

Diminishing Marginal Utility of Income? Caveat Emptor

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[T]he income and happiness relationship is . . . curvilinear . . . with a decreasing marginal utility for higher levels of income . . . (Diener, Sandvik, Seidlitz, and Diener, 1993, 204; cf. also Diener and Biswas-Diener, 2002, 119)

[W]e not only see a clear positive relationship [between happiness and GNP per capita], but also a curvilinear pattern; which suggest that wealth is subject to a law of diminishing happiness returns (Veenhoven, 1991, 10; cf. also 1989, 15-18; 1993, 127).

Comparing across countries, it is true that income and happiness are positively related and that the marginal utility falls with higher income. Higher income clearly raises happiness in developing countries, while the effect is only small, if it exists at all, in rich countries (Frey and Stutzer, 2002a, 90).

The early phases of economic development [as measured by GNP per capita] seem to produce a big return . . . in terms of human happiness. But the return levels off . . . Economic development eventually reaches a point of diminishing returns . . . in terms of human happiness (Inglehart, 2000, 219; cf. also 1997, 61).

Few generalizations in the social sciences enjoy such wide-ranging support as that of diminishing marginal utility of income. Put simply, this proposition states that the effect on subjective well-being of a \$1,000 increase in real income becomes progressively smaller the higher the initial level of income. As the quotations above attest, distinguished scholars in psychology, sociology, economics, and political science who have made major contributions to the study of subjective well-being concur on this assertion.¹ Its policy appeal is great, because it implies that raising the income of poor people or poor countries will raise their well-being considerably, while an increase of

¹ There are exceptions to the consensus. In comparisons across countries, Diener and his collaborators (1993, 1995) fail to find a significant curvilinear relationship. Schyns too finds only a linear association,

equal amount for the rich will have comparatively little effect (see, for example, the last two quotations above and Garhammer 2002, 219).²

In all of the quotations above, the diminishing returns generalization is based on data for a single point of time and on a simple bivariate comparison of happiness or life satisfaction with income without controls for other possible variables. This bivariate cross sectional approach is typical of the literature generally (cf. Argyle 1999, 356; Frank, 1997, 83; Inkeles 1993, 15; Lane 2000a; 2000b, 61). Two types of cross sectional evidence on the happiness-income relationship are used – comparisons among countries and within countries.

If there is diminishing marginal utility of income, as the cross sectional studies suggest, then the point-of-time pattern should be replicated over time as income traverses the range of values covered in the cross sectional analysis. I present here two test cases to see whether historical experience reproduces the point-of-time relationship, first, using an international cross section of happiness and income, and, then, a within-country one for the United States. As in the studies cited, I use a simple bivariate comparison. Clearly this is not an exhaustive test, and no previously unpublished data are used. The contribution here is methodological. To my knowledge this is the first attempt to consider explicitly whether a happiness-income generalization derived from cross sectional data is supported by corresponding time series data for income and happiness.

and astutely notes that this results entirely from the relation between rich and poor counties; within the group of rich countries and within the group of poor countries there is no significant relationship (2003, pp. 75-76). Hirata (2001), Appendix A critiques the among-country curvilinear relationship. Frey and Stutzer (2002b, pp. 408-418) point out that the time series relation of happiness to income differs from the cross sectional.

² Whether the effect for the rich will be slightly positive, zero, or negative is a matter on which opinions differ. Compare Diener et al. 1993, p. 205; Inglehart 1997, pp. 61-62; and Frey and Stutzer 2002a, pp. 83-85.

It turns out that income change over time within the income range used in the point-of-time studies does not generate the change in happiness implied by the cross sectional pattern. Hence, the point of this note is that, until much more time series research is done, one should think twice before assuming that bivariate cross sectional generalizations about diminishing marginal utility of income can be safely used to infer change over time.

Data and methods

For both the among country and within-country analyses here my procedure is as follows. I first present the cross sectional evidence of a curvilinear happiness to income relationship. Based on this relationship, I then note for the test case the path that happiness would be expected to follow as income grows over time within the range covered by the cross sectional analysis. Finally, I compare the actual time series change with the change predicted by the cross sectional relationship.

