Relative income and happiness in Asia:

Evidence from nationwide surveys in China, Japan, and Korea

Takashi Oshio[a], Kayo Nozaki[b], and Miki Kobayashi[c]

[a] **Corresponding Author:** Institute of Economic Research, Hitotsubashi University, 2-1 Naka, Kunitachi, Tokyo 186-8603, Japan. Tel/Fax: +81-42-580-8658. Email: oshio@ier.hit-u.ac.jp.

[b] JGSS Research Center, Osaka University of Commerce, 4-1-10, Mikuriya-sakaemachi, Higashi-osaka, Osaka 577-8505, Japan. Email: nozaki@daishodai.ac.jp.

[c] Graduate School of Economics, Kobe University, 2-1 Rokkodai-cho, Nada-ku, Kobe, Hyogo, 657-8501, Japan, Email: 066d209e@stu.kobe-u.ac.jp.

Abstract

This study attempts to examine relative income effects on perceived happiness in three major Asian countries—China, Japan, and Korea—in comparison with the United Sates, on the basis of largely comparable nationwide surveys in these countries. Consistent with the results from previous studies in Western countries, comparisons with an individual's own income and average income of the reference group are significantly associated with the individual's perceived happiness in Asia. The associations between relative income and happiness are stronger for individual income than family income in China, while the opposite is true in Japan and Korea. Even after controlling for the subjective assessment of family income or personal class identification within the society as a whole, income comparisons within the reference group matter for assessing happiness, especially when using family income for comparisons. Moreover, relative deprivation within the reference group, which is measured by the Yitzhaki index, is negatively related to happiness, providing more evidence for the validity of the relative income hypothesis.

1. Introduction

It is widely understood that individual happiness or subjective well-being depends not only on the absolute level of income but also on comparisons of this level with those of others, especially those who share similar socioeconomic characteristics (Clark and Oswald, 1996; Diener and Biswas-Diener, 2002; Caporale et al., 2009). Theoretically, this relative income hypothesis implies the presence of relative income in the individual utility function. It highlights the possibility that a rise in another's income makes an individual less happy even if his/her income remains unchanged or even increases. This is against the conventional assumption with regard to the social welfare function, even though it is not counterintuitive. On the empirical side, the observed associations between relative income and perceived happiness at the individual level can be clues to solving the so-called Easterlin paradox, which states that there has been no clear uptrend in life satisfaction over time even though real per capita income has increased steadily (Easterlin, 1974; Easterlin, 1995).

As comprehensively surveyed by Clark, Frijters, and Shields (2008), there have been a number of empirical analyses that examine whether and to what extent the relative income hypothesis holds. In the United Kingdom, Clark and Oswald (1996) found a negative association between job satisfaction and comparison of wage rates; this was followed by numerous empirical studies across various countries. In the United States, Blanchflower and Oswald (2004) confirmed that relative income matters for subjective well-being, defining it as average income by state in the United States.

Similar results were obtained by Luttmer (2005), who calculated the average income by smaller local area. In Germany, Ferrer-i-Carbonell (2005) used large-scale panel data to show that the income of the reference group is about as important as the individual's own income for individual happiness.

The associations between economic growth and happiness have been increasingly emphasized for Asian countries as well, because these countries have experienced rapid economic growth, albeit during different periods. Easterlin (1995) and Frey and Stutzer (2002) both presented impressive figures for Japan, which showed virtually no rise in life satisfaction despite the rapid increase in real per capita GDP since World War II. For China, Brockman et al. (2008) pointed out a decline in life satisfaction between 1990 and 2000, when there was massive improvement in material living standards in the country. A similar situation was observed using Veenhoven's (2010) database for Korea, where life satisfaction stayed in a narrow range from 1990 to 2005, a period during which real per capita GDP doubled.

Against this backdrop, recent years have witnessed a growing number of empirical analyses on happiness and its determinants in Asian countries. In China, Brockman et al. (2008) hypothesized about "frustrated achievers": as income distribution has become skewed towards the upper income strata, a worsening financial position relative to the average income has been raising financial dissatisfaction and reducing happiness. Knight, Song, and Gunatilaka (2007) found that most of the respondents take the villages from which they came as reference points and are happier if their income is higher than the village average.

In Japan, Urakawa and Matsuura (2007) directly tested the relative income hypothesis using panel data on women in their 20s and 30s and found that the hypothesis held only for those with spouses. De la Garza, Sannabe, and Yamada (2008) pointed out that union workers report higher levels of subjective well-being when they perceive that their wages are high relative to those of their peers. More recently, Oshio and Kobayashi (forthcoming) showed that individual happiness is negatively associated with income inequality at the regional level, following Alesina, Di Tell, and MacCulloch (2004). This result is consistent with those from preceding studies in social epidemiology that address the negative association between self-rated health and income inequality, as surveyed by Subramanian and Kawachi (2004) and Wilkinson and Pickett (2006).

To our knowledge, studies that explicitly discuss the relative income effect on happiness in Korea are limited. However, Park (2009) remarked that, based on micro data from the AsiaBarometer Survey, the Korean people as a whole are not very satisfied with their material life despite the country's economic growth and maturing democracy. His study points to the possibility that comparisons with other people's income or living standards matters for an individual's assessment of his/her own quality of life or happiness in Korea as well.

Following these existing studies, our analysis attempted to investigate individual happiness and its determinants, focusing especially on the relative income effect, in three major Asian countries—China, Japan, and Korea. We essentially followed the methodology of Ferrer-i-Carbonell (2005), but our analysis has three major features

5

distinguishing it from the existing studies. First, our dataset allowed us to consistently compare the results across countries. We utilized micro data collected from each country's version of the General Social Survey (GSS), which was originally designed and conducted by the National Opinion Research Center at the University of Chicago in the United States. Our empirical analysis was based on the Chinese, Japanese, and Korean GSS (referred to as CGSS, JGSS, and KGSS, respectively) conducted in 2006, which had survey designs and questionnaires that were broadly the same. We believe that this study is the first attempt at a cross-country analysis of the associations between relative income and happiness in Asia, using the micro data generally comparable across countries. In addition, we compared the results in the three countries with those in the United States, using micro data collected from the GSS in 2006.

