Deutsches Institut für
Wirtschaftsforschung

DIW BERLIN

www.diw.de

SOEP The German Socio-Economic Panel Study

SOEPpapers

on Multidisciplinary Panel Data Research

214

Guy Mayraz • Gert G. Wagner • Jürgen Schupp

Life Satisfaction and Relative Income - Perceptions and Evidence

Berlin, August 2009

SOEPpapers on Multidisciplinary Panel Data Research
at DIW Berlin

This series presents research findings based either directly on data from the German Socio-Economic Panel Study (SOEP) or using SOEP data as part of an internationally comparable data set (e.g. CNEF, ECHP, LIS, LWS, CHER/PACO). SOEP is a truly multidisciplinary household panel study covering a wide range of social and behavioral sciences: economics, sociology, psychology, survey methodology, econometrics and applied statistics, educational science, political science, public health, behavioral genetics, demography, geography, and sport science.

The decision to publish a submission in SOEPpapers is made by a board of editors chosen by the DIW Berlin to represent the wide range of disciplines covered by SOEP. There is no external referee process and papers are either accepted or rejected without revision. Papers appear in this series as works in progress and may also appear elsewhere. They often represent preliminary studies and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be requested from the author directly.

Any opinions expressed in this series are those of the author(s) and not those of DIW Berlin. Research disseminated by DIW Berlin may include views on public policy issues, but the institute itself takes no institutional policy positions.

The SOEPpapers are available at
http://www.diw.de/soeppapers

ISSN: 1864-6689 (online)

German Socio-Economic Panel Study (SOEP)
DIW Berlin
Mohrenstrasse 58
10117 Berlin, Germany

Contact: Uta Rahmann | urahmann@diw.de

Life Satisfaction and Relative Income—Perceptions and Evidence

Guy Mayraz*, Gert G. Wagner†, and Jürgen Schupp‡

August 23, 2009

Abstract

Using a unique dataset we study both the actual and self-perceived relationship between subjective well-being and income comparisons against a wide range of potential comparison groups, enabling us to investigate a broader range of questions than in previous studies. In questions inserted into a 2008 module of the German-Socio Economic Panel Study we ask subjects to report (a) how their income compares to various groups, such a co-workers, friends, and neighbours, and (b) how important these income comparisons are to them. We find substantial gender differences, with income comparisons being much better predictors of subjective well-being in men than in women. Generic (same-gender) comparisons are the most important, followed by within profession comparisons. Once generic and within-profession comparisons are controlled for, income relative to neighbours has a negative coefficient, implying that living in a high-income neighbourhood increases happiness. The perceived importance of income comparisons is found to be uncorrelated with its actual relationship to subjective well-being, suggesting that people are unconscious of its real impact. Subjects who judge comparisons to be important are, however, significantly less happy than subjects who see income comparisons as unimportant. Finally, the marginal effect of relative income on subjective well-being does not depend on whether a subject is below or above the reference group income.

JEL classification: D31, D62, D63, I3, I31, Z13
Keywords: Income Comparisons, Relative Income, Life Satisfaction, German Socio Economic Panel Study, SOEP.

*To whom correspondence should be addressed. Department of Economics and Centre for Economic Performance, London School of Economics.

†German Socio-Economic Panel Study (SOEP) and Max Planck Institute for Human Development, Berlin.

‡German Socio-Economic Panel Study (SOEP) and the Free University of Berlin.

1 Introduction

Surveys of life satisfaction are increasingly used to study the relationship between subjective well-being and income. The essential question is to what extent is it the case that higher income—or *material* well-being—translates into higher *subjective* well-being.

Early on it became apparent that different answers can be had depending on how one asks the question. On the one hand, within a given country at a given point in time, the rich report higher life satisfaction than the poor (Frey and Stutzer, 2002). Moreover, as far as we can judge the subjective value of an extra dollar does decrease with income, but never reaches zero. In fact, the value of a given *percentage* increase in income remains roughly the same whatever the income level (Layard et al., 2008). On the other hand, Easterlin (1974) looked at the macro subjective well-being data, and found no time-series correlation between subjective well-being and GDP.

Easterlin's findings (known as the Easterlin Paradox) raise the possibility that, at least in developed countries, much of the subjective value of higher income is due to relative comparisons. That is, the rich are happier because they have *more*, rather than simply because they have *a lot*. Easterlin's conclusions have been recently challenged by Stevenson and Wolfers (2008). This challenge only makes it more important that we collect good evidence as to the effect relative comparisons have on subjective well-being.

Focusing on income we want to understand what *ceteris paribus* effect does a change in relative income have on a person's subjective well-being. Consider the following regression model:

$$H_i = \alpha + \beta Y_{R_i} + \beta' Y_i + \sum_k \gamma_k X_i^k + \epsilon_i, \tag{1}$$

where H_i is the life satisfaction reported by subject i, Y_{R_i} is relative income, Y_i absolute income, and X_i^k represent other controls. In principle, the *ceteris paribus* effect of relative income can be estimated by the regression coefficient on Y_{R_i}.

