The association between income dynamics and subjective well-being:

Evidence from career income records in Japan

Takashi Oshio[a, *], Maki Umeda[b], Mayu Fujii[a]

[a]Institute of Economic Research, Hitotsubashi University
[b]Graduate School of Medicine, The University of Tokyo

[*] **Corresponding author**
Institute of Economic Research, Hitotsubashi University,
2-1 Naka, Kunitachi, Tokyo 186-8603, Japan.
Tel/Fax: +81-42-580-8372, E-mail: oshio@ier.hit-u.ac.jp

Acknowledgements
This study was funded by a Grant-in-Aid for Specially Promoted Research (Grant number 22000001) and Scientific Research on Innovative Areas (Grant number 200900000361) and from the Japan Society for the Promotion of Science.

Abstract

In this analysis, we attempted to investigate how subjective well-being (SWB) was associated with income dynamics for male employees in Japan (N = 1,004), on the basis of a panel dataset of career wage records covering a period of more than 30 years. It is widely recognized that income is a key determinant of SWB, along with other variables of socioeconomic status. We focused on the association of income dynamics with life satisfaction, its expectation five years later, self-rated health (SRH), and psychological distress. The history of income used in our analysis was based on administrative records, which were almost free from recall errors. Results showed that life satisfaction was more strongly affected by a change from lifetime average or maximum income than from income in the previous year, while the opposite was true of SRH and psychological distress. In addition, life satisfaction had a downward stickiness against a reduction in income from its average or maximum level, which was not the case for SRH or psychological distress. Further, the experience of peak out of income in the past made SWB more sensitive to changes in income. These findings suggest that the association between SWB and income should be further studied in a dynamic framework.

Keywords

Subjective well-being, life satisfaction, self-rated health, psychological distress, income dynamics

Research highlights

- We investigated the association between subjective well-being and income dynamics in Japan.
- Life satisfaction has a downward stickiness against reduction from average or maximum income.
- In contrast, self-rated health and psychological distress are sensitive to short-term changes in income.
- Experiencing peak out of income raises sensitivity of subjective well-being to income changes.

INTRODUCTION

Income is a key determinant of subjective well-being (SWB), along with other variables of socioeconomic status. Higher income raises the living standards of individuals by enabling them to purchase more goods and services and save for a rainy day. It also enhances health by giving them more chances to promote health through better access to health services and increased health literacy. In addition to providing better access to resources, higher income per se is expected to promote one's sense of happiness and life-satisfaction through higher self-appraisal and increased sense of control. Reduction of exposure to risks and uncertainties is another benefit of higher income, which can buffer against stresses related to health and life in general. Many empirical studies have provided evidence for these positive effects of higher income, either that of individual or household, on one's life-satisfaction, perceived happiness, or health (Braveman et al., 2005; Diener & Biswas-Diener, 2002; Frey & Stutzer, 2002; Frijters et al., 2004; Johnson & Krueger, 2006; Orpana & Lemyre, 2004).

Income dynamics and SWB

Past income dynamics is likely to affect one's SWB, independently of the current income (Gunasekara et al., 2011). For example, it is reasonable to believe that 1,000 dollars earned this month would affect life satisfaction differently if one's income last month, or average monthly income up to the present, was 5,000 dollars rather than 1,500 dollars. The psychological basis for a possible association between income dynamics and SWB is provided by behavioral science as reference-dependent preferences (Kahneman and Tversky, 1979; Kahneman, 1994). If individuals take their income in the past as a reference point for utility, their observed SWB is expected to be associated with it even after controlling for current income.

The association between income dynamics and SWB is also consistent with the relative

income hypothesis (Easterlin, 1995, 2005), which claims that individuals evaluate their current income with a reference to their own income in the past (habituation) as well as others' income (social comparison). As surveyed by Clark et al. (2008), empirical studies have supported this hypothesis by showing that income changes from the past affect current life satisfaction, even after controlling for current income (Burchardt, 2005; Clark, 1999; Grund & Sliwka, 2007; Inglehart & Rabier, 1986). This result is similar to what the social comparison version of the relative income hypothesis argues: comparisons with others in a reference group affect life satisfaction independently of the absolute level of income (Ferrer-i-Carbonell, 2005).

Further, we can predict that SWB has an asymmetric association with income changes. Regarding consumption expenditures, Duesenberry's (1949) ratchet effect hypothesis emphasizes consumption habits: as the level of income increases, individuals will become accustomed to a higher level of consumption, and accordingly it becomes difficult for them to curtail it as income falls. Considering that SWB is likely to have a close relationship with consumption expenditures, which constitute a realization of disposable material resources, it is reasonable to suspect that SWB has a downward stickiness against a fall in income. It remained unexplored, however, as to what kind of income individuals actually take as a reference point when assessing SWB—income in the previous year, their average income, or their maximum income in the past.

Income dynamics and health

The association between income dynamics and health also has been investigated (Duncan, 1996; Gardner & Oswald, 2007; Kaplan et al., 2008; Lindahl, 2005). Some studies have identified disadvantageous financial status, such as persistent low income, cumulative exposure to economic hardship, and income instability, as important predictors of health (Ahnquist et al.,

2007; McDonough et al., 1997). It is also known that lifetime earnings tend to modify the association between childhood financial hardship and adulthood multi-morbidity, suggesting that the association is differentially influential depending on earnings in the past (Tucker-Seeley et al., 2011).

