The Relative Income and Relative Deprivation Hypotheses

A Review of the Empirical Literature

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Abstract

The paper provides a review of the empirical literature in economics that has attempted to test the *relative income* hypothesis as put forward by Duesenberry (1949) and the *relative deprivation* hypothesis as formalized by Runciman (1966). It is argued that these two hypotheses and the empirical models used to test them are essentially similar and make use of the same relative income concept. The review covers the main intellectual contributions that led to the formulation and tests of these hypotheses, the main formulations of the utility and econometric equations used in empirical studies, the main econometric issues that complicate

tests of the hypotheses, and the empirical results found in the literature. The majority of studies uses absolute and relative income together as explanatory factors in utility models and finds absolute income to have a positive and significant effect on utility (happiness). The majority of studies also finds relative income to be a significant factor in explaining utility but the sign of this relation varies across studies. The source of this variation is complex to detect given that few results are directly comparable across studies because of differences in model specifications.

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The Relative Income and Relative Deprivation Hypotheses

A Review of the Empirical Literature¹

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1. Introduction

The paper provides a review of the empirical literature that has attempted to test the relative income and relative deprivation hypotheses in economics. The relative income and relative deprivation hypotheses are treated as one and the same hypothesis. As discussed in more detail in the next section, in economics the relative income hypothesis as put forward by Duesenberry (1949) in the context of savings and the relative deprivation hypothesis formalized by Runciman (1966) in the context of social status converged empirically into testing the same hypothesis simply stated as follows: *The evaluation of individual utility depends - among other factors - on relative income, one's own income relative to the income of others.*

The empirical literature on the relative income and relative deprivation hypotheses is vast and cuts across the social sciences. To set the boundaries of the review, the paper covers only published papers in economics journals as found in JSTOR and Econpapers by using the search terms “relative income” and “relative deprivation” in titles and keywords. This initial search provided over 200 hits. From this initial set of papers, we kept only papers that used relative income as one of the explanatory factors in the specification of the empirical models, therefore removing titles in specific areas of economics that tested for non-income dimensions of deprivation. A second screening was undertaken using the references in these papers. This left a final core of approximately 50 papers.

The relative income hypothesis as stated by Duesenberry (1949) emerged as one of the core issues in economics for a short period of time after its publication before being replaced by the life-cycle hypothesis put forward by Modigliani and others. The relative deprivation hypothesis stated by Runciman (1969) has been very popular across the social sciences since its publication and started to become popular in economics from the 1980s following an article by Yitzhaki (1979) that attempted to operationalize the relative deprivation hypothesis into a measure of relative deprivation. This literature focused on relative income as a measure of relative deprivation and mainly concerned itself with the measurement of relative deprivation rather than with the test of the relative income hypothesis. It has been only during the past decade and thanks to the popularity of the literature on happiness that the relative deprivation/relative income hypothesis has become mainstream in economics. As a result, tests of the relative income hypothesis have started to appear in high-ranking journals including the *Journal of Economic Literature*, the *Economic Journal* and the *Journal of Public Economics*, bringing to new life the original relative income hypothesis proposed by Duesenberry (1949).

The paper is structured as follows. In the next section, we will review the main intellectual contributions that led to the formulation and tests of the relative income hypothesis. It is shown how this hypothesis has been a catalyst for some of the important theories emerged in economics during the second half of the twentieth century. Section three states the relative income hypothesis in its simplest form. Section four reviews the construction of the empirical models used to test the relative income hypothesis. Section five discusses the econometric problems that typically affect the literature that used these models. Section six summarizes the empirical results related to absolute income and relative income in papers that attempted to test the relative income hypothesis.

2. Economics and the relative income hypothesis

The root of the relative income hypothesis is to be sought at the very roots of economics. It is therefore useful to start our search with one of the very first definitions of utility as given by Bentham: *“By utility is meant that property in any object, whereby it tends to produce benefit, advantage, pleasure, good, or happiness, (all this in the present case comes to the same thing) or (what comes again to the same thing) to prevent the happening of mischief, pain, evil, or unhappiness to the party whose interest is considered”* (p.2, Bentham, 1907). In its original conception, utility was the property that objects have in providing pleasure or preventing displeasure. Maximizing utility was therefore understood as the maximization of collective pleasure or the minimization of collective displeasure, the main societal objective advocated by both Bentham and Mill.

The theory of revealed preferences provided economics with a means to measure utility so that income or consumption could be used to measure utility and the utility maximization problem could be mathematically stated and empirically tested. These developments also helped to clarify one of the most complex and controversial issues in economics, namely the shape of the individual utility function and its aggregation in society. Pigou (1920) advocated utilitarianism as a way to maximize social welfare in a world with identical utilities functions across individuals and decreasing marginal utilities. This implied that, given a societal total income, societal utility could be maximized through the reallocation of income from the richer to the poorer until perfect income equality would be achieved. The paradox of this view was evidently that the maximization of utility could be achieved only with perfect income equality. Others, such as Dalton (1920) and Timbergen (1970), argued instead that, in a real world of differing individual utilities, equal incomes do not necessarily amount to equal utilities so that the optimal level of

inequality may in fact be different from zero. This debate highlighted how different hypotheses about individual utilities could lead to very different optimal solutions for societies. It also introduced the notion of relativity intended as utility functions relative to individual tastes for commodities.

The economics profession had also accepted for long the notion of interdependent utilities, the idea that individual utilities also depend on the utility of others. Both Adam Smith and Karl Marx in different passages noted the importance of relative wealth as opposed to absolute wealth. In *The Wealth of Nations* Adam Smith (1776) wrote that "*By necessities I understand not only the commodities which are indispensably necessary for the support of life, but whatever the custom of the country renders it indecent for creditable people, even of the lowest order, to be without*". Marx (1847) himself wrote that "*A house may be large or small; as long as the neighboring houses are likewise small, it satisfies all social requirement for a residence. But let there arise next to the little house a palace, and the little house shrinks to a hut*". Veblen (1898) noticed that people's consumption is also functional in expressing status and position in society, a concept later developed by Frank (1985) in his theory of positional goods. Here the relativity concept acquires a new dimension. Not only people are different in their own evaluation of commodities but the value function also depends on the commodities of others. This greatly complicates the maximization problem of societal utility as utility becomes a function of both absolute income and relative income or rank.

The formalization of interdependent utilities did not find much traction in economics until Duesenberry (1949) proposed a relative income hypothesis to explain savings behavior in the US. Looking at data between 1869 and 1929, Kuznets (1942) had noticed that aggregate savings did not increase as a proportion of income over time while evidence from cross-sectional budget surveys during the period 1935-1942 showed that the household savings rate increased with income. In an effort to explain the mismatch between income and savings behavior in longitudinal studies, Duesenberry (1949) proposed the so called "relative income hypothesis". His basic intuition was that households are concerned about community consumption standards and that this concern leads to savings rates being an increasing function of a household's position in the income distribution: "*(...) for any given relative income distribution, the percentage of income saved by a family will tend to be unique, invariant, and increasing function of its percentile position in the income distribution.*"(1949, pp.3). Duesenberry also noticed that social comparisons are not symmetric. People tend to discount or ignore downward comparisons while

consider or even over value upward comparisons. This further complicates the assessment of societal utility as the shape of the individual utility function becomes more complex and difficult to detect in empirical studies.