Second, we examined which type of income—individual income or family income—is relevant for income comparisons in subjective assessments of happiness. There is no rigorous theory regarding the choice of income for the relative income hypothesis, and it is likely that relevant income differs across countries with different social and cultural backgrounds. Ferrer-i-Carbonell (2005) defined the reference group at the individual level but used family income when calculating the relative income. However, the possibility that people are cautious about their own income rather than family income for income comparisons cannot be ruled out. Comparing the results of two different specifications of relative income is expected to help characterize the society as individual-oriented or family-oriented in terms of income comparisons.

Third, we investigated the extent to which comparisons within the reference group

6

matter for subjective well-being. People may well consider their own income within the context of the entire society as well as within the context of a certain reference group. We investigated how the magnitude and statistical significance of the sensitivity to income comparisons within the reference group are affected by controlling for the respondent's subjective ranking of family income or personal class identification within the society as a whole. If the positive association between relative income and happiness remains significant, we can confirm that comparisons of income with those of people with similar characteristics are an important determinant of individual happiness.

In addition to these analyses based on the conventional concept of relative income, we utilized relative deprivation, which is measured by the Yitzhaki index, and explored its association with happiness. The perception of being relatively deprived within the reference group, like a perceived lower position of the individual's own income within it, is expected to raise psychological stress and reduce happiness. If a negative association between the Yitzhaki index and happiness is observed, it will be another evidence of the validity of the relative income hypothesis.

The remainder of the paper is structured as follows. Section 2 provides a brief description of the data on which our analysis is based. Section 3 explains the methods of our empirical analysis. Section 4 presents our key estimation results. Section 5 concludes the paper.

2. Data

The empirical analysis in this paper was based on micro data collected from large-scale nationwide surveys in China, Japan, and Korea, that is, the Chinese, Japanese, and Korean General Social Surveys (CGSS, JGSS, and KGSS, respectively), which were conducted in 2006 and provided by the East Asian Social Survey Data Archive (EASSDA). We also used the micro data from the GSS conducted in 2006 in the United States to compare the results with those in a non-Asian country. These surveys provide a comprehensive collection of information about respondents' demographic and socioeconomic status and other aspects for each country. They were designed almost uniformly and have common questionnaires, which make them largely comparable with each other.

The sample size (response rate) was 3,208 (38.5%), 2,130 (59.8%), 1,605 (65.7%), and 4,510 (71.2%) for CGSS, JGSS, KGSS, and GSS, respectively. We concentrated on those aged below 20 and above 69, because JGSS did not collect data on those aged 19 and below and CGSS did not collect data on those aged 70 and above. Further, we excluded students and those with missing key variables such as income. As a result, there were 2,767 (China), 1,202 (Japan), 1,240 (Korea), and 2,178 (US) respondents in our estimation. The basic features of key variables used in our estimation are summarized in Table 1.

The most important variable in our analysis is perceived happiness. CGSS asked the respondents to answer the question "On the whole, how do you feel about your life?" on a five-point scale (1 = "very unhappy" to 5 = "very happy"). JGSS and KGSS asked respondents to answer the question "All things considered, how satisfied are you

with your life as a whole these days?" on a five-point scale (1 = "very satisfied" to 5 = "very dissatisfied"). Meanwhile, GSS presented three optional answers, "very happy," "pretty happy," and "not too happy," to the question "Are you happy with life?" In the current study, we assumed that life satisfaction is roughly equivalent to perceived happiness as in many preceding studies. [1] As we will discuss later, we further condensed the five categories into three, with 3 being the most happy and 1 being the least happy.

Another key issue is how to define the reference group. While there are various possible ways of defining it, we chose to concentrate on three dimensions: gender, age, and educational accomplishment[2]. In terms of age, we divided respondents into five groups, based on whether they were in their 20s, 30s, 40s, 50s, or 60s. In terms of educational accomplishment, we divided them into three groups based on six categories used in each country's GSS: "no formal qualification," "lowest formal qualification," "above lowest formal qualification," "higher secondary education completed," "above higher secondary level," and "university degree completed." We combined the first three categories into "low," the fourth into "middle," and the last two into "high." For the United States, we re-categorized "less than high school" as "low"; "high school" as "middle"; and "associate/junior college," "bachelor's degrees," and "graduate" as "high" to make the categories roughly comparable with those used for Asian countries. Defining the reference groups by these three dimensions, we had thirty (= $2 \times 5 \times 3$)

---

[1] Alesia et al. (2004) used life satisfaction for European countries and happiness for the United States in their Europe-US comparisons of happiness. Blanchflower and Oswald (2004) discussed the similarities of these two measures of subjective well-being.

[2] Some preceding studies have used the region of residence as the reference, and regional blocks were available in each country's GSS. We did not use them as the reference, however, because they were not comparable with across countries given their different sizes and institutional backgrounds.

groups in total.[3]

In terms of income, we used both the respondent's individual and family incomes. CGSS and KGSS provided actual values, while JGSS and GSS provided category values. For Japan and the United States, we took the median value of each category for simplicity. We equivalized family income by dividing the figure by the root of the number of family members, as in many existing studies. We further transformed all income data into logarithms, which made it easy to compare the estimation results across models and countries. We defined relative income as the difference between the log-transformed individual or family income of the respondent and its average within the reference group. Family income, which is adjusted by household size, represents the level of material living standards, while individuals might compare their income with those of others in terms of their individual income rather than family income.

We had several factors controlled for at the individual level: age (log-transformed, along with its squared value), gender, number of children (no child, one child, two children, and three or more children), marital status (married, unmarried, and divorced/widowed), educational accomplishment (low, middle, and high, as defined above), and employment status (employed, including management; self-employed; unemployed; at home; or other).[4] We further included dummy variables for regional blocks in each country to control for the unspecified characteristics of the region in which the respondent resided. The number of regional blocks was 28 in China, 6 in

---

[3] To check the robustness of the estimation results, we further divided the respondents by marital status (whether they had a spouse or not) and repeated the same estimations with sixty reference groups. We found that the results remained largely intact. The results are available upon request with the authors.

[4] It is widely understood and we also confirmed that self-rated health is significantly associated with happiness. However, we did not include self-rated health as an explanatory variable, considering the potential two-way causality between happiness and health.

Japan, 13 in Korea, and 9 in the United States.

