Money and Happiness: Rank of Income, Not Income, Affects Life Satisfaction

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Abstract

Does money buy happiness, or does happiness come indirectly from the higher rank in society that money brings? We tested a *rank-income hypothesis*, according to which people gain utility from the ranked position of their income within a comparison group. The rank hypothesis contrasts with traditional *reference-income* hypotheses, which suggest that utility from income depends on comparison to a social reference-group norm. We found that the ranked position of an individual's income predicts general life satisfaction, whereas absolute income and reference income have no effect. Furthermore, individuals weight upward comparisons more heavily than downward comparisons. According to the rank hypothesis, income and utility are not directly linked: Increasing an individual's income will increase his or her utility only if ranked position also increases and will necessarily reduce the utility of others who will lose rank.

Keywords

Is there a true causal relation between money and happiness? According to conventional economics, there is: Money can buy happiness because it can be exchanged for goods that will increase an individual's utility. Thus, money and happiness are assumed to be causally linked, and higher incomes should lead to greater happiness. In line with this *absolute-income hypothesis*, richer people are happier than those less well off within the same society (Diener, 1984). The correlation between money and happiness is often small, but effect sizes are larger in low-income developing economies (Howell & Howell, 2008), and even small correlations can reflect substantial real differences in happiness (Lucas & Schimmack, 2009). Such results, however, do not necessarily reflect a simple causal relation between money and happiness. The idea that absolute income leads to increased happiness is unable to account for the Easterlin (1974) paradox—that income and happiness are positively associated within a country at a given time but not (or less well) correlated within a country over time.

Furthermore, being among people richer than oneself can be detrimental to well-being, as measured in various ways (Blanchflower & Oswald, 2004; Clark, Frijters, & Shields, 2008; Clark & Oswald, 1996; Ferrer-i-Carbonell, 2005; Luttmer, 2005), consistent with income comparison. Self-rated happiness and satisfaction scores have been shown to act as valid and reliable proxies for utility (e.g., Lepper, 1998; Sandvik, Diener, & Seidlitz, 1993). The data have therefore been taken to suggest that an individual's utility is influenced not by absolute level of income, but instead by income relative to that of peers.

The *reference-income hypothesis* is the dominant model of income comparison and suggests that individuals care about how their income compares with the norm, or reference income, of a socially constructed comparison group. Again, a direct causal link is assumed: Increased income will lead to increased utility for an individual if all else is held constant. Individuals gain utility to the extent that their income exceeds the average or reference income of people in their comparison set and lose utility to the extent that their own income falls below the reference level. The average income of an assumed reference group typically negatively and significantly predicts a number of variables related to well-being, consistent with the reference-income approach (e.g., Clark & Oswald, 1996).

We suggest instead that utility is based on an individual's ranked position within a comparison group: the *rank-income hypothesis*. According to the rank-based model, people gain utility from occupying a higher ranked position within an income distribution rather than from either absolute income or

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their position relative to a reference wage (Brown, Gardner, Oswald, & Qian, 2008; Clark, Kristensen, & Westergard-Nielsen, 2009; Clark, Masclet, & Villeval, in press; Hagerty, 2000; Smith, Diener, & Wedell, 1989). For example, people might care about whether they are the second most highly paid person, or the eighth most highly paid person, in their comparison set (which might contain fellow workers of a similar age and qualification level, neighbors, friends from college, etc.). The ranked position of an income will be highly correlated with the position of that income relative to a mean, so evidence previously taken to support reference-income accounts may be consistent with a rank-income account. Not only do rank- and reference-based models predict very different savings and consumption behavior (Bilancini & Boncinelli, 2008) but also, according to the rank-income hypothesis, there is no simple causal relationship between money and happiness: An increase in income need not increase ranked position and hence need not increase happiness.