The relative income hypothesis appears to hold for health as well. An increasing number of studies have shown that social comparisons, or relative deprivation in income, are related to health and self-assessment (Subramanyam et al., 2009; Pham-Kanter, 2009). As in the case of life satisfaction, a habituation version of the relative income hypothesis is expected to hold for health; comparisons with income in the past may affect one's current health conditions, even after controlling for current income (Giordano & Lindstrom, 2010; Kaplan et al., 2008; McDonough et al., 1997). However, it is still under debate as to which aspects of income dynamics—short-term changes, long-term trend, or average income—are more influential in determining health over the others (Gunasekara et al., 2011; McDonough & Berglund, 2003).

Current study

Following these preceding studies, we attempted to investigate how SWB is associated with income dynamics for male employees in Japan (N = 1,004), on the basis of a panel dataset of career wage records covering a period of over 30 years. The current study has the following distinguishing features from existing studies. First, it addressed multiple aspects of SWB: two SWB indicators (life satisfaction and expected life satisfaction five years later) and two indicators of its health-related aspects (self-rated health (SRH) and psychological distress). This allowed us to compare the results across different aspects of SWB to obtain a deeper understanding of how SWB is related to income dynamics. We addressed the association of expected life satisfaction with income dynamics in order to speculate how life satisfaction is

dynamically adjusted to income changes, under limited information about the dynamics of life satisfaction in the cross-sectional dataset.

Second, we considered a variety of income dynamics, considering the possibility that different aspects of SWB may have different reference points of income in the past. We focused on changes from income in the previous year, average income, and maximum income, in addition to the absolute level of current income. We also distinguished between the impacts of an increase and a decrease in income, considering the possibility of asymmetric responses of SWB to income changes (Bowman et al., 1999; Sareen et al., 2011). In the current study, we further specified different patterns of the income profile: whether the respondent had experienced the peak or bottom of income in the past. It might be the case that individuals who have experienced the peak of income were more sensitive to a decrease in income, and that individuals who have experienced the bottom of income were resilient to it, although the reverse cases cannot be ruled out in advance.

Third, we utilized the career wages based on administrative records, which improved the accuracy of the income data. The respondents were asked to post their wages in April of each year from the administrative records reported in the Social Security Statements (SSS), an official statement of public pension programs regularly mailed from the government. This method helped us to prevent recall errors in income reports. To our knowledge, this is the first attempt to address the association between income dynamics and SWB in Japan, which has employment and wage systems that are different from the Western countries, for example, lifetime employment and a steeper age-wage profile (Clark & Ogawa, 1992; Hashimoto & Raisian, 1985; Mincer & Higuchi, 1988), although some studies have discussed how life satisfaction and SRH are associated with social comparisons in the country (Kondo et al., 2008; Oshio et al., 2011).

METHOD

Sample

We utilized the micro data collected from an Internet version of the Japanese Longitudinal Survey on Employment and Fertility (LOSEF), which was conducted as part of the Project on Intergenerational Equity in Japan (Takayama et al., 2012). Through an Internet survey company, LOSEF sent invitations to their registrants who had government-provided SSS, which included the administrative records of paid pension premiums and other information related to the public pension programs. By this procedure, public-sector employees, who did not receive the SSS, were excluded from the survey. Invitation was kept open until we obtained 1,000 respondents for each of the age categories by gender (aged 30s, 40s, and 50s for both male and female), which brought our prospective sample to 6,000. After excluding the respondents who provided answers inconsistent with their pension membership, we obtained 5,953 respondents (30s: 1,974, 40s: 1,919, and 50s: 2,060).

The current study selected data of the respondents who were the members of the Employees' Pension Insurance (EPI). EPI premiums are proportional to monthly wages, and the benefits have a wage-proportional component, making the wage profile key information in the SSS. Another major insurance system in Japan is the National Pension Insurance (NPI), which is a public pension program for self-employed and dependent spouses. NPI has only fixed-amount premiums and benefits, and so the SSS has only premium contribution records. Thus, only EPI members were able to post their monthly wages referring to the SSS records.

Further, we removed those who had at least one interruption in their wage history from the study sample, because any interpolation of missing wage data cannot be free from measurement errors. After removing those with missing variables, we had 1,004 men and 164 women. The limited number of women reflected the feature of the Japanese society, where women tend to

leave the labor force at marriage or childbirth. Even if women return to the labor force, most of them work as part-time workers and remain uncovered by the EPI, making their wages not recorded in SSS.

As a result, our empirical analysis utilized the data of 1,004 men with the complete history of their wage earnings up to the present. It should be noted that the conditions of no interruption in the wage profile made the sample heavily concentrated on those of relatively stable occupational status; the regularly employed in the latest year shared 96.7% of the total sample. In addition, as is often the case with Internet surveys, educational attainment of the sample was skewed toward those with higher educational attainment. These features should be remembered in interpreting estimation results in this study.

