

EC331 0405007

Who's Keeping Up With The Joneses?

An economic study into relative income and happiness

5,295 words¹

22nd March 2007

Mini-Abstract: This study finds, controlling for own income, people are negatively affected by higher incomes of others' around them (relative income concerns), taking a fresh perspective to previous literature in showing the pervasiveness of relative effects as well as adding empirical novelties such as the use of real income.

¹ Main body-text only, excluding tables, footnotes etc.

CONTENTS

Section I: Introduction	3
Section II: Theories and Previous Work	4
II.1 A Primer in Relative Utility Theories	4
II.2 Literature Review and Project Goals	6
Section III: Empirical Strategy	10
Section IV: Data and Results	12
IV.1 The Datasets: Description & Introduction	12
IV.2 Empirical Analysis: Results	15
IV.2A Headline Results	15
IV.2B Comparisons within the Distribution	16
IV.2C Subgroups	18
IV.2D Integrity and Limitations	19
Section V: Conclusions and Extensions	23
References	25
Appendices	27
A. Index of Variables	27
B. Some Detailed Descriptive Statistics	29
C. Some Statistical Tests	32
D. Using Average Income Calculated From GSS	33
E. Full Results for Headline Specification	33
F. Using Personal Income as the Comparison Level	35

All variables mentioned in the text are comprehensively explained in Appendix A

A note on terminology: “income envy” in this paper refers to any form of attachment to relative income concerns, not simply “envy” in the literal sense of the word

Acknowledgements: Professor Andrew Oswald, Dr Gianna Boero

I INTRODUCTION

IN 1965, as colour televisions permeated households in sprawling suburbs, President Johnson asked “not only how fast we are going, but where we are headed.”² Nine years later, Easterlin’s (1974) seminal happiness paper replied ‘nowhere.’ Showing that well-being stagnated during breakneck post-war economic growth, he speculated that “raising the incomes of all [will not] increase the happiness of all,” explaining that as wants are relative, people need to keep up with rising incomes simply to *maintain* utility. This paper shows empirically that, controlling for own income and characteristics, people’s happiness falls as incomes around them rise.

The concept has been relatively marginalised in economics. Open any reputable microeconomics textbook and the starting proposition declares that utility is derived purely from own consumption, such that increasing incomes automatically increase social welfare. Relative utility models such as interdependence of consumption, which formalises Easterlin’s supposition, and status-seeking theory which posits that people care mostly about their rank in the income distribution modify these basic assumptions. The implication that increasing individual incomes exerts a negative externality on others creates a space for welfare-enhancing tax and growth policy, avoiding a “rat race” or overemphasis on growth relative to other concerns such as environmental damage.

These policy implications lend a certain importance to empirical confirmation of relative utility theory. This paper swells the narrow body of evidence confirming a negative relationship between happiness and surrounding average income. Taking a fresh perspective, the specifications investigate the tractability of income comparisons, expanding the frame of reference to regions of up to 100m people and suggestively rejecting the hypotheses that, firstly, people restrict their envy to similar groups in society and, secondly, relative concerns are confined to certain groups in society. These findings from the General Social Survey, which also add to the literature by using real income and investigating changes in the definition of happiness, provide a compelling illustration of the pervasiveness of comparison effects, displaying their policy relevance on a macro level.

Section II details the relevant theories and literature as the framework for this study’s goals. The empirical path is detailed in Section III and results analysed in Section IV. Discussions and conclusions comprise section V. ♣

² Lyndon Johnson (State of the Union address, 1965) quoted in D. Kearns, “Lyndon Johnson and the American Dream,” Harper (1976)

II.1 RELATIVE UTILITY THEORIES

Absolute utility theory, stating that utility is derived solely from own income which fulfils insatiable wants, is based around two implicit foundations: firstly, the extent and intensity of people's wants are intrinsic and, secondly, utility from income is derived only from its consumption possibilities. Relative utility models, which place other people's incomes in the utility function, challenge both these assumptions.

The Traditional "Absolute Utility" Model

$$U = f(Y)$$

Utility is an increasing function of own income, Y, only

The Interdependent "Relative Utility Model

$$U = f(Y, Y^*)$$

$$U = f(Y, Y/Y^*)$$

Utility is an increasing function of own income, Y, and a decreasing function of income of "relevant others", Y*, or similarly an increasing function of own income relative to income of relevant others, Y/Y*

Interdependence of consumption theory details how others' consumption affects people's wants.³ Jones sees other people consuming good Y. He sees Y as feasible. He wants Y.⁴ He feels "relatively deprived" of Y. Frank (1985b) provides empirical evidence showing individual consumption is spurred by others' consumption. The complementary social ranking model (see Frank 1985a) postulates that utility from income is based on status gleaned from rank in the income distribution. Jones feels worse off if everyone else receives a pay rise since it worsens his relative position, although his absolute consumption possibilities are unaffected. Conversely, Smith feels better off if he alone receives a pay rise than if everyone receives a rise.

Thus, a conflict operates between the private interest in raising income and the negative externality entailed. In the pure status-seeking model, the quest for position is a zero-sum game as one person's rank promotion forces

³ Consumption and income are used interchangeably in this paper. Although savings and borrowing impose a conceptual difference, income can still broadly be thought of as bounding consumption possibilities.

⁴ Even if good Y holds no any inherent appeal to Jones, a "bandwagon effect" of consumption may exist.

offsetting demotions on others.⁵ Social welfare effects are negative owing to the effort expended status-seeking. Similarly, in the interdependence model, raising one person's income increases the wants of others. Layard (1980) proposes taxing the marginal gain in rank or damage to others' aspirations from an extra hour's work leaving gains from absolute income the residue.

This requires, firstly, understanding where externalities lie, that is whose consumption and rank within which group people care about. Runciman (1966) suggests that form feasible comparison groups. In interdependence parlance, Jones only sees good Y as feasible if he sees people with *similar characteristics* consuming it.⁶ Secondly, if some people care more about relative income than others, redistributing income to them may be efficient. "Relative deprivation" implies envy is concentrated upon the poor, whose consumption is abrogated, rather than the rich who set the pace. Duesenberry (1949) suggests this renders "progressive income taxes...necessary to allocational efficiency." These queries also enlighten the plausibility of Layard's (1980) alternative strategy to use education to change the utility function, exchanging envy for compassion and switching negative externalities to positive, by investigating the solubility of relative concerns. If people care only about the incomes of certain people, then changing their feasibility criteria or residential sorting, more than macro policy adjustment, is implied.

This paper adds to embryonic literature, surveyed shortly, testing empirically whether other people's income affects individual utility, asking whether people form constrained comparison groups and whether income effects matter more to some groups than others. ♣

⁵ The pure status-seeking model, where only relative income matters, can be reconciled with the apparent inherent gains of consumption using "hedonic treadmill" theory, which confines the pleasurable effects of consumption in the novelty of the cognitive stimuli. (For an excellent discussion of "hedonic treadmill" theory, refer to Brickman and D. T. Campbell (1971)) Van Praag, quoted in Stutzer (2004), calculates the upward preference shift entailed in becoming accustomed to a consumption surge sterilizes sixty percent of the expected welfare gain.

⁶ Modern technology means extensive channels of "seeing" others consume exists such as television and other media, mass culture etc. These could be expected to work across entire nations.

II.2 LITERATURE SURVEY

In 1995, Easterlin re-examined the landscape set by his earlier groundbreaking work, concluding “with...greater assurance” that relative income was the mainstay of the utility function.⁷ Presenting time series evidence from eleven countries, he cites well-being constancy during Japanese post-war miracle growth as clear evidence that “happiness varies...inversely with the income of others.” Easterlin’s method is inconclusive; the association may be driven by omitted variables correlated with growth, such as working hours, stress and environmental conditions. Moreover, the use of national averages offers only indirect evidence towards individual preferences.

Some research seeks to empirically evidence relative income effects via behavioural implications. Duesenberry (1949) finds individual savings rates react to position in the income distribution, implying that the relatively poor save less to keep pace with consumption above. The ESRC Society (2004) casually links debt with low relative income using descriptive statistics.⁸ Apart from likely omission of other variables relevant to debt and savings, such methodology, which may also be applied to house prices as poorer areas offer higher relative income, relies on revealed preference of relative income concerns. This requires that individuals possess a strong understanding of relative effects. The premise is questionable owing to ideas such as “preference drift,” which states that people moving to higher income areas calculate future utility relative to their old situation, neglecting the upward effect on preferences stimulated by their newly salubrious surroundings.