In practice, however, we are faced with the problem that we do not observe Y_{R_i}. To overcome this problem, the first thing researchers do is to replace Y_{R_i} by the *reference income* $\bar{Y}$, that is the object of comparison. This step requires that the researcher commit to the precise functional relationship between Y_{R_i}, Y_i and $\bar{Y}$. More substantial assumptions then have to be made as to what $\bar{Y}$ exactly is. There are many candidates: individuals may plausibly compare their income to that of their friends, to that of co-workers, to other people in their profession, to their neighbours, or perhaps to other people of their age group, or some other still more general comparison group. We thus have $\bar{Y}_1, \bar{Y}_2, \bar{Y}_3$,etc.

Moreover, even if we decide to commit to one of these possibilities, further choices present themselves. Suppose we consider comparisons with neighbours. Is it immediate neighbours? the whole street? the neighbourhood? the town? the entire region? Similarly, suppose we assume people compare their income to that of their co-workers. This still leaves the question open whether they compare themselves with everyone in their office, or perhaps with people doing a similar job only, or perhaps other workers who have similar experience or were hired at a similar time. Then, having committed to a functional form and a particular well-defined sub-species of a reference group we are faced with a final challenge: how to estimate the $\bar{Y}$ of our choice. This last challenge can also be significant. For example, in surveys generally used for subjective well-being research we have no information on the earnings of friends or colleagues, and so cannot use the relevant $\bar{Y}$ in a regression.

In spite of all these challenges, researchers have forged ahead, focusing on choices for $\bar{Y}$ that could be estimated from available data[1]. Clark et al. (2008) includes a detailed survey. By and large, published results tend to show a negative estimated coefficient on $\bar{Y}$, typically comparable to that on Y_i, and thus consistent with a pure relative income effect (i.e. no effect for a change in absolute income that keeps relative income constant). Nevertheless, results are often highly sensitive to specification, and in some cases the estimated coefficient is close to zero, or even has the opposite sign. Interestingly, results may have to do with the geographic scale of 'neighbourhood'. For example, in a recent work that looked at neighbourhoods at the local street-block level, Dittmann and Goebel (2009) find that life satisfaction increases when a person has neighbours of a high socioeconomic status. This study is particularly relevant to our paper, since subjects reporting their income relative to that of their neighbours presumably have a similarly local concept of neighbourhood in mind.

In this paper we propose to complement this literature by taking a very different approach. Instead of choosing a functional form, deciding on a particular reference group and subgroup, and then on some estimate of the chosen $\bar{Y}$, we ask subjects to report Y_{R_i} directly. Specifically, we asked subjects to report on a scale their income relative to some of the most plausible reference groups, including colleagues, same profession, same gender, same age, friends, and neighbours. We thus observe six candidates for Y_{R_i}, and can estimate regression models such as that in Equation 1 directly. In particular, (1) we have values for

[1]The most common choices are the average income in the local area (i.e. some special case of the neighbours reference group), or the average income in a cell defined by some combination of such variables as age, gender, and education, as in D'Ambrosio and Frick (2007).

Y_{R_i} in relation to such groups as colleagues and friends, overcoming the problem that the incomes of colleagues and friends are not observed in the survey data, and (2) these measures incorporate comparisons against the particular colleagues, friends, neighbours etc. that subjects perceive as relevant comparisons. This is important, since even if we had observed the income of all colleagues, friends, and neighbours, it would have required an additional difficult decision to identify the relevant individuals within those reference groups that should be used in estimating the reference group income.

In addition to asking subjects to report their relative income, we asked subjects to report how important they *perceive* each of these comparisons to be, allowing us to compare subjects' own perception of the importance of income comparisons to its actual importance, as estimate by subjective well-being regressions. The survey we used for these questions is the German Socio-Economic Panel Study (SOEP)[2]. Our questions were inserted into the pretest module of the 2008 wave, which consisted of 1,066 randomly chosen respondents.

Very little of the subjective well-being literature on relative comparisons uses a similar approach to the one we take in this paper. Clark and Senik (n.d.) report results using the third wave of the European Social Survey, which included a question on the perceived importance of relative income comparisons (but did not elicit Y_{R_i}, so the actual importance cannot be tested). The results of Clark and Senik (n.d.) for the perceived importance of income are consistent with the relevant part of our results. In a paper on rural migrants in China, Knight et al. (2008) asked subjects which group they are most likely to compare their income to, and found the subject's own village was the most common reference group for their subjects. McBride (2001) analysed a question in the U.S. General Social Survey asking subjects to compare their living standards to those enjoyed by their parents when they were of a similar age, and found that answers correlated strongly with reported happiness. Senik (forthcoming) studied post-transition countries, and investigated generic comparisons ("I have done better in life") with the people a person used to know before transition started.

