within the region,<sup>1</sup> which, in turn, could

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<sup>1</sup> See Bénabou (1996) for reasons why a more equal income distribution within a region could increase expenditures on public goods within the region.

affect health in the region. For this reason, it is very important to control for regional characteristics, which most previous studies do not pay much attention. This may be a reason why previous studies find mixed results on the effect of relative deprivation on health. We make use of township fixed effects (the smallest district level we can identify in our data set) for this purpose, and see any differences in the estimates with and without controlling for township fixed effects.

Both our health measures (self-reported health and mental health index) and relative income measures (subjective assessment of own living standard in comparison with multiple potential reference groups) are subjective, giving rise to the concern that our estimates of the effect of relative income on health are spurious due to omitted variables such as pessimism and optimism. We address this concern by estimating pessimism/optimism and controlling for the estimated pessimism/optimism in our econometric analysis.

The rest of the paper is organized as follows. The next section reviews previous studies on the effects of relative income and income inequality on health. Data and descriptive statistics are presented in Section 3, and econometric results follow in Section 4. It also contains a description of our method to control for omitted pessimism/optimism in estimating the effect of relative income on health. The paper ends with a concluding section.

### **Review of Previous Studies**

The two most famous surveys that have motivated the relative deprivation hypothesis are the two Whitehall studies of British civil servants conducted almost 20 years apart (1967 and 1985). Marmot et al (1991) finds that the 20-year interval has seen no decrease in the relative prevalence and incidence of many diseases and other health outcomes between the lowest and highest employment grades. This finding came as a surprise because absolute income levels were rising in Britain and because there was a determined effort to equalize access to health care during the 20-year period (Wilkinson 1996). Moreover, consistent with the relative deprivation hypothesis is the evidence

that the health gradient exists over the whole spectrum of socioeconomic status in rich countries, suggesting that there is no threshold such as a poverty line above which socio-economic status ceases to be correlated with health status (Marmot et al 1991; Davey Smith et al, 1990, 1996a, 1996b; Der et al 1999).

As far as we know, Wilkinson is the first scholar who formally advanced the concept of the relative deprivation hypothesis (Wilkinson 1996 for review). He claims that income inequality is a crucial determinant of population health, once the society has experienced the epidemiological transition, after which the dominant cause of mortality and morbidity changes from infectious diseases to degenerative ones (cardiovascular diseases, cancer, stroke, etc.), and a stark correlation between absolute income and health attenuates. He describes that income inequality accompanies unequal access to life opportunities and lack of social cohesion, and creates chronic stress among the relatively deprived. Wilkinson (1996) presents evidence that cross-country comparisons, not only in level but also in change, show a negative correlation between population health (life expectancy) and income inequality (Gini coefficient). Other research has supported his hypothesis, mainly using evidence from the U.S. states as the unit of analysis (Kawachi et al 1997; Kennedy et al 1998).

One concern of using aggregated health rather than individual health as the unit of analysis as in Wilkinson 1996, Kawachi et al 1997, and Kennedy et al 1998 is so-called the ecological fallacy: aggregated health is negatively associated with income inequality (after controlling for income) even if income inequality does not causally affect health as long as the relationship between individual income and individual health is plausibly concave. Mellor and Milyo (2002) finds no statistically significant association between individual health and the state- and MSA-level income inequalities after controlling for individual and regional characteristics, concluding that a negative correlation between aggregated health and income inequality found in some previous studies was partly due to the ecological fallacy. Further, Deaton et al (1999), using panel data of birth-cohorts, finds that higher inequality is associated with *lower* mortality in the US in the late 1970s and early 1980s.

Eibner and Evans (2001) creates measures of income inequality based on Yatzhaki's index, and defines reference groups using combinations of state, age, race, and education. They find that mortality is higher for those who are deprived in the defined reference groups for males aged between 21 and 64 in the US. Gerdtham and Johannesson (2004) uses Swedish individual mortality data where individuals were followed for 10 – 17 years, and finds that mortality significantly decreases as absolute income increases, but neither mean income nor the gini coefficient of the municipality matters for health.

Next, we review potential causal links from income inequality to population health. Evidence has been provided from many disciplines, such as epidemiology, sociology, criminology, psychology, political science, economics, and biology. Lynch and Kaplan (1999) argues that as the gap between the rich and the poor widens, interests diverge, translating into reduced social spending and leading to reduced access to life opportunities especially among the poor. They find a strong negative relationship between income inequality and support for human services for the US states.

House et al (1999) summarizes evidence that social relationships are significant predictors of mortality. Social relationships may affect health either by fostering a sense of coherence that promotes health or by facilitating health-promoting behaviors. Social cohesion is associated with successful health promotion efforts and positive behaviors, while lack of social cohesion is related with detrimental behaviors, such as adolescent pregnancy, smoking, binge drinking, drug abuse, and violence. Larger income inequality could lead to lack of social cohesion which is correlated with poor population health.

Another pathway is through psychosocial stress associated with low rank. Numerous medical studies have established correlations between stress and the incidence and progression of many illnesses (Lovallo 1997 and Sapolsky 1998 for reviews). Experimental research on primates has found that low social status gave rise to high cholesterol, increased atherosclerosis, obesity, and depression (Shively and Clarkson

1999; Shively, Laber-Laird, and Anton 1999; Sapolsky, Alberts, and Altmann 1999). Kristenson et al (1999) finds similar patterns in humans using random samples of Lithuanian and Swedish men. Lithuanian men had higher job strain, lower social support, and higher vital exhaustion than Swedish men did in 1994. The authors find that cortisol and cardiovascular responses to standardized laboratory stress tests significantly differed between the two countries in favor of Swedish men. Further, other studies have reported a link between stress caused by economic hardship and health-related behaviors such as smoking, heavy alcohol use, and less healthy diet (Conway et al 1981, Gorman 1988, Horwitz et al 1994, Jensen 2001).

## **Data**

The Social Inequality Survey (SIS) was designed to assess how Chinese people perceive the growing wealth inequality in the country over the past few decades. The survey interviews were fielded between September and November in 2004. Largely influenced by the fact that this survey was mainly designed by sociologists, many questions ask subjective perceptions about social inequality. Included in the survey are questions asking the respondents to rate their living standards in comparison with multiple reference groups: relatives, classmates, coworkers, villagers, and others in the same county, province, and China, respectively (five scales from much worse to much better).<sup>2</sup> We make use of the subjective responses to these questions to examine which reference groups are more important than others when people compare their own living standards with others'. Economists have a history of avoiding subjective measures for justifiable reasons, and our study could more convincingly appeal to the audience if we had some objective measures of relative deprivation in multiple comparison groups. At the same time, however, we think that in our study it is subjective perceptions of own living standards that affect health under the hypothesis that psychosocial stress gradually undermines the health of the relatively deprived.<sup>3</sup> Fortunately, as in previous studies, some objective measures of

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<sup>2</sup> Specifically, the exact phrases of the translated question goes this way: "Compared with average living standard of your relatives (your classmates, your coworkers, your neighbors/other villagers, others in this county/city/district, others in this province/municipality, or everyone in this country), do you feel your living standard is much better, a little better, about the same, a little worse, or much worse?"

<sup>3</sup> This is a subtle issue. We believe that there are two ways of defining a relative position in a reference group. Suppose that rank is determined by income within a reference group. The first view is that relative income is defined by the objective



relative deprivation in geographically-defined reference groups are available in our data set, and we use both subjective and objective measures of relative deprivation for geographically-defined reference groups, to see whether the results make any difference. For non-geographical measures, we use only subjective measures of relative deprivation to test the relative deprivation hypothesis. Also, we propose a methodology to econometrically overcome the weakness of our subjective measures of relative deprivation, as detailed below in the Econometric Results section.

The SIS is an individual survey and does not ask detailed information about other household members. Besides questions about the respondent's perception of social inequality, the SIS asks self rated health status (five scale from very poor to very good), and eight questions regarding the respondent's mental condition in the past week.<sup>4</sup> We create an index of mental health by standardizing the responses to the eight mental questions and calculating their mean for each individual. The higher is the index, the healthier people are mentally (the less depressed people are in their lives). We call the created index "mental health." We use both self-rated health and mental health as our health measures in this paper.

The SIS also collects information about individual demographic characteristics and household income. A multistage random cluster approach was taken to construct the sample, which consists of 3,267 individuals whose ages range from 18 to 70 in 2004. For the data analysis in this paper, we use the sampling weight to make the constructed sample nationally representative. The 3,267 sample individuals are located throughout 23 provinces,<sup>5</sup> 65 counties, and 85 townships all over China. The average number of sample individuals within a sample

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income position within a reference group, while the second view is that relative income is defined by the subjective income position within a reference group. In the second view, it is possible that although one's objective income position within a reference group is near the top, her relative income in the reference group is near the bottom because she *believes* that her income position within the reference group is near the bottom.

<sup>4</sup> Specifically, the question about the respondent's mental condition last week goes this way: "Below are some descriptions of people's life conditions. In the past week, did you experience these sorts of conditions: often, sometimes, rarely, or never? a. I worry about some small things. b. I have no appetite for food. c. I cannot focus my attention while doing things. d. I feel my life is a failure. e. The quality of my sleep is poor. f. I feel fortunate. g. I feel alone. h. I feel my life is very happy."

<sup>5</sup> Liaoning, Heilongjiang, Beijing, Hebei, Shanxi, Shaanxi, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Hunan, Guangdong, Hainan, Anhui, Jiangxi, Henan, Hubei, Ningxia, Xinjiang, Guangxi, Yunnan, and Xizang.

province, county, and township is 210.3, 82.7, and 64.4, respectively. Due to cluster sampling, 46 sample counties out of 65 (70.8%) include only one sample township, 18 sample counties (27.7%) include only two sample townships, and one sample county (1.5%) includes only three townships.