This leaves direct associations between utility and relative income as the most feasible method. Van Praag et al (1978) and van de Stadt et al (1985) link lower individual utility from income, measured by self-evaluation of income adequacy, to higher incomes of the reference group. This places much weight on the integrity of complex self-evaluation questions.⁹ This paper follows the strand of literature that avoids this issue by investigating how self-reported happiness - used to proxy utility - reacts to comparison income and own income, invariably via regressions testing the coefficient on the average income of “relevant others,” whom individuals compare with.¹⁰

⁷ R.A. Easterlin, “*Will raising the incomes of all increase the happiness of all?*” JEB0 (1995)

⁸ ESRC Society, “*Debt: Envy, Penury or Necessity?*” (2004). The ESRC simply matches average debt levels with relative income levels

⁹ “Preference drift” and “hedonic treadmill” theory suggest people may wrongly estimate income preferences, which may be fleeting

¹⁰ Self-reported happiness indicators have been questioned but have been largely validated by psychological literature (see Section III)

happiness = f(own income, comparison income, controls)

where comparison income is the average income, Y^* , of the "relevant others" who form the reference group

The central theoretical question in this specification is the choice of the "relevant others." Almost all researchers use narrow reference groups. Luttmer (2005) employs average neighbourhood income, while Blanchflower and Oswald (2000¹¹) use income relative to average earnings in state.¹² McBride (2001) pioneers an alternative method allocating people to age cohorts.¹³ Ferrer-i-Carbonell (2005) creates fifty groups based on age, education and region. Most find a significant and negative coefficient on average income supporting relative utility theory. An exception is Senik's (2004a&b) findings of positive effects in the transition economies. Her finding of negative effects in Western countries, using the same specification, supports her interpretation that average income in these unstable nations acts as information on future personal prospects. The use of restricted comparison groups in these specifications implies that income comparisons occur on a micro scale, such as with people in one's neighbourhood and, similarly, friends likely to be of similar age and education. Indeed, Luttmer finds stronger effects for those who socialise more with their neighbours. This study uses a wider reference group, dividing the US into just four large regions, closer to Easterlin's hypothesis that external effects have macro implications.¹⁴

The specification presents three key empirical dangers in inferring relative income effects. Firstly, the coefficient on average income may be biased by omitted correlated effects, most strikingly high income areas may have higher prices.¹⁵ Thus, the negative coefficient on the comparison term only eliminates the incongruence between nominal income in the specification and real income in the utility function. No study tackles this directly, although Blanchflower and Oswald use a local housing index, while Luttmer imputes local income from national data. The risk of imperfect proxies notwithstanding, they find little impact on results. Secondly, happier people may choose to reside in poorer reference groups, although panel data studies controlling for individual fixed

¹¹ Blanchflower and Oswald NBER Working Paper (2000) also published in *Journal of Public Economics* (2004)

¹² To be more precise, Luttmer uses average income in PUMA, the smallest microdata area in the United States

¹³ It must also be noted that McBride (2001) uses a very small sample numbering just over 300

¹⁴ While it is reasonable to suggest that the fortunes of large regions and, even, the entire nation may be highly correlated with the fortunes inside neighbourhoods, this would also demonstrate the relevance of macro policy as it would imply that it affects both large and small areas, whereas specifications using only the latter do not necessarily imply the former

¹⁵ Higher average incomes in regions are usually correlated with higher price levels (Luttmer 2005), this could be argued to extend to education reference groups or age cohorts if purchasing patterns are different according to education levels/age

effects offer similar findings to cross-section studies.¹⁶ Thirdly, people in richer areas may have different definitions of happiness than those in poorer areas.¹⁷ This issue can not be conclusively dismissed, although Luttmer's use of alternative well-being measures with less subjective definitions indicatively support his findings, as far as outcomes such as marital disagreements are sufficient approximations to utility.

Returning to theoretical issues, most studies use only average income in the chosen comparison group which implies (or does not question) that the incomes of all other people are weighted equally in the individual utility function, contrary to Runciman's hypothesis of feasible comparison groups. These can naturally be mapped onto the splits in the income distribution. A literary consensus shows race, education, age and gender exert fundamental effects on earning potential. Few studies enquire whether individual happiness reacts more to the income of some groups than others. Luttmer presents weakly-determined evidence that the happiness of graduates reacts more to the incomes of other graduates than non-graduates, though his efforts are hampered by low representation of some sub-groups in his localised reference groups. Blanchflower and Oswald suggestively find that people's utility responds most to income in the top quintile, indicating the only restraint in comparison is envying the very rich.

Furthermore, although theory such as "relative deprivation" suggests comparisons may be more important to poor than rich, the standard specification assumes coefficient constancy across subgroups. Limited work addresses this. Ferrer-i-Carbonell (2005) finds the hypothesised asymmetry on German data. Luttmer finds no asymmetry in the US while McBride, using a much smaller dataset, points to a higher coefficient for the rich.¹⁸ This variance in findings highlights the importance of furthering a still nascent body of empirical literature on relative income concerns. Similarly, few papers examine whether all subgroups experience income envy. Luttmer suggests neighbourhood reference groups may be inappropriate for some divisions such as the less settled unmarried.

¹⁶ For instance, the panel data work of Luttmer (2005) and Ferrer-i-Carbonell (2005) offers similar general conclusions as the cross-section work of McBride (2001) and Blanchflower and Oswald (2000)

¹⁷ This may also, of course, be the case with age and education comparison groups

¹⁸ Luttmer (2005) and McBride (2001)

This study seeks to enhance the incipient empirical evidence on income comparisons, taking the fresh perspective of testing the extensiveness of relative effects. First, a wider frame of reference is used. Second, a panoramic view of the income distribution asks whether people form feasible comparison groups by age, race, education and gender. Finally, symmetry across rich and poor, and demographic subgroups, is tested.

The main empirical addition is the use of accurate local CPI numbers to desensitise regional price differences. It is also hoped that using large regions may dilute some truculent estimation issues, perhaps making it less likely that correlated omitted effects or differences in the definition of happiness operate across vast swathes of area.¹⁹ ♣

PROJECT GOALS

- Q. How does average real income in a person's large region affect their individual happiness?
- Q. Do people restrict their comparisons to certain groups in the income distribution?
- Q. Do comparisons matter to rich and poor alike? Are all subgroups similarly envious?

¹⁹ This may not necessarily be the case, of course, since richer larger regions on average may have correlated effects on average. However, especially in regarding to the fear that people report their happiness relative to their neighbours (Luttmer 2005), it is reasonable to speculate that there may be less chance of this occurring across large areas

III EMPIRICAL STRATEGY

Happiness is used to proxy for utility. A large psychological literature elicits that self-reported scores are significantly correlated with objective signs such as genuine “Duchenne” smiles.²⁰ Happiness is regressed on family income, comparison income and a set of personal controls.

$$\text{happiness} = \alpha + \beta_1 Y + \beta_2 Y^* + \beta_3 Z + \varepsilon_i$$

Z is a vector of other available determinants of happiness, Y is own income and Y* (or Y/Y*) is comparison income

Ostensibly, the size and determination of the coefficients β_1 and β_2 encapsulate the independent effects of income and relative income. Established general happiness literature, such as Oswald (2006), offers suitable controls:

$$\text{happiness}_i = \alpha + \beta_1 \text{age}_i + \beta_2 \text{age}_i^2 + \beta_j (\text{EMP}_j)_i + \beta_6 \text{Income} + \beta_k (\text{FAMILY}_k) + \beta_l (\text{HEALTH}_l) + \beta_p \text{Education}$$

An U-shaped relationship in age is usually observed. Middle age may be the point of realisation and readjustment of aspirations

Vector of employment status vars
Student/Retired
Employed/Jobless
Job Type

Satisfaction with own income and relative income

Vector of family status variables
Singles/Married/
Widowed/Divorced
No of. Children
Friendships

Impact of health on quality of life e.g. days in hospital, disability.

Figure 1: Happiness Determinants excluding demographic assignments e.g. race and gender

The happiness question in the central dataset, the GSS 1972-2004, asks respondents to evaluate their happiness in one of three categories – very happy, pretty happy, not too happy. Since these are ordered by definition, an ordered logit is used. McBride (2001) confirms the ordered nature of the GSS happiness question using a Hausman test. The headline specification uses family income as Y and average family income in large census region of respondent (North East, West, South, Mid West) as Y* (or Y/Y*), before investigating whether results are sensitive to deflating by local CPI figures.²¹ Natural logs of income variables are used, since economic theory suggests decreasing marginal utility from income. The controls used are listed in Table 1, Section IV.2.

The second family of specifications asks whether people constrain their comparisons within the income distribution. The general empirical algorithm here tests whether happiness of a group, say race, reacts more to the regional mean of membership group (i.e. feasible comparison group e.g. Black mean) than the overall mean.

²⁰ See Blanchflower and Oswald (2000) for a discussion on this psychological literature

²¹ Relative income and comparison income are conceptually similar, since the comparison income specification holds own income constant, it is effectively measuring the harm of others' income pulling away from own income. The difference is made explicitly clear in the text only when necessary. To be more precise, the main specification uses family income variables per household member

This is accomplished using separate specifications with each comparison level and evaluating the difference in comparison terms, before including both comparison levels simultaneously to control for each other.²² This method also investigates whether people in the middle of the distribution are more concerned about the income of those richer than them than those poorer than them. An alternative technique compares a single comparison measure where each case is assigned the mean of their own group with a measure where each case is assigned the overall mean.

The third family of specifications investigate whether the comparison term displays significant differences across subsamples such as race and age groups and, notably, the richer and poorer halves of the distribution.

Finally, a comprehensive discussion of the integrity of results includes:

- Examining whether the results are affected by omitted variables correlated with average income
- Adding cohort dummies to the specification, examining possible changes in the definition of happiness
- Testing for structural change and effects correlated with economic growth
- Using income predicted by age and education as an instrument for family income which may be susceptible to measurement error
- Excluding movers from the sample, perhaps the most likely group to have changed comparison group
- Testing correct functional form of income variables. ♣

²² It may be obvious here to the reader that this method has clear empirical shortcomings, notably that the two comparisons are highly correlated. These issues are discussed in Section IV.2D

IV.1 THE DATASETS

Please refer also to Appendix B, which contains some detailed descriptive statistics; See References for detailed data source description

The main data source is the General Social Survey, repeated cross-sections (not panel) in 25 of the years between 1972 and 2004, encompassing face-to-face interviews with 46,510 cases, close to but not exactly demographically representative.²³ 56% of respondents are female, 14% black and 19% graduates. Two of the key variables in the specification, own income (personal and family) and happiness are included, while the third, average income in large census region, is allocated to respondents according to their region and year from US Census historical income data.²⁴ 75% of cases have observations for all three of these variables.²⁵ The GSS data further contains most of the personal controls in figure 1 with Appendix B showing that the controls selected for inclusion, except health status, have high response rates and significant variances.²⁶