The reminder of the paper is organised as follows. Section 2 describes the data. In Section 3 we report what comparisons subjects perceive to be important, how important comparisons are perceived to be, and what is the relationship between subjective well-being and perceiving comparisons to be important. In Section 4 we investigate the actual importance of different relative income comparisons using a regression model as in Equation 1 as the basic tool. In Section 5 we compare perceived importance ratings with actual ratings, and also investigate whether the fact that a subject perceives comparisons to

[2]See Wagner et al. (2007) and http://www.diw.de/english/soep/soepoverview/27908.html.

be important is a good predictor of the actual relationship between that subject's subjective well-being and his or her relative income. In Section 6 we consider the possibility that Y_{R_i} reports are biased by the subject's subjective well-being, and offer a test that suggests this is not the case. In Section 7 we investigate whether, as some authors have argued, the importance of relative comparisons is asymmetric, with the poor losing by relative comparisons more than the rich gain. In Section 8 we conclude.

2 The data

The data for this paper is the 2008 pretest module of the German Socio-Economic Panel Study (SOEP)[3]. SOEP is an annual household panel that has been conducted in Germany starting in 1984. The novel questions we developed were inserted into the pretest module of the 2008 wave. This sample for the pretest consisted of 1,066 randomly chosen respondents.

The first novel question we introduced asks respondents to report how important is it to them to compare their income against various reference groups on a 1-7 scale, ranging from "completely unimportant" to "extremely important". The second question asks respondents to report how their income compared with those groups on a 1-5 scale ranging from "much lower" to "much higher". Figure 1 shows a translation of the two questions. Descriptive statistics are in Table 1 and Table 2 respectively. The subjective well-being question we used is a standard life-satisfaction question, that is included in the common SOEP questionnaire. The question asks: "How satisfied are you with your life, all things considered?" with responses given on a 0-10 scale, in which 0 is labelled "completely dissatisfied" and 10 is labelled "completely satisfied". Other standard questions we used include gender, age, marital status, work status, and education level.

3 The subjective importance of income comparisons

In this section we analyse responses to the question asking subjects to report how important is it to them to compare their income against various reference groups. Figure 1 shows a translation of the relevant question together with the question eliciting relative income (see Section 4). Ratings were given on a scale of 1-7 ranging from "completely unimportant" to "extremely important". Descriptive statistics

[3] http://www.diw.de/english/soep/soepoverview/27908.html.

are reported in Table 1. The first thing to note is that about half the subjects perceive relative income comparisons to be *completely* irrelevant to their subjective well-being[4]. At the most extreme, comparisons with neighbours (the original "keeping up with the Joneses") are reported as completely unimportant by 2/3 of subjects. The comparisons perceived as most important are work-related, with comparisons with other people in the same profession appearing as most important both by average rating and by the percentage of people who perceive the comparison to be at least somewhat important. There are no apparent differences in how men and women judge the importance of income comparisons.

There is a significant negative correlation between life satisfaction and the subjective importance of income comparisons. For example, one unit higher on the 1-7 scale of the subjective importance of comparing income to other people of the same gender is associated with approximately a 0.2 lower life satisfaction rating (measured on a 0-10 scale). The third wave of the European Social Survey also has a question on the perceived importance of income comparisons. Clark and Senik (n.d.) report a similar negative correlation between life satisfaction and the subjective importance of income comparisons. Clark and Senik (n.d.) also report the results of a question that asked subjects to choose which comparison they consider to be most important, and report that work place comparisons are considered as most important, in agreement with the results reported here.

Ratings of perceived importance matter, in particular as people presumably act on the basis of what they perceive as important. These ratings cannot, however, tell us whether income comparisons actually are a significant determinant of subjective well-being, and which comparisons really are important. To investigate these questions we now leave the subjective ratings of perceived importance aside, and turn to regressions of life satisfaction on relative income and other controls. In a later section we combine the two to investigate the information value of perceived importance ratings.

[4]The third wave of the European Social Survey has a related question asking subjects "How important is it for you to compare your income with other people s incomes?". The distribution of replies reported in Clark and Senik (n.d.) is similar to the results we find in SOEP, with somewhat fewer subjects in the European Social Survey reporting income comparisons to be completely unimportant, as compared with the SOEP results. The fact that the question in the European Social Survey combines all possible income comparisons may readily account for this difference.

4 The actual importance of relative income comparisons

In this section we investigate how important relative income comparisons actually are, and which comparisons are the most important. In the key question we make use of, subjects were asked to report their income relative to various reference groups. Figure 1 shows a translation of this relevant question together with the question (discussed in the previous section) eliciting the perceived importance of these comparisons. Income relative to the different reference groups was reported on a 1-5 scale ranging from "much lower" to "much higher". Descriptive statistics are reported in Table 2. Reports were somewhat skewed, with the average male subject reporting income about 1/3 of a standard deviation below the subjective comparison standard[5]. One possible explanation is that the subjective comparison standard is the mean of the reference group income, rather than its median. Given the skew in the income distribution, the income of most subjects would then indeed be below the comparison standard.