Data

Dependent variables

The dependent variables included four SWB-related measures, all of which were presented as three-point scores for consistent comparisons: life-satisfaction, expected life-satisfaction in five years, SRH, and psychological distress. For life satisfaction, the survey asked, "In general, how satisfied are you with your current life?" on a six-point scale (1 = *Very dissatisfied*, …, 6 = *Very satisfied*). For expected life satisfaction five years later, a question following that about current life satisfaction was asked, "How do you think you will feel in 5 years?" The response options for these two types of life-satisfaction were six points, ranging from "1 = *Very dissatisfied*" to "6 = *Very satisfied*." We reversed the order of the answers and re-categorized them into three-point scores (combining 1 and 2 to 1, 3 and 4 to 2, and 5 and 6 to 3). SRH was measured by a question, "How is your current health?" on a five-point scale (1 = *Excellent*, 2 = *Good*, 3 = *Average*, 4 = *Poor*, 5 = *Bad*). We coded positive evaluation of SRH (1 and 2) as 3, average (3)

as 2, and negative (4 and 5) as 1. Psychological distress was measured by K6, a six-item questionnaire (Kessler et al., 2002). We summed up the total score (0 to 24) and constructed a three-point-score variable with two cutoff points: 0 to 4 as low distress, 5 to 12 as mood or anxiety disorder in a Japanese sample (Sakurai et al., 2011), and 13 to 24 as serious mental illness (Kessler et al., 2010).

Independent variables

The respondents were asked to report their wages from their initial job to their current one by referring to their career wage records provided by the SSS. In the current study, we focused on four income variables (current income, income in the previous year, average income, and maximum income) and five income-dynamic variables (an increase and decrease in income from that in the previous year, an increase and decrease from average income, and a decrease from maximum income). We calculated the annual income by multiplying the reported monthly wage in April of each year by twelve, assuming that the monthly wage was fixed in April, the first month of fiscal year in Japan. Then, we evaluated this annual income at the 2005 prices and took the logarithm of it, considering the concavity of the association between income and SWB. Current income was defined by the latest income at the time of survey: 83.9% comprised the wages reported in April of 2011, and 16.1% the wages reported in April of 2010. Income in the previous year was the wage one year before the latest income; that is, 2010 or 2009. Average income was calculated by summing up all the reported monthly wages and dividing it by the months they earned those wages. Maximum income corresponded to the highest wage reported. We also calculated the changes in income from its level in the previous year, as well as its average and maximum.

Covariates

We adjusted all the statistical models for the following six covariates: (i) Age was squared, assuming nonlinear relations with SWB. (ii) Educational attainment was categorized into three groups—graduated from high school or below, junior college, or college or above. (iii) Marital status had three categories—married, unmarried, and divorced/separated. A dichotomous variable of having children was coded as positive when a respondent had any living biological children, regardless of cohabitation status. (iv) The number of household members was included as a continuous variable. (v) Occupational status had two categories—regular employment and non-regular employment, such as short-term contract worker, dispatched workers, and part-time workers. (vi) Urban residency meant living in either of Tokyo, Osaka, and Nagoya Metropolitan areas. Residential areas were also included (Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku, and Kyushu). The basic features of key variables are summarized in Table 1.

Analytic strategy

We employed ordered logit models to explain each of the four SWB measures by income variable (in the form of logarithm) along with a set of covariates. Models 1 to 3 examined the effect of three types of income dynamics: changes from income in the previous year, average income, and maximum income. In Model 1, we used three income variables: the absolute level of current income (y), an increase from income in the previous year (max ($y - y_{-1}$, 0)), and a decrease from income in the previous year (max ($y_{-1} - y$, 0)), where y_{-1} indicate the income in the previous year. If an increase and/or a decrease from income in the previous year are significantly associated with SWB, we can argue that individuals take income in the previous year as a reference point for SWB. We also assumed asymmetric associations of SWB with an increase and decrease from the income in the previous year. This was an analogy to

Ferrer-i-Carbonell's (2005) methodology, which examined how the association of life satisfaction with relative income differed between those with income higher than the average and those with lower income. In our study sample, 12.6% of all respondents experienced a decrease in income from the previous year.

Model 2 replaced the income in the previous year with the average income to test whether the average income can be used as a reference point for SWB. In our study sample, 8.7% of all the respondents experienced a decrease of income from the average. In the same manner, Model 3 replaced the income in the previous year with the lifetime maximum income to examine the ratchet effect hypothesis for SWB. Models 4 and 5 aimed at examining the robustness of the estimation results obtained from Models 1, 2, and 3, all of which included only one type of income change—change from previous year's income, average income, or maximum income. Model 4 included the income changes from both the previous year and from the average income. Model 5 included the decrease from maximum income.

Furthermore, we examined how the income pattern in the past affected the sensitivity of SWB to income dynamics. We developed two types of income profile. The first was the "peak out," which corresponded to the respondents whose income had peaked out in the past (initial income < maximum income > current income). The second was the "bottom out," which corresponded to the respondents whose income had bottomed out in the past (initial income > minimum income < current income). It should also be noted that these two types were not exclusive of each other: out of 1,004 respondents, 404 and 348 experienced the peak out and bottom out, respectively, while 122 experienced both. We separately estimated Models 1 to 5 for those who experienced peak out and bottom out.

We repeated the same estimation procedures for all the four SWB variables to assess how differently income dynamics was related to different aspects of SWB—that is, life satisfaction,

its expectation five years later, SRH, and psychological distress.