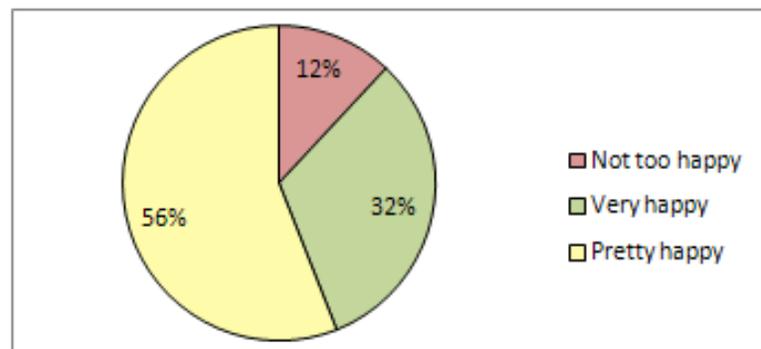


Figure 2: Happiness Categories of Respondents by %

Returning to the central variables, unsurprisingly most respondents place themselves in the middle category of “pretty happy” with many “very happy” and a few “not too happy.” Ideally a continuous measure of family income would minimise risk of measurement error. Nonetheless, after approximating the categorical variable using mid-points, mean inflation-adjusted family income is \$25,932 with standard deviation \$21,071. Census average income data, collected monthly using a representative sample of around 60,000, exhibits no such susceptibility to measurement error. As figure 3 shows, the repeated nature of the GSS permits the use of just four large regions as comparisons, which in a single-year study would result in a minuscule variance in

²³ J.A. Davis, T.W. Smith and P.V. Marsden, “General Social Surveys, 1972-2004,” Computer File, [producer NORC] ICSPR (2006)

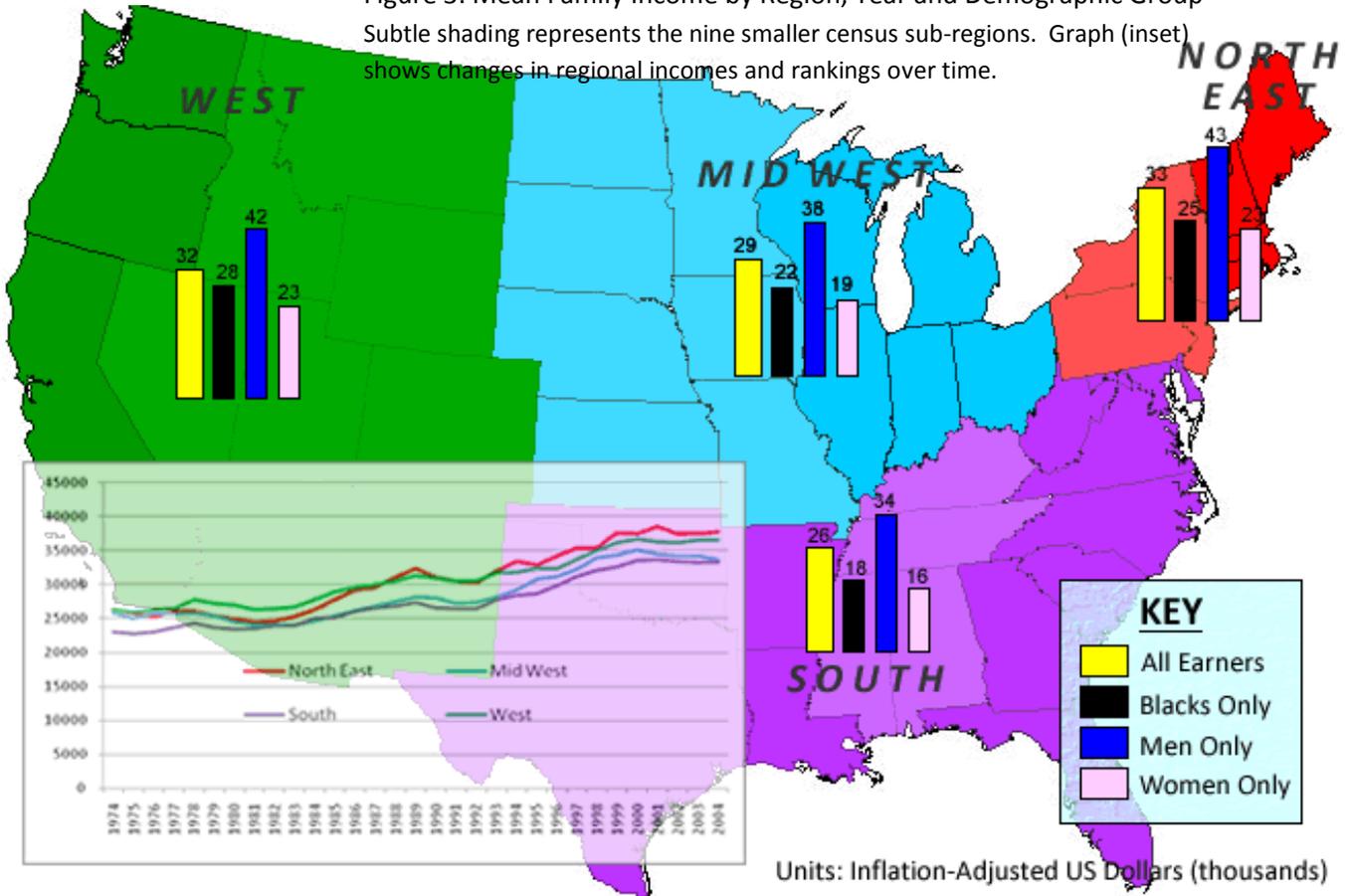
²⁴ US Census Bureau, “Historical Income Data 1967-2005,” www.census.gov (2005)

²⁵ Appendix B shows no noticeable difference in the distribution of happiness scores for cases with missing values for family income compared to those with values for family income, allaying fears of selection issues. Census family income data from 1975 onwards

²⁶ Accordingly, specifications excluding health status are also run in the results, Section IV.2

comparison income curbing the reliability of the coefficient estimate on comparison income. Here, instead, average income in census region (unadjusted) has standard deviation \$14,881 around a mean of \$37,779. Bureau of Labour Statistics historical Consumer Price Index data by region and year, based 1982-4=100, is allocated to every case by its region-year combination facilitating deflating to create real incomes.²⁷

Figure 3: Mean Family Income by Region, Year and Demographic Group
 Subtle shading represents the nine smaller census sub-regions. Graph (inset) shows changes in regional incomes and rankings over time.



The income data also reveals the income distribution is segmented by race, gender, age and education. A simple Mincer earnings equation shows the expected large gains from education and n-shape in age and large penalties for being Black - 12% - and female unexplained by age and education. This provides the necessary preconditions for the creation of feasible comparison groups (Runciman 1966) or status-seeking within sub-distributions.

$$\ln(\text{earnings}) = 4.84 + 0.137\text{age} - 0.0014\text{age}^2 + 0.10\text{educ} - 0.12\text{black} - 0.6\text{female}$$

(72.7) (56.3) (-51.1) (50.3) (-6.7) (-57.7)

Full set of year and region dummies included, t-statistics in parentheses, educ is years of schooling, black/female are binary dummies

²⁷ The inflation-adjusted figures quoted in this section are deflated only by national CPI figure in year of case; U.S. Bureau of Labor Statistics, "Consumer Price Index Data 1966-2004," <<http://www.bls.gov/cpi>> (accessed 17/02/2007)

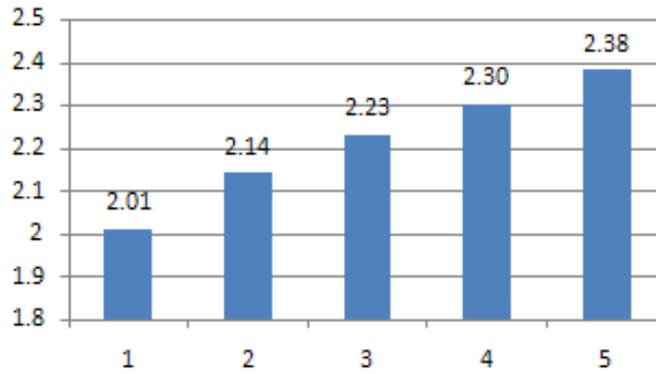


Figure 4: Mean Income by Inflation-Adjusted Quintile

Figure 4 shows that higher income is casually associated with increasing happiness. The main other happiness determinants explained in the literature also show expected casual patterns, further underlining the amenability of the data to the desired empirical specification. The only other variable that has a significant casual effect on happiness is settlement size, with those in smaller settlements happier.²⁸

	Means	Equality of Means Test
Blacks less happy than whites	2.0, 2.2	t=25.5, Reject
Married people happier	2.3, 2.0	t=47.96, Reject
Employed people happier	2.2, 1.9	t=18.5, Reject
Those earning > average happier	2.28, 2.16	t=15.04, Reject
Healthy people happier ²⁹	2.3, 2.0	t=38.9, Reject
Women only happier (though only marginally)	2.20, 2.19	t=1.2, Do Not Reject
People in larger settlements less happy ³⁰	2.16, 2.24	t=12.1, Reject

The correlation with absolute income renders casual associations between relative income and happiness meaningless; this inquiry is left for the forthcoming section. Before proceeding, it is worth noting that the correlation between regional CPI and regional average family income (adjusted by national CPI) is 0.81, not inimical to the fear of omitted variable bias in specifications where only nominal income is used. ♣

²⁸ Settlement size may, of course, proxy for environmental degradation and other factors mentioned in the literature

²⁹ Healthy defined as those with self-reported "excellent" or "good" health as opposed to "fair" or "poor"

³⁰ Larger settlements defined as those with a population greater than the median size in the dataset

IV.2 RESULTS

IV.2A HEADLINE RESULTS – DOES RELATIVE INCOME MATTER?