In order to determine whether relative income can predict life satisfaction, life satisfaction was regressed separately on income relative to the different reference groups. Regressions were run with and without absolute income as a regressor (in log terms), and separately for men and women. The regression model with log income is

$$H_i = \alpha + \beta_j Y_{R_i}^j + \gamma \log Y_i + \sum_k \delta_k X_i^k + \epsilon_i, \tag{2}$$

where H_i is the life satisfaction reported by subject i, $Y_{R_i}^j$ is subject i's reported income relative to reference group j, Y_i is subject i's reported income in euros, and X_i^k represent other controls. Regressions without log income omitted the $\log Y_i$ regressor, but were otherwise the same. The results in Table 3 show a clear gender split: relative income has significant predictive power for men, but not for women. For example, income relative to other men has a standardised (beta) coefficient of 0.25 for men when absolute income is not included in the regression, going down to 0.19 when income is included. For women the corresponding comparison with other women has standardised regression coefficients of only 0.06 and 0.02 respectively.

For women the small effect combined with the small sample size means that none of the comparisons is statistically significant at the 5% level. It is therefore not really possible to rank the difference income

[5]In addition, females tend to rate their relative incomes as somewhat lower than do men. For example, the average man rates his income relative to other men as 2.82 on a 1-5 scale, whereas the average woman rates her income relative to other women as 2.68 on a 1-5 scale.

comparisons by importance. For men the effect size is much larger, and there is consequently also better statistical power. The results in Table 3 indicate that the important comparisons are work related comparisons (same profession and with co-workers), and even more so comparisons with other men in general. Comparisons with friends and with other individuals of the same age are less important. Finally, comparisons with neighbours are almost completely unimportant.

In addition to separate regressions we also regressed life satisfaction on relative income compared to all the reference groups in one regression. The results in Table 4 are in line with the results of the separate regressions in that relative comparisons are much more significant for men than for women. Because of the small sample size and the correlation among Y_{R_i} with respect to different reference groups, the results are much less statistically significant. Nevertheless, it is clear that the most reference groups for men is the general one (all men) followed by same profession. Comparisons with neighbours are also somewhat important. Table 5 reports the results of a similar regression in which only these three relative income values were included. With fewer regressors the statistical significance goes up, with only a slight drop in the regression R^2. The implication of these results is that (a) the most important income comparison is a generic one ("all men"), (b) that within profession comparisons have an independent predictive power, and (c) that *ceteris paribus* people are happier if they live in a neighbourhood in which their neighbours are better off. These findings are discussed in the Conclusion.

5 Comparing actual and perceived ratings

Table 3 tells how important relative income comparisons are to subjective well-being, and which comparisons are most important. Comparing these results to the perceived ratings in Table 1 we see first that the gender split evident in Table 3 does not exist in the perceived ratings of Table 1. Both men and women perceive income comparisons as equally important, but the evidence suggests that only the subjective well-being of men is significantly correlated with such comparisons.

The comparisons of average ratings cannot, however, tell us whether a person's estimate of the importance of relative income comparisons to his or her happiness is a good predictor of its actual importance. This section presents a test of this possibility. The hypothesis to be tested is that the reported perceived importance of relative income comparisons is a good predictor of the correlation of relative income with subjective well-being. If this hypothesis is correct, we would expect the coefficient on Y_{R_i} in Equation 2 to vary depending on the perceived importance of income comparisons. To test this we expanded the model of Equation 2

to include the perceived importance of relative income comparisons, and an interaction term. The expanded model is thus

$$H_i = \alpha + \beta_j Y^j_{R_i} + \beta'_j I^j_{R_i} + + \beta''_j Y^j_{R_i} I^j_{R_i} + \gamma \log Y_i + \sum_k \delta_k X^k_i + \epsilon_i, \quad (3)$$

where H_i is the life satisfaction, $Y^j_{R_i}$ is income relative to reference group j, $I^j_{R_i}$ is the perceived importance of group j, Y_i is income in euros, and X^k_i represent other controls. Our focus is the estimate of β'' for the different groups. The results in Table 6 suggest that the interaction term is, in fact, zero. It seems therefore that the subjective estimates of the important of relative income comparisons are not a good predictor of their actual importance to that person's subjective well-being.

This conclusion raises another question. If the perceived importance of relative income comparisons does not indicate the actual importance of those comparisons, does it predict anything else of interest? As we already noted in Section 3 high ratings of perceived importance are negatively correlated with life satisfaction. That this is so can also be seen from the coefficient on I_R in Table 6. This coefficient is significantly negative for all reference groups and both genders[6]. It thus seems that unhappy individuals tend to perceive relative income comparisons as important, but that the actual importance of relative income comparisons is either the same for all individuals, or is otherwise uncorrelated with its perceived importance.

6 Does relative income causally affect happiness?

The regressions in Table 3 establish correlation between life satisfaction and income relative to various reference groups controlling for various regressors, including absolute income. Perhaps the most significant concern in interpreting this correlation as a causal link is that the relative income reports are themselves subjectively estimated. Thus, an alternative account of the correlation between life satisfaction and relative income is that happy people over-estimate their relative income as compared with unhappy people. There is a limit to what can be done to address this concern. Nevertheless, we offer in this section one plausible test that suggests this alternative account is false, thereby providing some support to the causal interpretation.