The relative income hypothesis is in contrast with the better known permanent income hypothesis (Modigliani and Brumberg, 1954 and Friedman, 1957) that superseded the relative income hypothesis and eventually became the core teaching in economics. The permanent income hypothesis can explain the cross-section positive relation between income and savings share with transitory deviations from permanent income that in the long-run tend to cancel each other out, which provides an explanation for the lack of correlation between saving rates and incomes in longitudinal studies. The popularity of the permanent income hypothesis eventually marginalized the relative income hypothesis for decades witnessed the fact that, the Duesenberry hypothesis has only seldom been tested empirically.

At the same time that Duesenberry was putting forward his relative income theory, Stouffer et Al. (1949) published a very extensive study on the US Army during World War II that pinpointed a number of striking facts about soldiers' reported wellbeing. They noted, for example, that African American soldiers stationed in the Southern United States were happier than African American soldiers stationed in the Northern states. More generally, the happiness of the American soldier largely depended on the specific context and the reference group, the group of people soldiers compared themselves with. This idea would be re-elaborated two decades later by Runciman (1966) in a theory of social justice. Runciman defines the situation of relative deprivation as one where an individual is deprived of a status or commodity, sees other persons as having these assets and wishes to have these assets. In addition to turning the initial findings of Stouffer et al. into a full theory of social justice, Runciman's contribution is essential in understanding the role of the reference group, the group of people individuals compare themselves with. This group can be different across people and can be defined across different characteristics complicating further the question of societal aggregation of utilities.

Although very appealing, this definition was rather complex to operationalize in empirical research and found little support in economics until a couple of decades later. The concept of relative deprivation used in empirical research in economics was first put forward by Yitzhaki, (1979) and is confined to the income sphere. Yitzhaki proposed to measure any individual relative deprivation as the sums of incomes of the people richer than the observed individual. The sum of these measures across a population would then represent the relative deprivation measure

for a society. This is evidently a gross simplification of Runciman's relative deprivation theory but one that provided appealing empirical applications. Not only relative deprivation could be measured by simply summing up income distances but also, as shown by Yitzhaki, the relative deprivation measure at the societal level was equivalent to the absolute Gini index (the Gini multiplied by the mean).

This last property of the Yitzhaki relative deprivation measure is particularly important for our review as it allows us to relate the debate on the aggregation of individual utilities with the debate on relative income and relative deprivation. By adopting income as a unit measure, the Yitzhaki measure is *de facto* a relative income measure while the fact that this measure at the societal level is equal to the absolute Gini index implies that this measure can be used to measure the degree of equality of a society. In a nutshell, the more unequal a society is the more relatively deprived this society will be. Moreover, while the Gini index *per se* is a cross-section measure of inequality, the absolute Gini also considers mean income. This implies that, the Gini index being equal, with increasing mean incomes over time relative deprivation increases. In longitudinal studies that try to explain individual and societal behavior with changing levels of incomes, this property could potentially help to explain the inconsistency between longitudinal and cross-section studies on happiness and incomes.

A few years before Yitzhaki's contribution, Easterlin (1974; updated in 1995) noticed another inconsistency between longitudinal and cross-section data, a paradox that would eventually lead research on happiness for years to come and revive the relative income hypothesis. Easterlin noticed that the US and other Western countries had been growing in income per capita for several decades without any corresponding rise in reported happiness levels. For example, while income per capita in the US almost doubled between 1973 and 2004, happiness - as measured by the General Social Survey - showed no trend. This paradox acquired quickly popularity across the social sciences confirming the initial intuition and providing some possible explanations in disciplines as diverse as political science (Inglehart, 1990) and psychology (Diener et al., 1995). The search for a solution to the Easterlin paradox has also largely hovered around the idea that, beyond a minimum absolute income necessary for living, relative income becomes more important than absolute income for explaining happiness. This would explain why in richer societies average happiness and average absolute income do not covariate as expected while richer people tend to be happier than poorer people.

Economics was a late comer in this debate despite the obvious relation between happiness and utility when one looks at the original definition of utility as stated by Bentham, where happiness and utility are one and the same concept. Early contributions included several contributions from the Dutch Leiden School (see Kapteyn et al, 1978 and Van Herwaarden and Kapteyn 1979 for example), Layard, 1980 and Frank, 1985 but mainstream economics resisted for long the idea of considering self-reported happiness as a direct measure of utility. The initial skepticism was related to the measurement of happiness thought as unreliable but these concerns were progressively removed by advances in psychology that showed the robustness of answers to happiness questions. In fact, it is the recognition by the economics profession of the role of psychological factors in decision making that eventually provided credibility to the relative income hypothesis in economics.

The seminal work of Khaneman and Tversky (1979) is key to understand this step forward in economics and also to better understand the relative income hypothesis and its possible tests. Khaneman and Tversky (1979) showed that what matters for individuals when they make choices is not the *status quo* but changes from a reference point. This can be interpreted in two ways for the study of the relative income hypothesis. The reference point can be interpreted as the reference group which can be defined as self-selected groups of peers in society or, alternatively, as one's own status in the past or in the future. In their work, Khaneman and Tversky have mainly focused on the latter showing how the value function is concave in gains and convex in losses and also how the value function is steeper for losses than for gains (Tversky and Khaneman, 1991). As we will see further in the paper, findings related to the relative income hypothesis are very much in line with prospect theory in that they provide significant evidence on this behavioral asymmetry. Also important of this body of work is the concept of *ex-ante* decisions utility versus *ex-post* experienced utility. While Khaneman and Tversky worked extensively on the former, they also recognized that the latter has been little studied. But models where the dependent variable refers to past or current experiences rather than future projections - such as models that use happiness or life satisfaction as dependent variable – focus on *ex-post* utility and offer a significant bulk of evidence on how ex-post utility is shaped.

This brief review of the literature that dealt directly or indirectly with the relative income hypothesis provides the essential guidelines for empirical modeling. Utility is equated to happiness or considered a latent variable measured with happiness. Income is a measure of revealed preferences but contribute to utility in its relative form in addition to the absolute form. Individual utilities are therefore inter-dependent and shaped by the reference group. The reference

group (or point) may relate to the same individuals in the past or the future or to groups of individuals in the same society. These comparisons may lead to convex or concave individual utility functions. After stating more formally the relative income hypothesis, the paper will review how all these aspects are captured by models that attempt to test the relative income hypothesis.

3. The relative income hypothesis

In essence, the test of the relative income hypothesis revolved around the test of how measures of relative income enter the happiness/utility equation, with what sign, what shape and what level of significance. More formally, the empirical literature on the relative income hypothesis essentially tests one main hypothesis:

H1: Absolute incomes being equal, satisfaction decreases with increasing relative income.

In testing this hypothesis, we should keep in mind that different authors have opted for different types of data (cross-section, cross-country, panel), different types of welfare measures (income, consumption, expenditure, wages), different types of observational unit (individual, household, population groups, countries), different types of dependent variables (happiness, life satisfaction, job satisfaction, different numbers of steps for the multi-steps indicators), different types of key variables transformations (log, squared, cubic), different types of estimators (ordered logit or probit, OLS), different types of estimations (with/without fixed effects, with/without clustering) and different sets of control variables (household, individual and community characteristics and different sets of variables). This makes comparisons across empirical results an arduous task and the truth of the matter is that we could not find two studies the results of which could be entirely compared. However, one obvious test of the relative income hypothesis is the consistency of the sign and significance of the relative income variable across different types of models, countries and times.