International comparison – The data for the cross-country study are from an article published in this journal by Ruut Veenhoven (1991). I choose this study because the point-of-time data are for the early 1960s, and this makes it possible to see how well the subsequent time series experience of one of the low income countries included in that study, Japan, fits the happiness-income relationship implied by the 1960s cross section. Japan is the only one of the low income countries included in the study for which there are reasonably reliable data spanning a lengthy period and a substantial range of income. The 1991 article is also the source of the Veenhoven quotation included in the epigraph of the present paper.

The original happiness data in Veenhoven's analysis are from surveys of 14 countries, rich and poor, communist and noncommunist, conducted by Hadley Cantril (1965). However, the individual country data points in Veenhoven's published article are not the same as Cantril's (compare the plotted points in Exhibit I, figures a and b in Veenhoven 1991, p. 11). I therefore reproduced Veenhoven's country observations here by reading the coordinates for each country from Exhibit I, figure b in his published article.

The generalization about the curvilinear happiness-income relationship in Veenhoven's article is inferred from two curves drawn in his Exhibit I, figure b. No equations are presented for the curves and no explanation is given of how the curves are fitted to the data. To reproduce them here I again read the coordinates from the published figure, as with the individual country data points.

For the test case of Japan, to obtain the absolute values of GNP per capita used in Figures 2 and 3 below, and of happiness in Figure 3, the procedure was as follows. Annual indexes (1962=100) of life satisfaction and real GNP per capita for Japan, 1958-1987, were computed from Veenhoven 1993, pp. 176-177, and Summers and Heston 1991. Japan's 1962 values of happiness and GNP per capita read from Veenhoven 1991, p. 11 were then multiplied by these index values for each year (divided by 100). The time series relationship of happiness to income for Japan, 1958-1987 was then inferred by fitting an OLS regression to the annual observations.

Within-country comparison – In the international comparison, it is possible to follow over time one of the countries actually used in the published cross section analysis, but the counterpart of this approach for a published within-country study is not feasible.

Instead, I present my own income-happiness cross section for the United States in 1994, and, as my test case, examine the time series relation of happiness to income as the same group of people, the birth cohort of 1941-50, experiences income growth within the range covered in the cross section.

The happiness data are from the United States General Social Survey, the GSS (Davis and Smith, 2002). The question asked is: “Taken all together, how would you say things are these days – would you say that you are very happy, pretty happy, or not too happy” (National Opinion Research Center, 2003, p. 179). I scaled the responses from “very happy” = 3 to “not too happy” = 1, and computed mean happiness for income groups or birth cohorts from the responses, so-scaled.

The income data are pre-tax family income from all sources, and are reported by income categories. Household income for each respondent is assumed equal to the midpoint of the respondent’s income category. Household income per capita is obtained as the quotient of the respondent’s household income and household size. Household income per capita in each year is converted to 1994 dollars using the Consumer Price Index of the Bureau of Labor Statistics.

The cross sectional analysis is based on 1994 data because the total number of observations is greater ($n=2636$), and the income span, wider than in earlier years of the GSS. For the test case, the birth cohort of 1941-50, the data cover a period of 29 years as the cohort ages from a mean of about 26 years in 1972 to 55 years in 2000. In the technique of cohort analysis, developed by demographers in the 1950s, the investigation is based on annual samples of the same group of persons, rather than on identical individuals, as in panel studies. I fit OLS regressions to both the cross sectional and time

series data in order to generalize about the happiness-income relationship exhibited by each.

Results

International comparison – The curvilinear relationship between happiness and income in 14 countries in the early 1960s reported by Veenhoven is reproduced in Figure 1 (Veenhoven, 1991, 11, Exhibit I, figure b). Japan, the test case here, is marked in Figure 1 by an asterisk.