Table 1: Headline Specifications	Ord. Logit 1	OLS	IV (TSLS)	Relative	No Health
Ln(Region Mean Family Income)	-0.134 (-4.1)	-0.040 (-4.2)	-0.05 (-4.9)		-0.19 (-6.7)
Ln(Family Income)	0.174 (9.5)	0.050 (9.6)	0.06 (11.6)	0.07 (3.0)	0.25 (16.2)
Family Income/Region Mean				0.16 (5.7)	
Age	-0.023 (-4.4)	-0.006 (-4.3)	Family income variables in all regressions are per household member ³¹		Above spec omits health variables which have low response rate. Included for comparison with later regressions. n=34895
Age ²	0.00037 (6.9)	0.0001 (6.7)			
Female	0.175 (6.3)	0.049 (6.0)			
Education (years)	0.011 (2.3)	0.004 (2.7)			
No. of children	0.003 (0.3)	0.0004 (0.1)			
Black	-0.333 (-7.9)	-0.100 (-8.1)			
Settlement Size (millions)	-0.051 (-4.5)	-0.015 (-4.5)			
Widowed	-1.014 (-17.1)	-0.293 (-17.3)			
Divorced	-0.871 (-20.0)	-0.254 (-20.0)			
Separated	-1.027 (-13.5)	-0.299 (-13.7)			
Never Married	-0.618 (-14.7)	-0.181 (-14.7)	Running 1 using income in USD00s instead of log incomes yields coeffs of -0.0094 (-6.3) and 0.0090 (8.5) respectively		
Working Part-time	-0.078 (-1.8)	-0.022 (-1.7)			
Temp Not Working	-0.130 (-1.5)	-0.0405 (-1.6)			
Unemployed/ Laid Off	-0.698 (-8.5)	-0.203 (-8.6)			
Retired	0.163 (2.8)	0.048 (2.9)			
Student	0.190 (2.3)	0.053 (2.2)			
Keeping House	0.032 (0.7)	0.009 (0.76)			
Other Work Status	0.013 (0.1)	0.004 (0.1)			
Good Health	-0.680 (-23.2)	-0.194 (-23.0)			
Fair Health	-1.285 (-30.9)	-0.371 (-31.6)			
Poor Health	-1.900 (-25.2)	-0.535 (-25.8)	Dep. Var: Happiness 3 ordered indicators: Very Happy (3 – OLS/IV) Pretty Happy (2 – OLS/IV) Not Too Happy (1 – OLS/IV) Base category is employed white male in excellent health.		
Year Dummies (full set)	Yes	Yes			
Region Dummies (full set)	Yes	Yes			
<i>cut1, cut2</i>	-2.827, 0.300		White/Huber heteroskedasticity-consistent SEs used. (see Appendix C for details) All regressions in sec. IV.2 use controls in Column 1 & are ord. logits unless stated		-2.183, 0.84
<i>n</i>	25994	25994			
<i>(Pseudo) R²</i>	0.08	0.14			

Table 1 reports full results from the headline specification (see also Appendix E). Column 2 is an OLS version. The U-shape in age, benefits of marriage and employment, and deficits for males and blacks are unsurprising to happiness readers.³² Additionally, those living in smaller settlements seem happier. Column 3 uses predicted

³¹ This technique is based on Blanchflower and Oswald (2000)

³² Refer for instance to Oswald (2006)

earnings, based on age and education, as an instrument for family income, confirming possible measurement error in the categorical variable has no decisive impact.

Income effects are small compared to life events. An annual pay rise of at least \$70,000 is required to match the happiness of a first marriage.³³ Given the idiosyncratic nature of responses to the nebulous dependent variable, these comparisons between variables are more illuminating than statistical interpretations. The coefficient on regional mean income is appreciable and well-determined. A rise in other peoples' incomes of \$90,000, holding own income constant, abrogates well-being on a par with divorce, firmly supporting relative utility theory. The difference between the own income and others' income term is significant at 0.01 (t=8.2).³⁴ Accordingly, the hypothesis that increasing everyone's incomes equally has no effect on happiness can be rejected, although the effect of doing so is much smaller than when relative concerns are omitted.

Table 2 assuages the mismatch between nominal and real incomes, showing that deflating the income variables by regional CPI numbers has little effect on results.³⁵

Table 2	Unadjusted	CPI Adjusted
Ln(Real Region Mean Family Income)	-0.134 (-4.1)	-0.134 (-4.0)
Ln(Real Family Income)	0.174 (9.5)	0.173 (9.5)
cut1	-2.827	-2.809
cut2	0.300	0.315

Thus, convincing evidence shows individual happiness is damaged by the increased incomes of others' within a large implicit frame of reference.

IV.2B WHO TO ENVY? – COMPARISONS WITHIN THE INCOME DISTRIBUTION

Is it simply other peoples' incomes that matter or is their identity important? This set of tests questions if people compare within their own groups within the income distribution. Although the conclusions are suggestive owing to high standard errors, Black happiness appears to depend more strongly on income relative to the overall mean than the black mean, with the difference between the first two specifications in Table 3 significant at 0.05

³³ This is based on an unreported OLS version of column 1 of table 1 which uses a linear functional form for the family income variables
³⁴ T-tests throughout this study are performed on both ordered logits and OLS equivalents, providing similar results
³⁵ The minimal changes are partly owing to the fact that year and region dummies adopted much of the onus of deflating previously

(allowing for the difference in means). When both comparison levels are included as controls, only income relative to overall mean is determined in the expected direction.

Table 3: Black subsample	1	2	3	4	5
Ln(Family Income)	0.092 (2.0)	0.096 (2.1)	0.093 (2.1)		
Family Income/Regional Black Mean		0.088 (1.6)	-0.766 (-1.4)		
Family Income/Overall Mean	0.142 (1.8)*		1.261 (1.7)*		0.172 (2.1)
Family Income (USD thousands)				0.010 (3.6)	0.005 (1.5)
cut1, cut2	-0.482, 2.321	-0.457, 2.347	-0.481, 2.323	-1.15, 1.62	-1.15, 1.65
Pseudo-R ²	0.04	0.04	0.04	0.04	0.04

*significant at 10%. n=4597. Controls are the same as in the baseline regression except health/black dummy variable(s) dropped as non-response rate attenuates sample size increasing SEs beyond scope of meaningful analysis. An unreported regression showed a small impact on coefficients. The literature does not suggest that health variables are essential controls in a study of this nature. Pure comparison incomes entered with a negative but poorly-determined coefficient, so relative income measures used. Included observations are where race of case is Black, census average income data is when householder is Black but Black out-race marriage low over this period.

4 & 5 confirm that relative income is not proxying for own income owing to incorrect functional form in the latter.

Evaluating female comparisons necessitates harnessing personal income data. Notwithstanding possible conceptual differences (see Appendix F), there is no evidence that women restrict their income comparisons. The comparison levels are predicted earnings based on age and education from a Mincer earnings equation. Women react more to the fitted values from the overall distribution (Mincer Fitted), what a person of similar age/education can expect to earn, than fitted values from the female distribution (Female Fitted) representing what a similar female can expect to earn.³⁶

Table 4: Female Subsample	1	2	3	4
Own Income (USD thousands)	0.004 (2.6)	0.004 (2.5)	0.004 (2.4)	0.004 (2.6)
Mincer Fitted (USD Thousands)	-0.017 (-2.1)		-0.076 (-2.0)	
Female Fitted (USD Thousands)		-0.016 (-1.8)*	0.074 (1.6)	
Male Fitted (USD Thousands)				-0.014 (2.3)

*significant at 10%. n=9120. Controls same as in baseline regression bar work status restrictions to exclude casual workers

The effect of education on comparison groups was evaluated by a comparison income level that assigned graduates mean regional graduate earnings and non-graduates conversely. The measure offered less explanatory power than the indiscriminate comparison.³⁷

³⁶ An alternative test was also undertaken, comparing fitted values from a simple Mincer equation with additive and interactive gender dummy variables thus including gender in the implicit comparison level with the basic *Mincer Fitted* comparison level. No statistically significant differences were found even at the 10% level.

³⁷ It could be said that the combined measure may be contaminated by information effects but unless this effect is very large, there is little sign that the measure will outperform the indiscriminate comparison. An unreported test was also carried such as in Table 3.

Combined Measure	Log(Mean Regional Income)	T-stat on difference
-0.107 (-4.3)	-0.134 (-4.1)	7.8

Unreported regressions, using both methods above, showed the young were concerned about the earnings of older people and vice versa. The increasing prosperity of others, black or white, young or old, appears to make people feel left behind, contradicting Runciman's theory that people form feasible comparison groups.

If only money and not identity matters, do people envy the relatively rich more than the relatively poor? There is some evidence that, for people in the middle of the distribution, happiness is damaged by increasing incomes in the quintile above them and relatively insensitive to the status of the quintile below. The idea that people seek to climb upwards in the income distribution further contravenes Runciman's restraint in comparison.

Table 5: Upwards or Downwards	1	2	3	4♦ - IV (2SLS)
Log(Family Income)	0.178 (3.23)	0.348 (3.6)	0.183 (1.7)	0.733 (9.5)
Log(Mean Income in Quintile Above Own)		-0.234 (-2.2)*	-0.471 (-3.9)	-0.725 (-9.0)
Log(Mean Income in Quintile Below Own)	0.089 (1.7)*		0.347 (4.2)	
Sample (Quintiles Included, n)	2-5, 27271	2-3, 15296	2-3, 15296	2-3, 15296

♦ Column 4 re-estimates specification 2 using predicted family income by age and education as an instrument for family income. *t-test on equality of coefficients = 3.7 → Reject. The fourth quintile is excluded for reasons of data integrity (see footnote). Health variables excluded to maximise sample size.