4. Empirical specifications

To simplify the exposition, we consider utility and happiness as one concept and relative income and relative deprivation as one measure. Therefore, in what follows, we will refer to utility and relative income only. Let U be utility, x a vector of incomes, r a measure of relative incomes and Z a vector of controls, whether demographics or fixed effects. The subscripts i will refer to individuals, c to countries or cohorts and t to time.

The relation between utility and income can be modeled in several ways depending on what we think individuals consider when deriving utility from income. The simplest possible specification and also the most common in economics is that utility derives from absolute income in any point in time so that

$$U_i = f(x_{it})$$

Critics of this approach argued that individuals are in fact concerned about relative income rather than absolute income so that

$$U_i = f(r_t),$$

where r is relative income, which can be defined with different specifications. For example, Easterlin (1974) proposed a utility function defined in relative terms only with $U_i = U_i \frac{C_i}{\sum_{j \in J} a_{ij} C_j}$, where C is consumption rather than income and a is a weight attached to individual consumption (see below for more details).

However, the most common specifications in empirical analyses that attempt to test the relative income hypothesis make utility a function of both absolute and relative income so that

$$U_i = f(x_{it}, r_t)$$

This type of specification is the focus of this paper. Econometric specifications of the utility function that includes both absolute and relative incomes mostly rely on measures of life satisfaction or happiness as proxies for utilities. This evidently implies that self-reported happiness is a reliable variable that convey true information on individual utility, a question which is has been debated in the literature in the past but that now finds broad consensus in economics (see Easterlin, 1974, Diener, 1984 and Clark et al, 2008).

Empirical specifications of the utility equation have several sources of variety including: 1) the choice of the income variable; 2) the different specifications of relative income - r ; 3) the choice of the reference group; 4) the mechanism for the selection of the reference group; 5) the estimators used; 6) the functional modeling of absolute and relative income (variables transformations); 7) the choice of control variables and 8) the choice between cross-section and longitudinal data.

The **choice of the income variable** usually falls on a continuous variable but some authors have also used income measured in steps (see, for example, McBride, 2001). The relative income

hypothesis has also been tested with household income as opposed to individual income and with different measures of welfare such as income, consumption or expenditure. Ferrer-i-carbonell (2005) used family income as a form of relative income while Oshio et al. (2011) used household income in place of individual income. Many data sets, especially in poorer countries, do not contain information on incomes or contain information on incomes that is not reliable because of under-reporting. In these cases, scholars prefer to use consumption or expenditure as a proxy of income or as a better indicator of welfare. While these choices are routinely made to test the relative income hypothesis, it is also evident that income and consumption are two conceptually different measures in economics (differentiated by savings) that cannot be simply equated or compared.

Perhaps the greatest source of variety relates to the **different specifications of relative income - r** . In some studies r is a share of income over mean income - $x/\bar{x}$ (Duesenberry, 1949, Layard, 1980, Persson, 1995) while for others r is a distance of income from mean income - $(x - \bar{x})$ - (Akerlof, 1997, Corneo and Jeanne, 1997). Johansson-Stenman et al. (2002) compared the two types of formulations and found that the “ratio” approach performed better than the “distance” approach. However, in our review we could not find other similar tests and both approaches continue to be widely used in empirical research. Some studies also use income rank as a measure of relative income (Franck, 1985, Van de Stadt et al., 1985). Frank (1985), for example, suggests a maximization problem in which the utility index is expanded to allow for the effect of rank.

Also very important is the **choice of the reference group** when defining relative income r . Assume that mean income (or median incomes in some papers) is the variable that defines relative income. The question is over what group this mean should be estimated. This reference group can be the whole society, sub-samples of the population, samples of other populations, the same unit of observation i in other points in time such as the past or the future or reference points used by individuals in the past such as the income levels of parents.

Clark et al. (2008) define as *internal* reference points self-comparisons with past and future incomes as opposed to *external* reference points where the reference group is represented by other members of society or other societies. McBride (2001) refers to the *external* or *sociological* norm when people compare themselves with others and to the *internal* or *psychological* norm when people compare themselves with their own status in the past. Similarly, Luttmer (2005) and Ferrer-i-Carbonell (2005) refer to *parallel* and *longitudinal* comparisons. Parallel comparisons are comparisons with peers while longitudinal comparisons are comparisons with richer (upwards

comparisons) or poorer (downwards comparisons) people. More generally, Verme (2010) refers to *alter* comparisons when people compare themselves with other people in society in the same point in time (cross-section comparisons) and *ego* comparisons when people compare themselves with their own past status or their own expected status in the future (self-comparisons). In essence, we can think of at least five types of reference groups: Richer and poorer individuals in the present (upward and downward comparisons), past and future own status (past and future self-comparisons) and comparisons with peers (parallel comparisons) as depicted in the figure below.

Figure 1 – Individual Evaluation System of Happiness/Satisfaction

Source: Verme (2010)

Both McBride (2001) and Verme (2010) propose utilities functions that combine the alter/external and the ego/internal dimensions so that

$$U_{it} = f\{(x_{it}/g(e_{it}, a_{ijt}))\},$$

where $g(.)$ is a function of both the ego (e) and alter (a) value systems. In McBride, the econometric specification of such model results in

$$H_{ict} = \beta_1 \log(x_{it}) + \beta_2 \log(e_{it}) + \beta_3 \log(a_{ict}) + \alpha_{it} + \alpha_t + \varepsilon_{ict},$$

where H is a measure of happiness, A is a time-varying individual specific effect and α_{it} and α_t are the time variant and time-invariant individual effects respectively.

The **mechanism for the selection of the reference group** is also central to the understanding of the relative income hypothesis. The empirical literature has explored different possibilities. Some

studies focused on testing systematically the relative income hypothesis using reference groups defined across different characteristics (Van de Stadt et al., 1985; Ferrer-i-Carbonell, 2005; Akay and Martinsson, 2011). These different characteristics may be based on personal characteristics such as age and education or location characteristics such as region or town. For example, Van de Stadt et al. (1985) used education, age and employment, Persky and Tam (1990) used other people in the same region and and McBride (2001) used people in the same country as reference group.

A slightly more complex approach to the identification of the reference group is to model utilities in two stages. In the first stage, income or wages are modeled based on a number of personal characteristics that people use to select the reference group. In a second stage predicted income is used in a utility function either in conjunction or as a replacement of relative income (see for example Clark and Oswald, 1996 or Verme, 2011). This approach arises from the concern that people self-select their own reference groups based on their peers where peers are defined on the basis of similar personal characteristics and also on the idea that what may define relative income is the distance between one's own status and one's own expected status, information conveyed by the predicted values of income.

Different dependent variables also correspond to **different types of estimators**. Irrespective of the choice of reference income and reference group, estimations of the happiness/utility equation rely almost always either on ordered probit (or logit) for categorical ordered dependent variables or on OLS estimators for continuous dependent variables. Ferrer-i-Carbonell and Frijters (2004) showed that an ordered logit or probit specifications lead to very similar results. Our review will show that most authors opted for a categorical dependent variable and for an ordered probit estimation.

The functional modeling of absolute and relative income (variables transformations) is also an important source of diversity across empirical studies. The equations would normally be in log form as the standard approach with continuous independent variables. But some studies opted to focus on testing the linearity of the income/happiness relation using quadratic or cubic transformations of the income variable.

Most applications would also add a set of **control variables** Z defining personal, household or communities characteristics and also a set of fixed effects, usually based on spatial criteria such

as regions or urban and rural areas. If relative income is modeled in terms of predicted income and predicted income is estimated using a set of personal and/or household characteristics, these characteristics should normally not be used also in the utility model, although this is not always the case in empirical papers.

