Implications of Happiness Research for Environmental Economics

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1. Introduction

Concept

- Happiness is a measure of an individual's evaluation of her overall quality of life.
- Synomyms: life satisfaction, subjective well-being (SWB)

Relevance of happiness indicators for economics

- Empirical approximation to experienced utility (Kahneman et al. 1997), the utility concept used by the classics: Neo-Utilitarianism ("Back to Bentham")
- The availability of happiness data permits to enrich and test the standard framework of (micro)economics.

Specifically: some untested assumptions of environmental economics

- In their utility evaluation of market goods and environmental goods, people trade off *absolute levels* of the respective goods against each other.
- In deciding on environmentally relevant behavior, people successfully make individually optimal *utility maximizing choices*.
- Upon the presumption of utility maximizing behavior, people's *valuation of environmental goods* is revealed by their choices concerning market goods.

Suggested implications of happiness research

- Results from happiness research suggest modifications to environmental welfare economics.
- Results from happiness research suggest that observed pro-environmental individual behavior may be less than individually optimal.
- Happiness indicators provide a new approach to environmental valuation.

Agenda

- Background: Happiness in economic research
- Happiness and environmental welfare economics
- Happiness and pro-environmental behavior
- Happiness and environmental valuation
- Conclusions

2. Background: Happiness in economic research

Initial paper on economics and happiness

"Does Economic Growth Improve the Human Lot? Some Empirical Evidence" (Easterlin 1973): People in the U.S. did not get happier over time despite huge increases in their incomes ('Easterlin paradox').

Rising interest by economists in happiness

Number of happiness-related articles in *EconLit* journals:

1991-1995: 4

2001-2005: >100

Sources of happiness data

Large-scale surveys (World Values Survey (WVS), Eurobarometer Surveys, General Social Surveys (U.S.), Socio-Economic Panel (Germany))

Typical happiness question (WVS)

- "*All things considered, how satisfied are you with your life as a whole these days?*"
- Scale from 1 to 10
- 1 labeled "dissatisfied", 10 labeled "satisfied"

Technical assumptions

- Ordinal-scale measurability
- Interpersonal ordinal comparability

Socio-economic determinants of happiness: micro-level

- income
- employment status (personal unemployment)

Socio-economic determinants of happiness: macro-level

- macroeconomic conditions (unemployment rate and inflation rate)
- institutional conditions (political freedom, democracy, rule of law)
- public bads (corruption, terrorism, civil war)
- environmental amenities/pollution

3. Happiness and environmental welfare economics

Some findings from the happiness literature

People evaluate consumption relative to benchmarks

- Other people's consumption level (social comparison)
- Individual's own consumption level in the past (habituation)

Implication of social comparison: Other people's consumption yields negative externalities:

$$u_i = U(x_i - \alpha \bar{x}_i, leisure_i), \quad \bar{x}_i = \frac{1}{n-1}\sum_{j \neq i} x_j \quad \alpha \approx 0.3$$

Implication of habituation: An individual's own past consumption yields negative 'internalities'

$$u_{it} = U(x_{it} - \beta\, x_{i,t-1}, leisure_{it}), \quad \beta \approx 0.3$$

Note (Gilbert et al. 1998, Wilson and Gilbert 2003, Loewenstein et al. 2003):

- Relativity (inter-personal and inter-temporal) does not seem to apply to social life, time spent with family, job security, better health care, etc.
- Habituation to consumption levels is largely unforeseen in the individual's decision making (myopia).

Welfare implications (Layard 2005, 2006):

- Consumption-leisure choice not socially optimal
- (Myopic) Consumption-leisure choice not individually optimal

=> income tax = corrective tax

Implications of findings for environmental economics

The standard model: public (environmental) good only (income exogenous)

$$u_i = U(x_i, Q), \quad Q = \sum_j q_j, \quad y_i = x_i + pq_i$$

Individualistic optimum

$$\frac{\partial u_i / \partial q_i}{\partial u_i / \partial x_i} = p \quad \forall i$$

Social optimum

$$\frac{\sum_j \partial u_j / \partial q_i}{\partial u_i / \partial x_i} = p \quad \forall i$$

Extension 1: social comparison

$$u_i = U(x_i - \alpha \bar{x}_i, Q), \quad \bar{x}_i = \frac{1}{n-1}\sum_{j \neq i} x_j, \quad Q = \sum_j q_j, \quad y_i = x_i + pq_i$$