However, while column 4 checks that neighbouring income quintile is not proxying for incorrectly-measured own income, the sample sizes and standard errors preclude firm inferences.³⁸

IV.2C WHO'S ENVIOUS? – EXAMINING SUBGROUPS

These upward comparisons do not violate Duesenberry's hypothesis that comparisons are more important to the poor than the rich. However, Table 6 which splits the distribution into two subsamples of above-median and below-median earners reveals, on the contrary, noticeably higher coefficients in the richer subsample with a \$100,000 independent increase in mean income required to damage the poorer as much as a \$75,000 increase harms the richer.³⁹ Moreover, symmetric relative income effects can not be rejected. This may be reconciled with the earlier findings of upward comparisons by suggesting that the rich are as concerned about maintaining their

³⁸ Allocation to quintile was performed by matching family income data within the boundaries of the quintile limit points calculated from Census data by region, on the assumption of similar inequality levels within regions, illustrated by state Gini coefficients. Allocation between the fourth and fifth quintile was particularly sensitive to the choice of mid-point for the top income category and was excluded from the regressions, partly owing to the large impact on regressions that contained Log(Mean in Quintile Above Own) stemming from the high skewness of the income distribution bolstering comparison incomes in the top quintiles.

³⁹ These point interpretations were made using an OLS version of the reported equation with linear function terms on income variables

relative opulence as the middle classes are about improving their relative position. Column 1 of Table 5 vaguely implies that the comparisons of the rich are more sideways than downwards but unfortunately no test is possible with the dataset. Thus no evidence for progressive taxation is offered.

Table 6: Symmetry	Below Median	Above Median	Equal Coefficients?	Quintiles 4&5
Log(Regional Mean)	-0.140 (-3.5)	-0.190 (-6.7)	Don't Reject (t=1.1)	
Log(Family Income)	0.162 (6.9)	0.253 (16.2)	Reject (t=4.2)	0.151 (2.9)
Family Income/Mean				0.177 (6.2)

n=34821 (19075, 15746), health variables excluded to increase sample size, census median income data used

Comparing subsamples of other subgroups underlines the striking universality of income comparisons.

Table 7: Subgroup comparisons	Coefficients on Log(Regional Mean)	Equal coefficients?
Males and Females similarly envious	-0.183 (-4.2), -0.184 (-4.8)	t=0.01 → Do not reject
Blacks and non-Blacks similarly envious*	0.142 (1.8), 0.167 (6.5)	t=-0.3 → Do not reject
Parents and the childless similarly envious	-0.237 (-6.1), -0.218 (-4.6)	t=0.3 → Do not reject
Educated* and less educated similarly envious	-0.230 (-5.5), -0.212 (-5.7)	t=0.3 → Do not reject
Unmarried people may be more envious	-0.202 (-5.8), -0.119 (-2.5)	t=1.4 → Do not reject
Size of settlement of residence unimportant♦	-.19 (-3.8), -.19 (-5.7), -.18 (-3.7)	t=0.1 → Do not reject
Supervisory level at work not important**	-0.198 (-4.5), -0.167 (-4.4)	t=0.6 → Do not reject
Over 43s and under 43s similarly envious***	-0.234 (-5.3), -0.239 (-5.6)	t=0.1 → Do not reject
Pre- and post-war cohorts similarly envious	-0.215 (-4.3), -0.206 (-6.0)	t=0.2 → Do not reject

*Relative income term used. ♦Educated defined as 13 or more years schooling. ♦Three categories are population>100,000, population<10,000 and population<1,000 respectively. **Respondents were asked, respectively in coefficients column, if they or spouse had a supervisor at work. Health variables excluded to increase sample size. ***This result is sensitive to inclusion of health variables and split-point of age bifurcation with a marginally statistically significant premium on some specifications. 43 is median age.

The only noticeable difference in coefficients is between unmarried and married people, with the latter *perhaps* more likely to compare to intrinsic standards. The strong envy effects of those born before the post-war economic miracle support the notion of contemporary comparisons as crucial to income envy. This universality of comparison casts doubt on Layard's (1980) suggestion of education to change the utility function.

IV.2D RESULTS: INTEGRITY AND EMPIRICAL LIMITATIONS

Can the coefficient on comparison income be interpreted in accordance with relative utility theory? The headline specification effectively says that, controlling for included personal characteristics and own income, people living in a region with high average income in case-year are less happy than those living in a region with a low average

income in case-year. Thus, comparisons across space and time, for instance South 1974 with West 1988, exert two possible threats to the interpretation of the coefficient on comparison income. Firstly, it may be local effects antagonistic to happiness in high income regions that make people unhappy rather than the average income itself. Other than prices, however, prosperous areas are usually associated with better services and environment. US crime data shows the South, with the lowest income, has the highest crime rate.⁴⁰ Additionally, these local effects would have to broadly occur across the vastness of the regions. In the absence of a suitable instrument for regional income uncorrelated with local effects, this is the furthest extent to which these fears can be allayed.

Secondly, the other issue is whether people are less happy in high income region-years since, owing to continuous economic growth, higher income region-years are more likely to be in the “future” of the sample. This is plausible if economic growth is systematically correlated with omitted effects detrimental to happiness such as increased working hours, stress or environmental degradation; other time effects are picked up by year dummies. This is investigated in two ways. Firstly, the sample is split into compressed time spans, which also acts as a test on structural change. Secondly, since many of these correlated detriments are suffered by workers, a subsample of retired people is used. There is no evidence of major temporal issues.

Table 8	Retired	1975-1980	1982-1986	1987-92	1993-1998	1999-2004
Ln(Fam. Income)	0.263 (5.9)	0.282 (7.4)	0.258 (7.6)	0.281 (8.0)	0.250 (8.3)	0.228 (5.7)
Ln(Reg. Mean)	-0.33 (-2.8)	-0.155 (-2.6)	-0.209 (-3.4)	-0.269 (-4.3)	-0.152 (-2.8)	-0.263 (-3.5)

Health variables excluded to maximize sample size.

The third alternative explanation why happier people are found in lower income areas is because people of a happy disposition choose to live in poorer regions. The empirical risk is heightened by absence of individual fixed effects. It is worth noting, however, that an unreported regression excluding the mere fifth of the sample who live in a different region from at age sixteen exhibits minimal differences with the headline results. Although this is not conclusive as the remaining four-fifths also self-selected by electing not to move, the findings match those of panel data studies which hold time-invariant individual fixed effects constant.⁴¹

⁴⁰ US crime data by census region at <http://services.alphaworks.ibm.com/manyeyes/data/Sk1zvEsOtha6D6-wXdA-F2->

⁴¹ See for instance Luttmer (2005) and Ferrer-i-Carbonell (2005) which include time-invariant individual fixed effects

Moving to the reliability of the key variables, happiness certainly means different things to different people but, unless these differences are not randomly assigned, this measurement error in the dependent variable is swept into the error term. Generational differences may pose a threat, particularly as older generations are more likely to reside in poorer case-years. Adding dummies by birth decade, to absorb changes in definition and values, has minimal impact. Only the earliest two dummies, covering pre-1920 birth, are significant at 0.1 offering no evidence of changing generational definitions beyond a process spanning centuries.

Table 9: Cohort effects (OLS)	Headline OLS	Cohort Effects*
Ln(Region Mean Family Income)	-0.040 (-4.2)	-0.045 (-4.8)
Ln(Family Income)	0.050 (9.6)	0.052 (9.9)
1970s Birth		-0.002 (-0.0)
1960s Birth		0.025 (0.4)
1950s Birth		0.004 (0.1)
1940s Birth		0.015 (0.2)
1930s Birth		0.087 (1.1)
1920s Birth		0.124 (1.4)
1910s Birth	*Base category is 1980s birth.	0.191 (1.9)
Born Pre-1910		0.254 (2.3)

The family income data is prone to measurement error. Comparing the distribution with census data suggests error is most prevalent in the top two quintiles where the categories are extremely wide.⁴² Again, the results are untarnished by running on the lower three quintiles.

Table 10	Log(Family Income)	Log(Mean Regional Income)
Qunitiles 1-3	0.182 (8.6)	-0.149 (-4.2)

Health scores excluded to maximise sample size, n=22899

It may also be argued that the use of natural log of family income variables, as commonly used in economics, is not appropriate to this specification.⁴³ This issue is examined in Appendix C. Appendix F uses personal income.

Another concern relating to the income variables is the merger of GSS own family income data with Census average family income data. This requires that the concept of family income in both surveys match. Indeed, they both use identical definitions, although the GSS question is rather cursory compared to Census methods.

⁴² This comparison was executed by dividing GSS income data for the entire sample into quintiles and comparing mean and limit points for each quintile with US population mean and limit points provided by census data

⁴³ It may further be argued that using per household member income measures is inappropriate but this certainly segues with interdependence of consumption theories as the consumption possibilities of income are shared according to family size. Intuitively, it seems reasonable that a high family income and large family *may* confer less status than a slightly lower family income and small family

The census (using Current Population Survey) *“asks a series of questions about more than 50 sources of income, including questions about the amount of several noncash benefits such as food stamps and employment-related health insurance, during the previous calendar year.”* (US Census Bureau, www.census.gov (2006))

GSS Question: *“In which of these groups did your total family income, from all sources, fall last year before taxes, that is?”* (General Social Survey, ICSPR (2006))

Appendix D shows that using average incomes calculated as the mean of the GSS responses of all respondents in the region and year of the case as the comparison level offers similar conclusions.⁴⁴

A strategy criticism relates to the comparison of reference groups in IV.2B. Since the income of all reference groups are highly correlated by the thread of the US economy, including one comparison level without another allows the included level to proxy for the omitted level, while including both as controls invites high standard errors, if not multicollinearity owing to the large sample size. Information effects may contaminate the coefficient on similar demographic subgroups or information failures may preclude people assessing income within their sub-group, although channels such as the media and job advertisements exist. Unfortunately, no superior estimation strategy is known within the boundaries of the data and these conclusions are suggestive only.