Finally, the **distinction between cross-section and longitudinal models** leads us to three types of studies, those that rely on one cross-section survey focusing therefore on individuals or households within a single country, cross-country studies, and longitudinal studies. The empirical specification of relative income models is essentially the same with the only difference being the change in subscripts but the interpretation of the coefficients is evidently different. For example, the great debate on the Easterlin paradox revolved around the paradox of countries showing little increase in happiness as they grew richer but this is very different from considering individual happiness and income within these same countries. The measurement of collective utility over time and the measurement of individual utility over a given society in a given point in time are two very different lines of investigation even if the concept of relative income is central in both types of studies.

In essence, the standard econometric model to test the relative income hypothesis can be described as

$$U_i = \beta_1 \ln(x_i) + \beta_2 \ln(r_i) + \gamma Z_i,$$

where β_1 and β_2 are the parameters of interest.

Provided that cross-section and longitudinal data are available, one can of course try to reconcile the two types of relative income hypotheses. Di Tella et al. (2003) offer, for example, one of the most comprehensive models by considering individuals, countries and time at once trying to test the relative income hypothesis using countries and time as reference:

$$U_{ict} = \beta_1 \ln(x_{ict}) + \beta_2 \ln(x_{ict}/\bar{x}_{jt}) + \beta_3 \ln(\bar{x}_{ct}/\bar{x}_c) + \gamma Z_{ict}$$

These complex relations are nicely depicted in the following figure from Clark et al. (2008) where the cross-section within countries relation between happiness and income is superimposed over the longitudinal cross-country relation. The figure shows how difficult is to capture these relations in one equation, especially if the empirical model is linear. It also shows that we can think of two forms of relative income hypotheses. One is relative income across individuals within countries while the second is relative income across time.

Figure 2 – Happiness and Income

Source: Clark et al. (2008)

The longitudinal approaches to the study of relative income also raise the question of *adaptation*. The basic idea is that people become accustomed to current income and, if income does not change in real terms, the utility that derives from income diminishes over time simply because of habituation. The question of habituation is well known in psychology with prominent experiments on lottery winners showing how people quickly adapt to the new welfare status and rapidly return to the level of happiness enjoyed before winning the lottery. This is important for the relative income hypothesis because it would imply that income has diminishing returns over time so that when people compare their income with their own income in the past the present income is discounted by the habituation factor.

5. Econometric issues

The test of the relative income hypothesis - as it implies the specification and estimation of econometric models - is a microcosm of econometric issues that plague any empirical model. In this section, we review briefly the main econometric issues that have been specifically found to complicate the test of the relative income hypothesis.

The choice of the welfare measure. Income is often the measure of choice for well-being in rich countries but micro economists working on developing countries tend to use consumption or expenditure (consumption for short) as a proxy of income. That is because reported income is often underestimated and more volatile than consumption or expenditure. However, the difference between income and consumption is savings and savings change significantly across

the distribution of incomes with the poor having zero or low savings and the rich having large savings. In addition, consumption may or may not include consumption of public goods that consumers already paid for via taxation and the difference between income and consumption also depends on whether we consider pre-tax or post-tax incomes. Regressions that attempt to explain deprivation or satisfaction with consumption tend to underestimate the impact of income either because consumption is likely to have less variance than consumption (less significance) or because income is larger than consumption (lower coefficient). Headey and Wooden (2004) find some evidence of this phenomenon concluding that the impact of income on satisfaction is typically underestimated.

There is also a difference in using household as opposed to individual incomes. The choice depends on how we believe individuals make value assessments of their own status when comparing their status with the status of others. For example, a young individual may have a low salary but live in a very wealthy family. This person may assess his own status on the basis of his own family wealth rather than individual income. Hence, modeling household or individual relative income requires different behavioral assumptions, the interpretation of the coefficients estimated is different and, ultimately, models that use income or consumption are not strictly comparable.

Identification of the reference groups. Relative income is “relative” in that refers to the income of a reference group. Reference groups can be group or individual specific and researchers need to pinpoint the relevant reference group to assess the importance of relative income for satisfaction or deprivation. The problem is that very few studies actually ask respondents what is their reference group and most of the times researchers either use the whole population as reference group or a subset of the population which is defined based on normative criteria chosen by the researchers themselves. This is what McBride (2001) refers to as problem 2: the lack of direct data on norms.

There are a few approaches to address this problem. A popular method is to estimate predicted incomes based on a number of personal characteristics that are generally thought to be used by people to compare themselves with others such as age and education. However, including or excluding important variables can result in very different estimates and such approach is often criticized for being too ‘normative’. The use of average incomes of peer groups such as co-workers or neighbors, which is also a popular approach to the selection of reference groups, may not be a better option. Knight and Song (2006) find, for example, that 68% of survey respondents

in China reported that their main comparison group consisted of individuals in their own village. While this may be regarded as a high share, it does not exhaust the whole population and leaves over a third of the population who look for reference points outside their own village. In addition, this kind of localized knowledge is very rare in empirical studies. Also, depending on psychological factors, individuals may have a different approach to choosing the reference group and these different approaches result in such heterogeneity that cannot be easily captured in empirical studies. As noted by Clark et al. (2008), “the empirical happiness literature is still in its infancy on this issue.” (p. 24).

Discreteness of the dependent variable. In happiness/satisfaction/utility models, utility is a latent variable Z which is a proxy of the true level of utility S . The latent variable is represented by the scores R of the dependent variable. With ordered logit or probit models, what is captured is the ordinal information that the dependent variable provides but not the cardinal information. Since S is a continuously differentiable monotonously function of R (Vendrik and Woltjer, 2006), ordinal properties of S are the same as those of Z but the cardinal properties such as concavity and convexity may differ (Vendrik and Woltjer, 2007).

Timing. As in any causal or correlation study, researchers must be knowledgeable about the time distance between cause and effect or between two correlated phenomena. Feelings of satisfaction such as life satisfaction may be the result of past recollection of income, the last income received or future income expectations. Feelings of satisfaction or deprivation may also derive from life events occurred in the past that altered the perception of income. Many of these factors are not observed in empirical studies. In fact, we will see that studies that use lagged income variables are very few.

Multicollinearity. In happiness models it is common to use variables constructed on income such as relative income or income inequality in conjunction with absolute income itself. This may lead to multicollinearity that can affect both the significance and the size of the coefficients. As noted by Kosicki (1987), the basic problem in determining whether rank matters is collinearity between income rank and the level of income (p 426). The way to resolve the dilemma, as he suggests, is to include both the level of income and income rank in the equation, and, at the same time, generate as much variation in rank independent of variation in the level of income as possible, for example by comparing people across different communities.

It is also possible that the introduction of fixed effects generates collinearity with core explanatory variables such as relative income. The use of fixed effects is very common in

happiness studies that use relative income as explanatory variable. As fixed effects tend to be variables representing communities or areas, they may be at similar levels of aggregation than the reference group used to measure relative income. This increases the likelihood of correlation between relative income and fixed effects. In a review of studies on the relation between income inequality and happiness, Verme (2011) has shown how in empirical models multicollinearity between fixed effects and core explanatory variables may explain the empirical heterogeneity of results. Addressing this problem is not simple and often boils down to a trade-off between losing on the explanatory power of the model and depicting more accurately the sign and significance of the inequality-happiness relation.