RESULTS

Table 2 summarizes the estimation results of Models 1–5 for life satisfaction for the whole sample, focusing on the estimated coefficients on the income variables. The magnitudes of the coefficients can be compared with each other, because the income variables were expressed in terms of logarithm or their differences. The estimation results of covariates are not reported to save space (available upon request from the authors). We confirmed that the propensity odds assumption, which must be satisfied to make ordered logit (probit) estimation relevant, was not violated for all models.

This table presents several noteworthy findings. First, we observed in Model 1 that life satisfaction was not associated with an increase or decrease from income in the previous year, while it is positively associated with current income. This result suggests that income in the previous year was not a reference point for current life satisfaction.

Second, we found in Model 2 that after controlling for current income, life satisfaction was positively associated with a decrease from average income but not associated with an increase from it. This indicates that individuals were inclined to disregard a fall in income from its average, while their life satisfaction was adjusted upward in response to current income when income rose from its average. This result highlights that average income was an asymmetric reference point for life satisfaction; in other words, life satisfaction had a downward stickiness against a change in income from its average.

Third, we confirmed a ratchet effect of life satisfaction from Model 3, which focused on maximum income. A decrease from the maximum income was positively associated with life satisfaction, after controlling for current income. We also found that Models 2 and 3 had higher

goodness of fit than Model 1, suggesting that changes from the average or maximum income were more important for life satisfaction than shorter-term income changes.

Finally, we confirmed the robustness of the abovementioned results by estimating Models 4 and 5. In Model 4, we included changes both from income in the previous year and changes from the average income, and found that only a decrease from the average income was positively associated with life satisfaction, after controlling for current income. In Model 5, we replaced the changes from average income with a decrease from maximum income. These two models obtained results consistent with those in Models 1–3 in terms of the sign, magnitude, and statistical significance of estimated coefficients of the income variables.

Table 3 summarized the estimation results of Models 1–5 for SRH. We notice their substantial differences from the results for life satisfaction in Table 2. First, current income was not significantly associated with SRH in any model specification. Second, and more importantly, a decrease in income from the previous year lowered SRH, while any other type of change in income was not associated with it.

We estimated Models 1–5 for other aspects of SWB, that is, expected life satisfaction five years later and psychological distress. Table 4 summarizes the results of Model 4 for four aspects of SWB: the coefficients on an increase and decrease from income in the previous year and from the average income. The table consists of three parts. The top part shows the results for all samples, with results for life satisfaction and SRH copied from Tables 2 and 3, respectively. The middle and bottom parts of the table show the results for individuals who had experienced peak and bottom of income, respectively.

From the top part, we first found that expected life satisfaction was positively associated with a decrease from the average income. This result was similar to the case of current life satisfaction, but comparing the sizes of coefficients on current income and a decrease from

average income revealed that the average income was more important as a benchmark for prospective estimation of life satisfaction. Second, expected life satisfaction was also negatively associated with a decrease from income in the previous year. These results suggest that when individuals expect life satisfaction in the future, a short-term decrease in income partially offsets the ratchet effect.

Third, the rightmost column showed that psychological distress was negatively associated with an increase from income in the previous year but not associated with any other income variable. Psychological distress, like SRH, is associated with a short-term change in income, but unlike SRH, it is associated with an increase, and not decrease, of income.

Turning to the middle part for peak-out individuals, we first found that both the current and expected life expectation were more sensitive to a decrease from the average income. We also observed that a decrease from income in the previous year was negatively associated with both the current and expected life satisfaction. In addition, we observed that SRH and psychological distress were both more sensitive to a change in income—a decrease for SRH and an increase for psychological distress—from the previous year for peak-out individuals than for the whole sample. Combined with the results for life satisfaction and its expectation, these findings suggest that the experience of peak of income in the past generally made SWB more sensitive to income changes.

The bottom part of the table provides the results for bottom-out individuals. Except for the association of life satisfaction with current income and an increase in income from the previous year, and that of expected life satisfaction with current income, the associations of SWB with income variables turned or remained insignificant. We also noticed that the experience of bottom of income in the past generally made SWB less sensitive to income changes, while it made individuals more positively affected by a short-term increase in income.

Finally, Table 5 summarized the results obtained by replacing increases/decreases from the average income with a decrease from the maximum income. One of the noticeable differences from the observation in Table 4 is that for individuals of bottom out type, a decrease from maximum income, and not an increase from income in the previous year, is positively associated with life satisfaction. Despite these differences, the findings in Table 5 provided the same message as those in Table 4.

DISCUSSION AND CONCLUSION

We addressed the associations between income dynamics and various aspects of SWB on the basis of micro data for male employees in Japan. We first found that the reference point for life satisfaction was the average or maximum income up to the present when assessing life satisfaction, while respondents did not compare the current income with income in the previous year. However, we cannot rule out the possibility that short-term fluctuations in income affect the trajectory of life satisfaction in the long run, given our observation that individuals were cautious about a reduction in income from the previous year when expecting life satisfaction over the near future.

Another noticeable finding was that life satisfaction responds asymmetrically to an increase or decrease in income. After controlling for current income, life satisfaction was positively affected with a decrease from the average income but not associated with an increase from it. We observed a similar ratchet effect of life satisfaction against a decrease from the maximum income: a decrease from the maximum income was positively associated with life satisfaction after controlling for current income.