Finally, an important theoretical criticism is that both happiness and actual utility from income can be thought of as the discounted values of lifetime happiness and income. Thus, in the cross-section with only current income included, high relative income may act as an indicator of future income prospects including job security - rather than higher incomes of others exerting an inherent negative external effect - as those earning more than average are likely to have scarce skills.⁴⁵ This concern can not be fully annexed but, as well as this being a form of ranking effect, Table 7 shows the importance of comparisons to the old. In summary, while the limits of the empirical specification preclude wholly unequivocal conclusions, a strong association between individual happiness and comparison income dovetails firmly with the relative utility theories described in Section II.1. ♣

⁴⁴ This also has the advantage of partly “internalising” possible inaccurate coding of top categories

⁴⁵ The difference here with Senik’s information effects is that there average income acts as information on the entire economy. High average income means own income will soon increase. The argument here is that the movement of average income away from own income is an indicator of worse intrinsic earnings potential.

V CONCLUSIONS AND EXTENSIONS

This study convincingly demonstrates that an individual's happiness is reduced by rising average incomes of others in their large region, with populations of up to 100m. Furthermore, there is considerable suggestive evidence of few restraints on the subjects of this "income envy." The sharpest reaction of happiness appears to be to this overall average, to which all persons contribute, rather than to any restrained comparison groups whether by race, gender, age or education. Secondly, this reaction is observed within all demographic subgroups: rich or poor, black or white, parents or childless. These conclusions add a picture of the pervasiveness of income envy to complementary works such as Luttmer (2005) and Blanchflower and Oswald (2000) which find a significant reaction of happiness to average income in smaller areas.

The empirical additions of this study, including directly addressing the anomaly between real income in the utility function and nominal income in previous empirical specifications and using cohort dummies to investigate changes in definition of happiness, add further momentum to this strand of literature. Of course, empirical boundaries preclude conclusive inferences regarding the mechanisms through which relative income concerns operate, although the finding of symmetry across rich and poor suggests "relative deprivation" may not be a sufficient explanation of relative income effects (see Section II.1 for details).

Instead, the study can be seen as a starting point. The immutability of the negative externality in individual income and large implicit frame of reference employed is strongly associated with policy implications on a national or, at least, supra-local level. Thus, completing the bridge between theory and policy implications appears an important target for future literature. The potential welfare gains are impressive. Where income inequality is seen as normatively unfair, relative income concerns widen the chasm between rich and poor with the latter suffering both absolute and relative deprivation. (This may partly explain some of the gulf in happiness with the rest of society incurred by disadvantaged groups such as Blacks⁴⁶). There may be an allocational case for progressive taxation if the weakly-determined findings of upward comparisons in part of the distribution are

⁴⁶ M. Hughes and M.E. Thomas, "The Continuing Significance of Race: A Study of Race, Class and Quality of Life in America 1972-1985," (1986) find a large unexplained gap in happiness of blacks and whites, also using GSS data, that they term a "racial tax."

extended in further work. Wide comparisons also suggest, as explained in Section II, that the benefits of growth are overstated and income tax policies are seen as distortionary when these relative effects are not taken into account. Further work on optimal tax and growth policies in the presence of these effects, such as Layard (1980) and Ng (1987), is encouraged.

This study has looked only at the cross-sectional effects of comparison income. While the findings permeate all generations, there is clear evidence and theoretical appeal (see Stutzer 2004) that aspirations depend also on internal norms and previous consumption experiences. A longitudinal study looking at how people's aspirations adapt over a period of time spanning several years would make an invaluable contribution to the literature and may be able to cover interactions between relative effects. Does living with low relative income increase the importance of absolute income? Are aspirations dependent on the rate of economic growth? How do *changes* in relative income or rank affect people? The effect of moving comparison group may also be studied. To facilitate this, further work is required to resolve data issues that exist at the penumbra between economic and psychology. The GSS is a dataset with social and economic questions, yet the non-continuous nature of its income variables hamper the efficiency of some economic specifications based around it.

In 500BC, the ancient Greek playwright Aeschylus wrote "few men have the natural strength to honour a friend's success without envy."⁴⁷ This study offers empirical evidence to support the idea of income envy that has been a part of human culture since time immemorial, demonstrating that people react unfavourably to the economic success of others' within a wide frame of reference, whether friend or any other identity. It seems the writer of the Ten Commandments had little success in ordering people to carry no jealousy for their neighbours' possessions. If income envy is such an immovable pillar of human preferences, policy-makers would be advised to adjust policies on growth, tax and distribution accordingly. ♣

⁴⁷ ESRC Society, "Debt: Envy, Penury or Necessity?" (2004).

REFERENCES

Data Sources:

J.A. Davis, T.W. Smith and P.V. Marsden, "*General Social Surveys, 1972-2004*," Computer File: Stata Format, ICPSR04295-v2, Chicago, IL: National Opinion Research Center [producer], 2005. Storrs, CT: Roper Center for Public Opinion Research, University of Connecticut/Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributors], (2006)

"National Opinion Research Center national probability sample. For the 2004 survey, a new sample frame based on the 2000 United States Census was implemented. Block quota sampling was used in 1972-1974 and for half of the 1975 and 1976 surveys. Full probability sampling was employed in 1977, 1978, 1980, 1982-1991, 1993-1994, 1996, 1998, 2000, 2002, 2004, and in half of the 1975 and 1976 surveys. Also, the 2004 survey had subsampled non-respondents." ICSPR website.

US Census Bureau, "*Historical Income Data 1967-2005*," Source: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplements, <<http://www.census.gov/hhes/www/income/histinc/histinctb.html>>, (2005, last revised)

U.S. Bureau of Labor Statistics, "*Consumer Price Index Data 1966-2004*," <<http://www.bls.gov/cpi>> (accessed 17/02/2007)

US crime data by census region at <<http://services.alphaworks.ibm.com/manyeyes/data/Sk1zvEsOtha6D6-wXdA-F2->> (accessed 20/04/2007)

Literary Sources:

A. Alesina, R. Di Tella, and R.J. MacCulloch, "*Inequality and Happiness: Are Europeans and Americans Different?*" *Journal of Public Economics* (2004)

D.G. Blanchflower and A.J. Oswald, "*Well-Being over Time in Britain and the USA*," NBER Working Paper 7487 (2000); also published *Journal of Public Economics* (2004)

ESRC Society, "*Debt: Envy, Penury or Necessity?*" <http://www.esrc.ac.uk/ESRCInfoCentre/about/CI/CP/research_publications/seven_sins/envy/> (2004)

P. Brickman and D. T. Campbell, "*Hedonic Relativism and Planning the Good Society*" in M. H. Apley, "*Adaptation-level Theory: A Symposium*," Academic Press (1971)

A.E. Clark and A.J. Oswald, "*Satisfaction and Comparison Income*" *Journal of Public Economics* (1996)

C. Dougherty, "*Introduction to Econometrics*," Oxford (2002)

J.S. Duesenberry, "*Income, Saving and the Theory of Consumer Behaviour*," Harvard University Press (1949)

R.A. Easterlin, "*Does Economic Growth Improve the Human Lot? Some empirical evidence*" in P.A. David, "*Nations and Households in Economic Growth, Essays in Honour of Moses Abramowitz*," Academic Press (1974)

R.A. Easterlin, "*Will Raising the Incomes of all increase the Happiness of all?*" *Journal of Economic Behavior and Organization* (1995)

- A. Ferrer-i-Carbonell, *"Income and Well-Being: An Empirical Analysis of the Comparison Income Effect,"* Journal of Public Economics (2005)
- R.H. Frank, *"Choosing the Right Pond: Human Behavior and the Quest for Status,"* Oxford University Press (1985a)
- R.H. Frank, *"The Demand for Unobservable and other Non-Positional Goods,"* The American Economic Review (1985b)
- M. Hughes and M.E. Thomas, *"The Continuing Significance of Race: A Study of Race, Class and Quality of Life in America 1972-1985,"* (1986)
- N. Ireland, *"Optimal Tax in the Presence of Status Effects,"* Journal of Public Economics 81 (2001)
- A. Kapteyn, *"A Theory of Preference Formation,"* Leyden University (1977)
- D. Kearns, *"Lyndon Johnson and the American Dream,"* Harper (1976)
- E. Luttmer, *"Neighbours as Negatives,"* Quarterly Journal of Economics (2005)
- R. Layard, *"Human Satisfaction and Public Policy,"* Economic Journal 90 (1980)
- M. McBride, *"Relative-income effects on subjective well-being in the cross-section,"* Journal of Economic Behavior and Organization (2001)
- Ng, Yew-Kwang, *"Relative-Income Effects and the Appropriate Level of Public Expenditure,"* Oxford Economic Papers (1987)
- A.J. Oswald, *"Altruism, Jealousy and the Theory of Optimal Non-Linear Taxation,"* Journal of Public Economics (1983)
- A.J. Oswald, *"What is a Happiness Equation?"* University of Warwick (2006),
<<http://www2.warwick.ac.uk/fac/soc/economics/staff/faculty/oswald/happinessformula06.pdf>>
- W.G. Runciman, *"Relative Deprivation and Social Justice,"* Routledge (1966)
- C. Senik, *"When Information Dominates Comparison: a panel data analysis using Russian Subjective data,"* Journal of Public Economics (2004a)
- C. Senik, *"Relativizing Relative Income,"* University Paris-Sorbonne Working Paper (2004b)
- A. Stutzer, *"The Role of Income Aspirations in Individual Happiness,"* Journal of Economic Behavior and Organization (2004)
- T. Veblen, *"The Limitations of Marginal Utility,"* Journal of Political Economy (1909)
- T. Veblen, *"The Theory of the Leisure Class,"* Macmillan (1899)
- B.M.S van Praag, A. Kapteyn and F.G. van Herwaarden, *"Individual welfare functions and social preference spaces,"* Economics Letters 1 (1978)
- H. van de Stadt, A. Kapteyn and S. van de Geer, *"The Relativity of Utility: Evidence from Panel Data,"* Review of Economics and Statistics (1985) ♣