A rank-based approach to judgment is independently motivated by the fact that judgments about items within a context of other items are known to be influenced by the ranked position of the item along the dimension of interest. This perspective originated within psychophysics in the judgment of quantities such as weight or pitch, but has since been extended to economic and social phenomena (e.g., Mellers, 1986; Niedrich, Sharma, & Wedell, 2001; Parducci, 1995; Stewart, Chater, & Brown, 2006). Subjective judgments of utility may be governed by context just as judgments of other quantities are (Parducci, 1995).

Some evidence has already shown that rank income rather than reference or absolute income may be important, although previous large-scale studies have looked only at satisfaction with economic conditions and not overall life satisfaction. In a study of 16,000 British workers, wage satisfaction depended on the ordinal rank of an individual's wage within a workplace (Brown et al., 2008). Further, in a study of 9,000 small neighborhoods, researchers found that satisfaction with economic conditions increased with ranked position within a neighborhood (Clark et al., 2008). Other studies have considered rank in the broader context of range-frequency theory (Hagerty, 2000; Smith et al., 1989). However, no large-scale study has examined the effect of income rank on self-reported general life satisfaction. We use data from 12,000 British adults to examine this question. We also examine whether upward comparison (the number of people earning more than oneself) has a greater influence on life satisfaction than downward comparison (Duesenberry, 1949).

Method

We tested a simple rank-based model, according to which individuals compare themselves with a sample of other people in their reference group and assess whether each sampled person earns more or less than they do (Stewart et al., 2006). The number of people who have an income "worse than" that of the individual ($i - 1$) is compared with the total number of people within the individual's reference group ($n - 1$). The ratio gives the individual a rank (R_i) normalized between 0 and 1:

$$R_i = \frac{i - 1}{n - 1}. \qquad (1)$$

We used R_i to predict life satisfaction in a multiple regression analysis after the influence of other relevant variables had been partialed out. Data were taken from 7 years of the British Household Panel Survey (BHPS), which is a representative longitudinal sample of British households. All adults from 1997 to 2004 who answered a life-satisfaction question were included in the analysis ($N = 86,679$).[1] Life satisfaction was determined by the respondent's answer (on a scale from 1 to 7) to the question, "How dissatisfied or satisfied are you with your life overall?" and was used in this study as a proxy for an individual's utility and standardized. Household incomes were adjusted for differences in regional living costs and for number of individuals in the household: Total household income was divided by 2004 regional living costs and weighted by household size (adults = 1 unit; each child = 0.5 units). After such adjustment, comparable incomes mean that individuals with children, or those who may stay at home in the presence of a big income earner, will have comparable spending powers. Demographic characteristics were controlled for in all analyses.

Results

We first report analyses comparing rank income and income in the overall sample as predictors of life satisfaction and then present the results of analyses in which we divided the sample into reference groups to test the rank-income hypothesis against the reference-income hypothesis. Finally, we discuss evidence of asymmetric (upward) comparison.

The ranked position of each individual's income within the entire sample in a given year was compared with the individual's absolute income (logarithmically transformed[2]) as a predictor of life satisfaction (see Table 1). Each was significant when entered as the only income-related predictor after controls (Regressions 1 and 2). The coefficient from Regression 1 suggests that once we controlled for other factors, the life-satisfaction difference between the highest and lowest earners was 0.29 standard deviation. Alternatively, the coefficient on the logarithm of household income shown in column 2 suggests that on average an individual will be 0.1 standard deviations higher in life satisfaction than someone earning about half as much. However, rank explains significantly more of the overall variation (R^2) in life satisfaction. Furthermore, when both income variables were entered simultaneously, rank income dominated, and absolute income accounted for no additional variance (Regression 3), consistent with a role for ranked position of income, not income per se, in determining life satisfaction.[3]

Next, we compared the rank- and reference-income hypotheses. We constructed various reference groups to explore the

Table 1. Results of Pooled Ordinary Least Squares Regression Analyses That Compared the Logarithm of Absolute Income and Income Rank by Sample as Predictors of Life Satisfaction

