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The Relative Income Hypothesis: A comparison of methods.

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Abstract:

Empirical studies of the relative income hypothesis have found both positive and negative effects of relative income on utility. Differences in data and methods make the results difficult to compare. To facilitate comparisons we explore the problem using a large UK household panel. Our findings highlight the sensitivity of the estimated relative income effect to the definition of the reference group and to the estimation strategy employed. Given the increasing attention paid to interdependent preferences in the economics literature, and the implications for problems such as the measurement of societal welfare, our findings are of interest for both the theoretical and empirical study of the relative income hypothesis.

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Key Words: relative income, reference group, subjective well-being.

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1. Introduction and Background

The relative income hypothesis was proposed by Duesenberry (1949) to explain savings behaviour in the US. The hypothesis, which states that individual utility depends both on own income and on income relative to that of others, did not attract a lot of empirical attention until two separate later developments. Firstly, Kahneman and Tversky (1979) provided a theoretical justification for the importance of comparison effects by explaining that changes from a reference point mattered for decisions, not absolute states of wealth. One possible reference point was the income of a comparison group of 'others'. Secondly, the rise of 'happiness economics' began to persuade economists that self-reported measures of well-being could be used as reliable proxies for individual utility (see for example Clark and Oswald, 1994)[1].

There are numerous studies of the relative income effect but, while own income is generally found to have a positive effect on utility, there is no consensus as to the sign on relative income. Theoretical arguments can be made for both a negative sign via 'comparison effects', and a positive sign via 'information effects' (Senik, 2004). Given the importance of the relative income hypothesis, for example in understanding societal welfare or as a potential explanation for the Easterlin paradox (Easterlin, 1974), it is a serious shortcoming that the empirical literature raises more questions than answers. In an effort to highlight some of these issues we use data from a UK household longitudinal data set to test the relative income hypothesis in a number of ways.

The basic model is:

$$U_{it} = \alpha + \beta y_{it} + \gamma y_{it}^{r} + \sum_{k} \theta_k x_{k,it} + \varepsilon_{it}$$

i subscripts the individual and *t*, time. *U* is a proxy for utility, such as self-reported happiness or life satisfaction. *y* is own income, y^r is relative income (the income of the reference group), *x* is a set of *k* conditioning variables and ε is the error term. Hence the main parameter of interest is γ.

Partly the lack of consensus on the sign of γ arises because it is difficult to make comparisons across the empirical literature due to differences in data, definitions, model specification and estimation methods. Firstly, data for many different countries have been used, with different average income levels, as well as both cross section and longitudinal data. Secondly, estimation methods depend on the type of data and form of the utility proxy; specifically some studies control for individual unobserved heterogeneity and some do not, and studies vary in the way they deal with the ordinal nature of many of the dependent variables. Thirdly, different ways of defining the reference group; sometimes this is defined on the basis of individual characteristics ('people like you') and sometimes it is defined spatially ('people

[1] It is worth noting here that while the subjective well-being literature is our focus in this paper, alternative approaches to studying reference group effects do exist. For example Card *et al.* (2012) utilise a field experiment on knowledge of colleagues pay, and Brown *et al.* (2008) carry out a laboratory experiment with students on future hypothetical wage distributions.

near you'). These methods can also be combined in various ways so that the comparison group is local people with similar characteristics, who might be work colleagues, old school friends, relatives etc[2]. Finally, different proxies for individual utility are used.

Table 1 summarises key papers from the empirical literature, describing the data, utility proxy, method for defining the reference group and estimation method. This table clearly illustrates the lack of agreement on the direction of the relative income effect.