Omitted variables. It is widely recognized that happiness models can explain only a limited part of the variation in happiness witness the fact that the R squared and pseudo-R squared obtained from these models are typically low. It is possible therefore that the real explanation behind variations in happiness lie behind some of the omitted variables. Di Tella and MacCulloch (2005a) examined a series of potential omitted variables which could explain why increasing income has not led to more happiness using Eurobarometer and US GSS data. Variables used included life expectancy, pollution, unemployment, inflation, hours worked, divorce rate, crime and income inequality. Their results show that most of these variables are correlated with life satisfaction as expected. However, their inclusion as right-hand side variables does not explain why rising income has not produced rising well-being. That is because these additional variables have mostly *also* improved over time without increasing happiness. In their own words: “introducing omitted variables worsens the income-without-happiness paradox”. While these tests are not conclusive, the fact that the explanatory power of the happiness models is very low indicates that the results on relative income should be taken with caution. Significance of the relative income variable simply indicates that this is a variable that contributes with income and among many other unobserved variables to wellbeing.

Non-linearity, concavity and convexity of the utility function. It is also very little understood whether the relation between income and satisfaction is non-linear and what function would best describe this relation. One of the explanations of the Easterlin paradox is that, as a country become richer, income becomes less relevant for happiness. This would imply decreasing marginal returns from income (as predicted by orthodox economic theory) and a concave utility function. Many papers test this hypothesis using different sets of data (cross-section, longitudinal or panel data) but a few use variables transformations of income and relative income that would allow looking at the shape of the utility function.

Behavioral asymmetries. Perhaps one of the most complex behaviors to model is the question of upward/downward or past/future comparisons. We have discussed how the literature has hypothesized different value functions for both types of comparisons in the works for example of Duesenberry (1949) for upward/downward comparisons (alter comparisons) and in the work of Khaneman and Tversky for past-future comparisons (ego comparisons). The central problem is the question of asymmetry of comparisons across these two dimensions and how to model such asymmetry. Vendrik and Woltjer (2007) is one of the few papers that provided formal tests of these hypotheses but the empirical literature is otherwise silent on these questions.

Observational equivalence. It is possible that the observation of a constant level of satisfaction over time at the aggregate level (such as for a country) can be explained by different factors. For example, this constancy could be explained by a reference group constituted by internal reference points (comparison with one own income in the past) or by a reference group constituted by both internal and external reference points (where external is the comparison with other people). It is also possible that positive and negative developments over time cancel each other out across individuals resulting in no change at the aggregate level. Studies that attempted to address these issues are very few.

Inconsistent estimates. The use of ordered categorical models such as ordered probits and logits can lead to inconsistent estimates (Maddala, 1983). Ferrer-i-Carbonell and Frijters (2004) tests whether results on the relative income hypothesis are sensitive to the use of OLS or categorical ordered models and find no significant differences between the use of the two models. However, controlling for fixed effects reduces the size of the positive coefficient on income. To address this problem one would need panel data, good instruments for personality traits or variables that observe personality traits directly and, in our knowledge, there are no studies in economics that delved into this question.

6. Empirical results

As already mentioned, the sources of differences across the specification of empirical models for testing the relative income hypothesis are many from the choice of the welfare variable, to the choice of country and time, to the choice of the estimation method. We remarked that this diversity does not allow comparing results across studies. We also remarked that comparing the signs and significance of the relative income variable across different empirical models is *per se* a robustness test of the relative income hypothesis. This is what we do in this section by cataloguing a selected sample of empirical works across types of studies and according to results.

Absolute income is almost invariably used in conjunction with relative income to test the relative income hypothesis and recall that this is the type of specification we focus on in this paper. A first observation is that empirical models that try to explain happiness with absolute and relative income can explain only a small part of the variation in happiness. Ferrer-i-Carbonell (2005) noticed that the pseudo-R²'s for all regressions tested in the paper were between 0.07 and 0.08. This is in accordance with the general finding in the literature that only about 8% to 20% of individual SWB depends on observed variables that are typically used in these types of models (Kahneman et al., 1999). Therefore, testing the relative income hypothesis does not amount to testing whether this variable is the most relevant factor in explaining happiness but boils down to testing whether this variable is consistently significant in happiness equations.

Almost all studies find a positive association between **absolute income** and satisfaction. This evidence is consistent with studies that used cross-section surveys, panel data and cross-country studies. Cross-section studies on single countries have consistently found a positive and significant relation between income and life satisfaction or happiness with or without demographic controls. This is true for developed countries (Blanchflower and Oswald, 2004; Shields and Wheatley Price, 2005) as well as for developing countries (Graham and Pettinato, 2002; Lelkes, 2006). The main difference between developed and developing countries seems to be the slope of the relation, steeper for poorer economies as compared to richer economies. Panel data have been used to control for unobserved heterogeneity, such as personality traits. This section of the literature also concludes that changes in absolute incomes are correlated with changes in happiness (Winkelmann and Winkelmann, 1998; Ravallion and Lokshin, 2002; Ferrer-i-Carbonell and Frijters, 2004; Senik, 2004; Ferrer-i-Carbonell, 2005; Clark et al., 2005).

Some of the work with panel data has also gone further in an effort to establish a causality link between income and satisfaction by instrumenting income with exogenous shocks. Frijters et al. (2004) used the average increase in incomes in East Germany after reunification and the average decrease in incomes in Russia after the collapse of the Soviet Union as exogenous shocks and find a greater effect of income on happiness than in much of the previous literature. Gardner and Oswald (2007) use information on lottery winnings in the British Household Panel Survey (BHPS) as reflecting exogenous income movements. In both the level and panel equations, lottery winnings are found to significantly reduce mental stress scores. These studies are consistent in finding a positive and significant relation between income and happiness and concord in finding

different slopes of the income-satisfaction relation across countries and across groups of people (Clark et al., 2005; Frijters et al., 2004a; Lelkes, 2006). A few cross-country longitudinal studies also used GDP per capita instead of income controlling for country fixed-effects and found a positive relation in contrast with the Easterlin paradox (Di Tella et al., 2003; Helliwell, 2003; Alesina et al., 2004).

Despite the fact that the overwhelming majority of studies find a positive relation between income and happiness, there are a few studies that find a negative relation. This case has been labeled the case of the *frustrated achievers* (Graham and Pettinato, 2002; Becchetti and Rossetti, 2009; Brockmann et al., 2009) to underscore the fact that even an increase in income can result in decreased satisfaction. For example, using the German Socio-Economic Panel Survey (SOEP), Becchetti and Rossetti (2009) found that half of the achievers - defined in terms of people who improved on their income during the last period – are frustrated, meaning that they declared a reduction in life satisfaction. This is one of the few studies that actually splits happy and unhappy achievers into two groups avoiding in this way the averaging of negative and positive income-satisfaction relations.

Several studies also find that income exhibits decreasing marginal returns on satisfaction for individuals within countries and across countries and that this is true especially over time (Diener and Luca, 1999; Layard, 2005). This would be partly explained by the role of positional goods and the reference group, two factors that change along with income (Duesenberry, 1949, Frank, 2005). In essence, expectations, needs and the reference group are continuously adjusted to higher incomes so that the effect of an increase in marginal income is short-lived. This literature provides a possible explanation for the Easterlin paradox. In low income countries, an increase in average incomes increases average happiness but in high income countries this elasticity is no longer at work and factors other than income such as religion, social networks and freedom become more important for explaining changes in happiness.