Regression and variable	b	t	R^2
Regression 1			.0838
Income rank[a]	0.288	21.46*	
Regression 2			.0826
Log household income[b]	0.101	18.66*	
Regression 3			.0838
Income rank[a]	0.302	10.60*	
Log household income[b]	0.006	0.53	

Note: The n for all analyses was 86,679. All analyses included demographic controls: age, gender, education, marital status, children, housing ownership, labor-force status, disabilities, and dummy variables identifying both region and wave. In all cases, these variables accounted for significant variation in life satisfaction.
[a]Income rank is based on the individual's household income adjusted for household size and deflated by regional living costs. [b]Household income is adjusted for household size and deflated by regional living costs.
*p < .001.

possibility that people compare their income to the income of other individuals (a) in the same geographical region (there were 19 geographical regions in the BHPS), (b) of the same gender and education (six groups, resulting from three levels of education: graduate, college, and neither), or (c) of the same age (we used 12 age groupings: less than 20, 20–24, 25–29, 30–24, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, and 70 years and older). In each case, we computed the relative rank of each individual's income within the reference group and also the mean income of all individuals within the reference group. We then predicted each person's life satisfaction from (a) his or her relative rank within the reference

group, (b) his or her absolute income (logarithmically transformed), and (c) the mean income of his or her reference group (logarithmically transformed).

We were then able to test the rank-income hypothesis against both the absolute-income and the reference-income hypotheses. Results are shown in Table 2; the standard errors were adjusted for clustering at the group level (Moulton, 1990). In all cases, the rank position of an individual's income within his or her reference group dominated the explanation of life satisfaction. When geographically defined reference groups were assumed, rank income was significant, whereas absolute income was not (Regression 1). An R^2 comparison further revealed that rank income also explained more of the variation in life satisfaction than the reference-group income model (Regression 2). Neither reference income nor absolute income explained any additional variance over rank income (Regression 3). Similar results were found when individuals were assumed to compare themselves with others of the same education level and gender and when individuals were assumed to compare themselves with others of similar age.

The final analyses examined whether upward comparisons were weighted more heavily than downward comparisons. It is commonly suggested that comparison is asymmetric, being made mostly to those above oneself (Blanchflower & Oswald, 2004; Duesenberry, 1949; Ferrer-i-Carbonell, 2005). Does the model improve when upward comparison is accommodated? The rank measure can be adapted in a way such that higher-ranked others have greater (or lesser) impact on individuals' assessment of their own income than do those below (or above). We refer to this as *subjective income rank* (SR; Brown et al., 2008):

$$SR_i = 0.5 + \frac{(i-1) - \eta(n-i)}{2[(i-1) + \eta(n-i)]}. \qquad (2)$$

Table 2. Results of Pooled Ordinary Least Squares Regression Analyses That Compared the Logarithm of Mean Income and Income Rank According to Various Reference Groups as Predictors of Life Satisfaction

	Regional reference groups			Gender-education reference groups			Age reference groups		
Regression and variable	b	t	R^2	b	t	R^2	b	t	R^2
Regression 1			.0838			.0839			.0838
Income rank[a] by reference group	0.294	9.36*		0.289	10.89*		0.270	4.95*	
Log household income[b]	−0.004	0.38		−0.007	0.50		0.003	0.20	
Regression 2			.0826			.0826			.0831
Log household income[b]	0.101	16.30*		0.101	7.43*		0.103	9.43*	
Log mean reference-group income[b]	−0.050	0.47		−0.213	0.79		−0.365	2.10	
Regression 3			.0838			.0838			.0840
Income rank[a]	0.294	9.46*		0.289	11.07*		0.244	3.68*	
Log household income[b]	−0.004	0.38		−0.007	0.50		0.013	0.76	
Log mean reference-group income[b]	0.011	0.11		−0.130	0.48		−0.263	1.34	

Note: The n for all analyses was 86,679. Standard errors were adjusted to account for clustering at the group level (see Moulton, 1990). All analyses included demographic controls: age, gender, education, marital status, children, housing ownership, labor-force status, disabilities, and dummy variables identifying both region and wave. In all cases, these variables accounted for significant variation in life satisfaction.
[a]Income rank is based on the individual's household income adjusted for household size and deflated by regional living costs. [b]Household income is adjusted for household size and deflated by regional living costs.
*p < .001.

