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# Income and Well-being

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# Income and Well-being: An Empirical Analysis of the Comparison Income Effect

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# An Empirical Analysis of the Comparison Income Effect

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# Income and Well-being:
# An Empirical Analysis of the Comparison Income Effect

**Abstract**

This paper presents an empirical analysis of the importance of 'comparison income' for individual well-being or happiness. In other words, the influence of the income of a reference group on individual well-being is examined. The main novelty is that various hypotheses are tested: importance of own income, relevance of the income of the reference group and of the distance between own income and the income of the reference group, and asymmetry of comparisons, i.e. the comparison income effect differing between richer and poor individuals. The analysis uses a self-reported measure of satisfaction with life as a measure of individual well-being. The data come from a large German panel known as GSOEP. The study concludes that the income of the reference group is about as important as own income for individual happiness, that individuals are happier the larger their income is in comparison with the income of the reference group, and that for some populations this comparison effect is asymmetric.

**Key-words**: Comparison Income, Interdependence of Preferences, Reference Group, Relative Utility, Subjective Well-Being.

**JEL-Code**: I31.

# 1. Introduction

Utility theory is based, among others, on the premise that more is better and therefore that increases in income are desirable from an individual's perspective. In technical terms, a higher income allows the insatiable consumer to reach a higher indifference curve. Despite this assumption, the relation between income and happiness or well-being[1] has been one of the most discussed and debated topics in the literature on subjective well-being since the early 1970s (for an overview see Frey and Stutzer, 2002) .

On the one side, various researchers claim that income correlates only little with individual well-being, so that continuous income growth does not lead to ever happier individuals. Easterlin (1974, 1995, 2001) finds that while richer individuals in a country are happier than their poorer fellows, income increases do not lead to increases in well-being. In her book *The Overworked American*, Schor (1991, chapter 5) reports that the percentage of United States population that felt "very happy" peaked in 1957 and decreased since then, despite continuous economic growth (for similar ideas see also Campbell *et al.*, 1976; Frank, 1999; and Scitovsky, 1976). Oswald (1997) analyses a large data set for the US and various West European countries and concludes that a higher income only results in a slightly higher happiness level. Inside the same country, it is usually found that there is a low correlation, if any, between income and subjective well-being (see, Ferrer-i-Carbonell and Frijters, 2001). From all that one can conclude that richer individuals in the same country are only (if at all) slightly happier than their poor co-citizens, and economic growth in Western countries has not led to happier individuals.

On the other side, income allows people in modern societies to buy expensive cars, enjoy luxurious leisure activities, purchase the last technologically advanced goods, and travel to exotic countries. Moreover, the majority of individuals express much interest in obtaining a higher income level, indicating that this is an explicit goal for most people. There are indeed studies that

[1] The terms well-being, happiness, life satisfaction, and quality of life are taken as interchangeable in this paper.

provide evidence that countries with higher income have higher average levels of well-being (Diener *et al.*, 1995; Inglehart, 1990). In other words, richer countries, as well as richer individuals in one country, are slightly happier.

Several explanations have been given for what seems to be a contradiction. First, individual well-being does not depend only on income in absolute terms but also on the subjective perception whether income is adequate to satisfy one's needs. Second, individual income perception is subject to the own situation in the past as well as to the own income compared with the income of other people. The latter reflects the importance of the relative position of individuals in society for their satisfaction with life. This is often referred to as the "comparison income" or "relative utility" effect. According to Easterlin (1995, p.36): "... happiness or subjective well-being, varies directly with one's own income and inversely with the incomes of others". The "others" constitute what is known as the reference group. Third, it is often argued that individuals adapt to new situations by changing their expectations (Helson, 1947). This implies that higher incomes are accompanied by rising expectations that lead to what is known as "the hedonic treadmill" (Brickman and Campbell, 1971) or the "preference drift" (van Praag, 1971). Thus, individuals strive for high incomes even if these lead only to temporary or small increase in well-being.

This paper aims at an empirical testing of the importance for individual happiness or well-being of own income compared to the income of others, namely the income of the reference group. This will be done through econometric regression of individual self-reported happiness, known as Subjective Well-Being (SWB). The empirical analysis is based on a large German panel data set, the German Socio Economic Panel (GSOEP). At a general level, this study contributes to the small empirical literature on interdependence of individual well-being and of individual preferences in general. The main contributions of this paper in relation to previous work are the following. First, the present study includes three different specifications to test for the hypothesis of the importance of the reference group income on individuals well-being. The

other empirical studies only include the average income of the reference groups, and do not test for other hypotheses.

Second, the estimation of SWB includes a large set of control variables, such as family size, number of children, education, gender, age, and whether the individual works. Some of these variables are correlated with income and thus its inclusion is of importance for the study of the relation between income and well-being.