APPENDICES

A. Index of Variables

Income Variables

Family Income	Nominal family income of respondent in US dollars using GSS categorical family income variables transformed using mid-points of categories with top-points assigned to open-ended top categories. Per household member measure calculated as family income divided by household size
Ln(Family Income)	Natural log of family income of respondent
Real Family Income	Family income of respondent in real 1982-4 USD. Nominal figure deflated by CPI in large census region and year of respondent. Calculated as $(\text{Family Income}/\text{CPI}) * 100$.
Ln(Real Family Income)	Natural log of real family income
Predicted Family Income	A predicted measure of nominal family income in USD based on education and age of respondent using GSS and Census data
Own Income	Nominal personal income of respondent using GSS categorical personal income variables transformed using mid-points of categories with top-points for open-ended top categories
<u>Comparison Income Variables</u>	
Region Mean Family Income	Average nominal family income in USD in large census region and year of respondent, allocated from census historical income data. Per household member measure calculated by dividing regional average by household size of respondent
Ln(Region Mean Family Income)	Natural log of regional mean family income
Real Region Mean Family Income	Region mean family income in real terms, deflated by CPI of region in case-year. Calculated as $(\text{Region Mean}/\text{CPI}) * 100$
Family Income/Region Mean	Relative income term. Family income (per household member) as a proportion of regional mean family income (per household member), calculated by dividing the former by the latter. This variable is named 'Family Income/Overall Mean' in Table 3.
Regional Black Family Income	Average nominal family income (in USD) of households with a Black householder in large census region and year of respondent, allocated from census historical income data. Per household member measure calculated as above
Family Income/Regional Black Mean	Relative income term, as above, for Black respondents only
Mean Income in Quintile Above Own	Average nominal family income (USD) in the income quintile above the income quintile in which the respondent's family income resided, allocated using quintile limits points and means from census historical income data
Log(Mean Income in Quintile Above Own)	Natural log of mean family income in quintile above own
Mean Income in Quintile Below Own	Average family income in the income quintile below the income

	quintile in which the respondent's family income resided, allocated using quintile limits points and means from census historical income data
Log(Mean Income in Quintile Below Own) Mincer Fitted (USD Thousands)	Natural log of mean family income in quintile below own Predicted value of nominal personal income (USD) using a simple Mincer earnings equation with age and education regressors fitted on all cases with a personal income
Female Fitted (USD Thousands)	Predicted value of nominal personal income (USD) using a simple Mincer earnings equation with age and education regressors fitted on all cases with a personal income and female
Male Fitted (USD Thousands)	Predicted value of nominal personal income (USD) using a simple Mincer earnings equation with age and education regressors fitted on all cases with a personal income and male NOTE: All earnings equations included full set of year dummies
<u>Controls and Other Variables</u>	
Age	Age of respondent in completed years
Black	Dummy variable: 1 if black, 0 if race other than black
CPI	Consumer Price Index in large census region and year of respondent allocated from Bureau of Labour Services data
Children	Number of children of respondent. Values of "more than eight" were assigned ten
Cohort Variables	Set of categorical dummy variables, assigns respondents to mutually exclusive cohorts according to the decade of their birth calculated as age subtracted from year surveyed
1980s Birth	
1970s Birth	
1960s Birth	
1950s Birth	
1940s Birth	
1930s Birth	
1920s Birth	
1910s Birth	
Born Pre-1910	
Education	Years of education completed by respondent
Female	Dummy variable: 1 if female, 0 if male
Marriage Variables	Set of categorical dummy variables, assigns respondents to mutually exclusive marital status categories
Married	
Widowed	
Divorced	
Separated	
Never Married	
Health Status Variables	Set of categorical dummy variables, assigns respondents to mutually exclusive self-reported health categories
Good Health	
Fair Health	
Excellent Health	
Poor Health	
Household Size	Number of people in respondent's household
Region	Census region division of respondent. There are nine such regions shown by subtle shading in figure 4: New England,

<p>Large Region</p> <p>Large Region at age 16</p> <p>Settlement Size</p> <p>Work Status Variables</p> <p>Working Full-time</p> <p>Working Part-time</p> <p>Temp Not Working</p> <p>Unemployed/ Laid Off</p> <p>Retired</p> <p>Student</p> <p>Keeping House</p> <p>Other Work Status</p> <p>Year</p>	<p>Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, Pacific</p> <p>Large census region of respondent, shown by major shading in figure 4. There are four such regions: North East, Mid West, South, West. Since the nine divisions are subsets of the larger regions, this variable transformed from 'region.'</p> <p>Large census region of residence at age 16, with the added category of abroad.</p> <p>Size of settlement in which respondent resides</p> <p>Set of categorical dummy variables, assigns respondents to mutually exclusive work status categories (respondent must select their primary current work status)</p> <p>Year in which respondent was surveyed. Survey years included in the dataset used are 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1980, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1993, 1994, 1996, 1998, 2000, 2004</p>
--	--

B. Some Detailed Descriptive Statistics

Dependent Variable: Happiness

Treating happiness as cardinal, very happy=3, pretty happy=2, not so happy=1, facilitates a picture of the mean and variance of happiness over time:

Year	Number	Number Surveyed	Response Rate (%)	Mean	Standard Deviation
1972	1606	1613	99.6	2.14	0.67
1973	1500	1504	99.7	2.23	0.66
1974	1480	1484	99.7	2.25	0.67
1975	1485	1490	99.7	2.20	0.65
1976	1499	1499	100.0	2.22	0.65
1977	1527	1530	99.8	2.23	0.64
1978	1517	1532	99.0	2.25	0.61
1980	1462	1468	99.6	2.21	0.66
1982	1855	1860	99.7	2.16	0.65
1983	1573	1599	98.4	2.18	0.64
1984	1445	1473	98.1	2.22	0.66
1985	1530	1534	99.7	2.17	0.61
1986	1449	1470	98.6	2.21	0.63

1987	1780	1819	97.9	2.16	0.63
1988	1466	1481	99.0	2.25	0.61
1989	1526	1537	99.3	2.23	0.61
1990	1361	1372	99.2	2.24	0.60
1991	1504	1517	99.1	2.20	0.62
1993	1601	1606	99.7	2.20	0.62
1994	2977	2992	99.5	2.17	0.62
1996	2885	2904	99.3	2.18	0.63
1998	2806	2832	99.1	2.20	0.63
2000	2777	2817	98.6	2.21	0.61
2002	1369	2765	49.5	2.18	0.63
2004	1337	2812	47.5	2.18	0.65
Total	43317	46510	93.1	2.20	0.63

The happiness variable displays a healthy variable for each year in the sample and a near-universal response rate. The exception to the latter is the 2002 and 2004 surveys, when a “competing” happiness question was asked. Table 8 shows the results hold when these years are excluded from the sample, while there is no reason to suspect anything other than random selection in these years.

Main independent variable 1: Family Income

Year	Number	Total Surveyed	Response Rate (%)	Mean	Standard Deviation
1972	1474	1613	91.4	10586	8004
1973	1396	1504	92.8	12094	8904
1974	1357	1484	91.4	12944	9525
1975	1407	1490	94.4	13097	9685
1976	1394	1499	93.0	13725	10125
1977	1398	1530	91.4	16754	14067
1978	1432	1532	93.5	16655	13701
1980	1358	1468	92.5	20420	16429
1982	1679	1860	90.3	20379	17109
1983	1453	1599	90.9	24841	20100
1984	1342	1473	91.1	24908	19628
1985	1419	1534	92.5	26686	21057
1986	1346	1470	91.6	27253	22403
1987	1665	1819	91.5	28089	23212
1988	1357	1481	91.6	29531	23699
1989	1380	1537	89.8	32788	25477
1990	1229	1372	89.6	34129	26540
1991	1368	1517	90.2	32467	26698
1993	1467	1606	91.3	38444	31474
1994	2636	2992	88.1	38882	30475
1996	2561	2904	88.2	41782	32350

1998	2503	2832	88.4	44177	37992
2000	2456	2817	87.2	46630	40852
2002	2463	2765	89.1	51502	44344
2004	2482	2812	88.3	57068	47400
All	42022	46510	90.4	31384	31361

Again, despite the categorical status of the source variable, the family income variable (transformed using mid points) has a consistently high variance. A high response rate of around 90% is noticed throughout the surveys. Most (4098) of the 4488 cases without responses to family income respond to the happiness question, answering with a mean of 2.20 and SD of 0.66, a distribution very similar to the overall distribution. Thus, there is no reason to suspect that participation/response rates to this question has any selection impact on the headline specification.

Main independent variable 2: Regional Family Income

This variable is described in Figure 4, Section IV.2

Controls and Other Variables

- Selected Continuous Variables**

Variable	Number	Mean	Median	SD	Min	Max
<i>Age</i>	46344	45.26	42	17.5	18	89
<i>CPI (1982-4=100)</i>	46510	119.26	121.50	45.48	40.7	200.2
<i>Children</i>	46351	1.96	2	1.81	0	N/A
<i>Education (Years)</i>	46369	12.61	12	3.17	0	20
<i>Real Family Income</i>	42022	26074	20868	21197	250	125000
<i>Real Mean Regional Family Income</i>	41909	28919	28601	2834	23756	34581
<i>Real Personal Income</i>	27163	17979	14217	16196	250	125208
<i>Settlement Size</i>	46510	387730	23000	1.2m	N/A	8m
<i>Household Size</i>	46504	2.73	2	1.54	1	16

- Selected Dummy Variables**

Variable	Number	Description
<i>Race</i>	46510	82.7% white, 13.8% Black, 3.5% Other
<i>Marital Status</i>	46502	55.5% married, 10.0% widowed, 11.6% divorced, 3.5% separated, 19.3% never married
<i>Work Status</i>	46506	49.6% full-time employed, 10.2% part-time employed, 2.1% temporarily not working, 3.0% unemployed, 12.8% retired, 3.0% students, 17.7% keeping house, 1.7% other work status
<i>Health Status</i>	34975	31.4% excellent, 44.6% good, 18.4% fair, 5.6% poor
<i>Birth Decade Cohort</i>	46344	0.8% born 1980s, 5.7% born 1970s, 13.5% born 1960s, 21.2% born 1950s, 18.8% born 1940s, 12.5% born 1930s, 11.9% born 1920s, 6.5% born before 1910
<i>Female</i>	46510	56% female, 44% male
<i>Large Region</i>	46510	20.2% live in the North East, 26.5% Mid West, 34.6% South and 18.7% West

All cases have a value for year surveyed

It is clear that all of the control variables, except health which has many missing values, have both significant variance and a near universal response rate, conducive to their inclusion in the Ordered Logit and OLS specifications.