The sign and significance of the relation between happiness and **relative income** in empirical studies is less consistent than the observed relation between happiness and absolute income. The majority of studies find a negative and significant relation as postulated by the relative income hypothesis (when controlling for absolute income). Studies that use averages of incomes across pre-defined reference groups as relative income are perhaps the most common and results are quite consistent in finding a negative relation between relative income and life satisfaction (Ferrer-i-Carbonell, 2005; Blanchflower and Oswald, 2004; Graham and Felton, 2006; Helliwell

and Wang, 2005, Kapteyn and van Herwaarden, 1980; Kapteyn et al., 1997; McBride, 2001). Alpizar et al (2005) use a group of students from Costa Rica and a specifically designed questionnaire to test the relative income hypothesis using the ratio approach and the differential approach with both income and consumption measures. They find a negative and significant sign for relative income in all equations.

Two studies that use the German SOEP data (D'Ambrosio and Frick, 2007 and 2012) find that the role of relative deprivation (measured with the Yitzhaki, 1979 income measure) in explaining subjective well-being carries a negative sign and is more important than the role of absolute income. Interestingly, these studies also find that both absolute and relative income in the past contribute to shape the perception of well-being in the present, what we referred to as the “ego” comparisons in section four.

For China, there is overwhelming evidence that relative income and deprivation is very important in both urban and rural areas. Knight and Song (2006) using a sample of Chinese households find that people who perceived their own income to be above average were much happier than those who perceived their own income to be below average after controlling for absolute income. Appleton and Song (2008) and Knight and Gunatilaka (2008) find that relative income is very important in rural China to explain happiness and Wang and Vander Weele (2011) find that relative deprivation is very relevant in explaining happiness also for urban residents.

Despite the evidence reported for countries like China and Costa Rica, several studies that have focused on poorer countries found that relative income is positively correlated with happiness or satisfaction. For example, Ravallion and Lokshin, (2010) find a positive sign for relative income measure using a survey from Malawi and the same sign is found by Senik (2004) for Russia and by Kingdon and Knight (2007) for South Africa.

There is also evidence that *relative income predicted* with an income equation is a significant factor that explains satisfaction. In these types of models, predicted income is interpreted as the income that people expect given their own characteristics and relatively to the characteristics of the reference group, where the reference group can be the whole population or selected sub-sets of the population. Hamermesh (1977) uses the residual from a wage equation as reference income and finds this residual to have a positive and significant effect on job satisfaction. Clark and Oswald (1996) using a similar approach with a sample of British employees find both income and reference income to be significant and with opposite signs in a job satisfaction regression. Sloane

and Williams (2000) also find a negative and significant relation between job satisfaction and the reference income predicted with a wage equation.

Measures of relative deprivation have been found by several authors to be negatively associated with happiness or life satisfaction. Verme (2010) and Silber and Verme (2012) using the Consortium of Household Panels for European Socio-Economic Research (CHER) find that deprivation indices constructed with predicted income values are consistently and negatively correlated with income satisfaction. Oshio et al. (2011) find the Yitzhaki measure of relative deprivation to be negatively associated with happiness for China and Korea.

The choice of the *reference group* is an important determinant of the outcome of the relative income-happiness relation. Most researchers use ‘alter’ comparisons, comparisons with other groups in society based on pre-defined characteristics. In Ferrer-i-Carbonell (2005) the reference group contains all the individuals with a similar education level, inside the same age bracket, and living in the same region. Akay and Martinsson (2011) used several types of reference groups to test the relative income hypothesis in Northern Ethiopia but found no significance of relative income as opposed to absolute income which is always found to be significant. Persky and Tam (1990) assume that all individuals living in the same region are part of the same reference group. McBride (2001) includes in the reference group of each individual all people in USA who are in the age range of 5 years younger and 5 years older than the individual concerned. Van de Stadt et al. (1985) define the reference group according to education level, age, and employment status. It was not possible to detect unequivocally certain reference groups as being better than others in determining a significant relation between happiness and relative income. All we can say is that most scholars use individual characteristics, either directly in the happiness equation or indirectly with the estimation of predicted income.

A number of studies find evidence that both the internal (ego) comparisons and external (alter) comparison matter. Knight et al. (2009) find this result for rural China where relative income seems to be more important than absolute income in explaining happiness while both past and expected incomes in the future are also found to be relevant for present happiness. Verme (2010) using a set of European panel surveys concludes that absolute income is more important than relative income in explaining happiness but also that relative income carries consistently a negative and significant sign in equations where the dependent variable is satisfaction with income.

Some studies indicate *upward and downward asymmetries* in social comparisons. These asymmetries were originally suggested by Duesenberry (1949) when he noticed how people tend to make upwards comparisons rather than downwards comparisons. Frank (1985) also explored this aspect in relation to the role of positional goods and found similar results. For Taiwan, China, Tao and Chiu (2009) find a weak role of absolute income in explaining happiness, a non-significant role of downward comparisons and a positive and significant role for upward and parallel comparisons (the latter measured in terms of predicted income). According to these authors, relative income is a better predictor of happiness than absolute income.

Corazzini et al. (2010) designed a questionnaire to explore the relativist vs. absolutist perception of wellbeing and administered this questionnaire to respondents in eight countries, four low-income and four high income countries. Results indicate that wellbeing is perceived mainly in relative terms with the strength of relativism being higher for respondents in high-income countries. They also find that interpersonal comparisons take place by looking both ‘upward’ and ‘downward’ along the income scale and that both rank and the magnitude of reference incomes are important in assessing wellbeing.

Relative income has also been found to be a key element in the understanding of a number of factors related to happiness such as the case of the *frustrated achievers and adaptation*. Becchetti and Rossetti (2009) find that relative income contributes to explain the case of the frustrated achievers, those individuals who report higher income but lower satisfaction as compared to the past. The adaptation hypothesis - whereby individuals tend to adapt quickly to a new welfare status and, by consequence, derive less utility from the same level of welfare - has also found substantial support in various studies across countries such as the UK (Clark, 1999) and Germany (Grund and Sliwka, 2003; Di Tella et al., 2005) and also in cross-country studies (Van Praag and Frijters, 1999).

7. Conclusion

The paper reviewed the empirical literature that attempted to test the relative income or the relative deprivation hypotheses in economics. Section two reviewed some of the most relevant intellectual contributions to the relative income and relative deprivation hypotheses and concluded that the testing of the two hypotheses implies similar empirical modeling. Section three stated formally this hypothesis and section four discussed the most popular empirical models used for testing the relative income hypotheses in economics. This section found a large variety of empirical models that differ for the choice of relative income indicator, reference group, the

mechanism for the selection of the reference group, estimator, variable transformations and type of data (cross-section, longitudinal, panel). The review of the main econometric obstacles to the hypothesis testing also revealed a great diversity in purely econometric choices such as the use of fixed effects or cluster estimations. Considering that studies are also diverse in terms of countries, data sets and time periods considered, the discussion of empirical results forcibly focused on detecting consistency of the sign and significance of the utility-income relation.

The review finds that there is overwhelming evidence that absolute income is positively and significantly correlated with utility (happiness or life satisfaction) when absolute income and relative income are used in conjunction. The relation between utility and relative income is less consistent in terms of sign and significance but the majority of studies find a negative and significant relation. This is explained by the fact that all equations control for absolute incomes. Income being equal, a higher income in the reference group reduces happiness.