3. Method

As a benchmark model, referred to as Model 1 hereafter, we estimated the ordered logit model to explain perceived happiness on a three-point scale:

$$happiness = \alpha \ln(y_F) + \beta[\ln(y_k) - \ln(y_{kR})] + X\gamma + \varepsilon, \;\; k = F, I, \qquad (1)$$

where y_F and y_I are (equivalized) family and individual income, respectively, y_{FR} and y_{IR} are the averages of the reference group, X is a set of control variables, and ε is an error term. Individuals are assumed to care about their individual (family) income when comparing their income with those of others if $k = F$ ($k = I$). We included family income in both specifications, assuming that it represents material living standards. If the relative income hypothesis holds, the coefficient β is expected to be significantly positive in each specification. Moreover, we used each country's GSS-provided sampling weights and computed robust standard errors to correct for potential heteroscedasticity in all estimations.

Model 2 reflects the hypothesis that income comparisons are not symmetric, following Ferrer-i-Carbonell's (2005) specification. We replaced $\ln(y_k) - \ln(y_{kR})$ in eq. (1) with two variables, *richer* and *poorer*, which are defined respectively as

$$richer = \ln(y_k) - \ln(y_{kR}) \text{ if } y_k > y_{kR}; = 0 \text{ otherwise}, \qquad (2)$$

$$poorer = \ln(y_{kR}) - \ln(y_k) \text{ if } y_k < y_{kR}; = 0 \text{ otherwise}.$$

The difference in the coefficients on these two variables is expected to reflect an

asymmetric response to income comparisons with others. It might be that individuals feel unhappy if their income is below that of their reference group, while those with income higher than that of their reference group are not sensitive to income comparisons. If that is the case, the coefficient on the variable *poorer* is expected to be negative but that on the variable *richer* is expected to be non-significant or of a smaller magnitude than *poorer*. However, the opposite results cannot be ruled out in advance; richer individuals might be more cautious than poorer ones about other people's income reflecting their socioeconomic backgrounds.

In Models 3 and 4, we additionally included the respondent's subjective assessment of his/her family income and the social class to which they belong. It is reasonable to suspect that individuals are mostly cautious with regard to the income of "people like me." However, they might well be simultaneously sensitive to the subjective assessment of their relative position within the society as a whole. The GSSs, excluding CGSS, asked the respondents to choose from among "far below average," "below average," "average," "above average," and "far above average" in response to the question "Compared with [country name]'s families in general, what would you say about your family income?" This question investigated the respondents' subjective assessment of their family income relative to the national average. The Surveys also asked the respondents about their class identification in the society as a whole, using the question "If we were to divide the contemporary [country name] into the following ten strata, which would you say you belong to?" with options from 1 (top) to 10 (bottom).[5] We

---

[5] In the GSS, there were no respondents that answered both questions about happiness (life satisfaction) and class identification. Hence, we did not estimate Model 4 for the United States.

condensed ten-point scores into five-point ones (for instance, 1 and 2 were combined as 1 and 3 and 4 were combined as 2). CGSS asked the respondents, "In your opinion, which level do you and your family respectively belong to in terms of your personal and family socioeconomic status?" The respondents were asked to choose from among five categories, from "far below average" to" "far above average." We used the answers to this question for class identification and subjective assessment of family income in China.

If the respondent's answers to these two questions are significantly associated with his/her perceived happiness, it will be additional evidence for the validity of the relative income hypothesis. A more interesting issue is how adding these answers to explanatory variables affect the magnitude and statistical significance of β, the sensitivity of happiness to income comparisons within the reference group. We estimated Models 3 and 4, which include the assessments of relative family income or personal class identification, respectively, with "average" or "middle" as a reference category; that is,

$$
\begin{aligned}
happiness = {} & \alpha \ln(y_F) + \beta[\ln(y_k) - \ln(y_{kR})] + X\gamma \\
& + \sum_{m=1,2,4,5} \delta_m (rank\ of\ family\ income)_m + \varepsilon,
\end{aligned} \tag{3}
$$

$$
\begin{aligned}
happiness = {} & \alpha \ln(y_F) + \beta[\ln(y_k) - \ln(y_{kR})] + X\gamma \\
& + \sum_{m=1,2,4,5} \theta_m (class\ identification)_m + \varepsilon,
\end{aligned} \tag{4}
$$

for Models 3 and 4, respectively. Here, m = 1, 2, 4, and 5 corresponding to "far below average," "below average," "above average," "and "far above average," respectively, in eq. (3), and to "lower", "lower middle," "upper middle," and "upper," respectively, in eq. (4). "Average" and "middle" (m = 3) are the reference category in eqs. (3) and (4),

respectively.

Finally, we utilized relative deprivation, instead of relative income, within the reference group to examine the relative income hypothesis in Model 5. We replaced $\ln(y_k) - \ln(y_{kR})$ in eq. (1) with the Yitzhaki index (Yitzhaki, 1979):

$$happiness = \alpha \ln(y_F) + \beta(Yitzhaki\ index)_k + X\gamma + \varepsilon. \tag{5}$$

The Yitzhaki index is based on the theory of relative deprivation articulated by Runciman (1966) and calculated as the aggregated shortfall in income between that individual and everyone else with higher incomes within the reference group.[6] The index is equal to zero for any of the highest-income individuals within the reference group, while it is closely equal to the average income minus the own income for a lowest-income individual. We calculated the Yitzhaki index for both individual and family income. A negative coefficient on the index would support the relative income hypothesis.

4. Results and discussion

4.1 Descriptive analysis

Before discussing regression results, we first present a rough picture of happiness in China, Japan, and Korea, in comparison with the United States. Figure 1 depicts the

---

[6] The Yitzhaki index for individual i, is calculated as

$$Yitzhaki\ index_i = \frac{1}{N}\sum_j (y_i - y_j)\ \forall y_j > y_i,$$

where individual j belongs to the same reference group and N is the total number of individuals in that reference group. In our analysis, we calculated this index based on the original (i.e., before log-transformed) value of income, considering its original definition and theoretical relationship with the Gini coefficient (Yitzhaki, 1979).

distribution of happiness on a five-point scale in China, Japan, and Korea. The respondents who choose 3 or 4 are in the highest proportion in all countries. In contrast, the proportion of those who choose 1 (least happy) or 5 (happiest) are below 10% in all countries. Notably, the least happy respondents make up only 0.8% in China. To make results from ordered logit models as reliable as possible, we re-categorized the five categories into three by combining the bottom two and top two categories respectively. This also made it possible to compare the results with those of the United States, in which GSS investigated happiness on a three-point scale only. Figure 2 depicts the distribution of happiness on a three-point scale among the three Asian countries and the United States. The American people tend to choose the middle category more than Asian people, who are more inclined to assess that they are happy.