Table 1 shows descriptive statistics of the main variables used in this paper. The great majority of sample individuals report OK or better (86.5%) for self-reported health, while the distribution of the mental health index is more symmetric in the sense that approximately half of them (51.7%) report mental health more than zero (fewer depressing experiences in their daily lives than the mean), because we standardize responses to the eight questions regarding mental conditions of individuals, and calculate individual means.

Table 1 also presents sample individuals' perceptions of own living standard relative to seven potential reference groups. Three of them use non-geographical reference groups (relatives, classmates, and co-workers), and the remaining four use geographical reference groups (village, county, province, and nation). For the non-geographical reference groups, the tendency to report middle alternatives is clear. Thirty four percent to 52% of sample individuals report that their living standard is about the same as the living standard of their relatives, classmates, and co-workers. For the geographical reference groups, the picture is somewhat different. Although more than 50% of sample individuals feel that their living standard is about the same as the living standard of others in the same village, more than 50% of sample individuals think that their living standards are a little or much worse than the living standard of others in the same county, province and China as a whole. In contrast, less than 10% of individuals think that their living standards are better than that of others when the reference group is either county, province, or nation.

The SIS asks sample respondents to report their household income of the entire year 2003. Of the total 3,267 sample individuals, 2,517 individuals (77%) report their household income. For the remaining 750 individuals, household income is not available, but 390 individuals (12% of 3,267) report their household income

ranges.<sup>6</sup> We impute missing household income by using predicted values obtained from the OLS regression of 2,507 household income on the following independent variables: 85 township dummies (one of them is the reference township, so omitted from the regression), a dummy variable for urban residence, a dummy variable for households with agricultural registrations, a dummy variable for households whose household income is mainly from agriculture, log household size, the ratio of college graduates to total household size, the ratio of high-school graduates to total household size, the ratio of income earners to total household size, and eight dummies for household assets (motor cycle, car, refrigerator, color TV, computer, camera, telephone/cell phone, and washing machine). For income imputation, we do not mean to establish anything causal, and we simply rely on correlations between household income and the independent variables. For households which report income ranges, we use the imputed household income only when it falls within the reported ranges. If the imputed income is larger than the max value of the reported range, we use the max value of the reported range as income for the household. Similarly, if the imputed income is smaller than the minimum value of the reported range, we use the minimum value of the reported range as income for the household. Neither the predicted household income nor reported household income is available for six individuals due to missing observations, thus they are dropped from analysis. With income imputation, household income is available for 3,261 sample individuals.<sup>7</sup> If the per-capita imputed income or per-capita reported income is less than one RMB, we replace them by one, so we can calculate log per-capita household income later. Per-capita household income varies widely across individuals as shown in Table 1. Mean per-capita household income within township, county, and province also differ considerably across townships, counties, and provinces, respectively.

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<sup>6</sup> There are 16 ranges of household income separately for agricultural and non-agricultural households.

<sup>7</sup> Our results given below are robust to how to handle individuals with missing household income. Using the mid points of the income ranges for individuals who reported income ranges and dropping sample individuals who reported neither income nor income ranges, we find qualitatively the same results as the results we present in this paper. Without income imputation, the sample size is smaller (N=2,907), and the analyses produce statistically significant results less often in comparison with the case with income imputation.

Next, we show how the self-reported health and mental health indexes are correlated with how individuals rate themselves in each potential reference group. Individuals choose one of the five alternatives (much better, a little better, about the same, a little worse, or much worse) in comparing their living standard with others' in each reference group. We calculate mean self-reported health scores (1: very poor to 5: very good) and mean mental health scores (the larger mental health score the fewer depressing experiences an individual has) separately for each one of five perceptions of living standard in each reference group. Figure 1 summarizes the results. Besides subjective rating of own living standard, we look at the two health scores by per-capita household income quintile. Focusing on self-reported health, there are strong associations between self-reported health and the perception of own living standard in comparison with others in each of the seven reference groups. We also see a strong correlation between self-reported health and per-capita income quintile. Simple correlation between self-reported health and perception of own living standard for each reference group is 0.1846 (p-value=0.0000) for relatives, 0.1917 (p-value=0.0000) for classmates, 0.1222 (p-value=0.0000) for coworkers, 0.2180 (p-value=0.0000) for villagers, 0.1859 (p-value=0.0000) for county, 0.1406 (p-value=0.0000) for province, 0.1873 (p-value=0.0000) for country, and 0.1770 (p-value=0.0000) for per-capita income quintile. Turning to the mental health index, the associations are less evident in general, but we still see that the mental health scores are low when individuals consider that their living standard is a little or much worse than the living standard of others in multiple reference groups. Simple correlation between the mental health score and perception of own living standard for each reference group is 0.1678 (p-value=0.0000) for relatives, 0.1838 (p-value=0.0000) for classmates, 0.1352 (p-value=0.0000) for coworkers, 0.1481 (p-value=0.0000) for villagers, 0.0989 (p-value=0.0000) for county, -0.0015 (p-value=0.9384) for province, 0.0348 (p-value=0.0753) for country, and 0.0667 (p-value=0.0001) for per-capita income quintile.

## Econometric Results

### 1) Econometric Model

We use the self-reported health and mental health indexes as dependent variables. As relative income measures, we prepare both objective and subjective measures. The relative deprivation hypothesis implies that after controlling for own income, the higher the income of others in a reference group, the more deprived people are, thus the poorer their health is. The objective measures are mean log per-capita household income within townships and provinces. As discussed earlier, a great majority of sample counties (70.8%) contain only one sample township due to cluster sampling, and the rest of counties include at most three townships. To avoid multi-collinearity, we use mean log per-capita household income within townships and provinces only and do not use mean income within counties. For the subjective measures of relative income, we use perceptions of own living standard relative to others in seven potential reference groups: relatives, classmates, co-workers, villagers, others in the same county, province, and China as a whole.

The estimating equation is as follows:

$$h = \beta_0 + \beta_1 \log(y) + \beta_2 RI + \beta_3 X + \beta_4 TOWNSHIP + \varepsilon \quad (1)$$

where  $h$  is either self-reported health or the mental health scale,

$y$  is per-capita household income,

$RI$  is a vector of relative income measures,

$X$  is a vector of demographic variables including a dummy variable indicating whether the place of residence is in urban area or not,

**TOWNSHIP** is a vector of dummy variables for 85 sample townships (one of them is the reference township),

$\varepsilon$  is the remaining error,

and  $\beta_0$ ,  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ , and  $\beta_4$  are all coefficients to be estimated.

### 2) OLS with objective relative income measures

First, we estimate the equation (1) using OLS with traditional relative income measures without township fixed effects. Specifically, we use mean log per-capita

household income within townships and provinces as the relative income measures. This specification is similar to the one which previous studies typically adopt. In this case, we cannot employ township fixed effects because township fixed effects would absorb the effects of mean household income within townships and provinces on health, which are the main variables of our interest. We think that the coefficients on mean per-capita household income within townships and provinces theoretically take either a positive or negative sign, because two contradictory forces work simultaneously. On the one hand, higher mean income within townships or provinces could lead to better regional infrastructure including food markets and health-care facilities, so people live more healthy lives. On the other hand, higher income of others could ruin the health of the relatively deprived according to the relative income hypothesis. Depending on which force is stronger, the effect of regional mean income on individual health could be either positive or negative.

Columns (1) and (2) in Table 2 use self-reported health (1: very poor to 5: very good) and the mental health scale (the larger the mental health scale the fewer depressing experiences) as the dependent variable, respectively. No matter which health measure is used for the dependent variable, higher own income is significantly correlated with better self-reported health and fewer depressing experiences in daily life. Mean log per-capita household income within townships is negatively correlated with the health measures after controlling for own income, meaning that the higher is the income of others within the same township, the poorer the health of individuals is, supporting the relative income hypothesis. Further, the estimated coefficient on mean income within townships is larger than that on own income in absolute value, suggesting that the association of health and mean township income could be very strong. In contrast with mean township income, mean province income is positively associated with the self-reported health and the mental health scale, supporting that the effect of better infrastructure is greater than the effect of relative deprivation on the province level.

For other demographic variables, the coefficient estimates are mostly as expected.

Males are more likely to describe themselves healthier and less likely to report depressing experiences than females, which is consistent with the view that China is a pro-male society, so females are more exposed to depressing life events or more resources are devoted towards males than towards females inside and outside of households. As people become older, their self report of health becomes worse at a decreasing rate (the coefficient of the squared-age term is positive). In comparison with married individuals, people with other marital statuses are more likely to report poorer health, but the effects are not always statistically significant at the conventional levels. Education also seems to be correlated with self-reported health and depressive life experiences. In reference to individuals without primary education degrees, self reported health is better and the fewer depressing life experiences people have for those with at least primary education degrees, but the association between education and health seems nonlinear in the sense that individuals with middle-school-education degrees may have the best self reported health and the least depressing experiences among all educational groups. Residing in urban areas is associated with poorer self-reported health and more depressing life experiences after controlling for other covariates.