References

- Akay, A. and Martinsson, P. (2011) Does relative income matter for the very poor? Evidence from rural Ethiopia, *Economics Letters*, 110, (3), 213-215
- Akerlof, G. A. (1997) Social Distance and Social Decisions. *Econometrica* 65, 1005-1027
- Alesina, A., Di Tella, R. and MacCulloch, R. (2004) Inequality and Happiness : Are European and Americans Different ? *Journal of Public Economics*, 88(9-10), 2009-2042
- Alpizar, F. Carlsson, F. and Johansson-Stenman, O. (2005) How much do we care about absolute versus relative income and consumption? *Journal of Economic Behavior and Organization*, 56, 405-421
- Appleton, S. and Song, L. (2008) Life satisfaction in urban China: Components and Determinants, *World Development*, 36, 2325-2340
- Becchetti, L. and Rossetti, F. (2009) When money does not buy happiness: The case of “frustrated achievers”, *The Journal of Socio-Economics*, 38, 159-167
- Blanchflower, D. G. and Oswald, A. J. (2004) Well-being over time in Britain and the USA, *Journal of Public Economics*, vol. 88, 1359-1386
- Brockmann, H., Delhey, J., Christian, W. and Yuan, H. (2009) The China puzzle: Falling happiness in a rising economy, *Journal of Happiness Studies*, 10(4), 387-405

Clark, A.E. (1999) Are wages habit-forming? Evidence from micro-data, *Journal of Economic Behavior and Organization*, 39, 179-200

Clark, A.E., Etilé, F., Postel-Vinay, F., Senik, C. and Van der Straeten, K. (2005) Heterogeneity in reported well-being: Evidence from twelve European Countries. *Economic Journal*, 115, C118-C132

Clark, A.E., Frijters, P. and Shields, M. (2008) Relative income, happiness and utility: An explanation for the Easterlin paradox and other puzzles, *Journal of Economic Literature*, 46(1), 95-144

Clark, A.E. and Oswald, A.J. (1996) Satisfaction and comparison income, *Journal of Public Economics*, 61, 359-381

Corazzini, L.E. and Majorano, F. (2010). Reign in Hell or Serve in Heaven? A Cross-country Journey into the Relative vs. Absolute Perceptions of Wellbeing," ISLA Working Papers 36, ISLA, Centre for research on Latin American Studies and Transition Economies, Università Bocconi, Milano, Italy.

Corneo, G. and Jeanne, O. (1997) Conspicuous consumption, snobbism and conformism, *Journal of Public Economics* 66, 55-71

Dalton, H. (1920) The Measurement of the Inequality of Incomes, *The Economic Journal*, 30 (119), 348-361

D'Ambrosio, C., Frick, R.J. and Jäntti, M. (2009). Satisfaction with Life and Economic Well-Being: Evidence from Germany, *Schmollers Jahrbuch : Journal of Applied Social Science Studies / Zeitschrift für Wirtschafts- und Sozialwissenschaften*, Duncker & Humblot, Berlin, 129(2), 283-295.

D'Ambrosio, C. and Frick, R.J. (2007). Income Satisfaction and Relative Deprivation: An Empirical Link, *Social Indicators Research*, Springer, 81(3), 497-519

Diener, E., Diener, M. and Diener, C. (1995) Factors predicting the subjective well-being of nations. *Journal of Personality and Social Psychology*, 69, 851-864

Diener, E. and Lucas, R.E. (1999) Personality and subjective well-being, in Kahneman, D., Diener, E. and Schwarz, N. (Eds.), *Foundations of Hedonic Psychology: Scientific perspectives on enjoyment and suffering*, Chapter 11, New York: Russell Sage Foundation

Di Tella, R., MacCulloch, R. and Oswald, A.J. (2003) The macroeconomics of happiness, *Review of Economics and Statistics*, vol. 85, 809-827

Di Tella, R., MacCulloch, R. and Haisken-deNew, J.P. (2005) Happiness adaptation to income and to status in an individual panel, Harvard Business School Working Paper.

Duesenberry, J.S., (1949) *Income, Saving and the Theory of Consumer Behavior*. Harvard University Press, Cambridge, MA.

Easterlin (1974; updated in 1995) Does economic growth improve the human lot? Some empirical evidence, in: David, P.A., Reder, M.W. (Eds.), *Nations and Households in Economic Growth, Essays in Honor of Moses Abramowitz*, Academic Press, NY, pp. 89– 125.

Easterlin, R.A., (1995). Will raising the incomes of all increase the happiness of all? *Journal of Economic Behavior and Organization* 27 (1), 35– 47.

Ferrer-i-carbonell (2005) Income and well-being: An empirical analysis of the comparison income effect, *Journal of Public Economics*, vol. 89, 997-1019

Ferrer-i-Carbonell and Frijters (2004) The effect of methodology on the determinants of happiness. *The Economic Journal* 114, 641– 659.

Frijters, P., Shields, M.a. and Haisken-DeNew, J.P. (2004a) Money does matter! Evidence from increasing real incomes in East Germany following reunification. *American Economic Review*, 94, 730-741

Frijters, P., Shields, M.A. and Haisken-DeNew, J.P. (2004b) Changes in the pattern and determinants of life satisfaction in Germany following reunification, *Journal of Human Resources*, vol. 39, 649-674

Frank R.H. (1985) The demand for unobservable and other non-positional goods. *The American Economic Review*, 75, 101– 116.

Friedman, M. (1957) *A Theory of the Consumption Functions*, Oxford University Press, London

Gardner J. and Oswald, A.J. (2007) Do Divorcing Couples Become Happier by Breaking Up? *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 169(2): 319–36.

Graham, C. and Felton, A. (2006) Inequality and Happiness: Insights from Latin America, *Journal of Economic Inequality*, 4(1), 107–22.

Graham, C and Pettinato, S. (2002) *Happiness and Hardship: Opportunity and Insecurity in New Market Economies*. Washington, D.C.: Brookings Institution Press.

Grund, C. and Sliwka, D. (2003) The further we stretch the higher the sky – On the impact of wage increases on job satisfaction. University of Bonn, Bonn Econ Discussion paper 2003-1

Grund, C. and Sliwka, D. (2007) Reference-Dependent Preferences and the Impact of Wage Increases on Job Satisfaction: Theory and Evidence, *Journal of Institutional and Theoretical Economics*, 163(2): 313–35.

Hamermesh, D. S. (1977) Economic Aspects of Job Satisfaction. In *Essays in Labor Market Analysis*, ed. O. Ashenfelter and W. Oates. New York: Wiley, 53–72.

Helliwell, J. F. (2003) How's Life? Combining Individual and National Variables to Explain Subjective Well-Being, *Economic Modelling*, 20(2): 331–60.

Helliwell, J.F. and Huang, H (2005) How's the Job? Well-Being and Social Capital in the Workplace, NBER Working Paper, no. 11759.

Inglehart, R. (1990) *Cultural Shift in Advanced Industrial Society*. Princeton: Princeton University Press.

Johansson-Stenman, O., Carlsson, F., and Daruvala, D. (2002) Measuring Future Grandparents' Preferences for Equality and Relative standing, *Economic Journal*, 112, 362-83.