Suppose that the alternative account was correct, namely that happy people had a tendency to over-estimate their income relative

[6]Comparisons vs. neighbours for female subjects being a possible exception, but quite possibly simply a statistical coincidence.

to other people, presumably because higher relative income is desirable. If that were the case then we would expect such a bias to be greater the more important relative income comparisons are perceived to be. Because we observe the subjective importance of relative income comparisons this hypothesis is testable.

Formally, suppose we view reported income as the outcome variable, rather than as an explanatory variable. Then we can invert the model of Equation 3 to obtain the following regression model:

$$Y_{R_i} = \alpha + \beta H_i + \beta' I_{R_i} + + \beta''_j H_i I^j_{R_i} + \gamma \log Y_i + \sum_k \delta_k X^k_i + \epsilon_i, \quad (4)$$

written for one particular reference group, and where Y_{R_i} is subject i's reported income relative, H_i is the life satisfaction reported by subject i, I_{R_i} is subject i's perceived importance of comparing income, Y_i is subject i's reported income in euros, and X^k_i represent other controls.

If the above reverse causality model is correct, we would then expect the interaction terms to be positive. Table 7 reports the results of these regressions, which suggest that this is not the case. This test provides therefore no support for the reverse causality account, and is therefore consistent with the view that relative income comparisons are one of the causal determinants of life satisfaction.

7 Do the rich gain as much as the poor lose?

In his groundbreaking book Duesenberry (1949) suggested that relative income comparisons may be asymmetric, so that the well-being loss from earning less than others is greater than the corresponding gain from earning more. If this hypothesis is true, then the slope of the life-satisfaction and relative income relationship should be decreasing as relative income goes up. To test this hypothesis we repeated the main regression in Equation 2 adding a quadratic in relative income. The model is thus

$$H_i = \alpha + \beta_j Y^j_{R_i} + \beta'_j (Y^j_{R_i})^2 + \gamma \log Y_i + \sum_k \delta_k X^k_i + \epsilon_i. \quad (5)$$

If comparisons are asymmetric we would expect that the β' coefficients are negative. However, the regression results in Table 8 suggest that the β' coefficients are very nearly zero. There is thus no evidence for non-linearities in the effect of relative income. With a caveat for small sample size the data instead supports the view that the gain from earning more than the reference group is comparable in size to the loss from earning less.

8 Conclusion

In this paper we sought to study the relationship between life satisfaction and income relative to various reference group. The key to this study has been special questions we inserted into the pretest module of the 2008 wave of the German Socio-Economic Panel Study (SOEP). Specifically, we asked subjects to evaluate how their income compares to various reference groups, and also to evaluate the subjective importance of how their income compares to these reference groups. These questions enabled us to assess the actual importance of relative income comparisons vs. the different reference groups.

Our first finding is that the life satisfaction of men is significantly correlated with their relative income, but that this is not the case with women. Second, we are able to establish that individually the more important comparisons are either generic (all men) or work-related, and that comparisons with friends, other same-age individuals, and neighbours are considerably less important. Third, in a combined regression we find that almost all the effect of relative comparisons is captured by the generic (all men) comparison, a within profession comparison, and a comparison with neighbours, where the coefficients on relative income are positive for the generic and profession comparisons and negative on the comparison with neighbours. Fourth, we find that high perceived importance of income comparisons is correlated with lower subjective well-being, but does not predict how important to subjective well-being relative income actually is. Finally we find that the marginal importance of relative income comparisons is the same whether income is lower or higher than that of the reference group.

In line with previous studies our findings confirm the importance of relative income comparisons to subjective well-being. However, using the new data we find that the picture is significantly more complicated than first envisaged. In particular, (a) there appears to be a big gender difference, with a much greater effect for male, (b) the most important comparison seems to be a generic one, rather than a comparison with close others. A possible explanation is that income comparisons first and foremost proxy for the ability to purchase positional goods, the price of which is determined outside an immediate social environment[7], (c) within-profession comparisons are important independently of other income comparisons, suggesting that professional success is desirable in itself, separately from its correlation with higher income, and (d) other things being equal, people seem to be happier if they

[7]Positional goods are such goods as a house by the lake, which are in inherently limited supply. Because of the limited supply, prices adjust so that positional goods can only ever be purchased by those with a high enough income relative to other consumers. The economist Robert Frank has written extensively about positional goods (Frank, 1991, 2001, 2005).

earn *less* than their neighbours. That this is the case suggests that people significantly benefit from living in a good neighbourhood, and lose little—if anything—by the negative relative comparison[8].

References

Clark, A., Frijters, P. and 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.

Clark, A. and Senik, C. (n.d.). Who compares to whom? The anatomy of income comparisons in Europe.

D'Ambrosio, C. and Frick, J. (2007). Income satisfaction and relative deprivation: An empirical link, *Social Indicators Research* **81**(3): 497–519.

Dittmann, J. and Goebel, J. (2009). Your house, your car, your education The socioeconomic situation of the neighborhood and its impact on life satisfaction in Germany, *Social Indicators Research* **83**(forthcoming).

Duesenberry, J. (1949). *Income, saving and the theory of consumer behavior*, Harvard University Press.