Third, the data set at hand has a continuous measure of income. Often, the income variable is only available in intervals and not on a continuous scale (for example, McBride, 2001). Additionally, SWB is measured on a 0 to 10 scale, which contrasts with other studies that only have a scale with 3 or 4 numbers. The larger the scale, the more precise is the measure of individual well-being. Summarizing, the two most relevant variables for the analysis are of fairly good quality.

Fourth, the data is a micro panel. The literature on the importance of income for SWB has been based on time time-series or cross-section at the macro or micro level. The use of time-series, which usually indicates a fairly stable SWB despite income growth, can not capture the fact that individual expectations and standards change as everybody else is also getting richer. As a result, these studies can not examine the comparison income effect. Cross-section analysis can be based on individuals in the same country (micro) or on multiple countries (macro). The latter type have been undertaken by psychologists, sociologists, and economists alike, leading to conclusions that richer countries have higher average levels of well-being. Nevertheless, such country-comparisons suffer from the problem of cultural differences, which implies that the results are doubtful since stated SWB are not comparable among countries. Cross-section micro empirical analysis do not suffer from this limitation. Moreover, this type of data allows to test for the importance of the income of the reference group. The use of micro panel data, as in the present case, has the same advantages as the cross-section micro data and some more. The use of panel data allows to take into account the individuals personal traits that largely determinate

SWB. An optimistic individual tends to give a higher SWB score than a pessimistic one even if their objective situation is identical. The empirical analysis presented here corrects for this by including individual random effects. Thus, the error term, or unobservable variables, has a systematic part related to the individual that can be identified by means of panel data techniques.

The paper is structured as follows. Section 2 briefly discusses the interdependence among individual preferences and surveys the literature. Section 3 introduces the subjective well-being question and formalizes the hypotheses to be tested. Section 4 presents the data and the estimation procedure. Section 5 discusses the empirical findings on the relationship between income, "comparison income", and well-being. Section 6 concludes.

## 2. Interdependence of preferences

The discussion about the interdependence of preferences and the importance of other individuals in one's utility and consumption decisions goes back to the inception of modern utility and consumption theory. In the beginning of the 20$^{th}$ century, Veblen argued that the marginal utility school failed to account for the significant importance of human interactions for individual decision making: "Then, too, the phenomena of human life occur only as phenomena of the life of a group or community" (Veblen, 1909, page 629). In economics, the interrelation among individuals of a society is relevant at least in two respects. First, individuals are affected by the economic situation of their peers. Second, consumption and behavior of individuals are influenced by decisions of other individuals of society (see Hodgson, 1988 for a summary). These two issues are closely related.

Already at the end of the 19$^{th}$ century, Fisher considered the introduction of consumption of other individuals in individual utility. He argued that the purchase of diamonds, for example, depends not only on the good itself but also on the status given to it by society at large (Stigler, 1950). Veblen (1909, page 632) explains this as follows: "Precious stones, it is admitted, even by

hedonistic economists, are more esteemed than they would be if they were more plentiful and cheaper". Other economists of that time that highlighted the interdependent nature of wants are Knight (1922) and Clark (1918). Somewhat later, Duesenberry (1949) studied and empirically tested the impact of interdependent preferences on individual consumption and savings behavior. Around the same time, Leibenstein (1950) reasoned that consumers get satisfaction not only from the good itself (functional demand) but also from other characteristics related to the consumption of the good (nonfunctional demand).[2] The nonfunctional demand includes the "Bandwagon effect", namely when individuals consume a good because a large proportion of the society does it. In this case the good serves the purpose of social belonging.

The work on interdependence of preferences was picked up by, among others, Frank (1985a), Kapteyn (1977), Kapteyn *et al*. (1978), and Holländer (2001). Other recent studies on the interdependence of preferences on consumption and savings decisions are, for example, Childers and Rao (1992), Bearden and Etzel (1982), Falk and Knell (2000), Frank (1985b). All these studies find that individual consumption is partly driven by other's consumption. In particular, consumption decisions are, to a certain extent, a result of imitating others and following social standards. In this sense, consumption causes a negative externality by reducing welfare of other individuals (Frank, 1989; Layard, 1980). Other studies have examined the influence of interdependent preferences on individual behavior other than consumption and savings: giving charity (see, e.g., Andreoni and Scholz, 1998); voting (see, e.g., Schram and Sonnemans, 1996); and labor market behavior (see, e.g., Aronsson *et al.*, 1999; Charness and Grosskopf, 2001; Woittiez and Kapteyn, 1998).