3) OLS with subjective relative income measures without township fixed effects  
 Next, we estimate Equation (1) using OLS with the subjective measures of relative income without township fixed effects. Columns (3) and (4) in Table 2 present the coefficient estimates. Higher own income is associated with better health and fewer depressing experiences, and all coefficients on the demographic variables are similar to before. Of the seven subjective measures, comparisons with relatives, villagers, and others in the same county are significantly correlated with self-reported health, and all three comparisons support the relative income hypothesis. If the mental health scale is used for the dependent variable, the comparison with classmates is also statistically significant in addition to the three comparisons mentioned above. This suggests that classmates may also be an appropriate reference group. The estimated coefficient on province signs negative, meaning that after controlling for other covariates, higher living standards of others' within provinces is correlated with fewer

depressing experiences in daily life. This is consistent with the previous results with the objective measures of relative income where higher mean income within provinces is correlated with better self-reported health and less depressing life experiences.

We acknowledge that the coefficient estimates on the subjective income measures could be biased due to unobserved individual characteristics such as pessimism/optimism and tendency to complain. However, even if such spurious correlations bias the results upward, there is no reason why we see particularly large and statistically significant coefficients only for relatives, villagers, and counties and not for other reference groups. We address this issue in more detail later.

#### 4) OLS with subjective relative income measures with township fixed effects

One potential problem we address in this paper is possible correlation between typical relative income measures previous studies adopt and unobserved regional characteristics affecting health. The most obvious concern is that higher mean income or more equal distribution of income within regions could be correlated with better health-care facilities within the regions. To deal with this type of problems, we utilize township fixed effects. With township fixed effects, econometric identification comes from individual deviations in health from township-specific means in health, so township fixed effects control for unobserved regional differences across townships. However, even with township fixed effects, regional differences on the village level could bias our estimates. Given that township is the smallest administrative district we can identify in our data set, we control for unobserved regional differences as much as we can. Because the objective measures of relative income (mean household income within townships and provinces) are constant within townships, we cannot use them with township fixed effects in the regressions. In contrast, the subjective measures of relative income vary individually, so their effects on health can be identified with township fixed effects.

Columns (1) and (2) in Table 3 repeat the same regressions as Columns (3) and



(4) in Table 2, but with township fixed effects. In Table 3, the coefficient estimates on own income remain positive, and the magnitudes become larger than those reported in Table 2. Higher own income has strong correlations with better self-reported health and fewer depressing life experiences. Further, even with township fixed effects, the results support the relative income hypothesis for the reference groups of relatives, villagers, and others in the same county for both self-reported health and mental health. Regarding the coefficient estimates of other covariates, the only obvious difference with and without township fixed effects is that the coefficient estimates on the dummy variable city have turned the sign to positive and are statistically significant at the one percent level in both columns in Table 3. This clearly shows that within townships, urban areas are on average healthier than rural areas after controlling for other covariates. However, when urban and rural areas are compared across townships in Table 2, urban areas are less healthy on average than rural areas after controlling for other covariates probably due to some confounding factors.

Our motivation of including township fixed effects was to control for unobserved regional effects that are potentially correlated with both health and the geographically-defined measures of relative income. For the particular sample we use, we find qualitatively the same coefficient estimates on the relative income measures with and without including township fixed effects, although the coefficient estimates on absolute income is larger and the coefficient estimates on the relative income measures (relatives, village, and county) are smaller when including township fixed effects. This is evidence that our subjective measures of relative deprivation are unlikely to be correlated with unobserved township characteristics affecting health.

#### 5) Addressing the reverse causality running from health to income

The OLS regressions shown so far may suffer from the reverse causality running from health to income. When we use the objective measures of relative income, it is not plausible that individual health significantly affects mean township and provincial income. Thus, the reverse causality is relevant only to absolute income and the subjective measures of relative income. Because we have seven

subjective measures plus one measure of absolute income, it is not practical to use instruments for all of the eight potentially endogenous variables. Rather, we will instrument absolute income only and deal with the subjective measures of relative income as if they are exogenous variables. We know that this approach could produce biased results. At the same time, however, it is unlikely that the reverse causality from health to income is particularly strong for some potential reference groups and nothing for other potential reference groups. Thus, we believe that the relative magnitudes of the coefficients on different potential reference groups would still reveal important reference groups when we consider the effect of relative income on health.

Even when we assume that all subjective measures of relative income are exogenous, finding good instruments for absolute income is not easy. We prepared two sets of instruments for absolute income. The first set of instruments is two educational characteristics of other household members (the share of high-school graduates to household size excluding the survey respondent both in the numerator and denominator, and the share of college graduates to household size excluding the survey respondent both in the numerator and denominator), plus the share of income earners to household size excluding the survey respondent both in the numerator and denominator. The second set of instruments is five dummy variables indicating the ownership of household assets. Specifically, household assets include refrigerator, color TV, camera, telephone/cell phone, and clothes washing machine. By adopting these two sets of instruments, we believe that we can at least avoid the reverse causality due to temporary changes in health affecting absolute income.

Tables 4 and 5 use the educational and earning characteristics of other household members and household assets as instruments for absolute income, respectively. We continue to control for township fixed effects in both Tables 4 and 5 when the subjective measures of relative income are used (only columns (3) and (4) in both Tables 4 and 5).

We check the quality of instruments first. The F statistics on excluded

instruments in the first-stage regressions are at least 31 in all columns in Table 4 when the educational and earning characteristics of other household members are used as excluded instruments. The F statistics on excluded instruments are at least 14 in all columns in Table 5 when dummy variables for the household assets are used as excluded instruments. Thus, the excluded instruments have decent explanatory power in the first-stage regressions for both sets of instruments. Next, we present the results of the over-identifying tests of the exogeneity of excluded instruments. No matter which set of excluded instruments is used, the over-id tests do not reject the exogeneity of the excluded instruments at the conventional significance levels both in Tables 4 and 5, except in column (2) in Table 4 where the first set of instruments are used in the regression of the mental health scale on the objective measures of relative income (p-value for the over-id test=0.05). Besides this case, when the educational and earning characteristics of other household members are used as instruments, the p-values are between 0.24 and 0.87 which are well above the conventional levels of significance. When household assets are used as instruments, the p-values are between 0.18 and 0.66 which are still above the conventional significance levels. Because our main interest is in the regressions with the subjective measures of relative income (which are with township fixed effects), we proceed with the chosen two sets of instruments although the first set of instruments fails to pass the over-id test in one case.

Tables 4 and 5 reveal that some coefficient estimates are sensitive to choice of instruments. In Table 4 with educational and earning characteristics of other household members as instruments, absolute income has lost its statistical significance in explaining self-reported health. However, the positive association between absolute income and mental health is still statistically significant even with the instruments. Some objective measures of relative income have lost their significance in Tables 4 and 5, but some other statistically significant results on the objective measures of relative income still show that the relative income hypothesis is supported at the township level and that the infrastructure effect or the positive spillover effect from rich communities is supported on the province level.

The subjective measures of relative income we find important in previous tables continue to support the relative income hypothesis: considering own living standard worse in comparison with relatives and others in the same village and county is correlated with poorer self-reported health and a larger number of depressing life experiences.

In Table 5 where household assets are used as excluded instruments, the results are more similar to the OLS results, but the magnitudes of the coefficient estimates on absolute income and mean township income are now larger in absolute value than the OLS results. Particularly, the coefficient estimates on mean township income are statistically significant at least at the five percent level, supporting the relative deprivation hypothesis at the township level. One possible explanation for this result is that the set of household assets is a better indicator of household wealth than household income measured at one point in time, making it possible to identify a stronger magnitude of the effect of absolute income on the health measures. Upon the availability of the better measure of household wealth, it may be that mean household income within townships can better identify the effect of someone else's income on own health. Another possible explanation for the larger magnitudes of the coefficients of absolute income is that the household assets (refrigerator, color TV, camera, telephone/cell phone, and cloth washing machine) affect health independently from income. For example, telephone/cell phone may help people to learn health information which actually promotes health. In this case, the set of instruments is, of course, disqualified as instruments for absolute income.

In Table 5, the coefficient estimates on the subjective measures of relative income are smaller than the OLS results for the reference groups of relatives, villagers, and others in the same counties. Overall, the effects of absolute income and the objective measures of relative income on health are sensitive to choice of the alternative sets of excluded instruments. However, the effects of the subjective measures of relative income on health consistently support the relative income hypothesis.

#### 6) Addressing unobserved optimism/pessimism

One concern about the above OLS and 2SLS results would be bias due to unobserved individual dispositions. For example, people who like to complain may report poorer self-reported health as well as lower own living standard in comparison with multiple reference groups. For another example, if people are optimistic (pessimistic) about both self-reported health and subjective report of relative income, our estimates of the effect of relative income on health would be upward biased. To see if this problem biases our results, we estimate individual dispositions and control for them in our regressions. Our methodology is explained in detail below, but the basic idea is that we define the difference between one's subjective rating of his/her own living standard within the county and one's actual income position within the county as a measure of optimism/pessimism. We include this estimated optimism/pessimism in our regressions as a control for individual dispositions. Here, we estimate optimism/pessimism using the objective and subjective measures of income with reference to others in the same county, because county is the smallest district area for which both objective and subjective measures of income are available.

Consider the following health production function:

$$H = H(y_i, y_J, u_i, o_i, u_J) \quad (2)$$

Here,  $y_i$  is true household welfare,  $y_J$  is true mean welfare of group  $J$  (to which individual  $i$  belongs),  $u_i$  is individual and household unobservables affecting health that are independent of attitudinal biases that affect reporting of relative incomes,  $o_i$  is the unobserved outlook of individuals that can affect both health and perceptions of relative income, and  $u_J$  is unobserved group characteristics that affect health. Note that  $y_J$  captures relative income, but it also may proxy for other group characteristics that are correlated with mean welfare and affect health, such as the quality of health services. In a linear specification, it is impossible to separately identify the effects of  $y_i$ ,  $y_J$ , and  $y_i - y_J$  (a relative income measure) on health.