These results were supportive of a view that life satisfaction is asymmetrically adapted to changes in income from the reference point; people tend to adapt to rising incomes, but less so

to falling incomes (Burchardt, 2005). Preceding studies have found that individuals were reluctant to reduce their consumption expenditures in response to a decrease in income in order to avoid significant losses in utility (Bowman et al., 1999). The downward stickiness of SWB against a decrease in income observed in the current study is parallel to this ratchet effect of consumption expenditures, a reasonable result considering the positive association between SWB and consumption. It should be noted, however, that we have to further examine the dynamics of consumption to confirm the validity of this argument, once longitudinal data on consumption become available.

Our estimation results also highlighted the differences in the association of income dynamics between life satisfaction and health-rated aspects of SWB. SRH and psychological distress were associated with short-term changes of income, while comparisons with the average and maximum income did not matter for these health-related measures. In this regard, the results from previous studies have been largely mixed (Gunasekara et al., 2011), and some studies have emphasized the impact of long-term income changes (McDonough & Berglund, 2003) contrary to what the results of the current study may suggest.

One possible reason for observing no clear association between health and income levels or their longer-term changes in the current study is that we employed a very homogeneous sample. Our sample consisted of all male, 74.6% of them had graduated from college or above, and most importantly, 96.7% of them were regularly employed. We also removed individuals who had any interruption in their wage history. Hence, in our study sample, income variables did not reflect substantial differences in educational attainment and occupational status, which were likely to have close relations with health variables independently of income. In addition, the respondents in our empirical analysis had been continuously EPI members. This means that they had little experience of unemployment or other serious economic strains or financial hardship,

which could be a cause or consequence of health problems (Ahnquist et al., 2007; Fritzell & Burström, 2006; Kahn & Fazio, 2005). These features of the sample made income a less likely factor to reflect other related aspects of socioeconomic status, which were not fully controlled for by most of the existing studies, thereby reducing the estimated sensitivity of SRH and psychological distress to income.

It should be noted, however, that even among these relatively homogeneous individuals, we found short-term changes in income negatively associated with SRH and psychological distress. A short-term decrease in income reduced SRH, and a short-term increase in income mitigated psychological distress, while the average or maximum income was not associated with them. These results indicate that short-term fluctuations in income are an important stressor for health-related aspects of SWB. However, it remains to be addressed as to why SRH is sensitive to a decrease in income while psychological distress is sensitive to an increase in income.

Another novel finding is that the pattern of the income profile in the past confounded the associations between income dynamics and SWB. Those who had experienced the peak of income in the past were more sensitive to a short-term decrease in income than those who had not. Meanwhile, those who had experienced the bottom of income in the past were less sensitive to income changes in general. These findings are reasonable and intuitively understandable. Those whose best days had been in the past were probably less inclined to think that their income could be sustained, which made SWB more sensitive to short-term income changes. By contrast, those who have experienced a steady increase or recovery of income are more confident of income growth or its sustainability and are inclined to neglect short-term fluctuations. These findings provide a potential answer to the question as to why preceding studies show mixed results on the association between income dynamics and SWB, which was likely confounded by the pattern of income profile in the past.

Despite these noteworthy findings, we recognize that this study has several limitations, and there remains much to be addressed in the future research. The first issue is the limited coverage of the study sample. We focused on male employees in the private sector—more specifically, EPI members—who had no interruption in their income record. This helped us distinguish the impacts of income and of other variables of socioeconomic status as well as gender, but it reduced the generality of the message from estimation results.

Second, we did not utilize other aspects of financial conditions than wage income. Although wage income is a key determinant of current income and income dynamics, an association between income and SWB may be multidimensional. Some studies have highlighted the importance of profit income (Kaplan et al., 2008), economic difficulties (Ahnquist & Wamala, 2011), financial assets (Headey & Wooden, 2004; Johnson & Krueger, 2006; Meer et al., 2003), or household income (Duncan, 1996; Sareen et al., 2011).

Finally, future research must be expanded to investigate the dynamics of SWB. The current research utilized the income history to predict the current level of SWB, but SWB must be dynamically determined in response to income changes and life events (Di Tella et al. 2007; Frijters et al., 2011). Moreover, there must be a reverse pathway from SWB to income; higher levels of SWB provide the individuals with more opportunities to obtain higher income and other socioeconomic status (Gunasekara et al., 2011). The associations between income and SWB should be addressed in a more dynamic framework using a rich set of longitudinal information.

References

Ahnquist, J., & Wamala, S. P. (2011). Economic hardships in adulthood and mental health in Sweden. The Swedish National Public Health Survey 2009. *BMC Public Health, 11*, 788.

Ahnquist, J., Fredlund, P., & Wamala, S. P. (2007). Is cumulative exposure to economic hardships more hazardous to women's health than men's? A 16-year follow-up study of the Swedish Survey of Living Conditions. *Journal of Epidemiology and Community Health, 61*(4), 331–336.

Bowman, D., Minehart, D., and Rabin, M. (1999). Loss-aversion in a savings model. *Journal of Economic Behavior and Organization, 38*(2), 155–178.

Braveman, P. A., Cubbin, C., Egerter, S., Chideya, S., Marchi, K. S., Metzler, M. et al. (2005). Socioeconomic status in health research: One size does not fit all. *Journal of the American Medical Association, 294*(22), 2879–2988.

Burchardt, T. (2005). Are one man's rags another man's riches? Identifying adaptive expectations using panel data. *Social Indicators Research, 74*(1), 57–102.