Easterlin, R. (1974). Does economic growth improve the human lot? some empirical evidence, *in* P. A. David and M. W. Reder (eds), *Nations and Households in Economic Growth: Essays in Honor of Moses Abramowitz*, Academic Press, New-York, pp. 89–125.

Frank, R. (1991). Positional externalities, *Strategy and Choice, MIT Press, Cambridge, MA* pp. 25–47.

Frank, R. (2001). *Luxury fever: Why money fails to satisfy in an era of excess*, Simon and Schuster.

Frank, R. (2005). Positional externalities cause large and preventable welfare losses, *American Economic Review* pp. 137–141.

[8]The *ceteris paribus* clause is important. As Table 3 shows, the coefficient is positive if income comparison with neighbours is the only comparison included in the regression. Our results are thus consistent with those of researchers who include only income comparisons with neighbours in a regression, and find the coefficient to be significantly positive (this result is more commonly reported as a negative coefficient on the mean income of neighbours). Moreover, researchers who use local comparisons in studies of relative income typically define the locality as a much larger area than a local neighbourhood. For example, Luttmer (2005) uses units of about 100,000 people, which are perhaps closer to the generic group in this paper.

Frey, B. and Stutzer, A. (2002). What Can Economists Learn from Happiness Research?, *Journal of Economic Literature* **40**(2): 402–435.

Knight, J., Song, L. and Gunatilaka, R. (2008). Subjective well-being and its determinants in rural China, *China Economic Review* .

Layard, R., Mayraz, G. and Nickell, S. (2008). The marginal utility of income, *Journal of Public Economics* **92**(8-9): 1846–1857.

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

McBride, M. (2001). Relative-income effects on subjective well-being in the cross-section, *Journal of Economic Behavior and Organization* **45**(3): 251–278.

Senik, C. (forthcoming). Direct evidence on income comparisons and their welfare effects, *Journal of Economic Behaviour and Organisation* .

Stevenson, B. and Wolfers, J. (2008). Economic Growth and Subjective Well-Being: Reassessing the Easterlin Paradox, *Brookings Papers on Economic Activity* .

Wagner, G., Frick, J. and Schupp, J. (2007). The German socio-economic panel study (SOEP)–scope, evolution and enhancements, *Schmollers Jahrbuch* **127**(1): 139–169.

When you think about your income compared to that of other groups.

Please answer on the following scale, where ***1*** *means:* ***completely unimportant*** *and* ***7*** *means:* ***extremely important****.*

How important is it to you how your income compares with that of:

	completely unimportant						extremely important
	1	2	3	4	5	6	7
Your neighbours	☐	☐	☐	☐	☐	☐	☐
Your friends	☐	☐	☐	☐	☐	☐	☐

•
•
•

And how high is your income in comparison with the following people:

In comparison to . . .

	Much lower	Somewhat lower	About the same	Somewhat higher	Much higher
Your neighbours	☐	☐	☐	☐	☐
Your friends	☐	☐	☐	☐	☐

•
•
•

Figure 1: **The phrasing of the questions on income comparisons**. The above is a translation of questions 43 and 44 from the original German questionnaire.

Table 1: **Summary statistics of the subjective importance of relative income comparisons**. Reported on a scale ranging from 1 (completely unimportant) to 7 (completely important). The table reports for each reference group the percentage of reports in each cell, the mean, standard deviation, and the number of observations. Results are reported separately for males and females.

		% reporting									
	Reference group	1	2	3	4	5	6	7	Mean	Sd.	Obs.
Males	Same gender	55	10	7	13	8	4	2	2.29	1.73	484
	Same profession	37	6	7	14	12	14	10	3.37	2.20	458
	Co-workers	42	8	8	15	12	10	6	3.00	2.06	425
	Friends	51	10	12	13	10	4	1	2.37	1.66	493
	Same age	42	11	10	16	11	8	3	2.78	1.86	492
	Neighbours	66	12	7	8	5	1	0	1.78	1.31	493
Females	Same gender	52	8	9	16	9	5	2	2.46	1.76	537
	Same profession	39	6	7	15	13	12	8	3.27	2.14	497
	Co-workers	44	8	9	16	11	8	5	2.86	1.99	455
	Friends	52	14	10	15	7	2	1	2.20	1.52	539
	Same age	44	9	11	18	10	5	2	2.66	1.77	546
	Neighbours	65	14	7	9	3	1	1	1.78	1.31	539

Table 2: **Summary statistics of income relative to various reference groups**. Reported on a scale ranging from 1 (much lower) to 5 (much higher). The table reports for each reference group the percentage of reports in each cell, the mean, standard deviation, and the number of observations. Results are reported separately for males and females.