We can express self-reported relative income to be a function of true household

welfare, mean community welfare, and outlook bias<sup>8</sup>:

$$R_{ij} = R(y_i, y_j, o_i) \quad (3)$$

We recognize that  $y_i$  and  $y_j$  may both be measured with error:

$$\tilde{y}_i = y_i + e_i \text{ and } \tilde{y}_j = y_j + e_j. \quad (4)$$

Here,  $\tilde{y}_i$  and  $\tilde{y}_j$  are noisy measures of household welfare and group mean welfare.

For groups for which we have a noisy measure of group mean welfare, one can estimate the following version of the health production function:

$$H_i = H(\tilde{y}_i - e_i, \tilde{y}_j - e_j, u_i, o_i, u_j) \quad (5)$$

In equation (5), health is a function of our noisy measures of household and group mean welfare, as well five different types of unobservables. Most previous studies have estimated health as a function of  $\tilde{y}_i$  and  $\tilde{y}_j$ , implicitly assuming that all of the unobservables are uncorrelated with the welfare measures. We know by construction that  $e_i$  and  $e_j$  are positively correlated with the household and group mean welfare measures, leading to downward attenuation bias due to measurement error if the goal is to estimate the effect of true welfare levels on health. If measurement error on the welfare measures is random and uncorrelated with outlook bias or other unobservables associated with health, then there will be no further biases.

Another alternative is to use subjective measures of relative income as the relative income measure:

$$H_i = H(\tilde{y}_i, R_{ij}, e_i, u_i, o_i, u_j) \quad (6)$$

For some reference groups, we only have a subjective measure of relative welfare measure. A main concern in estimating (6) is that outlook bias may affect the self-reported measures of both relative income and health.

We propose the following approach to estimating equation (6) to reduce likely biases. We start by first estimating the determinants of the relative income

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<sup>8</sup> We could also add a random error term to the expression for relative income; this has no effect on the results.

measure with respect to groups for which we have multiple observations, i.e., counties. Assuming that relative income can be expressed as a linear function of its elements, we can estimate the following equation:

$$R_{ij} = \alpha_0 + \alpha_1 \tilde{y}_i + \gamma_j + \varepsilon_i^R \quad (7)$$

The county fixed effect  $\gamma_j$  absorbs the effect of true group mean welfare ( $y_j$ ). If we estimate (7) using OLS, the error term will have two components,  $\varepsilon_i^R = -\alpha_1 e_i + o_i$ . However, using instrumental variables, we can estimate  $\alpha_1$  consistently, so that the error term will consist only of omitted outlook bias. Our instruments are two assessments of the household's standard of living relative to others in the community made by the survey enumerator who interviewed the household, which are plausibly independent of income measurement error and outlook bias. The residuals from this regression can be used as a measure of outlook bias ( $\hat{o}_i$ ). If we assume that outlook bias affects all self-reported relative income measures similarly, these residuals can be used to control for outlook bias when estimating the effects of relative income with respect to reference groups for which multiple observations are not available.

This suggests that we can estimate the following equation for the determinants of health outcomes:

$$H_i = \beta_0 + \beta_1 \tilde{y}_i + \beta_2 R_{ij} + \beta_3 \hat{o}_i + \varepsilon_i^H \quad (8)$$

As before, we instrument household welfare with educational and earning characteristics of other household members to eliminate the reverse causality running from health to income. Under this estimation strategy, the error term includes  $u_i$  which is independent by assumption, and  $u_j$ . It is clear that we will be unable to fully isolate the effect of relative income on health, because group mean welfare (or unobservables correlated with group mean welfare) can have independent effects on health.<sup>9</sup> However, as a general rule, most of the likely

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<sup>9</sup> This was the motivation to use township fixed effects, but unobserved regional heterogeneity at the village level may still bias our results even with township fixed effects

effects of greater group mean welfare on health should be positive. For example, having more affluent relatives, classmates, or coworkers could improve one's health through remittances, information about health, or help in accessing better quality health care services. In contrast, the relative deprivation hypothesis is that greater group mean welfare (or lower relative income) reduces a person's own health. Thus a positive effect of relative income on health should be viewed as strong evidence in favor of the relative deprivation hypothesis. However, differences in the effect of relative income with respect to different reference groups could reflect differences in both the impact of relative deprivation on health and other independent effects of group mean welfare on health.

To estimate outlook bias ( $o_i$ ), we use as a household welfare measure ( $\tilde{y}_i$ ) a principal component of log income per capita and eight wealth indicators (motor cycle, car, refrigerator, color TV, computer, camera, telephone/cell phone, and clothes washing machine). We regress the subjective perception of own living standard in comparison with others in the same county on the constructed household welfare measure as well as county dummies, where we instrument the constructed household welfare measure using two subjective assessments of the survey respondents' economic situations by data enumerators.<sup>10</sup> We use the residual from this 2SLS estimation as our estimate of outlook bias ( $\hat{o}_i$ ).<sup>11 12</sup>

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<sup>10</sup> The two specific questions asking data enumerators to subjectively assess the respondents' economic situations are as follows:

- i) From your impression of the respondent's household, estimate the household's economic situation, explain whether the household, in its local area, would be considered a: low income household, average income household, upper middle income household, or high income household?
- ii) How does the respondent's residence compare to the average situation in the area: poor, middle, or good?

<sup>11</sup> The excluded instruments have decent explanatory power in the first stage regression as evidenced by  $F(2, 2853)=208.08$ . The excluded instruments barely pass the over-id test at the ten percent significance level (p-value=0.11).

<sup>12</sup> The smallest district we can identify in our data set is the township level. Unfortunately, we do not have the subjective measure of own living standard for the township level, so we cannot construct the estimated outlook bias at the township level. We have the subjective measure of own living standard in comparison with other villagers. We tried the alternative estimate of outlook bias where we regress the subjective measure of own living standard for the village level on the constructed household welfare measure as well as township dummies. No matter which



In Table 6, we include the estimated outlook bias to control for individual dispositions. We continue to instrument absolute income with the educational and earning characteristics of other household members.<sup>13</sup> Also, we include township fixed effects when the subjective measures of relative income are used in columns (3) and (4).

Even with the inclusion of the estimated outlook bias, the results are similar to the previous ones (Table 6 vis-à-vis Table 4). In columns (1) and (2) in Table 6, the positive association between the estimated optimism and better reports of health is statistically significant at the one percent level. However, the estimated optimism is not statistically significant when township fixed effects and the subjective measures of relative income are used in columns (3) and (4). We see large standard errors for the coefficient estimates on the relative income of county. This would be because our outlook bias is a linear function of the relative income of county, so we may have a multi-collinearity problem here. Even so, the estimated outlook bias is negatively correlated with reports of health in column (3), providing evidence against the hypothesis that optimistic people report better health. Without township fixed effects, Columns (1) and (2) show that if people are optimistic about their relative income in comparison with others in the same county, they tend to report better health in comparison with others after controlling for observed demographic characteristics. With township fixed effects, Columns (3) and (4) reveal that people who are optimistic about reporting relative income in comparison with others in the same county may not report better health in comparison with their counterparts who live in the same township. Thus, township fixed effects may effectively control for unobserved outlook bias even without explicitly including the estimated outlook bias in our regressions.

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alternative estimate of outlook bias is used, the results are similar.

<sup>13</sup> See the bottom of Table 6 to check the qualities of the instruments for the 2SLS regressions. The excluded instruments have decent explanatory power in the first-stage regressions (F-statistics at least 21), and the over-id tests pass at the conventional levels.

7) Different reference groups matter for different subgroups?

Finally, we examine the relative income hypothesis separately for subgroups of sample individuals. We divide sample individuals into two groups in terms of the following characteristics: the place of residence (rural/urban), sex (female/male), age group (age 18-40 / age 41-70), and educational degree (middle school or lower degree / high school or higher degree). Because the sample size for each regression estimation is now much smaller and the coefficient estimates on the relative income measures (our main interests) did not change much with and without the instrumental variables and the estimated optimism, we use the OLS results without including the estimated optimism to show the sub-group results.<sup>14</sup> Tables 7 through 10 show the results of the sub-group regressions separately for rural/urban, female/male, age 18-40 / age 41-70, and middle school or lower degree / high school or higher degree, respectively. We only show the estimated coefficients on absolute and relative income. The last four columns in each table include township fixed effects (with subjective measures of relative income) while the first four columns do not.

Table 7 shows that absolute income matters for health only in rural areas. Further, different reference groups matter in rural and urban areas. In rural areas, comparison with others in the same village and township seems to matter, while in urban areas comparison with relatives and classmates is more important. Table 8 shows that relative income matters more often for males than for females. Table 9 presents that comparison with classmates and others in the same county matters for the younger cohort, while comparison with relatives and villagers matters for the older cohort. Table 10 shows that absolute income matters for health only for the less educated group, and absolute income is negatively correlated with health for the more educated group. For the less educated group, comparison with villagers matters, while for the more educated group comparison with classmates is more important. To summarize, the important reference groups would not be the same across different types of

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<sup>14</sup> The OLS regression results are similar regardless of including or not the estimated optimism. Due to smaller sample sizes, the standard errors of the 2SLS estimates (where only absolute income is instrumented) are large, leading to unstable coefficient estimates.

individuals. A geographically-defined reference group seems to be more appropriate for the less educated group, the older cohort, and rural residents, if the reference area is as narrow as village or township. Relatives may be an important reference group for urban residents and the older cohort. Classmates could be a critical reference for the more educated. Males could be more likely to be influenced by relative comparison of income with others than females.