- Kapteyn, A. & Van Praag, B. M. S. and Van Herwaarden, F. G.(1978) Individual welfare functions and social reference spaces, *Economics Letters*, 1(2), 173-177.
- Kapteyn, A. and van Herwaarden, F.G. (1980) Independent welfare functions and optimal income distribution. *Journal of Public Economics* 14, 375– 397.
- Kapteyn, A., van de Geer, S., van de Stadt, H., Wansbeek, T., (1997). Interdependent preferences: an econometric analysis. *Journal of Applied Econometrics* 12, 665–686.
- Kingdon, G. and Knight, J. (2007) Community, Comparisons and Subjective well-being in a divided society, *Journal of Economic Behavior and Organization*, 64, 69-90
- Knight, J. and Song, L. (2006) Subjective Well-Being and Its Determinants in Rural China. mimeo
- Knight, J. and Gunatilaka, R. (2008) Income, Aspirations and the hedonic treadmill in a poor society. University of Oxford: Department of Economics.
- Knight, J, Song, L., Gunatilaka, R. (2009) Subjective well-being and its determinants in Rural China, *China Economic Review*, 20, 635-639
- Kosicki, G. (1987) A Test of the Relative Income Hypothesis, *Southern Economic Journal*, Vol. 54, No. 2, pp. 422-434
- Kuznets, S. (1942) National Income and Taxable Capacity *The American Economic Review* , Vol. 32 (1), Part 2, Supplement, Papers and Proceedings of the Fifty-fourth Annual Meeting of the American Economic Association (Mar., 1942), pp. 37-75
- Layard, R. (1980) Human satisfaction and public policy, *Economic Journal* 90, 737– 750.
- Layard, R. (2005) *Happiness: Lessons from a New Science*. London: Allen Lane.
- Lelkes, O. (2006) Tasting Freedom: Happiness, Religion and Economic Transition. *Journal of Economic Behavior and Organization*, 59(2): 173–94.

Luttmer, E. F. (2005) Neighbors as negatives: relative earnings and well-being, *Quarterly Journal of Economics*, 120(3), 963-1002

Maddala, G.S. (1983). *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge Univ. Press, Cambridge, UK.

McBride, M. (2001) Relative-income effects on subjective well-being in the cross-section. *Journal of Economic Behavior and Organization* 45, 251– 278.

Modigliani, F. and Brumberg, R. H. (1954) Utility analysis and the consumption function: an interpretation of cross-section data, in Kenneth K. Kurihara, ed., *Post-Keynesian Economics*, New Brunswick, NJ. Rutgers University Press, pp 388–436

Marx, K., (1847) *Wage Labour and Capital*, translated in 1891 by Frederick Engels, chapter on "Relation of Wage-Labour to Capital", available on <http://www.marxists.org/archive/marx/works/1847/wage-labour/ch06.htm>

Oshio, T., Nozaki, K. and Kobayashi, M. (2011) Relative Income and happiness in Asia: Evidence from nationwide surveys in China, Japan and Korea, *Social Indicators Research*, 104, 351-367

Persky, J. and Tam, M.Y. (1990) Local status and national social welfare. *Journal of Regional Science* 30 (2), 229–238.

Persson, M. (1995) Why are taxes so high in egalitarian societies? *Scandinavian Journal of Economics*, 97, 469-476

Pigou (1920) *The Economics of Welfare*, MacMillan and Co, London

Ravallion, M. and Lokshin, M. (2002) Self-Rated Economic Welfare in Russia, *European Economic Review*, 46(8): 1453–73.

Runciman, W. G. (1966) *Relative Deprivation and Social Justice*, Routledge and Kegan Paul, London.

Senik, C. (2004). When information dominates comparison. A panel data analysis using Russian Subjective data. *Journal of Public Economics* 88, 2099– 2123.

Shields, M. A., and Wheatley Price, S. (2005) Exploring the Economic and Social Determinants of Psychological Well-Being and Perceived Social Support in England, *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 168(3): 513–37.

Silber, J. and Verme, P (2010) Distributional Change, Reference Groups and the Measurement of Relative Deprivation, *Research on Economic Inequality*, 18, 197-217

Silber, J. and Verme, P (2012) Relative Deprivation, Reference Groups and the Assessment of the Standard of Living, *Economic Systems*, 36 (1), 31-45

Sloane, P. J., and Williams, H. (2000) Job Satisfaction, Comparison Earnings, and Gender. *Labour*, 14(3): 473–501.

Smith, A. (1776) *An Inquiry into the Nature and Causes of the Wealth of Nations* (republished, edited by R.H. Campbell and A.S. Skinner. Oxford: Clarendon Press, 1982).

Stouffer, S.A., Suchman, E.A., DeViney, L.C., Star, S.A., & Williams, R.A., 1949, “The American Soldier (1). Adjustment During Army Life.” Princeton University Press.

Tao, H. and Chiu, S. (2009) The effects of relative income and absolute income on happiness, *Review of Development Economics*, 13(1), 164-174

Timbergen (1970) A positive and normative theory of income distribution, *Review of Income and Wealth*, Vol. 16, No. 3, 221-234

Tversky, A. and Kahneman, D. (1991) Loss Aversion in Riskless Choice: A Reference-Dependent Model, *Quarterly Journal of Economics*, 106(4): 1039–61.

- van de Stadt, H., Kapteyn, A., van de Geer, S. (1985) The relativity of utility: evidence from panel data. *The Review of Economics and Statistics* 67(2), 179– 187.
- Van Herwaarden, F. G. and Kapteyn, A. (1979) Empirical comparison of the shape of welfare functions, *Economics Letters*, vol. 3(1), 71-76.
- Van Praag, B.M.S. and Frijters, P. (1999) The measurement of welfare and well-being: The Leiden approach, in Kahneman, D., Diener, E. and Schwarz, N. (Eds), *Foundations of Hedonic Psychology: Scientific Perspectives on Enjoyment and Suffering*, Chapter 21, New York, Russell Sage Foundation
- Veblen, T. (1898) *The Theory of the Leisure Class*, MacMillan, New York
- Veblen, T. (1899) *The Theory of the Leisure Class*. London: Macmillan, George Allen and Unwin.
- Veblen, T. (1909) The limitations of marginal utility. *Journal of Political Economy* 17, 620–636.
- Vendrik, M.C.M. and Woltjer, G.B. (2006) Happiness and Loss Aversion: when social participation dominates comparison. METEOR Research Memorandum RM/06/027. Faculty of Economics and Business Administration, Maastricht University
- Vendrik, M.C.M. and Woltjer, G.B. (2007) Happiness and loss aversion: Is utility concave or convex in relative income? *Journal of Public Economics* 91 (2007), 1423-1448
- Vendrik, Maarten C. M. (1998) Unstable Bandwagon and Habit Effects on Labor Supply, *Journal of Economic Behavior and Organization*, 36(2): 235–55.
- Verme, P. (2010) Happiness, Deprivation and the Alter Ego, in *The Measurement of Individual Well-being and Group Inequalities: Essays in Memory of Z. M. Berrebi, Deutsch, J. and Silber, J.* (Eds.), Routledge
- Verme, P. (2011) Life Satisfaction and Income Inequality, *Review of Income and Wealth*, Vol. 57 (1), 111-127

Yitzhaki, S. (1979) Relative Deprivation and the Gini Coefficient, *Quarterly Journal of Economics*, XCIII: 321-324.

Wang, P. and Vander Weele, T.J. (2011) Empirical Research on Factors Related to the Subjective Well-being of Chinese Urban Residents, *Social Indicators Research*, 101, 447-459

Winkelmann, L. and Winkelmann, R. (1998) Why are the unemployed so unhappy? Evidence from panel data, *Economica* 65, 1-15