It is important, however, to recognize that it is far from easy to precisely compare happiness across countries with different traits in people; happiness must mean different things to the Chinese and the Americans. Indeed, it is surprising to see that more than 40% of people in China assess their family income as "far below average" and think that they belong to the "lower" classes (see Table 1), while those whose perceived happiness was in the lowest category make up only 7.5% there (see Figure 2). This study does not aim to directly compare happiness across countries; instead, it is concerned more with what factors are related to the subjective assessment of health. The results from ordered logit models, which will be presented later, are expected to help in identifying these factors and comparing them across counties, although the study cannot be entirely free from biases due to the different traits of people in each county.

15

Table 2 summarizes simple comparisons of sample-weighted averages of three-point scale happiness by key individual attributes—gender, age, educational accomplishment, family income, and marital status—that we used for controls in ordered model estimations. In terms of age, we divided the respondents into "young" (aged 20 to 39 years), "middle" (40 to 59), and "elderly" (60 to 69) groups. In terms of educational accomplishment, we used three categories to construct the reference groups. In terms of family income, we divided the equivalized family income into three classes—"low," "middle," and "high"—by percentiles in each country. Finally, we defined three types of marital status: "unmarried," "married," and "divorced/widowed."

In this table, we observed similarities and differences in the associations between individual attributes and happiness across countries. Women tend to be happier than men in all countries, although the difference is limited. In contrast, the relationship between age and happiness differs across countries. Young people are happiest in China and Korea, while elderly people are happiest in Japan and the United States. Educational accomplishment has a clearly positive correlation with happiness in all countries, as does family income (except in the United Sates). Finally, unmarried people are happiest in China, while married people are happiest in other countries. We should be cautious in interpreting these results, however, because we simply compared the average levels of happiness for each attribute without controlling for the associations between the remaining attributes and happiness.

4.2 Regression analysis

Table 3 summarizes the estimation results of Model 1, in which we used an individual income version of income.[7] First of all, we found that the coefficient on relative income is positive and significant at the 1% level in China, 5% level in the United States, and 10% level in Japan and Korea. These results, which are obtained even after controlling for the absolute level of family income, confirm that the relative income hypothesis holds in these countries, albeit modestly in Japan and Korea.

The patterns of the coefficients on other controls are roughly consistent with those observed in Table 2, but their statistical significance differs across countries. The differences from the results in Table 2 are caused by cross effects from various factors in regression analysis. Among others, we observed the following results. Gender does not have much relevance for assessing happiness. Log-transformed age has large negative coefficients in all countries but positive signs on its squared value point to its non-linear relations with happiness. A larger number of children add to happiness only in China. Unmarried and divorced/widowed individuals tend to feel less happy than married ones in all countries. A higher level of educational accomplishment increases happiness in China and the United States, but not significantly in Japan and Korea. No clear patterns are observed for associations between employment status and happiness.

Using a family income version of relative income, we obtained somewhat different results, as seen in Table 4. Most noticeably, we found that the coefficient on relative income is positive and significant at the 5% level in Japan and Korea, while it is

---

[7] In Korea, individuals with no individual income were not included in estimations, because only those who were currently working were asked to report their individual income.

significant only at the 10% level in China and not significant in the United States. This pattern is in sharp contrast with that in Table 3, which is based on the individual relative income. This finding implies that Japanese and Korean people are more cautious about their family income than about their individual income for the purpose of income comparisons with others, while Chinese and American people are more sensitive to their individual income. Hence, we can tentatively argue that China and the United States are individual-oriented societies in terms of income comparisons with others, while Japan and Korea are family-oriented ones; however, more detailed analysis is required to address the relevance of this argument.

The results with regard to other explanatory variables are similar in general to those in Table 4, but two points must be highlighted. First, the coefficients on the absolute levels of family income turn negative and/or insignificant in contrast with the findings in Table 3. This might be partly due to the multicollinearity between the absolute income and relative income, both calculated on a family income basis in this table. Second, the coefficient on "high" educational accomplishment turns significant in Japan and Korea as well. This is probably because replacing individual relative income with family relative income reduces the problem caused by the multicollinearity between educational attainment and individual income.

Table 5 summarizes the coefficients on the key variables obtained from Models 1 to 5, using an individual income version of relative income. The following findings are worth noting. First, Model 2 found that individuals who are poorer than the reference group average are somewhat more sensitive than richer ones to relative income in China,

while only richer ones are sensitive to relative income in Korea and the United States and individuals on both sides are not very cautious about relative income in Japan. This result indicates that an asymmetric relationship between relative income and happiness is not uniform across countries.

Model 3 adds the subjective ranking of family income within the society as a whole. The coefficient on relative income remains significant but its magnitude declines slightly in China, while it turns insignificant in the other three countries. Model 4, in which the personal class identification is included in estimations, shows results similar to those in Model 3, while Korea sustains the 5% level of significance. A combination of these findings indicates that income or class comparisons within the society as a whole tend to reduce the importance of comparisons within the reference group, if we assume that individuals use individual income for income comparisons. Still, the sensitivity to relative income remains significant at the 5% level in China, pointing to the relevance of income comparisons within the reference group in that country.

Another noticeable finding is that for the subjective ranking of both family income and personal class identification, those in the two categories below the average or middle one feel less happy in all countries. Those who belong to the "above average" or "upper middle" category feel happier in countries other than China. The latter result appears consistent with that obtained from Model 2, which indicates that richer individuals are more sensitive than poorer ones to relative income in those countries, in contrast with the case in China. Equally interesting, those in the top category are not significantly happier than those in the "average" or "middle" categories, pointing to a

nonlinear association between subjective assessments of income or class and happiness.

Finally, we found that the coefficient on the Yitzhaki index in Model 5 has a negative in all countries and significant except in Japan, pointing to the relevance of the relative income hypothesis. This is not a surprising result, considering that relative deprivation measured by the Yitzhaki index is another expression of relative income.

Table 6 shows the results obtained when replacing the individual relative income with the family relative income. In this table, the focus is on the results for Japan and Korea, in which the coefficient on the relative income becomes more significant than it is in the case of the individual relative income in Table 5. In Model 2, both terms, *poorer* and *richer*, have significant coefficients in both countries, while richer individuals are more sensitive than poorer ones to relative income in Japan in contrast with the roughly symmetric results observed in Korea.

Adding the subjective ranking of family income in Model 3 modestly raises both the magnitude and statistical significance of the coefficient on the relative income, except for the United States. This is in contrast with what is observed from Table 5, which shows the opposite changes. One possible explanation is that after controlling for subjective assessment about which income class their family belongs to, individuals become more sensitive to how their family income differs from that of others within the same class. This is not the case for an individual version of relative income.