Between 1962 and 1987 Japan experienced unprecedented economic growth, with GNP per capita (corrected for price level change) multiplying by 3.5-fold, and rising from 22 to 77 percent of the United States level in 1962. If, with this real income growth, Japan had followed the trajectory implied by the curves fitted by Veenhoven to the 1960s cross section, then happiness would have risen from a mean value of 6.5 in 1962 to about 7.7 in 1987 (Figure 2). Is this what actually happened?

The answer is no, happiness remained constant despite Japan's remarkable economic growth. As shown in Figure 3, there is no significant slope to a regression of happiness on income fitted to yearly data spanning 1958 to 1987. Note that Japan starts in the late 1950s slightly above the upper curve, then crosses both curves, and ends up considerably below the lower curve. The equation (t-stat in parentheses) for the regression is:

$$(1) \quad H = 0.0692 \ln(Y) + 5.9331,$$

$$(1.0924) \quad (11.7728)$$

where H = mean happiness, Y = real GNP per capita
Adj. R^2 = .042

Clearly the inference of growing happiness at a diminishing rate suggested by the curves fitted by Veenhoven to the 1960s cross section is not replicated by Japan's actual change over time within the income range of the 1960s cross section. The non-significant coefficient on income in the regression implies that there was not diminishing marginal utility of income, but zero marginal utility over the period as a whole.

Within-country – At a point in time one finds a curvilinear bivariate relationship between happiness and income in the United States, like that in the oft-cited article by Diener and his collaborators (1993). This relationship is illustrated in Figure 4 with data for 1994 from the GSS. The regression equation (t-stat in parentheses) for the curve in the figure is:

$$(2) \quad H = 0.1255 \ln(Y) + 0.9804.$$

(10.0259)
(8.2516)

$$\text{Adj. } R^2 = .917$$

The coefficient on income is significant and, consistent with most cross section generalizations in the literature, implies diminishing marginal utility of income.³

In 1972, the birth cohort of 1941-50, the test time series case for the within-country analysis, had a mean per capita income, expressed in dollars of 1994 purchasing power, of about \$12,000. By the year 2000 the cohort's average income had more than doubled, rising to almost \$27,000. If these income values are inserted in the cross sectional regression equation (2), this increase in income should have raised the cohort's mean happiness from 2.17 to 2.27, as shown in Figure 5. Did this increase in happiness actually occur?

³ The equation implies a linear relation of happiness to log income, but a curvilinear relationship to absolute income.

Again, the answer is no. In Figure 6, the annual observations on cohort happiness and income, 1972 to 2000, are plotted, together with a regression line fitted to these data. The regression equation (t-stat in parentheses) for the time series relation of happiness to income is:

$$(3) \quad H = 0.0060 \ln(Y) + 2.1456$$

$$(0.1355) \quad (4.9828)$$

$$\text{Adj. } R^2 = -.047$$

The non-significant coefficient on income means that the slope of the happiness-income regression does not differ significantly from zero. On average, over the period 1972 to 2000 the happiness of persons born between 1941 and 1950 remained unchanged despite the fact that their income more than doubled. This constancy of happiness as income grows holds for other birth cohorts as well (Easterlin 2001, Figure 1).

The result of the within-country test case is the same as that of the intercountry comparison. The diminishing returns relationship based on cross sectional data is not reproduced as income grows over time within the range encompassed by the cross section. In both cases, rather than diminishing marginal utility of income, there is zero marginal utility.

Summary

In both the among-country and within-country test cases here, as income increases within the range covered in the cross sectional analysis, happiness fails to reproduce over time its point-of-time relationship to income. Instead of diminishing marginal utility of income, there is zero marginal utility.

The generalization about diminishing marginal utility of income found in the literature is based on simple bivariate comparisons of happiness with income at a point in time. Although a number of life circumstances that influence happiness, such as marital status, employment status, and health, vary by level of income at a point in time, this has not prevented analysts from generalizing from the bivariate cross sectional relation to the prospective change in happiness over time as income grows. It seems reasonable, therefore, to ask whether the cross sectional relationship does in fact foreshadow the time series one. The results of both the among-country and within-country cases examined here are mutually supportive: the time series relationship does not correspond to the cross sectional pattern, and in both cases, the time series regression curve is horizontal.