Here, η captures the degree of upward comparison and increases the weight given to those who earn more. If η = 1, Equation 2 can be rewritten as Equation 1. When η > 1, individuals earning more than *i* influence perception of the individual's rank more than those earning less. If η = 2, for example, the number of individuals who earn more than *i* matters twice as much as those who earn less. *SR*, based on the whole sample for each wave according to Equation 2 with a given value of η, was compared to the simple relative-rank-income variable (η = 1). With η set to 1.75 (the optimal value), significant additional variance is accounted for, $F(1, 86641) = 8.75, p < .01$. The coefficient on the rank variable that incorporates this degree of upward comparison is 0.394 and significant, whereas the coefficient on the absolute-income variable is –0.03 and insignificant. This result supports Duesenberry's (1949) claim that comparison is primarily upward and shows further that people compare to those above themselves in income 1.75 times more than they do to those below.

Discussion

In an analysis of more than 80,000 observations, the relative rank of an individual's income predicted the individual's general life satisfaction and removed the effect of absolute income. In analyses assuming that individuals compare themselves to smaller reference groups, relative rank of income continued to dominate the explanation of life satisfaction. Results suggest that individuals sample from a reference group and compare their own income with sampled incomes ordinally—satisfaction is gained from each "better than" comparison and lost for each "worse than" comparison. No calculation of mean reference-group income is required. We note that rank could be influencing either an underlying internal utility or an individual's interpretation of his or her own utility. On the latter interpretation, individuals will score themselves as more happy to the extent that they perceive themselves as ranking higher in happiness than others. Although this possibility is difficult to exclude, we note considerable evidence for relative effects in neuroscience (e.g., Fliessbach et al., 2007), along with the observation that subjective well-being ratings correlate well with observable behavioral measures (Ekman, Friesen, & Davidson, 1990; Koivumaa-Honkanen et al., 2001). We also note that income rank may act as a proxy for more general social rank (Powdthavee, 2009), with the analyses then showing that social rank is key to well-being.

The rank-income hypothesis carries several implications. First, it assumes no direct causal relationship between income and well-being. Unless the individual's ranked position were perceived to change, income could increase without increasing utility.[4] Rank income also predicts a concave utility function when comparison incomes are positively skewed, because an increasing income at the lower end of the income distribution will increase rank faster (Brown et al., 2008; Kornienko, 2004; Stewart et al., 2006). Finally, to the extent that there are effects only of rank, income distribution cannot affect society's income-derived utility. However, dissatisfaction could still result from inequality per se (Alesina, Di Tella, & MacCulloch, 2004).

Our study underlines concerns regarding the pursuit of economic growth. There are fixed amounts of rank in society— only one individual can be the highest earner. Thus, pursuing economic growth, although it remains a key political goal, might not make people any happier. The rank-income hypothesis may explain why increasing the incomes of all may not raise the happiness of all, even though wealth and happiness are correlated within a society at a given point in time.

Notes

1. The 2001 wave included no life-satisfaction question and was therefore excluded.

2. The natural logarithm of income is the transformation typically used in income and happiness studies, so it provides a useful benchmark against which to test rank income. Higher-order polynomials in income against rank income were also tested, but logarithm of income was a better specification.

3. A fixed-effect analysis, analyzing the within-person variation, was also undertaken. Fixed-effect analysis controls for unobservable heterogeneous factors. Again, rank dominated: When entered simultaneously, the coefficient on the rank variable was 0.06 and significant, whereas the coefficient on the absolute-income variable was 0.02 and insignificant.

4. We note the possibility that "previous self" may enter the comparison set (e.g., Vandestadt, Kapteyn, & Vandegeer, 1985), in which case any increase in income could lead to increased utility.

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