Meanwhile, adding the personal class identification in Model 4 somewhat reduces both the magnitude and significance of the coefficient on relative income in Japan and Korea, while there is no substantial change in China. Still, the positive association

20

between relative income and happiness remains significant in the three countries. Finally, both the magnitude and significance of the negative coefficient on the Yitzhaki index rise in Japan (now significant at the 5% level) and Korea and decline in China and the United States.[8] This provides more evidence that people in Japan and Korea are more cautious than those in China and the United States about individual income than family income for income comparisons.

5. Conclusion

We examined the relative income effects on perceived happiness in three major Asian countries—China, Japan, and Korea—on the basis of their nationwide surveys, CGSS, JGSS, and KGSS, respectively, which are comparable with each other. We also compared the results in these Asian countries with those of the United States, where the data from GSS, the original version of the survey conducted in the three other countries, are available. The key message from our empirical analysis is that the relative income hypothesis largely holds in China, Japan, and Korea, as already observed in the United States and other Western countries. People are not only cautious about their own income but also compare it with the income of those with similar characteristics when assessing happiness or life satisfaction in the three countries in Asia.

In addition to this main result, our cross-country analysis obtained the following findings. First, people are more cautious about individual income than family income in

---

[8] The magnitude of the coefficient on the Yitzhaki index for each country can be roughly compared between Tables 5 and 6, because the index is scaled by dividing it by the average family income in Table 5 and by the average individual income in Table 6.

China (as in the United States) for income comparisons with others, while the opposite is true in Japan and Korea. This finding is consistent with a view that China is an individual-oriented society (as in the United States) in income comparisons with others, while Japan and Korea are family-oriented ones.

Second, our regression analysis confirmed the importance of income comparisons within the reference group with regard to subjective well-being, if we assume that individuals are cautious about family income for income comparisons. Even after controlling for the subjective ranking of family income or personal class identification within the whole society, the difference between one's family income and the average income of those with similar characteristics tends to be significantly associated with individual happiness.

Third, relative deprivation within the reference group, which is measured by the Yitzhaki index, is negatively related to happiness. This result provides more evidence for the validity of the relative income hypothesis. The relative deprivation analysis showed the same difference between China and Japan-Korea as obtained from the relative income analysis.

We recognize that this analysis has a variety of limitations. For example, our definition of the reference group, based on gender, age, and education, is reasonable but tentative. There are many alternative definitions based on residential area, occupation type, and other attributes as well as even the subjective perception of the peers' income. We need to explore the robustness of our conclusion using alternatively defined reference groups, when more data are available. Moreover, as is often the case with

cross-section analysis of this type, we cannot precisely identify any causality from relative income to happiness. An analysis based on panel data is expected to help address this problem. These issues must also be researched in the future.

Acknowledgments

References

Alesina A., Di Tell, R., & MacCulloch, R. (2004). Inequality and happiness: Are Europeans and Americans different? *Journal of Public Economics*, 88(9-10), 2009–2042.

Blanchflower, D. G., & Oswald, A. J., (2004). Well-being over time in Britain and the USA. *Journal of Public Economics*, 88(7-8), 1359–1386.

Brockmann, H., Delhey, J., Christian, W., & Yuan, H. (2009). The China puzzle: Falling happiness in a rising economy. *Journal of Happiness Studies*, 10(4), 387–405.

Caporale, G. M., Georgellis, Y., Tsitsianis, N., & Yin, Y. P. (2009). Income and happiness across Europe: Do reference values matter? *Journal of Economic Psychology*, 30(1), 42–51.

Clark, A. E., & Oswald, A. J. (1996). Satisfaction and comparison income. *Journal of Public Economics*, 61(3), 359–381.

Clark, A. E., Frijters, P., & Shields, M. (2008). Relative income, happiness and utility: An explanation for the Easterlin paradox and other puzzles. *Journal of Economic Literature*, 46(1), 95–144.

De la Garza, A., Sannabe, A., Yamada, K. (2008). Job satisfaction and happiness: New evidence from Japanese union workers. Discussion Papers on Economics and Business 08–10, Graduate School of Economics and Osaka School of International Public Policy. Osaka: Osaka University.

Diener, E., & Biswas-Diener, R., (2002). Will money increase subjective well-being?

Social Indicators Research, 57(2), 119–169.

Easterlin, R. A. (1995). Will raising the incomes of all increase the happiness of all? *Journal of Economic Behavior and Organization*, 27(1), 35-47.

Easterlin, R. A. (1974). Does economic growth improve the human lot? In P. A. David & W. Melvin (Eds.), *Nations and Households In Economic Growth: Essays in Honor of Moses Abramovitz* (pp. 89-125). New York: Academic Press.

Ferrer-i-Carbonell, A. (2005). Income and well-being: An empirical analysis of the comparison income effect. *Journal of Public Economics*, 89(5-6), 997–1019.

Frey, B. S., & Stutzer, A. (2002). What can economists learn from happiness research? *Journal of Economic Literature*, 40(2), 402–435.

Knight, J., Song, L, & Gunatilaka, R. (2007). Subjective well-being and its determinants in rural China. Discussion Paper 334, Department of Economics. Oxford: Oxford University.

Luttmer, E. F. P. (2005). Neighbors as negatives: Relative earnings and well-being. *Quarterly Journal of Economics*, 120(3). 963–1002.

Oshio, T., & Kobayashi, M. (forthcoming). Area-level income inequality and individual happiness: Evidence from Japan. *Journal of Happiness Studies*. doi: 10.1007/s10902-010-9220-z.

Park, C.-M. (2009). The quality of life in South Korea. *Social Indicators Research*, 92(2), 263–294.

Runciman, W.G. (1996). *Relative deprivation and social justice: A study of attitudes to social inequality in twentieth-century England*. Berkeley: University of California

Press.

Subramanian, S. V., & Kawachi, I. (2004). Income inequality and health: What have we learned so far? *Epidemiologic Reviews*, 26(1), 78–91.

Urakawa, K., & Matsuura, T. (2007). The effect of relative differences on life satisfaction: Analysis of a panel survey of consumers. *Japanese Journal of Research on Household Economics*, 73, 61–70 [in Japanese].