It is hard to judge how representative these test cases are. Lengthy and reliable time series data comparable to those for Japan from 1958 to 1987 do not yet exist for other low income countries. Studies of the life cycle happiness of birth cohorts outside of the United States, though feasible with extant data, have yet to be done.⁴ Clearly there is need for more research on change over time for periods extending over several decades.

My interest here is in demonstrating the disjuncture between cross sectional and time series experience. I have suggested elsewhere the possible causes of this inconsistency (Easterlin 2001). Let me be clear that I am not saying that happiness is a constant, given by genetics and personality. Nor am I saying that individual or social action aimed at increasing happiness is fruitless (Easterlin 2003). My point is a simple one; on the subject of diminishing marginal utility of income analysts should beware: the

⁴ An exception is Hayo and Seifert, 2003, 339-340, who find little indication of life cycle trends in economic well-being for eleven Eastern European cohorts.

cross sectional relationship is not necessarily a trustworthy guide to experience over time or to inferences about policy.

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Figures

Figure 1. Happiness and Per Capita Income, 14 Countries, Early 1960s

Figure 2. Predicted Happiness in Japan in 1987, Based on 1960s Cross Section

Figure 3. Actual Happiness in Japan, 1958-1987

Figure 4. Happiness and Per Capita Income, United States, 1994

Figure 5. Predicted Happiness of Birth Cohort of 1941-50 in 1972 and 2000, Based on 1994 Cross Section

Figure 6. Actual Happiness of Birth Cohort of 1941-1950, 1972-2000

Figure 1. Happiness and Per Capita Income, 14 Countries, Early 1960s

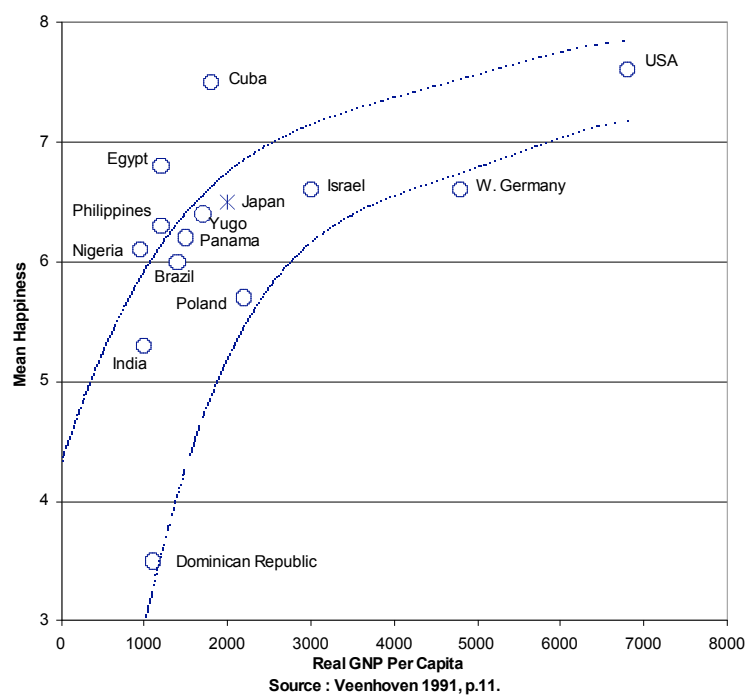
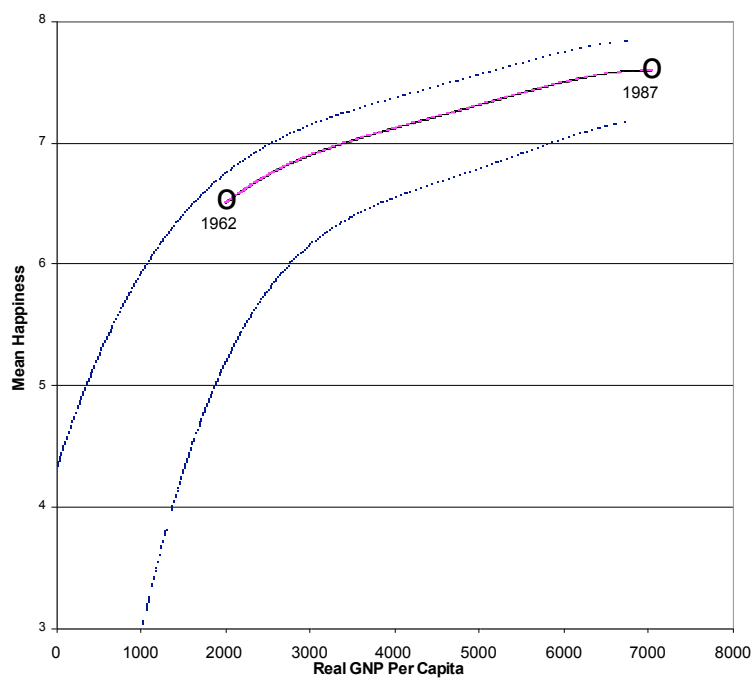