Clark, A. E. (1999). Are wages habit-forming? Evidence from micro data. *Journal of Economic Behavior and Organization, 39*(2), 179–200.

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

Clark, R., & Ogawa, N. (1992). Employment tenure and earnings profiles in Japan and the United States: Comment. *American Economic Review, 82*(1), 336-345.

Di Tella, R., Haisken-DeNew, J., & MacCulloch, R. J. (2007). Happiness adaptation to income and to status in an individual panel. *NBER Working Pape*r, 3159.

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

literature review and guide to needed research. *Social Indicators Research, 57*(2), 119–69.

Duesenberry, J. S. (1949). *Income, Saving and the Theory of Consumer Behavior*. Cambridge: Harvard University Press.

Duncan, G., J. (1996). Income dynamics and health. *International Journal of Health Services, 26*(3), 419–444.

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. (2005). Feeding the illusion of growth and happiness: A reply to Hagerty and Veenhoven. S*ocial Indicators Research*, *74*(3), 429–43.

Ferrer-i-Carbonell, A. (2005). Income and well-being: An empirical analysis of the comparison income effect. *Journal of Public Economic*s, *89* (11–12), 997–1019.

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

Frijters, P., Haisken-DeNew J. P., & Shields, M. A. (2004) "Money does matter! Evidence from increasing real income and life satisfaction in East Germany following reunification. *American Economic Review, 94*(3), 730–740.

Frijters, P., Johnston, D. W., & Shields, M. A. (2011). Life satisfaction dynamics with quarterly life event data. *Scandinavian Journal of Economics, 113*(1), 190–211.

Fritzell, S., & Burström, B. (2006). Economic strain and self-rated health among lone and couple mothers in Sweden during the 1990s compared to the 1980s. *Health Policy, 79*(2–3), 253–264.

Gardner, J., & Oswald, A. J. (2007). Money and mental well-being: A longitudinal study of medium-sized lottery wins. *Journal of Health Economics, 26*(1), 49–60

Giordano, G. N., & Lindstrom, M. (2010). The impact of changes in different aspects of social

capital and material conditions on self-rated health over time: A longitudinal cohort study. *Social Science & Medicine*, *70*(5), 700–710.

Grund, C., & Sliwka, D. (2007). Reference-dependent preferences and the impact of wage increases on job satisfaction: Theory and evidence. *Journal of Institutional and Theoretical Economics*, *163*(2), 313–335.

Gunasekara, F. I., Carter, K., & Blakely, T. (2011). Change in income and change in self-rated health: Systematic review of studies using repeated measures to control for confounding bias. *Social Science & Medicine*, *72*(2), 193–201.

Hashimoto, M., & Raisian, J. (1985). Employment tenure and earning profiles in Japan and the United States. *American Economic Review*, *75*(4), 721–735.

Headey, B., & Wooden, M. (2004). The effects of wealth and income on subjective well-being and ill-being. *Economic Record*, *80*(S1), S24–S33.

Inglehart, R., & Rabier, J.-R. (1986). Aspirations adapt to situations—But why are the Belgians so much happier than the French? A cross-cultural analysis of the subjective quality of life. In F. M. Andrews (Ed.), *Research on the Quality of Life* (pp. 1–49). Ann Arbor: Institute for Social Research, University of Michigan.

Johnson, W., & Krueger, R. F. (2006). How money buys happiness: Genetic and environmental processes linking finances and life satisfaction. *Journal of Personality and Social Psychology*, *90*(4), 680–691.

Kahn, J. R., & Fazio, E. M. (2005). Economic status over the life course and racial disparities in health. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *60*(Special Issue 2), S76–S84.

Kahneman, D. and Tversky A. (1979) Prospect theory: An analysis of decision making under risk. *Econometrica 47*, 263–91.

Kahneman, D. (1994). New challenges to the rationality assumption. *Journal of Institutional and Theoretical Economics, 150*(1), 18–44.

Kaplan, G. A., Shema, S. J., & Leite, M. C. A. (2008). Socioeconomic determinants of psychological well-being: The role of income, income change, and income sources over 29 years. *Annals of Epidemiology*. *18*(7), 531–537.

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L., et al. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, *32*(6), 959–976.

Kessler, R. C., Green, J. G., Gruber, M. J., Sampson, N. A., Bromet., E, Cuitan, M., et al. (2010). Screening for serious mental illness in the general population with the K6 screening scale: Results from the WHO World Mental Health (WMH) survey initiative. *International Journal of Methods in Psychiatric Research, 19*(Suppl. 1), 4–22.

Kondo, N., Kawachi, I., Subramanian, S. V., Takeda, Y, Yamagata, Z. (2008). Do social comparisons explain the association between income inequality and health?: Relative deprivation and perceived health among male and female Japanese individuals. *Social Science & Medicine*, *67*(6), 982–987.

Lindahl, M. (2005). Estimating the effect of income on health and mortality using lottery prizes as an exogenous source of variation in income. *Journal of Human Resources, 40* (1), 144–168

McDonough, P. and Berglund P. (2003). Histories of poverty and self-rated health trajectories. *Journal of Health & Social Behavior, 44*(2), 198–214.

McDonough, P., Duncan, G. J., Williams, D., & House, J. (1997). Income dynamics and adult mortality in the United States, 1972 through 1989. *American Journal of Public Health*,

87(9), 1476–1483.