Veenhoven, R. 2010. World Database of Happiness, Erasmus University, Rotterdam. http://worlddatabaseofhappiness.eur.nl/. (20 September 2010)

Wilkinson, R. G., & Pickett, E. K. (2006). Income inequality and health: A review and explanation of the evidence. *Social Science & Medicine*, 62(7), 1768–1784.
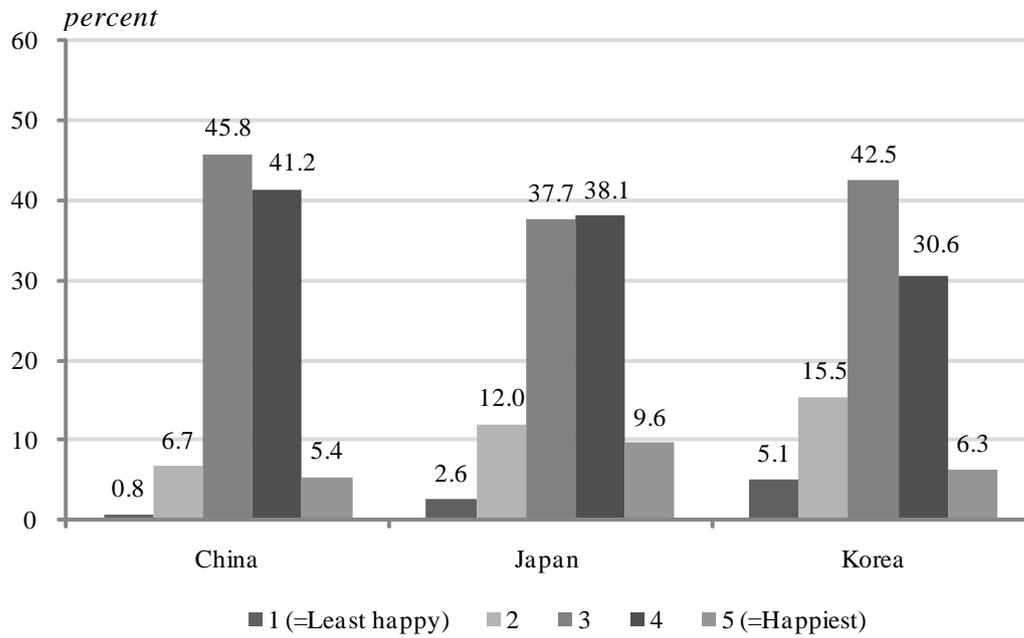
Yitzhaki, S. (1979). Relative deprivation and the Gini coefficient. *Quarterly Journal of Economics*, 93(2), 321–324.
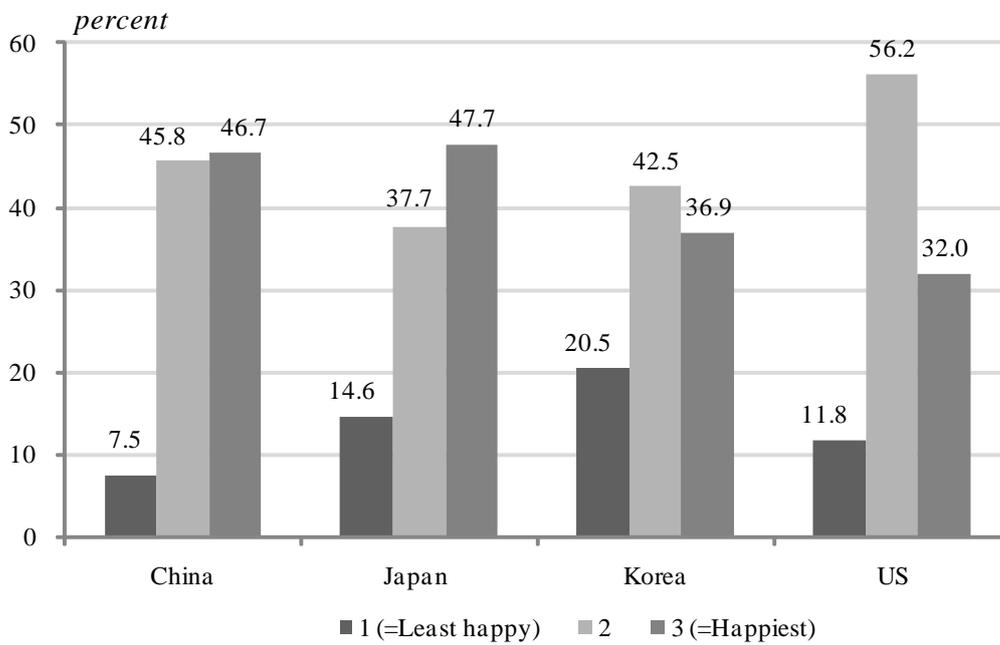
Table 1. Summary statistics of key variables

		China	Japan	Korea	US
Category variables (proportions)					
Happiness	1 (= Least happy)	0.075	0.146	0.205	0.118
	2	0.458	0.377	0.425	0.562
	3 (= Happiest)	0.467	0.477	0.369	0.320
Gender	Women	0.520	0.521	0.573	0.538
Marital status	Married	0.888	0.709	0.759	0.587
	Unmarried	0.073	0.213	0.158	0.228
	Divorced/widowed	0.039	0.078	0.083	0.185
Education	Low	0.750	0.113	0.201	0.135
	Middle	0.176	0.520	0.357	0.508
	High	0.075	0.370	0.442	0.357
Occupational status	Employed/management	0.459	0.636	0.493	0.614
	Self-employed	0.428	0.105	0.177	0.099
	Unemployed	0.013	0.023	0.072	0.036
	Home or retired	0.100	0.236	0.258	0.251
Subjective rank of family income					
	Far below average	0.401	0.095	0.137	0.053
	Below average	0.292	0.318	0.313	0.228
	Average	0.271	0.460	0.348	0.503
	Above average	0.030	0.117	0.189	0.200
	Far above average	0.007	0.010	0.013	0.017
Personal class identification					
	Lower	0.433	0.062	0.076	0.023
	Lower middle	0.288	0.235	0.333	0.097
	Middle	0.288	0.235	0.333	0.097
	Upper middle	0.021	0.158	0.147	0.308
	Upper	0.004	0.011	0.007	0.127
Continuous variables (mean and standard deviation [in parenthesis])					
Age		43.2	45.7	43.0	43.1
		(12.8)	(13.9)	(11.4)	(13.0)
Number of children		1.75	1.52	1.76	1.80
		(1.15)	(1.15)	(1.20)	(1.56)
Individual income		7,355	292.8	2,398	26,230
		(10,055)	(305.9)	(3,690)	(11,602)
Equivalized family income		9,019	356.9	187.5	19,448
		(15,140)	(232.6)	(198.2)	(7,635)
Number of regional blocks		28	6	13	9
Number of observations		2,767	1,202	1,240	2,178

Note: The units of currency are yuan, million yen, thousand won, and US dollar in China, Japan, Korea, and the United States, respectively.