Figure 2. Predicted Happiness in Japan,1987, Based on 1960s Cross Sections



Source : Predicted Happiness in 1987 estimated from curves in Figure 1.

Figure 3. Actual Happiness in Japan, 1958-1987

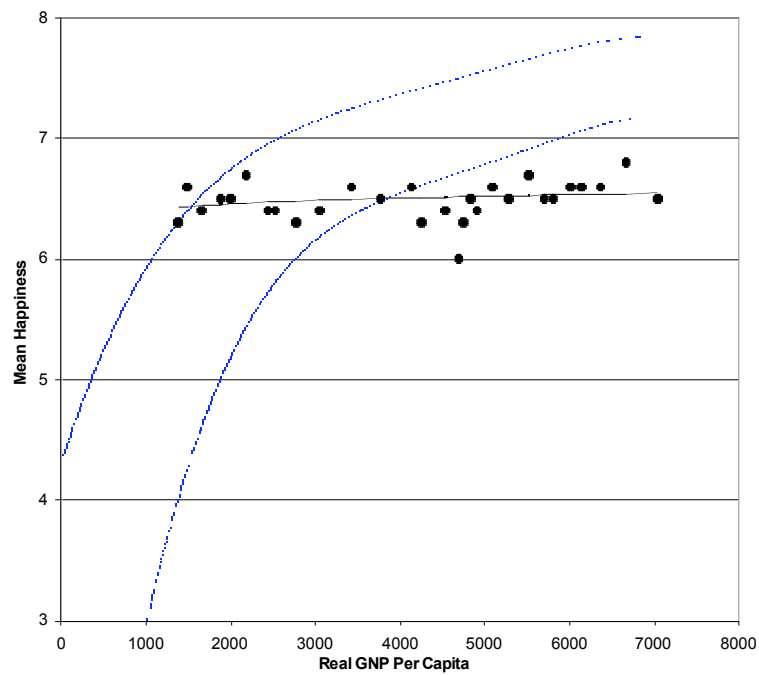


Figure 4. Happiness and Per Capita Income, United States, 1994.