		% reporting							
	Reference group	1	2	3	4	5	Mean	Sd.	Obs.
Males	Same gender	13	18	47	20	3	2.82	1	328
	Same profession	9	16	65	9	1	2.76	1	361
	Co-workers	10	11	62	15	2	2.88	1	327
	Friends	12	17	52	19	1	2.82	1	391
	Same age	11	23	37	27	3	2.88	1	397
	Neighbours	18	20	37	23	3	2.74	1	345
Females	Same gender	14	24	46	13	3	2.68	1	374
	Same profession	11	16	63	8	1	2.72	1	367
	Co-workers	10	17	65	8	1	2.73	1	323
	Friends	18	23	47	11	1	2.56	1	417
	Same age	14	27	40	19	1	2.65	1	394
	Neighbours	26	24	34	14	2	2.41	1	352

Table 3: **Regressions of reported life satisfaction on reported income relative to different comparison groups.** Each line in this table reports regressions run on one subgroup of subjects (males or females) and using income relative to one particular reference group. Each of these regressions was run both with and with absolute log income controls. Other controls included a quadratic in age and dummies for marital status, work status, and education level. In each regression the standardised (beta) coefficient on relative income is reported with robust $t-$statistics in parentheses. The regression R^2 is also reported. In order to avoid selection bias the sample was restricted to subjects who completed all relative income questions.

		No $\log Y$ controls		With $\log Y$ controls	
Subjects	Reference group	Coeff.	R^2	Coeff.	R^2
	Same gender	0.25 (3.88)	0.284	0.19 (3.00)	0.313
	Same profession	0.23 (4.35)	0.282	0.17 (3.10)	0.310
Males	Co-workers	0.21 (3.80)	0.270	0.14 (2.53)	0.301
(228 obs.)	Friends	0.19 (3.04)	0.263	0.11 (1.76)	0.296
	Same age	0.17 (2.91)	0.258	0.09 (1.43)	0.292
	Neighbours	0.11 (1.72)	0.245	0.04 (0.63)	0.288
	Same gender	0.06 (0.79)	0.155	0.02 (0.27)	0.228
	Same profession	0.11 (1.54)	0.163	0.06 (0.85)	0.230
Females	Co-workers	0.08 (1.05)	0.158	0.05 (0.69)	0.230
(216 obs.)	Friends	0.11 (1.53)	0.163	0.07 (0.92)	0.231
	Same age	0.06 (0.80)	0.155	0.02 (0.33)	0.228
	Neighbours	0.10 (1.24)	0.160	0.06 (0.83)	0.230

Table 4: **Combined regression of reported life satisfaction on reported income relative to different comparison groups.** A single regression was run with and without absolute log income controls, separately for males and females. Other controls included a quadratic in age and dummies for marital status, work status, and education level. The standardised (beta) coefficient on relative income is reported with robust $t-$statistics in parentheses. The regression R^2 without and with absolute log income was 0.303 and 0.332 respectively for men and 0.169 and 0.235 for women. Note the low statistical significance due to collinearity and small sample size. Results should be interpreted together with those of the separate regressions reported in Table 3.

		No $\log Y$		With $\log Y$	
Subjects	Reference group	coeff.		coeff.	
	Same gender	0.22	(1.94)	0.24	(2.03)
	Same profession	0.16	(1.90)	0.15	(1.78)
Males	Co-workers	0.05	(0.56)	0.02	(0.23)
(228 obs.)	Friends	0.03	(0.24)	0.01	(0.10)
	Same age	-0.06	(0.57)	-0.11	(0.97)
	Neighbours	-0.12	(1.25)	-0.13	(1.39)
	Same gender	-0.05	(0.51)	-0.06	(0.61)
	Same profession	0.10	(0.99)	0.05	(0.59)
Females	Co-workers	-0.01	(0.05)	0.01	(0.14)
(216 obs.)	Friends	0.08	(0.71)	0.05	(0.46)
	Same age	-0.05	(0.58)	-0.04	(0.49)
	Neighbours	0.07	(0.74)	0.06	(0.67)

Table 5: **Combined regression of reported life satisfaction on reported income relative to selected comparison groups.** A single regression was run with and without absolute log income controls, separately for males and females. Other controls included a quadratic in age and dummies for marital status, work status, and education level. The standardised (beta) coefficient on relative income is reported with robust $t-$statistic in parentheses. The regression R^2 without and with absolute log income was 0.301 and 0.328 respectively for men and 0.166 and 0.232 for women.

		No $\log Y$		With $\log Y$	
Subjects	Reference group	coeff.		coeff.	
Males (228 obs.)	Same gender	0.22	(2.30)	0.20	(2.14)
	Same profession	0.18	(2.37)	0.14	(1.87)
	Neighbours	-0.12	(1.38)	-0.14	(1.69)
Females (216 obs.)	Same gender	-0.05	(0.51)	-0.05	(0.64)
	Same profession	0.10	(1.28)	0.06	(0.81)
	Neighbours	0.08	(0.88)	0.07	(0.79)

Table 6: **Regression of reported life satisfaction on reported income relative to different comparison groups (Y_{R_i}), the subjective importance of the comparison (I_R), the two interacted, log absolute income ($\log Y$), and standard controls**. Standard controls included a quadratic in age and dummies for marital status, work status, and education level. In each regression standardised (beta) coefficients are reported with robust $t-$statistics in parentheses. Coefficients for the standard controls are not reported. Results for males and females are reported separately. The number of observations in each regression is reported at the end of each line.