Individualistic optimum

$$\frac{\partial u_i / \partial q_i}{\partial u_i / \partial x_i} = p \quad \forall i$$

Social optimum

$$\frac{\sum_j \partial u_j / \partial q_i}{\partial u_i / \partial x_i - \sum_{j \neq i} \partial u_j / \partial x_i} = p \quad \forall i$$

(where $\sum_{j \neq i} \partial u_j / \partial x_i = (\alpha/(n-1)\sum_{j \neq i} \partial u_j / \partial X_j$).

Extension 2: (unforeseen) habituation to past consumption level

$$u_i = U(x_i - \beta x_{i,-1}, Q) \equiv U((1-\beta)x_i + \beta \Delta x_i, Q), \quad Q = \sum_j q_j, \quad y_i = x_i + pq_i$$

Definition: $s_i = x_i / y_i$

Assumption: s_i = constant (steady state)

$$\Rightarrow \quad x_i = s_i y_i, \quad \Delta x_i = s_i \Delta y_i, \quad q_i = \frac{1-s_i}{p} y_i$$

$$\Rightarrow \quad u_i = U((1-\beta)s_i y_i + \beta s_i \Delta y_i, \sum_j \frac{1-s_j}{p} y_j)$$

=> s_i as choice variable

Myopic behavior: $\beta = 0$ (habituation not anticipated)

	Individualistic optimum	Social optimum
Habituation not anticipated	$\frac{\partial u_i / \partial q_i}{\partial u_i / \partial x_i} = p$	$\frac{\sum_j \partial u_j / \partial q_i}{\partial u_i / \partial x_i} = p$
Habituation anticipated	$\frac{\partial u_i / \partial q_i}{\partial u_i / \partial x_i} = ((1-\beta) + \beta \frac{\Delta y_i}{y_i}) p$	$\frac{\sum_j \partial u_j / \partial q_i}{\partial u_i / \partial x_i} = ((1-\beta) + \beta \frac{\Delta y_i}{y_i}) p$

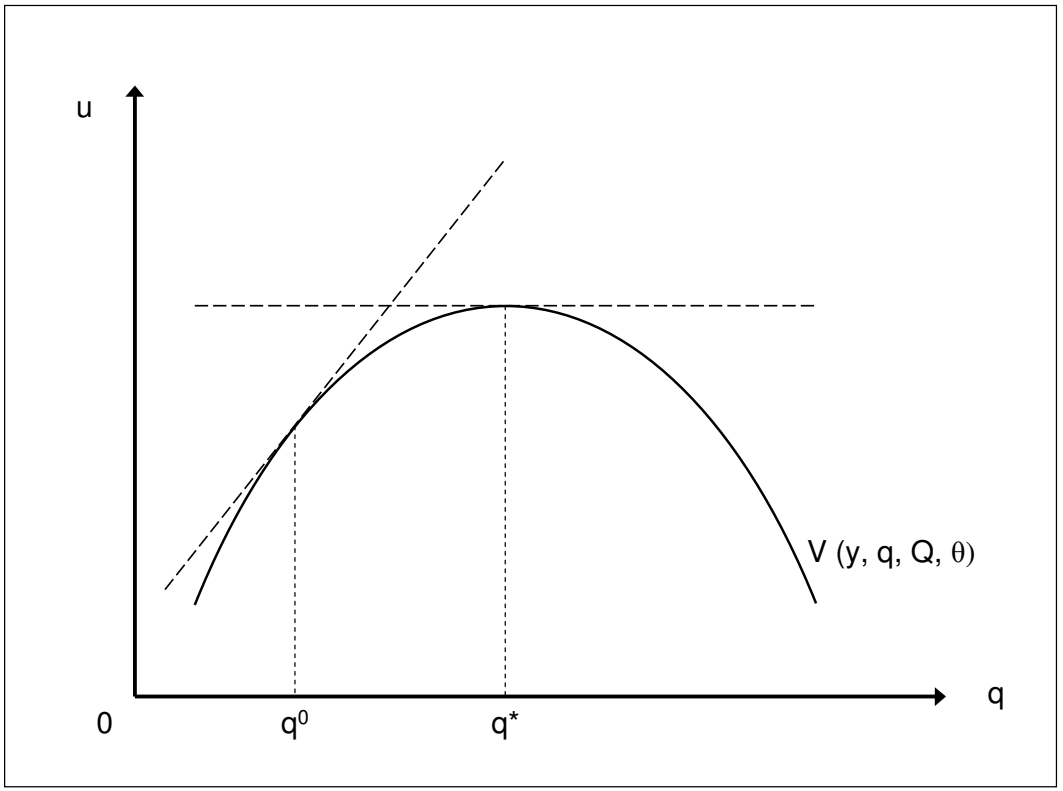
(where $(1-\beta) + \beta(\Delta y_i / y_i) < 1 \Leftrightarrow \Delta y_i / y_i < 1$)