Figure 1. Distribution of perceived happiness on a five-point scale

percent

China: 0.8, 6.7, 45.8, 41.2, 5.4
Japan: 2.6, 12.0, 37.7, 38.1, 9.6
Korea: 5.1, 15.5, 42.5, 30.6, 6.3

■ 1 (=Least happy)　■ 2　■ 3　■ 4　■ 5 (=Happiest)

Figure 2. Distribution of perceived happiness on a three-point scale

percent

China: 7.5, 45.8, 46.7
Japan: 14.6, 37.7, 47.7
Korea: 20.5, 42.5, 36.9
US: 11.8, 56.2, 32.0

■ 1 (=Least happy)　■ 2　■ 3 (=Happiest)

Table 2. Comparisons of average scores of happiness by key individual attributes

		China	Japan	Korea	US
Gender	Men	2.38	2.32	2.13	2.20
		(0.61)	(0.72)	(0.76)	(0.62)
	Women	2.40	2.34	2.19	2.21
		(0.63)	(0.71)	(0.73)	(0.64)
Age	Young	2.43	2.32	2.24	2.18
		(0.63)	(0.73)	(0.73)	(0.63)
	Middle	2.38	2.26	2.16	2.22
		(0.62)	(0.73)	(0.74)	(0.63)
	Elderly	2.38	2.39	2.03	2.32
		(0.65)	(0.68)	(0.72)	(0.63)
Educational accomplishment	Low	2.35	2.30	2.00	2.07
		(0.63)	(0.69)	(0.72)	(0.64)
	Middle	2.49	2.27	2.09	2.16
		(0.59)	(0.73)	(0.72)	(0.63)
	High	2.60	2.43	2.29	2.30
		(0.55)	(0.70)	(0.74)	(0.61)
Family income	Low	2.24	2.16	1.93	2.15
		(0.64)	(0.78)	(0.73)	(0.63)
	Middle	2.46	2.34	2.24	2.29
		(0.60)	(0.71)	(0.71)	(0.62)
	High	2.56	2.51	2.37	2.15
		(0.54)	(0.66)	(0.71)	(0.62)
Marital status	Unmarried	2.43	2.16	2.06	2.01
		(0.62)	(0.75)	(0.75)	(0.60)
	Married	2.40	2.40	2.21	2.35
		(0.62)	(0.68)	(0.72)	(0.60)
	Divorced/widowed	2.13	2.13	1.91	1.97
		(0.67)	(0.82)	(0.81)	(0.62)

Note: 1. Happiness is measured on a three-point scale (3 = happiest). The figures in parentheses are standard errors.

2. For age, "young" = aged 20-39, "middle" = aged 40-59, and "elderly" = aged 60-69. For educational accomplishment, "low" = no/lowest/above lowest formal qualification, "middle" = higher secondary education completed, and "high" = above higher secondary level/university degree completed in China, Japan, and Korea. In the United States, "low" = less than high school, " "middle"= high school, and "high,"= associate/junior college, Bachelor's degrees, and graduate school.

3. Family income is categorized into three segments by percentiles.

Table 3. Estimated coefficients in Model 1 with individual relative income

	China		Japan		Korea		US	
$\ln(y_I)-\ln(y_{IR})$	0.253	(2.92)***	0.181	(1.72)*	0.276	(1.66)*	0.222	(2.16)**
$\ln(y_I)$	0.299	(2.90)***	0.548	(4.08)***	0.393	(2.22)**	0.107	(0.65)
Women	0.020	(0.18)	-0.051	(-0.40)	0.092	(0.64)	0.035	(0.29)
$\ln(Age)$	-22.871	(-4.20)***	-5.604	(-0.93)	-16.878	(-2.12)**	-13.464	(-2.69)***
$\ln(Age)$-squared	2.981	(4.07)***	0.723	(0.90)	2.204	(2.06)**	1.775	(2.59)***
One child	0.967	(2.87)***	-0.502	(-1.69)*	-0.549	(-1.49)	-0.187	(-0.97)
Two children	1.278	(3.50)***	-0.148	(-0.57)	-0.535	(-1.51)	-0.057	(-0.30)
Three children or more	1.271	(3.30)***	-0.490	(-1.77)*	-0.564	(-1.43)	-0.039	(-0.20)
Unmarried	-0.324	(-0.87)	-1.227	(-4.13)***	-1.390	(-4.00)***	-1.428	(-7.46)***
Divorced/widowed	-0.610	(-2.80)***	-0.623	(-2.62)***	-0.689	(-2.09)**	-1.270	(-7.80)***
Education: middle	0.438	(2.75)***	-0.088	(-0.45)	-0.089	(-0.37)	0.338	(1.44)
Education: high	0.742	(3.31)***	0.223	(0.99)	0.340	(1.32)	0.730	(2.97)***
Self-employed	0.125	(0.94)	0.499	(2.31)**	-0.421	(-2.52)**	0.078	(0.39)
Unemployed	0.436	(0.60)	-0.662	(-1.59)			-0.389	(-1.01)
At home or retired	0.103	(0.37)	0.441	(2.14)**			0.104	(0.44)
Regional block dummies	Yes		Yes		Yes		Yes	
Pseudo R-squared	0.0863		0.0548		0.0605		0.0759	
Log pseudo likelihood	-1970.349		-979.536		-779.976		-1359.535	
Number of observations	2393		1032		794		1608	

Note: 1. The dependent variable is happiness on a three-point scale (3 = Happiest).

2. The numbers in parentheses are z values.

3. The reference categories are "no child" for children, "married" for marital status, "low" for education, and "employed" for occupational status.