Subjects	Reference group	Y_{R_i}	I_R	$Y_R I_R$	$\log Y$	Obs.
Males	Same gender	0.21 (3.62)	-0.16 (2.93)	0.03 (0.63)	0.09 (1.54)	316
	Same profession	0.13 (2.85)	-0.19 (3.80)	0.05 (1.03)	0.19 (3.33)	344
	Co-workers	0.09 (1.76)	-0.13 (2.16)	0.08 (1.65)	0.22 (3.70)	305
	Friends	0.09 (1.74)	-0.11 (1.99)	0.02 (0.53)	0.16 (2.99)	379
	Same age	0.15 (2.75)	-0.20 (3.97)	-0.01 (0.17)	0.13 (2.18)	382
	Neighbours	0.06 (1.12)	-0.14 (2.85)	0.01 (0.20)	0.19 (3.48)	335
Females	Same gender	0.00 (0.00)	-0.19 (3.13)	0.05 (0.91)	0.23 (3.36)	364
	Same profession	0.03 (0.61)	-0.16 (3.01)	-0.01 (0.18)	0.25 (3.16)	350
	Co-workers	0.06 (0.98)	-0.12 (2.23)	-0.06 (0.96)	0.30 (3.77)	306
	Friends	0.08 (1.48)	-0.14 (2.98)	0.05 (1.03)	0.23 (3.28)	403
	Same age	-0.02 (0.31)	-0.17 (3.23)	0.01 (0.25)	0.24 (3.59)	383
	Neighbours	0.04 (0.69)	-0.05 (0.90)	0.02 (0.49)	0.31 (4.33)	343

Table 7: **Regression of reported income relative to different comparison groups on life satisfaction (H), the subjective importance of the comparison (I_R), the two interacted, log absolute income ($\log Y$), and standard controls**. Standard controls included a quadratic in age and dummies for marital status, work status, and education level. In each regression standardised (beta) coefficients are reported with robust $t-$statistics in parentheses. Coefficients for the standard controls are not reported. Results for males and females are reported separately. The number of observations in each regression is reported at the end of each line.

Subjects	Reference group	H	I_R	HI_R	$\log Y$	Obs.
Males	Same gender	0.20 (4.08)	0.05 (0.22)	-0.01 (0.05)	0.33 (4.82)	316
	Same profession	0.15 (2.94)	-0.24 (0.91)	0.26 (1.03)	0.25 (3.44)	344
	Co-workers	0.08 (1.62)	-0.17 (0.75)	0.19 (0.82)	0.33 (3.86)	305
	Friends	0.08 (1.68)	0.04 (0.20)	-0.03 (0.13)	0.36 (5.33)	379
	Same age	0.14 (2.90)	0.08 (0.50)	-0.07 (0.40)	0.41 (7.00)	382
	Neighbours	0.06 (1.03)	-0.05 (0.21)	0.06 (0.28)	0.24 (3.27)	335
Females	Same gender	-0.00 (0.03)	0.08 (0.52)	-0.00 (0.03)	0.27 (4.13)	364
	Same profession	0.03 (0.52)	-0.03 (0.11)	0.07 (0.30)	0.27 (3.89)	350
	Co-workers	0.06 (0.92)	0.18 (0.66)	-0.16 (0.58)	0.09 (1.18)	306
	Friends	0.08 (1.40)	-0.13 (0.73)	0.24 (1.31)	0.28 (4.51)	403
	Same age	-0.02 (0.33)	0.03 (0.14)	0.04 (0.20)	0.29 (4.50)	383
	Neighbours	0.04 (0.71)	-0.07 (0.36)	0.12 (0.60)	0.26 (4.32)	343

Table 8: **Regressions of reported life satisfaction on a quadratic in relative income.** Each line in this table reports regressions run on one subgroup of subjects (males or females) and using income relative to one particular reference group. Controls included log absolute income, a quadratic in age and dummies for marital status, work status, and education level. In each regression the standardised (beta) coefficient on relative income and relative income squared is reported with robust $t-$statistics in parentheses. The regression R^2 is also reported. In order to avoid selection bias the sample was restricted to subjects who completed all relative income questions.

		Y_{R_i}	$Y^2_{R_i}$	R^2
Males	Same gender	0.19 (2.95)	-0.01 (0.12)	0.313
	Same profession	0.17 (3.08)	0.00 (0.02)	0.310
	Co-workers	0.14 (2.47)	0.00 (0.02)	0.301
	Friends	0.12 (1.91)	0.02 (0.39)	0.297
	Same age	0.10 (1.55)	0.04 (0.69)	0.294
	Neighbours	0.04 (0.56)	-0.04 (0.62)	0.289
Females	Same gender	0.02 (0.26)	0.01 (0.13)	0.228
	Same profession	0.06 (0.97)	0.01 (0.21)	0.230
	Co-workers	0.08 (1.01)	0.05 (0.68)	0.232
	Friends	0.07 (0.95)	0.03 (0.45)	0.232
	Same age	0.03 (0.38)	0.02 (0.27)	0.228
	Neighbours	0.06 (0.81)	-0.04 (0.77)	0.232