## **Conclusions**

We examine the relative income hypothesis in this paper. Our main concerns about previous studies on the relative income hypothesis are twofold. First, we are concerned that typical measures of relative income such as mean income and gini coefficients within regions could be correlated with community characteristics affecting health. To alleviate this concern, we make use of township fixed effects. Another important issue we address in this paper is to examine some non-geographical reference groups for the first time in the literature on the relative income hypothesis. We take advantage of subjective responses to questions asking sample respondents to compare their own living standard with the living standard of others in multiple potential reference groups including relatives, classmates, and co-workers.

For sample individuals in our dataset, township fixed effects do not change the coefficient estimates on the subjective measures of relative income, implying that our subjective measures of relative income would not be correlated with unobserved regional characteristics affecting health. However, it is plausible that the typical measures of relative income such as mean income or gini coefficient within some region are correlated with unobserved regional characteristics affecting health.

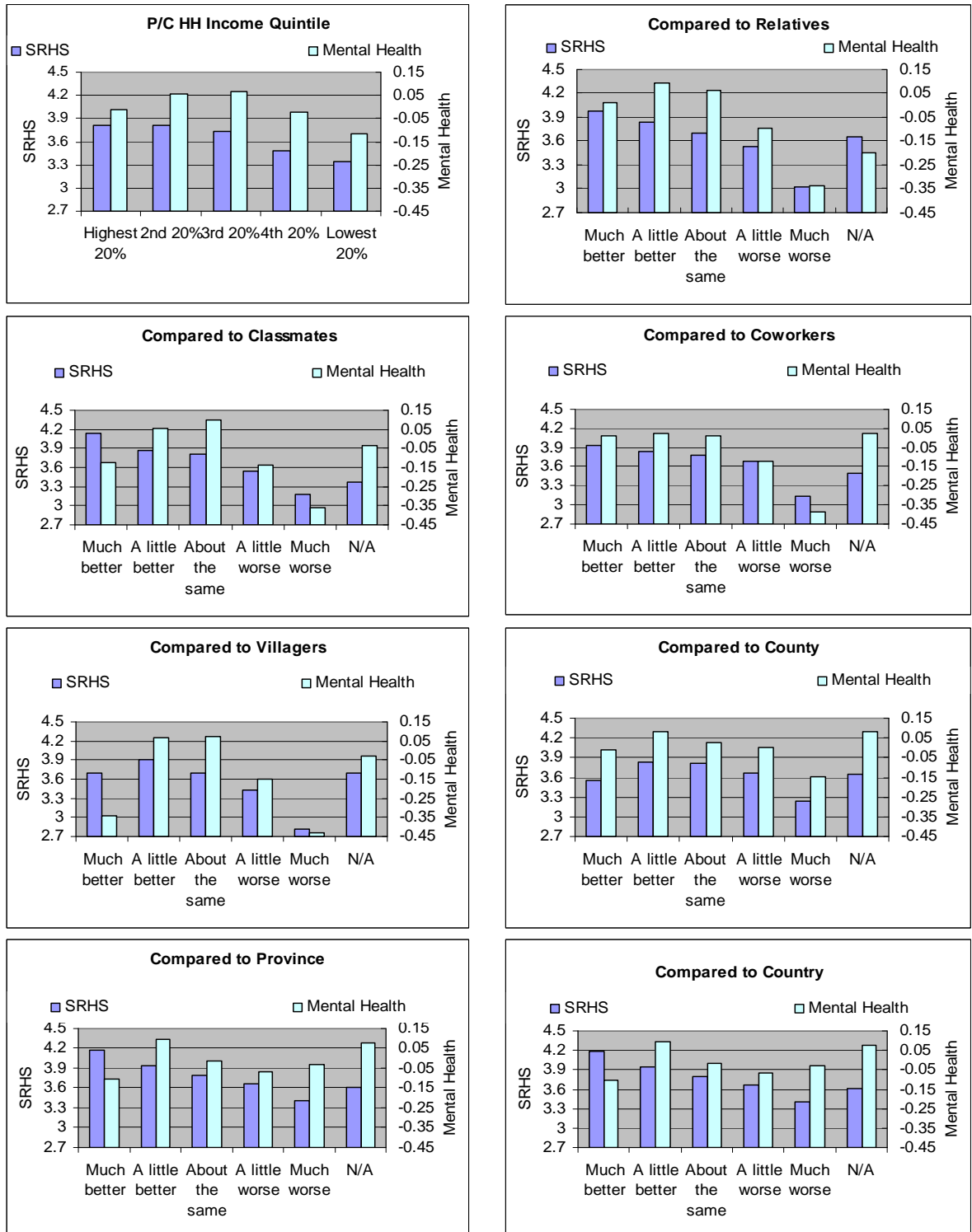
We acknowledge that reverse causality running from health to both absolute and relative income could bias our results. We use two sets of instruments (educational and earning characteristics of other household members and household assets) as excluded instrumental variables for absolute household income. We deal with the measures of relative income as if they are exogenous

variables. We think that although there could exist, to some extent, reverse causality from health to the subjective measures of relative income, we see no reasons why reverse causality is stronger for some reference groups than for other reference groups, implying that the relative magnitude of the coefficient estimates on the relative income measures still suggests which reference groups are important in the relative income hypothesis.

Using 2SLS, our estimated effects of both absolute income and the objective measures of relative income on health are, to some extent, influenced by the choice of instrumental variables. However, the estimated effects of subjective measures of relative income on health consistently support the relative income hypothesis no matter which set of instruments are adopted. We find that subjective comparison of own living standard relative to the living standard of relatives, and others in the same village and county is significantly correlated with health after controlling for other covariates. Our findings are robust to the inclusion of the covariates that measure different degrees of optimism across individuals.

Finally, we find that the reference groups would be different for different individuals. Our results show that a geographically-defined reference group seems to be more appropriate for the less educated group, the older cohort, and rural residents, if the reference area is as narrow as village or township. Relatives may be an important reference group for urban residents and the older cohort. Classmates could be a critical reference for the more educated group. Males could be more likely to be influenced by relative comparison of income with others than females.

**Figure 1: Mean Self-Reported Health and Mean Mental Health by Perception of Own Living Standard Relative to Multiple Reference Groups**



**Table 1: Descriptive Statistics of Variables Used in Regressions (N=3,240)**

Self reported health	Very good 711 21.9%	Good 1,144 35.3%	OK 948 29.3%	Poor 357 11.0%	Very poor 80 2.5%
Mental health (N=3,249)	Mean -0.0071	Std. Dev. 0.6255	Min -2.1199	Max 1.1949	

	Much better	A little better	About the same	A little worse	Much worse	No response
Living standard compared to RELATIVES	48 1.5%	449 13.8%	1,682 51.9%	769 23.7%	248 7.7%	45 1.4%
Living standard compared to CLASSMATES	40 1.2%	296 9.2%	1,406 43.4%	575 17.7%	189 5.8%	735 22.7%
Living standard compared to COWORKERS	27 0.8%	230 7.1%	1,094 33.8%	372 11.5%	88 2.7%	1,429 44.1%
Living standard compared to VILLAGERS	56 1.7%	491 15.2%	1,730 53.4%	646 19.9%	166 5.1%	151 4.7%
Living standard compared to residents in COUNTY	8 0.3%	224 6.9%	954 29.4%	1,184 36.5%	615 19.0%	256 7.9%
Living standard compared to residents in PROVINCE	20 0.6%	225 7.0%	658 20.3%	927 28.6%	971 30.0%	439 13.6%
Living standard compared to residents in COUNTRY	28 0.9%	214 6.6%	734 22.7%	709 21.9%	933 28.8%	622 19.2%

	Married	Never married	Divorced/ Separated/ Widowed/ Other	No response
Marital status	2,545 78.6%	560 17.3%	130 4.0%	4 0.1%

	No schooling	Primary	Middle school	High school	Tertiary	No response
Educational degree achieved	791(24.4%)	507(15.6%)	1,069(33.0%)	550(17.0%)	307(9.5%)	17(0.5%)
* Household income is imputed if missing (See the text for a description of the imputation)	Mean	Std. Dev.	Min	Max		
Per-capita hh income (RMB) *	4,206.5	9,908.6	1.0	375,000.0		
Mean per-capita hh inc within TOWNSHIP (RMB) *	4,211.6	4,368.5	326.6	32,300.9		
Mean per-capita hh inc within COUNTY (RMB) *	4,211.7	3,977.9	380.7	32,300.9		
Mean per-capita hh inc within PROVINCE (RMB) *	4,206.7	2,652.3	613.1	11,475.3		
Male (dummy)	0.514	0.500	0.000	1.000		
Age	38.4	13.3	18.0	70.0		
Urban (dummy)	0.415	0.493	0.000	1.000		
Agricultural household registration (dummy)	0.684	0.465	0.000	1.000		
Major income from agriculture (dummy)	0.569	0.495	0.000	1.000		
Own motor cycle (dummy) (standardized)	0.002	1.001	-0.750	1.334		
Own car (dummy) (standardized)	0.000	1.000	-0.226	4.433		
Own refrigerator (dummy) (standardized)	-0.001	1.000	-0.742	1.348		
Own color TV (dummy) (standardized)	-0.001	1.001	-1.945	0.514		
Own computer (dummy) (standardized)	0.001	1.001	-0.368	2.721		
Own camera (dummy) (standardized)	-0.001	1.000	-0.562	1.778		
Own telephone/cell phone (dummy) (standardized)	-0.001	1.000	-1.373	0.728		
Own washing machine (dummy) (standardized)	-0.004	1.000	-0.933	1.072		
Household size	4.1	1.5	1.0	14.0		
Ratio of high-school graduates to household size (N=3,238)	0.077	0.187	0.000	1.000		
Ratio of college graduates to household size (N=3,235)	0.134	0.209	0.000	1.000		
Ratio of income earners to household size (N=3,237)	0.617	0.231	0.000	1.000		
	Low income	Average inc.	Upper-mid. Inc.	High inc.	No response	
Interviewer's perception of the respondent's economic situation in its local area	617 19.0%	1,840 56.8%	659 20.3%	83 2.6%	41 1.3%	
	Poor	Middle	Good		No response	
Interviewer's perception of the respondent's residential situation in its local area	396 12.2%	2,243 69.2%	586 18.1%		15 0.5%	