Meer, J., & Miller, D. L. & Rosen, H. S. (2003). Exploring the health-wealth nexus. *Journal of Health Economics*, *22*(5), 713–730.

Mincer, J. & Higuchi, Y. (1988). Wage structure and labor turnover in the United States and Japan. *Journal of the Japanese and International Economies*, *2*(2), 97–133.

Orpana, H. M., & Lemyre, L. (2004). Explaining the social gradient in health in Canada: Using the National Population Health Survey to examine the role of stressors. *International Journal of Behavioral Medicine*, *11*(3), 143–151.

Oshio. T., Nozaki K., & Kobayashi, M. (2011). Relative income and happiness in Asia: Evidence from nationwide surveys in China, Japan, and Korea. *Social Indicators Research*, 104(3), 351–367.

Pham-Kanter, G. (2009). Social comparisons and health: Can having richer friends and neighbors make you sick? *Social Science & Medicine*, *69*(3), 335–344.

Sakurai, K., Nishi, A., Kondo, K., Yanagida, K., & Kawakami, N. (2011). Screening performance of K6/K10 and other screening instruments for mood and anxiety disorders in Japan. *Psychiatry and Clinical Neuroscience*, *65*(5), 434–441.

Sareen, J., Afifi, T. O., McMillan, K. A., Gordon J. G., & Asmundson, G. J. G. (2011). Relationship between household income and mental disorders: Findings from a population-based longitudinal study. *Archives of General Psychiatry*, *68*(4), 419–427.

Subramanyam, M., Ichiro, K., Berkman, L., & Subramanian, S. V. (2009). Relative deprivation in income and self-rated health in the United States. *Social Science and Medicine*, *69*(3), 327–334.

Takayama, N., Inagaki, S., & Oshio, T. (2012). The Japanese Longitudinal Survey on Employment and Fertility (LOSEF): Essential features of the 2011 Internet version and a

guide to its users. *PIE/CIS Discussion Papers*, 546.

Tucker-Seeley, R. D., Li, Y., Sorensen, G., & Subramanian, S. V. (2011). Lifecourse socioeconomic circumstances and multimorbidity among older adults. *BMC Public Health*, *11*, 313.

Table 1. Basic features of key variables

Life satisfaction:		Educational attainment:	
1	0.140	High school or below	0.145
2	0.644	Junior college	0.109
3 (= highest)	0.215	College or above	0.746
Expected life satisfaction five years later:		Marital status:	
1	0.170	Married	0.800
2	20.63	Unmarried	0.173
3 (= highest)	0.196	Divorced/separated	0.023
Self-rated health (SRH):		Having a child (ren)	0.676
1	0.130	Number of family members *M*	3.22
2	0.203	*SD*	1.36
3 (= highest)	0.667	Occupational status:	
Psychological distress (*K*6):		Regularly employed	0.967
1 ($K6 < 5$)	0.625	Non-regularly employed	0.033
2 ($5 \leq K6 < 13$)	0.296	Living in metropolitan areas	0.620
3 ($13 \leq K6$)	0.080	Residential areas:	
Income variables (million yen, 2005 prices):		Hokkaido	0.034
Current income *M*	522.3	Tohoku	0.036
SD	153.7	Kanto	0.453
Income in the previous year *M*	518.6	Chubu	0.176
SD	154.1	Kinki	0.186
Maximum income *M*	562.6	Chugoku	0.045
SD	148.5	Shikoku	0.014
Age *M*	44.2	Kyushu	0.056
SD	8.3	*N*	1,004

Note: The numbers other than *M* (mean), *SD* (standard deviation), and *N* (sample size) indicate proportions.

Table 2. The estimated association of life satisfaction with income variables (in log), adjusted for covariates

N = 1,004

Model	1	2	3	4	5
Current income	1.22***	1.64***	1.68***	1.68***	1.70***
	(0.28)	(0.37)	(0.34)	(0.37)	(0.35)
Increase from income in the previous year	0.84			0.82	0.66
	(1.03)			(1.08)	(1.04)
Decrease from income in the previous year	–0.92			–1.48	–2.01
	(1.03)			(1.12)	(1.11)
Increase from average income		–0.13		–0.40	
		(0.61)		(0.64)	
Decrease from average income		2.42*		2.60*	
		(1.21)		(1.21)	
Decrease from maximum income			1.15*		1.47*
			(0.58)		(0.61)
Log likelihood	–840.614	–839.118	–838.938	–837.959	–837.170
Pseudo *R*-squared	0.0586	0.0603	0.0605	0.0616	0.0625

Note: The numbers in the parentheses are standard errors. “Increase” (“Decrease”) equals zero if income decreased (increased) or remained unchanged. Covariates included age, squared value, educational attainment, occupational status, marital status, having a child (ren) or not; the number of household members; and living in a metropolitan area or not, and residential areas. Their estimation results are not reported to save space (available upon request from the authors).