C. Some Statistical Tests

White Test For Heteroskedasticity (no cross terms)

A White test for heteroskedasticity was executed on the headline OLS specification since the family income variable is increasingly graduated and thus, it is reasonable to assume, more accurate for observations later in the sample reducing the error variance in these segments:

Null hypothesis: No heteroskedasticity

F-statistic	7.82	Probability 0.000 → Reject
Obs*R-squared	423.98	Probability 0.000

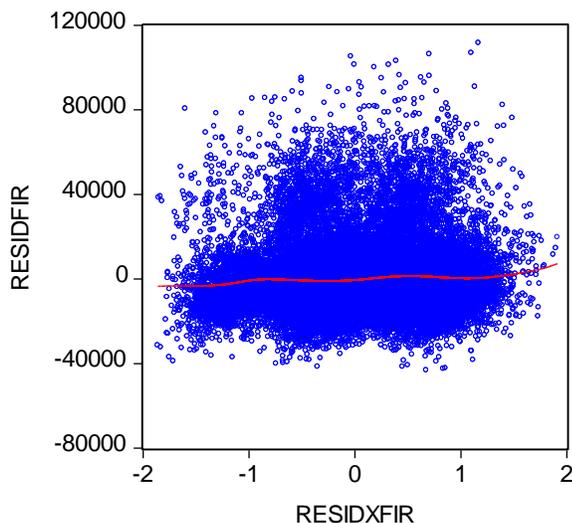
Null hypothesis of no heteroskedasticity rejected. This approves the use of White/Huber heteroskedastic-consistent standard errors are used throughout the paper.

Testing functional form of Income

It is standard economic practice to treat utility from income as a decreasing function in the second differential, that is to say that the incremental gain from additional income shrinks the greater the level of income. Hence, it is common practice to use the natural log of income terms are used in empirical specifications.

Here, a technique proposed by Dougherty (2002) is used to investigate the response of happiness to income. The skeleton specification is happiness on all the controls listed in Table 7 plus inflation-adjusted (according to US CPI in year of case) family income, a coefficient of 2.00E-06 (9.64) is yielded on this term. OLS is used for simplicity.

The next step is to isolate the *independent* effect of happiness on income. First, happiness is regressed on all the explanatory variables in the aforementioned skeleton specification except family income. The residuals are saved as 'resids1.' Second, family income is regressed on all the other explanatory variables in the skeleton specification (happiness is not included in this regression). The residuals are saved as 'resids2.' Plotting 'resids2' against 'resids1' isolates the effect of family income on happiness, holding all other variables constant.



To confirm this, regressing 'resids1' on an intercept and 'resids2' yields exactly the same coefficient, 2.00E-06 (9.64), on 'resids2' as in the skeleton specification. Thus, a visual inspection of the scatterplot should provide some indicators as to an appropriate functional form.

A cursory glance shows only a slight linear relationship. Using linear income specifications do not materially alter the results as seen in a sideline to Table 1. A more important implication perhaps is the need for further

work studying the functional form of the response of happiness to income.

Ramsey RESET test for misspecification

Unsurprisingly a Ramsey RESET test on the OLS version of the headline specification suggests the presence of misspecification. This is not surprising given the limited explanatory power of happiness equations already seen given they myriad, often unobservable, determinants of well-being.

Null hypothesis: no misspecification

F-statistic 463.63 Probability 0.00 → Reject
 Log likelihood ratio 912.83 Probability 0.00

D. Using Average Income Calculated From GSS Data

The headline specification is run with one difference. Comparison income from census data, average family income in region and year of respondent is replaced by comparison income calculated from GSS data, allocated to each case as follows: (per household member values used in regression)

$$Y^* = \frac{\sum \text{Family income of all respondents (except NA) in region and year of case}}{\sum \text{respondents with values present for family income in region and year of case}}$$

This resulted in the following output (income terms only shown):

Table D.2, Ordered Logit	Coeff.	z-Stat
Log(Family Income)	0.176	(10.384)
Log(Mean Income in Region) [GSS]	-0.114	(-3.798)
cut1, cut2	-2.588	0.488
Pseudo-R ²	0.08	

E. Full Results for Headline Specification

The full results from the headline specification (Column 1, Table 1) are presented below:

Dependent Variable: Happiness, Number of ordered indicator values: 3
 Sample (adjusted): 6 46510, Included observations: 25944 after adjustments
 Convergence achieved after 7 iterations, QML (Huber/White) standard errors & covariance

	Coefficient	Std. Error	z-Statistic	P-Value
Age	-0.023033	0.005178	-4.448501	0
Age ²	0.000369	5.36E-05	6.893342	0
Education	0.011461	0.005076	2.257815	0.024
Children	0.002745	0.009531	0.288029	0.7733
Female	0.175135	0.027974	6.260549	0
Black	-0.332772	0.042119	-7.900836	0

Log(Family Income per household member)	0.173831	0.018276	9.511516	0
Log(Regional Mean Family Income p.h.m.)	-0.133645	0.032934	-4.057938	0
Settlement Size	-0.051397	0.011484	-4.475492	0
Widowed	-1.014064	0.059436	-17.06131	0
Divorced	-0.870655	0.043502	-20.01393	0
Separated	-1.026728	0.076334	-13.45043	0
Never Married	-0.618057	0.042001	-14.71517	0
Year=1976	0.096758	0.078198	1.237345	0.216
Year=1977	0.126732	0.078806	1.608145	0.1078
Year=1980	0.032418	0.081646	0.397051	0.6913
Year=1982	0.014528	0.077721	0.186923	0.8517
Year=1984	0.102338	0.084434	1.212048	0.2255
Year=1985	-0.121222	0.079775	-1.519552	0.1286
Year=1987	-0.026962	0.080304	-0.335753	0.7371
Year=1988	0.205282	0.092532	2.218486	0.0265
Year=1989	-0.007309	0.091311	-0.080047	0.9362
Year=1990	0.078147	0.095167	0.821149	0.4116
Year=1991	-0.005723	0.093546	-0.061181	0.9512
Year=1993	-0.035492	0.091467	-0.38803	0.698
Year=1994	-0.14456	0.082754	-1.746853	0.0807
Year=1996	-0.000546	0.082281	-0.006632	0.9947
Year=1998	0.007107	0.082324	0.086328	0.9312
Year=2000	0.086951	0.085046	1.022398	0.3066
Year=2002	0.038262	0.103091	0.371149	0.7105
Year=2004	0.048065	0.106936	0.449479	0.6531
Region=Middle Atlantic	-0.057087	0.065624	-0.869906	0.3844
Region=E. Nor. Central	0.073172	0.062013	1.179949	0.238
Region=W. Nor. Central	0.104017	0.069116	1.50495	0.1323
Region=South Atlantic	0.134256	0.062814	2.137356	0.0326
Region=E. Sou. Central	0.33021	0.073098	4.517376	0
Region=W. Sou. Central	0.165277	0.068883	2.399385	0.0164
Region=Mountain	0.030842	0.074389	0.414607	0.6784
Region=Pacific	-0.028334	0.065054	-0.435549	0.6632
Working Part-Time	-0.077595	0.043257	-1.79382	0.0728
Temp Not Working	-0.130444	0.086839	-1.502139	0.1331
Unemployed, Laid Off	-0.698145	0.082558	-8.456411	0
Retired	0.162701	0.057424	2.833326	0.0046
Student	0.189605	0.08281	2.289648	0.022
Keeping House	0.031913	0.042975	0.742603	0.4577
Other	0.012721	0.122181	0.104114	0.9171
Health=Good	-0.680406	0.029304	-23.21883	0
Health=Fair	-1.286366	0.041654	-30.88233	0
Health=Poor	-1.899576	0.075346	-25.21148	0

Base category: White, Male, 1975, New England, Employed, Excellent Health

Limit Points

cut1:c(50)	-2.82716	0.282718	-9.999925	0
cut2:c(51)	0.296986	0.282032	1.053022	0.2923

Log likelihood: 22470.54	Restr. log likelihood: -24454.93	Avg. log likelihood: -0.86612
LR index (Pseudo R ²): 0.08115	LR statistic (49 df): 3968.786	Probability(LR stat): 0.000

F. Using Personal Income as the Comparison Levels

The following specifications use the controls in Table 1 coupled with the income variables shown below:

Table F	1	2	3	4	5
Personal Income	0.005 (5.9)	0.006 (6.3)	0.005 (5.9)	0.005 (5.9)	0.003 (2.5)
Mincer Fitted		-0.015 (-2.9)			-0.016 (-3.0)
Regional Mean Personal Income			0.021 (0.75)		
Regional Median Personal Income				0.010 (2.3)	
Family Income phm					0.007 (4.4)
Regional Mean Family Income phm					-0.007 (-3.9)
n	18,945	18,945	18,945	18,945	17,699
cut1, cut2	-3.55, -0.29	-2.81, 0.45	-3.37, -0.11	-2.93, 0.32	-2.67, 0.61
Pseudo-R ²	0.08	0.08	0.08	0.08	0.08

Units of income variables are thousands of US dollars; Ordered Logits

The only personal income comparison variable determined in the expected direction is Mincer Fitted, which can be loosely interpreted as the income that a person of similar age and education can expect to earn. One may speculate people compare their personal income to those of similar characteristics rather than everyone around them, but it is beyond the scope of an appendix to investigate whether this is the correct interpretation. ♣