**Table 2: OLS results without township fixed effects**

Dependent variable	(1)	(2)	(3)	(4)
Objective or subjective measures of relative income	SRHS Objective	Mental Objective	SRHS Subjective	Mental Subjective
Log per-capita hh income	0.070*** (0.017)	0.061*** (0.011)	0.024* (0.015)	0.029*** (0.010)
Mean log per-capita hh inc within TOWNSHIP	-0.079** (0.033)	-0.066*** (0.022)		
Mean log per-capita hh inc within PROVINCE	0.072* (0.037)	0.002 (0.024)		
Living standard compared to RELATIVES (1: much worse to 5: much better)			0.115*** (0.024)	0.086*** (0.016)
Living standard compared to CLASSMATES			0.035 (0.030)	0.050*** (0.019)
Living standard compared to COWORKERS			-0.019 (0.037)	-0.014 (0.022)
Living standard compared to VILLAGERS			0.098*** (0.030)	0.068*** (0.018)
Living standard compared to residents in COUNTY			0.067** (0.031)	0.062*** (0.019)
Living standard compared to residents in PROVINCE			0.003 (0.032)	-0.041** (0.019)
Living standard compared to residents in COUNTRY			0.017 (0.025)	0.000 (0.015)
Male (dummy)	0.155*** (0.035)	0.117*** (0.022)	0.163*** (0.034)	0.137*** (0.022)
Age/10	-0.462*** (0.096)	-0.342*** (0.061)	-0.370*** (0.095)	-0.272*** (0.060)
(Age/10)^2	0.033*** (0.011)	0.035*** (0.007)	0.022** (0.011)	0.027*** (0.007)
Married==Never married (dummy)	-0.151** (0.068)	-0.317*** (0.043)	-0.106 (0.067)	-0.296*** (0.042)
Married==Other marital status (dummy)	-0.132* (0.075)	-0.254*** (0.049)	-0.073 (0.074)	-0.202*** (0.047)
Married==No response (dummy)	-0.349 (0.810)	0.066 (0.267)	-0.393 (0.775)	0.009 (0.282)
Degree==Primary (dummy)	0.184*** (0.061)	0.124*** (0.039)	0.194*** (0.061)	0.155*** (0.038)
Degree==Middle school	0.279*** (0.054)	0.149*** (0.034)	0.271*** (0.055)	0.179*** (0.034)
Degree==High school (dummy)	0.185*** (0.063)	0.123*** (0.040)	0.158** (0.065)	0.155*** (0.040)
Degree==Tertiary (dummy)	0.158** (0.077)	0.170*** (0.050)	0.064 (0.078)	0.152*** (0.049)



**Table 2: (continued)**

Dependent variable	(1)	(2)	(3)	(4)
Objective or subjective measures of relative income	SRHS Objective	Mental Objective	SRHS Subjective	Mental Subjective
Degree==No response (dummy)	-0.028 (0.246)	0.075 (0.136)	-0.038 (0.232)	0.092 (0.138)
City (dummy)	-0.076* (0.043)	-0.062** (0.027)	-0.132*** (0.040)	-0.085*** (0.025)
Non-missing for RELATIVES (dummy)			-0.458*** (0.166)	-0.113 (0.098)
Non-missing for CLASSMATES (dummy)			-0.156 (0.096)	-0.208*** (0.062)
Non-missing for COWORKERS (dummy)			0.061 (0.112)	-0.092 (0.067)
Non-missing for VILLAGERS (dummy)			-0.226** (0.114)	-0.225*** (0.074)
Non-missing for COUNTY (dummy)			-0.176* (0.106)	-0.247*** (0.067)
Non-missing for PROVINCE (dummy)			-0.067 (0.098)	0.120* (0.063)
Non-missing for COUNTRY (dummy)			-0.102 (0.076)	-0.096* (0.050)
Constant	4.216*** (0.272)	0.710*** (0.177)	4.596*** (0.280)	0.469*** (0.178)
Observations	3240	3249	3240	3249
Adj R Square	0.09	0.06	0.12	0.11

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 3: OLS results with township fixed effects**

Dependent variable	(1)	(2)
Objective or subjective measures of relative income	SRHS Subjective	Mental Subjective
Log per-capita hh income	0.040** (0.016)	0.037*** (0.010)
Living standard compared to RELATIVES (1: much worse to 5: much better)	0.071*** (0.023)	0.062*** (0.015)
Living standard compared to CLASSMATES	0.019 (0.029)	0.031* (0.018)
Living standard compared to COWORKERS	0.003 (0.035)	0.006 (0.020)
Living standard compared to VILLAGERS	0.095*** (0.029)	0.068*** (0.017)
Living standard compared to residents in COUNTY	0.063** (0.030)	0.055*** (0.018)
Living standard compared to residents in PROVINCE	0.010 (0.031)	-0.011 (0.018)
Living standard compared to residents in COUNTRY	0.006 (0.026)	0.009 (0.015)
Male (dummy)	0.148*** (0.033)	0.135*** (0.020)
Age/10	-0.338*** (0.090)	-0.261*** (0.058)
(Age/10)^2	0.021** (0.010)	0.027*** (0.006)
Married==Never married (dummy)	-0.073 (0.065)	-0.227*** (0.040)
Married==Other marital status (dummy)	-0.037 (0.071)	-0.165*** (0.044)
Married==No response (dummy)	-0.515 (0.595)	-0.101 (0.217)
Degree==Primary (dummy)	0.152*** (0.059)	0.122*** (0.034)
Degree==Middle school (dummy)	0.231*** (0.057)	0.124*** (0.033)
Degree==High school (dummy)	0.189*** (0.068)	0.108*** (0.040)
Degree==Tertiary (dummy)	0.145* (0.083)	0.119** (0.049)
Degree==No response (dummy)	-0.042 (0.246)	0.070 (0.129)

**Table 3: (continued)**

Dependent variable	(1)	(2)
Objective or subjective measures of relative income	SRHS Subjective	Mental Subjective
City (dummy)	1.984*** (0.188)	1.203*** (0.306)
Non-missing for RELATIVES (dummy)	-0.428*** (0.161)	-0.174** (0.085)
Non-missing for CLASSMATES (dummy)	-0.091 (0.094)	-0.094 (0.059)
Non-missing for COWORKERS (dummy)	0.027 (0.109)	-0.045 (0.064)
Non-missing for VILLAGERS (dummy)	-0.263** (0.112)	-0.253*** (0.070)
Non-missing for COUNTY (dummy)	-0.139 (0.106)	-0.177*** (0.064)
Non-missing for PROVINCE (dummy)	-0.065 (0.097)	0.056 (0.060)
Non-missing for COUNTRY (dummy)	0.026 (0.078)	-0.040 (0.049)
Constant	2.833*** (0.285)	-0.776** (0.337)
Observations	3240	3249
Adj R Square	0.21	0.27

Robust standard errors in parentheses

All columns include township fixed effects.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 4: 2SLS results**

**(excluded instruments: educational and earning characteristics of other household members)**

Dependent variable	(1)	(2)	(3)	(4)
Objective or subjective measures of relative income	SRHS Objective	Mental Objective	SRHS Subjective	Mental Subjective
Log per-capita hh income	0.022 (0.070)	0.172*** (0.048)	-0.030 (0.071)	0.109** (0.043)
Mean log per-capita hh inc within TOWNSHIP	-0.041 (0.066)	-0.153*** (0.045)		
Mean log per-capita hh inc within PROVINCE	0.071* (0.037)	-0.003 (0.025)		
Living standard compared to RELATIVES (1: much worse to 5: much better)			0.082*** (0.025)	0.056*** (0.016)
Living standard compared to CLASSMATES			0.027 (0.030)	0.027 (0.019)
Living standard compared to COWORKERS			-0.002 (0.036)	0.002 (0.021)
Living standard compared to VILLAGERS			0.113*** (0.032)	0.059*** (0.019)
Living standard compared to residents in COUNTY			0.065** (0.031)	0.049*** (0.018)
Living standard compared to residents in PROVINCE			0.007 (0.032)	-0.017 (0.018)
Living standard compared to residents in COUNTRY			0.016 (0.026)	0.005 (0.016)
Male (dummy)	0.150*** (0.035)	0.119*** (0.023)	0.146*** (0.033)	0.142*** (0.020)
Age/10	-0.450*** (0.101)	-0.312*** (0.065)	-0.312*** (0.095)	-0.223*** (0.059)
(Age/10)^2	0.031*** (0.011)	0.032*** (0.007)	0.018* (0.010)	0.023*** (0.007)
Married==Never married (dummy)	-0.166** (0.076)	-0.282*** (0.047)	-0.062 (0.072)	-0.181*** (0.043)
Married==Other marital status (dummy)	-0.111 (0.088)	-0.189*** (0.059)	-0.009 (0.080)	-0.126** (0.050)
Married==No response (dummy)	-0.427 (0.882)	0.170 (0.203)	-0.672 (0.700)	-0.049 (0.205)
Degree==Primary (dummy)	0.176*** (0.063)	0.084** (0.042)	0.146** (0.061)	0.093** (0.037)
Degree==Middle school (dummy)	0.300*** (0.059)	0.106*** (0.039)	0.251*** (0.062)	0.091** (0.036)
Degree==High school (dummy)	0.227*** (0.077)	0.052 (0.050)	0.231*** (0.080)	0.057 (0.046)