2. Empirical Analysis

We analyse the first three waves of *Understanding Society*, the UK household longitudinal study, covering 2009 to 2013 (University of Essex, 2012). We use data for all adults, yielding an unbalanced panel of 40,335 individuals (99,430 individual/wave observations). The average age is 48 years and 56% are female. We specify two utility proxies (U), which have been analysed in the existing literature, overall life satisfaction and the General Health Questionnaire (GHQ). Overall life satisfaction is based on the question, *"Please tick the number which you feel best describes how dissatisfied or satisfied you are with your life overall".* This is measured on a 7 point scale, where 1 indicates "completely dissatisfied" and 7 "completely satisfied"; the average score is 5.21. The GHQ measure of psychological well-being is constructed by summing the responses to 12 questions and is measured on a 36 point scale. In our data higher values represent better well-being, and the average score is 24.92. Income (y) is based on nominal gross household income in the month prior to the interview; we omit households who report zero income.

We explore two measures of relative income (y^r) replicating methods that have been used in the literature. Firstly, using individual characteristics the reference group is based on age categories (<25, 25-34, 35-44, 45-65, 66>), education (no qualification, other qualification, GCSE or equivalent, A-level or equivalent, degree or higher) and gender. Secondly, the reference group is based on a spatial definition, specifically the average income in 405 local authority districts (LAD) in a particular year.[3]

Table 2 summarises the results for the relative income effect for the two dependent variables and the two reference group definitions. The additional control variables (x_k) are listed in the note to Table 2. To explore the robustness of the results to estimation method we model ordinal life satisfaction in four ways: (1) pooled ordered probit; (2) random effects (RE) ordered probit; (3) RE ordered probit with Mundlak transformation to allow for unobserved time invariant effects; and (4) fixed effects (FE) ordered logit. Similarly, we model the continuous GHQ measure by pooled OLS, as well as model with RE and FE.

[2] Another strand of the literature has also explored whether it is average income of the reference group, or the individual's position in the ranking of incomes that is the driving factor in determining well-being (see for example Card *et al.* 2012; and Brown *et al.* 2008).

[3] Our findings are robust to other spatially defined reference groups including 240 Travel to Work Areas and 12 Government Office Regions.

It is apparent that own income effects are, as expected, positive regardless of the dependent variable and estimation technique. In contrast, both the sign and significance of the relative income effect varies with reference group and estimation technique. For both dependent variables, with the reference group based on individual characteristics, highly statistically significant negative relative income effects are apparent with the exception of the FE estimates, where the effects are insignificant. When the reference group is defined spatially the pattern of results is less pronounced. Although the estimated effects are all positive, statistical significance varies across the estimation methods. In the case of life satisfaction, only the RE ordered probit and FE ordered logit estimates attain statistical significance. In contrast, for the GHQ, the positive relative income effects are strongly significant in the case of pooled and RE estimates. By way of interpretation, own income and income of the reference group is much more closely correlated when the reference group is defined via individual characteristics ($r = 0.419$) than when it is defined spatially ($r = 0.239$). While Senik (2004) has argued that a positive coefficient is evidence of a dominant 'information effect'; it seems equally likely that this coefficient is picking up area wealth effects when a spatially defined reference group is used.

3. Conclusion

To summarise, our findings highlight the sensitivity of the estimated relative income effect to both the definition of the reference group and to the estimation strategy employed. In particular, the way in which unobserved heterogeneity is allowed for, which in turn is constrained by the nature of the utility proxy used and the way the reference group is defined, is of crucial importance to measuring and interpreting the relative income effect. Given the increasing attention paid to the role of comparison income and interdependent preferences in the economics literature, and the implications for a number of key concepts such as the measurement of societal welfare, authors have an obligation to make a convincing theoretical case for their choices and/or to illustrate the empirical robustness of their results. Much more attention should also be paid to exploring how the reference group is constructed, and data such as the Understanding Society 'best friends' module could facilitate this work in the future. Finally, both field and laboratory experiments on reference group effects can be explored as an alternative to the survey based subjective well-being approach.