4. In Korea, only those working at the time of the survey were asked to report their individual income.

5. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 4. Estimated coefficients in Model 1 with family relative income

	China		Japan		Korea		US	
$\ln(y_F)-\ln(y_{FR})$	0.646	(1.78)*	1.134	(2.46)**	0.837	(2.47)**	-0.082	(-0.17)
$\ln(y_F)$	-0.147	(-0.40)	-0.494	(-1.07)	-0.224	(-0.65)	0.283	(0.59)
Women	0.050	(0.46)	-0.177	(-1.39)	0.171	(1.35)	0.100	(0.86)
$\ln$(Age)	-19.340	(-3.88)***	-5.632	(-0.98)	-1.729	(-0.25)	-14.416	(-3.63)***
$\ln$(Age)-squared	2.507	(3.75)***	0.755	(0.99)	0.144	(0.15)	1.918	(3.58)***
One child	0.768	(2.62)***	-0.254	(-0.92)	-0.207	(-0.69)	-0.157	(-0.97)
Two children	1.133	(3.58)***	0.010	(0.04)	-0.240	(-0.83)	-0.115	(-0.74)
Three children or more	1.174	(3.49)***	-0.325	(-1.27)	-0.392	(-1.24)	-0.023	(-0.14)
Unmarried	-0.271	(-0.81)	-0.990	(-3.53)***	-0.903	(-3.18)***	-1.355	(-8.75)***
Divorced/widowed	-0.632	(-2.94)***	-0.514	(-2.23)**	-0.419	(-1.67)*	-1.202	(-8.90)***
Education: middle	0.655	(2.51)**	0.296	(1.16)	0.140	(0.59)	0.089	(0.33)
Education: high	1.178	(2.64)***	0.877	(2.47)**	0.769	(2.25)**	0.506	(1.45)
Self-employed	0.002	(0.02)	0.419	(2.02)**	-0.392	(-2.54)**	0.083	(0.45)
Unemployed	0.163	(0.33)	-0.446	(-1.11)	-0.742	(-2.55)**	-0.425	(-1.53)
At home or retired	-0.141	(-0.72)	0.209	(1.33)	0.063	(0.43)	0.012	(0.09)
Regional block dummies	Yes		Yes		Yes		Yes	
Pseudo R-squared	0.0771		0.0500		0.0556		0.0669	
Log pseudo likelihood	-2326.666		-1143.153		-1228.973		-1904.503	
Number of observations	2767		1202		1240		2178	

Note: See the note on Table 3.

Table 5. Comparisons of estimated coefficients across alternative models using individual relative income

	China		Japan		Korea		US	
Model 1								
$\ln(y_I)$-$\ln(y_{IR})$	0.253	(2.92)***	0.181	(1.72)*	0.276	(1.66)*	0.222	(2.16)**
Model 2								
Poorer	-0.265	(-2.16)**	-0.126	(-0.65)	0.023	(0.08)	-0.032	(-0.24)
Richer	0.237	(1.83)*	0.245	(1.22)	0.609	(2.40)**	0.809	(3.31)***
Model 3: subjective ranking of family income								
$\ln(y_I)$-$\ln(y_{IR})$	0.211	(2.42)**	0.132	(1.25)	0.220	(1.29)	0.135	(1.33)
Far below average	-0.987	(-6.02)***	-1.243	(-3.74)***	-1.244	(-3.74)***	-1.201	(-4.18)***
Below average	-0.337	(-2.19)**	-0.736	(-4.50)***	-0.786	(-4.74)***	-0.613	(-3.62)***
Above average	0.268	(0.66)	0.479	(2.53)**	0.558	(2.42)**	0.372	(2.28)**
Far above average	-0.465	(-0.80)	-0.038	(-0.04)	1.441	(1.49)	0.312	(0.81)
Model 4: personal class identification								
$\ln(y_I)$-$\ln(y_{IR})$	0.196	(2.22)**	0.135	(1.29)	0.155	(1.71)*		
Lower	-0.982	(-6.00)***	-1.243	(-3.75)***	-1.268	(-4.18)***		
Lower middle	-0.284	(-1.85)*	-0.735	(-4.50)***	-0.604	(-4.39)***		
Upper middle	0.327	(0.82)	0.479	(2.53)**	0.437	(2.31)**		
Upper	-0.644	(-1.14)	-0.037	(-0.04)	1.381	(1.41)		
Model 5								
Yitzhaki index	-0.611	(-2.66)**	-0.199	(-1.37)	-0.850	(-3.87)***	-0.450	(-2.87)***

Note: 1. The dependent variable is happiness on a three-point scale (3 = happiest).

2. The numbers in parentheses are z values.

3. The reference categories for the subjective ranking of family income and personal class identification are "average" and "middle," respectively.

4. The Yithaki index is divided by average individual income in each country for scaling.

4. The coefficients on other variables are not reported to save space.

5. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 6. Comparisons of estimated coefficients across alternative models using family relative income

	China		Japan		Korea		US	
Model 1								
$\ln(y_F)$-$\ln(y_{FR})$	0.646	(1.78)*	1.134	(2.46)**	0.837	(2.47)**	-0.082	(-0.17)
Model 2								
Poorer	-0.698	(-1.84)*	-0.894	(-1.82)*	-0.830	(-2.21)**	0.223	(0.44)
Richer	0.607	(1.60)	1.431	(2.92)***	0.843	(2.28)**	-0.006	(-0.01)
Model 3: subjective ranking of family income								
$\ln(y_F)$-$\ln(y_{FR})$	0.684	(1.82)*	1.282	(2.75)***	0.976	(2.80)***	-0.306	(0.65)
Far below average	-1.101	(-7.45)***	-1.774	(-6.54)***	-0.875	(-4.37)***	-1.117	(-4.56)***
Below average	-0.253	(-1.85)*	-0.737	(-5.38)***	-0.387	(-2.89)***	-0.672	(-5.10)***
Above average	0.576	(1.74)*	1.016	(4.49)***	0.569	(3.33)***	0.337	(2.42)**
Far above average	-0.533	(-1.12)	-0.293	(-0.52)	0.782	(1.26)	0.215	(0.56)
Model 4: personal class identification								
$\ln(y_F)$-$\ln(y_{FR})$	0.685	(1.82)*	0.941	(2.07)**	0.730	(2.13)**		
Lower	-1.152	(-7.44)***	-1.197	(-3.80)***	-1.341	(-4.77)***		
Lower middle	-0.396	(-2.77)***	-0.678	(-4.52)***	-0.570	(-4.45)***		
Upper middle	0.209	(0.57)	0.406	(2.37)**	0.477	(2.64)***		
Upper	-0.686	(-1.51)	0.120	(0.15)	0.280	(0.47)		
Model 5								
Yitzhaki index	-0.483	(-2.01)**	-0.707	(-2.29)**	-1.180	(-4.26)***	-0.436	(-2.10)**

Note: See the note on Table 5.