**Table 4: (continued)**

Dependent variable	(1)	(2)	(3)	(4)
Objective or subjective measures of relative income	SRHS Objective	Mental Objective	SRHS Subjective	Mental Subjective
Degree==Tertiary (dummy)	0.206* (0.105)	0.037 (0.071)	0.201* (0.108)	0.027 (0.063)
Degree==No response (dummy)	0.001 (0.264)	0.032 (0.139)	-0.014 (0.263)	0.046 (0.134)
City (dummy)	-0.089** (0.044)	-0.066** (0.028)	1.087*** (0.365)	1.122*** (0.297)
Non-missing for RELATIVES (dummy)			-0.444*** (0.170)	-0.137* (0.082)
Non-missing for CLASSMATES (dummy)			-0.104 (0.098)	-0.079 (0.061)
Non-missing for COWORKERS (dummy)			0.052 (0.112)	-0.041 (0.065)
Non-missing for VILLAGERS (dummy)			-0.312** (0.122)	-0.223*** (0.077)
Non-missing for COUNTY (dummy)			-0.133 (0.107)	-0.173*** (0.065)
Non-missing for PROVINCE (dummy)			-0.067 (0.101)	0.075 (0.063)
Non-missing for COUNTRY (dummy)			0.012 (0.080)	-0.030 (0.051)
Constant	4.268*** (0.296)	0.525*** (0.195)	4.110*** (0.626)	-1.352*** (0.427)
Observations	3146	3155	3146	3155
Adj R Square	0.09	0.01	0.20	0.25
F stat on excluded instruments in 1st-stage regress.	F(3, 3128) = 36.88	F(3, 3137) = 37.74	F(3, 3033) = 31.60	F(3, 3042) = 33.12
Over-id test on exogeneity of instruments (p-value)	0.24	0.05	0.87	0.40

Robust standard errors in parentheses

Columns (3) and (4) include township fixed effects, while columns (1) and (2) do not.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 5: 2SLS results**  
(excluded instruments: household assets)

Dependent variable	(1)	(2)	(3)	(4)
Objective or subjective measures of relative income	SRHS Objective	Mental Objective	SRHS Subjective	Mental Subjective
Log per-capita hh income	0.243*** (0.076)	0.120** (0.048)	0.152* (0.079)	0.138*** (0.050)
Mean log per-capita hh inc within TOWNSHIP	-0.222*** (0.070)	-0.116** (0.045)		
Mean log per-capita hh inc within PROVINCE	0.074** (0.038)	0.002 (0.024)		
Living standard compared to RELATIVES (1: much worse to 5: much better)			0.061** (0.025)	0.054*** (0.016)
Living standard compared to CLASSMATES			0.006 (0.030)	0.020 (0.019)
Living standard compared to COWORKERS			0.004 (0.035)	0.007 (0.021)
Living standard compared to VILLAGERS			0.076** (0.032)	0.051** (0.020)
Living standard compared to residents in COUNTY			0.058* (0.031)	0.050*** (0.018)
Living standard compared to residents in PROVINCE			0.005 (0.032)	-0.016 (0.018)
Living standard compared to residents in COUNTRY			-0.002 (0.026)	0.001 (0.016)
Male (dummy)	0.153*** (0.035)	0.116*** (0.022)	0.150*** (0.033)	0.136*** (0.020)
Age/10	-0.459*** (0.098)	-0.341*** (0.062)	-0.340*** (0.091)	-0.263*** (0.058)
(Age/10)^2	0.033*** (0.011)	0.035*** (0.007)	0.021** (0.010)	0.027*** (0.006)
Married==Never married (dummy)	-0.129* (0.070)	-0.309*** (0.043)	-0.066 (0.065)	-0.220*** (0.041)
Married==Other marital status (dummy)	-0.088 (0.080)	-0.239*** (0.051)	-0.024 (0.071)	-0.155*** (0.046)
Married==No response (dummy)	-0.074 (0.632)	0.123 (0.221)	-0.340 (0.491)	-0.002 (0.212)
Degree==Primary (dummy)	0.146** (0.065)	0.110*** (0.041)	0.126** (0.062)	0.097*** (0.038)
Degree==Middle school (dummy)	0.216*** (0.062)	0.126*** (0.039)	0.193*** (0.064)	0.088** (0.037)
Degree==High school (dummy)	0.077 (0.080)	0.084* (0.050)	0.123 (0.083)	0.047 (0.049)

**Table 5: (continued)**

Dependent variable	(1)	(2)	(3)	(4)
Objective or subjective measures of relative income	SRHS Objective	Mental Objective	SRHS Subjective	Mental Subjective
Degree==Tertiary (dummy)	-0.026 (0.112)	0.105 (0.071)	0.036 (0.113)	0.019 (0.069)
Degree==No response (dummy)	-0.102 (0.261)	0.044 (0.134)	-0.085 (0.255)	0.023 (0.132)
City (dummy)	-0.073 (0.045)	-0.061** (0.028)	1.836*** (0.207)	1.091*** (0.293)
Non-missing for RELATIVES (dummy)			-0.419*** (0.162)	-0.165* (0.087)
Non-missing for CLASSMATES (dummy)			-0.052 (0.098)	-0.059 (0.062)
Non-missing for COWORKERS (dummy)			0.003 (0.111)	-0.067 (0.066)
Non-missing for VILLAGERS (dummy)			-0.200 (0.122)	-0.195** (0.077)
Non-missing for COUNTY (dummy)			-0.148 (0.107)	-0.186*** (0.065)
Non-missing for PROVINCE (dummy)			-0.040 (0.100)	0.080 (0.063)
Non-missing for COUNTRY (dummy)			0.048 (0.080)	-0.019 (0.052)
Constant	4.010*** (0.288)	0.641*** (0.184)	2.157*** (0.547)	-1.410*** (0.446)
Observations	3240	3249	3240	3249
Adj R Square	0.06	0.05	0.19	0.24
F stat on excluded instruments in 1st-stage regress.	F(5, 3220) = 20.90	F(5, 3229) = 20.50	F(5, 3125) = 14.75	F(5, 3134) = 14.45
Over-id test on exogeneity of instruments (p-value)	0.66	0.41	0.30	0.18

Robust standard errors in parentheses

Columns (3) and (4) include township fixed effects, while columns (1) and (2) do not.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 6: 2SLS results controlling for estimated pessimism/optimism  
(excluded instruments: educational and earning characteristics of other household members)**

Dependent variable	(1)	(2)	(3)	(4)
Objective or subjective measures of relative income	SRHS Objective	Mental Objective	SRHS Subjective	Mental Subjective
Log per-capita hh income	0.041 (0.078)	0.189*** (0.055)	-0.041 (0.096)	0.123** (0.058)
Mean log per-capita hh inc within TOWNSHIP	-0.048 (0.071)	-0.151*** (0.051)		
Mean log per-capita hh inc within PROVINCE	0.054 (0.039)	-0.018 (0.026)		
Living standard compared to RELATIVES (1: much worse to 5: much better)			0.071*** (0.026)	0.064*** (0.016)
Living standard compared to CLASSMATES			0.021 (0.031)	0.020 (0.020)
Living standard compared to COWORKERS			-0.005 (0.038)	0.000 (0.022)
Living standard compared to VILLAGERS			0.095*** (0.031)	0.059*** (0.019)
Living standard compared to residents in COUNTY			0.274* (0.159)	0.004 (0.098)
Living standard compared to residents in PROVINCE			0.002 (0.033)	-0.020 (0.019)
Living standard compared to residents in COUNTRY			0.028 (0.026)	0.011 (0.016)
Estimated optimism	0.098*** (0.026)	0.077*** (0.016)	-0.216 (0.157)	0.046 (0.095)
Male (dummy)	0.149*** (0.037)	0.122*** (0.024)	0.158*** (0.035)	0.141*** (0.022)
Age/10	-0.445*** (0.109)	-0.283*** (0.071)	-0.256** (0.100)	-0.196*** (0.063)
(Age/10)^2	0.031** (0.012)	0.028*** (0.008)	0.012 (0.011)	0.019*** (0.007)
Married==Never married (dummy)	-0.155* (0.081)	-0.260*** (0.051)	-0.028 (0.075)	-0.172*** (0.044)
Married==Other marital status (dummy)	-0.113 (0.094)	-0.160*** (0.062)	-0.006 (0.084)	-0.108** (0.052)
Married==No response (dummy)	0.414 (0.771)	0.222 (0.265)	0.116 (0.609)	-0.055 (0.279)
Degree==Primary (dummy)	0.150** (0.067)	0.071 (0.045)	0.110* (0.066)	0.075* (0.039)
Degree==Middle school (dummy)	0.280*** (0.065)	0.090** (0.042)	0.197*** (0.064)	0.080** (0.036)