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Table 1: Studies testing the relative income effect

Study	Data	Utility Proxy (scale)	Reference Group	Estimation Method	Relative Income Effect
Clark and Oswald (1996)	British Household Panel Survey 1991	Overall Job Satisfaction and Pay Satisfaction (1-7)	Individual characteristics (predicted income) and spatial (region, occupation, industry)	Ordered Probit	Negative
McBride (2001)	1994 US General Social Survey (GSS)	Happiness (1-3)	Individual characteristics (age)	Ordered Probit	Negative
Senik (2004)	Russian Longitudinal Monitoring Survey 1994 – 2000	Life Satisfaction (1-5)	Individual characteristics (predicted income) and spatial (region, occupation, industry.	Ordered Probit with and without Mundlak	Positive
Ferrer-i-Carbonell (2005)	German Socio-Economic Panel 1992-1997	Life Satisfaction (0-10)	Individual characteristics (education, age, sex) and spatial (West and East Germany	RE Ordered Probit with Mundlak	Negative
Luttmer (2005)	1987/1988 & 1992/1994 US National Survey of Families & Households, 1990 Census & Current Population Survey	Happiness (1-7)	Spatial (earnings by industry and occupation for Public Use Micro Areas)	OLS with state FE	Negative
Senik (2008) –	European Community Household Panel (ECHP) 14 countries 1994 – 2001, GSS and European Social Survey.	Life, Income and Economic Satisfaction (4 to 9 points).	Individual characteristics (predicted income) and spatial (region, occupation, industry	Linear FE. OLS for cross section data.	Positive in Eastern and Baltic countries. Negative in Western countries.
Clark *et al.* (2009)	ECHP Denmark Sample & Danish administrative data 1994-2001.	Satisfaction with Economic Conditions (1-6)	Spatial (neighbourhood and municipality)	Linear FE	Positive
Mangyo and Park (2011)	China Inequality and Distributive Justice survey, 2004	Self-reported health (1-5). Normalised continuous depression scale.	*Subjective* – groups 'that you compare yourself to'. *Objective* - spatial (Township, County and Province)	OLS with clustered standard errors, with and without geographical FE.	*Objective* - Insignificant for health. Negative for depression. *Subjective* - Positive for health. Negative for depression.

Table 2: Estimation Results, Comparison of Relative Income Effects

Dependent Variable = Life Satisfaction		
Reference Group: Individual Characteristics	Own Income	Relative Income
Pooled Ordered Probit	0.138***	-0.236***
	(0.00579)	(0.0248)
RE Ordered Probit	0.141***	-0.250***
	(0.00805)	(0.0387)
RE Ordered Probit with Mundlak	0.0407***	-0.288***
	(0.0112)	(0.0389)
FE Ordered Logit	0.0954***	0.0403
	(0.0239)	(0.198)
Reference Group: Spatial		
Pooled Ordered Probit	0.135***	0.00551
	(0.00589)	(0.0176)
RE Ordered Probit	0.136***	0.0425*
	(0.00816)	(0.0257)
RE Ordered Probit with Mundlak	0.0409***	0.0164
	(0.0112)	(0.0258)
FE Ordered Logit	0.0906***	0.192**
	(0.0240)	(0.0849)
Dependent Variable = GHQ		
Reference Group: Individual Characteristics	Own Income	Relative Income
Pooled OLS	0.535***	-0.956***
	(0.0288)	(0.123)
RE	0.372***	-0.739***
	(0.0291)	(0.146)
FE	0.133***	-0.481*
	(0.0382)	(0.287)
Reference Group: Spatial		
Pooled OLS	0.503***	0.284***
	(0.0294)	(0.0879)
RE	0.354***	0.248***
	(0.0295)	(0.0943)
FE	0.131***	0.0644
	(0.0383)	(0.135)

Coefficients (standard errors in parentheses). *** p<0.01, ** p<0.05, * p<0.1. Control variables: logarithm of age and age squared, year dummies, highest education level, employment status, logarithm of number of adults and number of children, gender, marital status, country dummies. Mundlak correction includes mean of: number of adults, number of children, monthly income. N = 99,430