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

Table 3. The estimated association of self-rated heath with income variables (in log), adjusted for covariates

N = 1,004

Model	1	2	3	4	5
Current income	0.28	0.04	0.24	0.09	0.27
	(0.27)	(0.35)	(0.31)	(0.35)	(0.31)
Increase from income in the previous year	0.11			0.22	0.11
	(1.19)			(1.21)	(1.19)
Decrease from income in the previous year	–2.16*			–1.92*	–2.15*
	(0.94)			(0.97)	(1.02)
Increase from average income		0.25		0.02	
		(0.64)		(0.67)	
Decrease from average income		–1.73		–1.36	
		(1.17)		(1.16)	
Decrease from maximum income			–0.37		–0.01
			(0.51)		(0.57)
Log likelihood	–836.406	–837.364	–838.375	–835.687	–836.406
Pseudo *R*-squared	0.0295	0.0284	0.0272	0.0303	0.0295

Note: See Note on Table 2.

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.1$.

Table 4. The estimated association of subjective well-being with income variables: Model 4

	Life satisfaction		Expected life satisfaction		SRH		Psychological distress	
	Coef.	(S.E.)	Coef.	(S.E.)	Coef.	(S.E.)	Coef.	(S.E.)
All (N = 1,004)								
Current income	1.68***	(0.37)	1.24***	(0.37)	0.09	(0.35)	–0.32	(0.36)
Increase from income in the previous year	0.82	(1.08)	0.05	(0.91)	0.22	(1.21)	–3.49*	(1.48)
Decrease from income in the previous year	–1.48	(1.12)	–2.20*	(1.01)	–1.92*	(0.97)	0.50	(0.93)
Increase from average income	–0.40	(0.64)	–0.25	(0.59	0.02	(0.67)	0.62	(0.70)
Decrease from average income	2.60*	(1.21)	3.38**	(1.11)	–1.36	(1.16)	0.75	(0.87)
Peak-out type (N = 404)								
Current income	2.45***	(0.71)	2.09**	(0.70)	–0.18	(0.66)	–0.63	(0.64)
Increase from income in the previous year	0.15	(2.06)	–0.59	(1.92)	–0.16	(1.53)	–6.04*	(2.51)
Decrease from income in the previous year	–2.49*	(1.24)	–3.23**	(1.07)	–2.59*	(1.20)	0.26	(1.03)
Increase from average income	–0.66	(1.15)	–1.07	(1.09)	0.94	(1.23)	0.37	(1.18)
Decrease from average income	3.48*	(1.54)	4.70**	(1.50)	–1.26	(1.50)	0.37	(1.08)
Bottom-out type (N = 348)								
Current income	1.72**	(0.56)	1.25*	(0.57)	0.53	(0.50)	–0.24	(0.52)
Increase from income in the previous year	4.71*	(2.20)	3.01	(2.25)	–0.59	(2.59)	–3.51	(2.66)
Decrease from income in the previous year	1.67	(1.53)	0.64	(1.28)	–2.71	(1.76)	-0.36	(1.30)
Increase from average income	–1.13	(1.00)	–1.27	(0.91)	–0.76	(1.01)	0.43	(1.04)
Decrease from average income	1.95	(1.45)	2.44	(1.46)	–0.41	(1.46)	0.98	(1.09)

Note: This table reports the estimated coefficients and their standard errors on key income variables for Model 4 (using average income). “Peak-out type” means initial income < maximum income > current income, and “Bottom-out type” means initial income > minimum income < current income. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

Table 5. The estimated association of subjective well-being with income variables: Model 5

	Life satisfaction		Expected life satisfaction		Self-rated health		Psychological distress	
	Coef.	(S.E.)	Coef.	(S.E.)	Coef.	(S.E.)	Coef.	(S.E.)
All (N = 1,004)								
Current income	1.70***	(0.35)	1.18***	(0.33)	0.27	(0.31	–0.15	(0.30)
Increase from income in the previous year	0.66	(1.04)	0.04	(0.87)	0.11	(1.19)	–3.14*	(1.40)
Decrease from income in the previous year	–2.01	(1.11)	–2.64**	(1.01)	–2.15*	(1.02)	0.25	(0.95)
Decrease from lifetime maximum income	1.47*	(0.61)	1.49**	(0.53)	–0.01	(0.57)	0.29	(0.49)
Peak-out type (N = 404)								
Current income	2.34***	(0.60)	1.72**	(0.60)	0.34	(0.53)	–0.71	(0.51)
Increase from income in the previous year	0.17	(2.07)	–0.53	(1.96)	–0.22	(1.62)	–5.91*	(2.52)
Decrease from income in the previous year	–2.62*	(1.19)	–3.28**	(1.06)	–2.80*	(1.20)	0.30	(1.03)
Decrease from maximum income	2.03*	(0.91)	2.41**	(0.78)	–0.18	(0.82)	–0.20	(0.65)
Bottom-out type (N = 348)								
Current income	1.69**	(0.55)	1.15*	(0.53)	0.48	(0.46)	–0.29	(0.48)
Increase from income in the previous year	3.64	(2.03)	1.87	(2.05)	–1.32	(2.44)	–3.03	(2.47)
Decrease from income in the previous year	1.06	(1.54)	–0.02	(1.28)	–2.68	(1.83)	–0.41	(1.34)
Decrease from maximum income	1.56	(0.81)	1.73*	(0.73)	0.14	(0.80)	0.11	(0.71)

Note: This table reports the estimated coefficients and their standard errors on key income variables for Model 4 (using maximum). “Peak-out type” means initial income < maximum income > current income, and “Bottom-out type” means initial income > minimum income < current income. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.