**Table 6: (continued)**

Dependent variable	(1)	(2)	(3)	(4)
Objective or subjective measures of relative income	SRHS Objective	Mental Objective	SRHS Subjective	Mental Subjective
Degree==High school (dummy)	0.191** (0.084)	0.020 (0.054)	0.143* (0.077)	0.039 (0.044)
Degree==Tertiary (dummy)	0.130 (0.116)	-0.020 (0.079)	0.071 (0.100)	-0.001 (0.058)
Degree==No response (dummy)	-0.091 (0.266)	0.003 (0.143)	-0.111 (0.270)	0.039 (0.137)
City (dummy)	-0.069 (0.047)	-0.053* (0.030)	1.901*** (0.239)	0.089 (0.188)
Non-missing for RELATIVES (dummy)			-0.531*** (0.204)	-0.314*** (0.093)
Non-missing for CLASSMATES (dummy)			-0.087 (0.101)	-0.042 (0.065)
Non-missing for COWORKERS (dummy)			0.027 (0.119)	-0.056 (0.069)
Non-missing for VILLAGERS (dummy)			-0.243* (0.129)	-0.202** (0.085)
Non-missing for COUNTY (dummy)				
Non-missing for PROVINCE (dummy)			-0.056 (0.108)	0.070 (0.068)
Non-missing for COUNTRY (dummy)			-0.003 (0.083)	-0.042 (0.052)
Constant	4.300*** (0.323)	0.447** (0.218)	2.749*** (0.502)	-0.372 (0.340)
Observations	2820	2829	2820	2829
Adj R Square	0.09	0.00	0.20	0.23
F stat on excluded instruments in 1st-stage regress.	F(3, 2801) = 31.32	F(3, 2810) = 32.02	F(3, 2707) = 21.13	F(3, 2716) = 22.50
Over-id test on exogeneity of instruments (p-value)	0.24	0.20	0.74	0.71

Robust standard errors in parentheses

Columns (3) and (4) include township fixed effects, while columns (1) and (2) do not.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 7: Separate OLS results by place of residence (rural/urban)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	SRHS	SRHS	Mental	Mental	SRHS	SRHS	Mental	Mental
Objective or subjective?	Objective	Objective	Objective	Objective	Subjective	Subjective	Subjective	Subjective
Rural or urban?	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Log per-capita hh income	0.102*** (0.027)	-0.026 (0.045)	0.078*** (0.019)	0.016 (0.024)	0.064*** (0.024)	-0.045 (0.043)	0.056*** (0.017)	0.002 (0.021)
Objective TOWNSHIP	-0.106* (0.056)	0.007 (0.079)	-0.101*** (0.034)	0.075 (0.060)				
Objective PROVINCE	0.095 (0.065)	0.087 (0.078)	-0.003 (0.041)	-0.046 (0.051)				
Subjective RELATIVES					0.037 (0.045)	0.076* (0.044)	0.018 (0.027)	0.101*** (0.027)
Subjective CLASSMATES					-0.025 (0.052)	0.183*** (0.054)	-0.001 (0.032)	0.134*** (0.047)
Subjective COWORKERS					-0.050 (0.083)	-0.060 (0.073)	0.012 (0.045)	-0.010 (0.035)
Subjective VILLAGERS					0.183*** (0.048)	-0.035 (0.054)	0.123*** (0.029)	-0.029 (0.043)
Subjective COUNTY					0.071 (0.051)	0.061 (0.060)	0.039 (0.034)	0.102*** (0.037)
Subjective PROVINCE					0.014 (0.059)	-0.049 (0.070)	0.011 (0.032)	-0.093** (0.047)
Subjective COUNTRY					0.035 (0.045)	0.048 (0.056)	0.015 (0.029)	0.001 (0.030)
Observations	1472	1768	1475	1774	1472	1768	1475	1774
Adj R Square	0.17	0.14	0.07	0.05	0.28	0.23	0.27	0.24

Robust standard errors in parentheses

Columns (5) through (8) include township fixed effects, while columns (1) through (4) do not.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 8: Separate OLS results by sex (female/male)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	SRHS	SRHS	Mental	Mental	SRHS	SRHS	Mental	Mental
Objective or subjective?	Objective	Objective	Objective	Objective	Subjective	Subjective	Subjective	Subjective
Female or male?	Female	Male	Female	Male	Female	Male	Female	Male
Log per-capita hh income	0.042 (0.028)	0.051 (0.051)	0.043** (0.021)	0.058** (0.024)	0.029 (0.027)	0.010 (0.044)	0.039** (0.016)	0.028 (0.020)
Objective TOWNSHIP	0.024 (0.066)	-0.145** (0.073)	0.004 (0.050)	-0.091** (0.042)				
Objective PROVINCE	0.006 (0.072)	0.153** (0.071)	-0.037 (0.049)	0.005 (0.044)				
Subjective RELATIVES					0.045 (0.045)	0.068 (0.046)	0.048* (0.028)	0.066** (0.027)
Subjective CLASSMATES					0.059 (0.054)	0.121** (0.058)	0.088** (0.042)	0.028 (0.034)
Subjective COWORKERS					0.032 (0.086)	-0.136** (0.069)	0.036 (0.046)	-0.030 (0.033)
Subjective VILLAGERS					0.009 (0.054)	0.143*** (0.051)	0.019 (0.040)	0.111*** (0.031)
Subjective COUNTY					0.066 (0.053)	0.072 (0.051)	0.053 (0.034)	0.077** (0.036)
Subjective PROVINCE					0.026 (0.063)	-0.091 (0.058)	-0.087** (0.044)	-0.033 (0.031)
Subjective COUNTRY					-0.001 (0.052)	0.071 (0.047)	0.013 (0.031)	0.024 (0.027)
Observations	1674	1566	1679	1570	1674	1566	1679	1570
Adj R Square	0.13	0.14	0.04	0.04	0.24	0.29	0.27	0.27

Robust standard errors in parentheses

Columns (5) through (8) include township fixed effects, while columns (1) through (4) do not.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 9: Separate OLS results by age group (age 18-40 / age 41-70)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	SRHS	SRHS	Mental	Mental	SRHS	SRHS	Mental	Mental
Objective or subjective?	Objective	Objective	Objective	Objective	Subjective	Subjective	Subjective	Subjective
Age 18-40 or age 41-70?	Age 18-40	Age 41-70	Age 18-40	Age 41-70	Age 18-40	Age 41-70	Age 18-40	Age 41-70
Log per-capita hh income	0.033 (0.046)	0.067** (0.027)	0.044* (0.027)	0.053*** (0.017)	0.001 (0.043)	0.022 (0.024)	0.038 (0.027)	0.020 (0.015)
Objective TOWNSHIP	-0.048 (0.073)	-0.084 (0.061)	0.007 (0.050)	-0.106*** (0.037)				
Objective PROVINCE	0.114* (0.068)	0.042 (0.077)	-0.056 (0.047)	0.039 (0.043)				
Subjective RELATIVES					0.015 (0.045)	0.101** (0.042)	0.045 (0.027)	0.064** (0.025)
Subjective CLASSMATES					0.138*** (0.053)	-0.057 (0.054)	0.092** (0.044)	0.041 (0.034)
Subjective COWORKERS					-0.157* (0.085)	0.048 (0.063)	0.005 (0.044)	0.004 (0.033)
Subjective VILLAGERS					0.078 (0.051)	0.088* (0.049)	0.007 (0.037)	0.134*** (0.028)
Subjective COUNTY					0.117** (0.054)	0.038 (0.056)	0.114*** (0.041)	0.014 (0.029)
Subjective PROVINCE					-0.079 (0.063)	0.002 (0.057)	-0.119*** (0.046)	0.012 (0.027)
Subjective COUNTRY					0.033 (0.052)	0.107** (0.046)	0.013 (0.030)	0.036 (0.026)
Observations	1694	1546	1697	1552	1694	1546	1697	1552
Adj R Square	0.07	0.09	0.04	0.07	0.18	0.27	0.25	0.33

Robust standard errors in parentheses

Columns (5) through (8) include township fixed effects, while columns (1) through (4) do not.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 10: Separate OLS results by educational group (middle school or lower degree / high school or higher degree)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	SRHS	SRHS	Mental	Mental	SRHS	SRHS	Mental	Mental
Objective or subjective?	Objective	Objective	Objective	Objective	Subjective	Subjective	Subjective	Subjective
High school or higher degree?	No	Yes	No	Yes	No	Yes	No	Yes
Log per-capita hh income	0.088*** (0.024)	-0.059 (0.049)	0.077*** (0.016)	-0.029 (0.028)	0.054** (0.022)	-0.087* (0.046)	0.057*** (0.015)	-0.045** (0.019)
Objective TOWNSHIP	-0.166*** (0.050)	0.198** (0.098)	-0.098*** (0.032)	0.118 (0.084)				
Objective PROVINCE	0.156*** (0.056)	-0.118 (0.103)	0.013 (0.036)	-0.104 (0.071)				
Subjective RELATIVES					0.041 (0.036)	0.111* (0.064)	0.059*** (0.023)	0.059 (0.037)
Subjective CLASSMATES					0.005 (0.044)	0.147** (0.064)	0.009 (0.027)	0.149*** (0.044)
Subjective COWORKERS					-0.040 (0.064)	-0.154 (0.094)	0.044 (0.029)	-0.089* (0.053)
Subjective VILLAGERS					0.126*** (0.041)	-0.019 (0.063)	0.104*** (0.025)	0.005 (0.044)
Subjective COUNTY					0.067 (0.045)	0.110 (0.074)	0.027 (0.029)	0.179*** (0.054)
Subjective PROVINCE					0.029 (0.050)	-0.121 (0.084)	0.010 (0.028)	-0.149*** (0.056)
Subjective COUNTRY					0.077* (0.041)	0.048 (0.059)	0.011 (0.024)	0.015 (0.039)
Observations	2261	962	2266	965	2261	962	2266	965
Adj R Square	0.15	0.10	0.08	0.04	0.28	0.30	0.28	0.31

Robust standard errors in parentheses

Columns (5) through (8) include township fixed effects, while columns (1) through (4) do not.

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

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