Conclusion: Social comparison and unanticipated habituation imply additional distortions away from optimal environmental quality.

4. Happiness and pro-environmental behavior

Problem: Is people's choice between level and environmental friendliness of consumption individually optimal (Welsch and Kühling 2008)?

Utility function	$u = U(x, q)$, standard properties
Budget constraint	$x = G(q, y), \quad G_q < 0, \quad G_y > 0$
Semi-reduced utility function	$u = U(G(q, y), q) = V(q, y)$
Optimal choice of q	$V_q(q, y) = 0 \Leftrightarrow$
	marginal utility net of marginal cost = 0


u
V (y, q, Q, θ)
q
0
q0
q*

Empirical specification:

$$LifeSatisfaction_{ict} = \alpha \cdot q_{ict} + \beta \cdot \log y_{ict} + \gamma \cdot controls_{ict} + d_c + d_t + \varepsilon_{ict}$$

i = individual, c = country, t = year

α = marginal utility net of marginal cost

Data (WVS, n = 30586)

- Self-reported life satisfaction (scale from 1 to 10)
- Intensity of purchase of environmental friendly goods

Estimation method: ordered probit

Result: α is significantly positive, which refutes optimal consumer choice and suggests that observed environmental friendliness is less than individually rational.

Interpretation: Incomplete information on the benefits and costs of q.

5. Happiness and environmental valuation

Traditional valuation techniques (preference-based):

- Stated preference: hypothetical markets (CVM etc.)
- Crucial assumption: cognitive ability to value hypothetical goods

- Revealed preference: actual markets (housing and labor markets) for complements or substitutes of environmental goods (hedonic pricing model)
- Crucial assumption: no market imperfections

Happiness approach (experience-based):

Using happiness data as proxies for experienced utility, the (indirect) utility function over income and environmental conditions is estimated directly:

$$u_{irt} = F(income_{irt}, amenities_{rt}, controls_{irt}, error_{irt})$$

(i = individual, r = region, t = year)

Note

- F incorporates a purely statistical relationship between environmental quality and happiness, of which the individual need not be aware (e.g. health effects of nuclear radiation) => cognitively less demanding than CVM.
- The vector of controls may comprise housing prices. If environmental amenities are entirely reflected by income and housing prices, $\partial u_{irt} / \partial amenities_{rt} = 0$ => implicit test of hedonic pricing model.

Value of environmental good

Utility-constant marginal trade-off between income and amenities:

$$MRS = \frac{d\,income}{d\,amenities} = \frac{\partial F / \partial\, amenities}{\partial F / \partial\, income}$$

Non-marginal changes in environmental quality:

HEV and *HCV* can be computed from estimated *F*.

Estimation method

To avoid cardinality assumption for happiness scores, *F* is estimated using ordered probit

Applications

- Air pollution (Welsch 2002, 2006, 2007)
- Water pollution (Israel and Levinson 2003)
- Airport noise (van Praag and Baarsma 2005)
- Climate parameters (Rehdanz and Maddison 2005)
- Flood events (Luechinger and Raschky 2006)
- Drought events (Carroll et al. 2008)
- Survey (Welsch and Kühling, JES 2009)

6. Conclusions

- Survey data on happiness are useful because they provide an empirical proxy for utility.
- Direct estimation of the indirect conditional utility function provides a new approach to environmental valuation.
- Findings from happiness research imply that socially optimal environmental quality targets are more ambitious than implied by the standard model.
- Evidence from happiness data suggests that the observed degree of pro-environmental individual behavior is less than individually optimal.