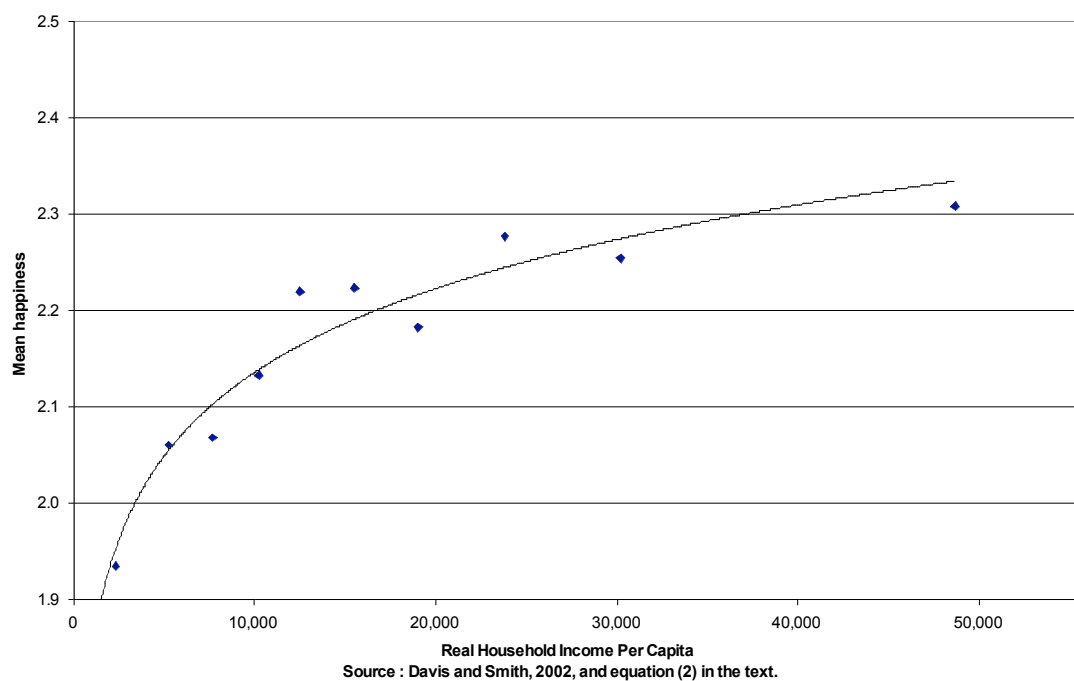


Figure 5. Predicted Happiness of Birth Cohort of 1941-50 in 1972 and 2000,
Based on 1994 Cross Section

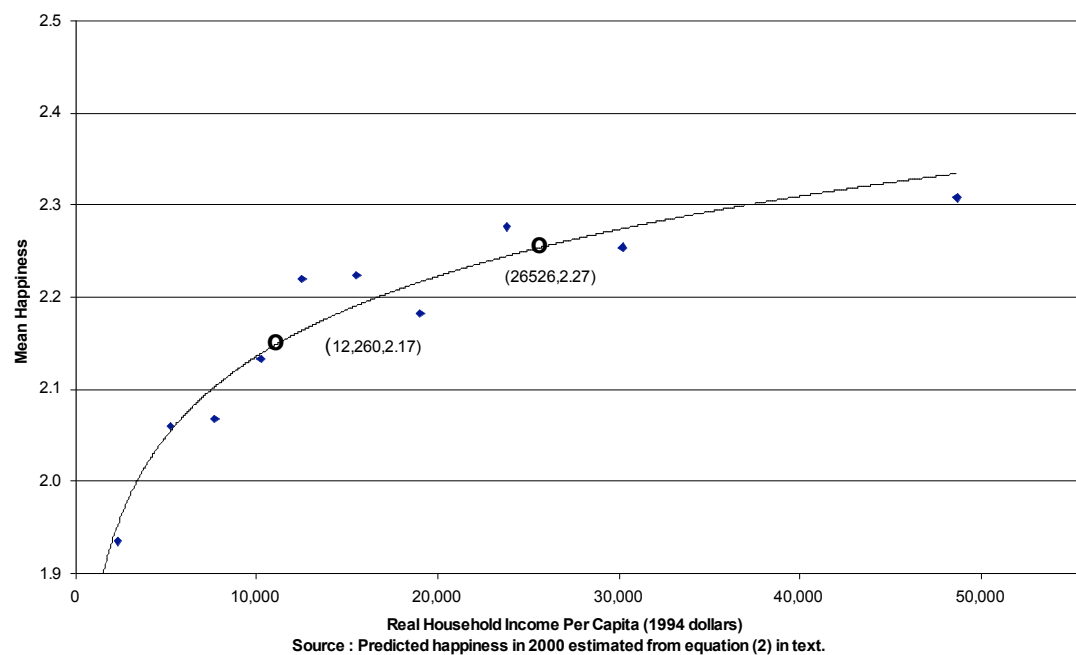


Figure 6. Actual Happiness of Birth Cohort of 1941-1950, 1972-2000