Due to interdependence of preferences, individual happiness and satisfaction will depend on what one achieves in comparison with others. If everybody would drive a Rolls Royce, one would feel unhappy with a cheaper car. Thus, individual happiness and welfare depend not only

[2] This is also related to the distinction made by the Greek philosophers between the intrinsic value and the subjective value (Georgescu-Roegen, 1968)

on the material achievements and income in absolute terms but also on one's relative position. Following this line of thought, it is usually assumed that individual well-being depends on own income as well as on the income of a reference group. The reference group can include all members of a society or only a subgroup of them, such as individuals living in the same neighborhood or having the same education level. Empirical studies that have tried to test this hypothesis are scarce. This lack of empirical work is consistent with the fact that the research on the interdependence of preferences is still marginalized in economics, even if fewer economists seem to believe in isolated individual preferences and utility.

Next, the main empirical findings using micro data, as in the present case, on the relation between the individual well-being or welfare and the income of the reference group, are summarized here. All the studies report a negative relation between own well-being or welfare and other's incomes. Kapteyn and van Herwaarden (1980), Kapteyn *et al*. (1978), Kapteyn *et al*. (1997), van Praag *et al*. (1979), and van de Stadt *et al*. (1985) present an empirical analysis of the importance for individual utility of their perception about where they are in the income distribution. Individual welfare is measured by means of reported answers to an income evaluation question. They find that individual utility depend negatively on the income of the reference group. They call this phenomenon the *reference drift effect* (see, for example, Kapteyn *et al*., 1978 page 177). Clark and Oswald (1996) find evidence of the negative influence of other's income to own job satisfaction, which is measured by means of self-reported questions. Thus, they analyze the comparison income effect on job-utility. On individual happiness, McBride (2001) presents an empirical analysis to test for the effect of own income, past financial situation, and cohort (reference) income on SWB. His study, as in the present case, is based on self-reported happiness. Past financial situation is subjectively defined by the respondents to as whether they were better off or worse off than their own parents McBride (2001) finds a negative correlation between SWB and the average income of the individual's cohort and the financial situation of the parents. In other word, the higher the income of the peers, the less satisfied is the

individual. McBride (2001) also tests for asymmetry of comparisons by regressing the SWB equation on different sub-samples according to income. He finds that the coefficient of the income of the reference group is larger for the richer sub-sample than for the poorer sample. This is in contradiction with Dusenberrgy (1949) assumption that comparisons are only up-wards.

# 3. Method of analysis

## 3.1 The life satisfaction question

The empirical analysis is based on a subjective, self-reported measure of well-being that was extracted from individual answers to a life satisfaction question. Life satisfaction questions have been posed into questionnaires for over three decades, starting with Bradburn (1969), Cantril (1965), and Likert (1932). In the GSOEP data set, which is used for the empirical analysis of this paper, the life satisfaction question runs as follows:

*And finally, we would like to ask you about your satisfaction with your life in general. Please answer by using the following scale, in which 0 means totally unhappy, and 10 means totally happy.*
*How happy are you at present with your life as a whole?*

The answer to this question takes discrete values from 0 to 10, and has been referred to as Subjective Well-Being (SWB), General Satisfaction, and self-reported life satisfaction. Here after, it is referred to as SWB.

Psychologists and recently economists have made ample use of subjectively evaluated measures of individual well-being, satisfaction, and welfare. See, for example, the economists Clark (1997, 1999), Clark and Oswald (1994, 1996), DiTella et al. (2001), Easterlin (1974, 1995, 2000, 2001), Ferrer-i-Carbonell and Frijters (2001), Ferrer-i-Carbonell and van Praag (2001a, 2001b), Frey and Stutzer (1999, 2000a, 2000b), Frijters (2000), Frijters *et al*. (2002), Frijters and

van Praag (1998), Ng (1996, 1997), McBride (2001), Oswald (1997), van Praag et al. (2000), and Pradhan and Ravallion (2000).

In order to use answers to SWB questions in the analysis, three assumptions are needed: (1) individuals are able and willing to answer satisfaction questions; (2) there is a relation between what is measured and the concept the researcher is interested in; in particular, *SWB* is linked with the economic concept of welfare or well-being (*W*); (3) interpersonal comparability at an ordinal level is assumed; i.e. an individual with a *SWB* of 8 is strictly happier than one with a *SWB* of 6. Note that other studies sometimes assume cardinality, meaning that the satisfaction difference between a SWB equal to 8 and one equal to 6 is the same as between 6 and 4. For discussion of the underlying assumptions see Ferrer-i-Carbonell (2001) and Ng (1996, 1997).

### 3.2 The hypotheses and corresponding specifications

This paper aims at testing the importance of the income of other individuals on own well-being. The following relation is assumed for each individual *n* at time *t*

$$W = SWB(y, y_r, X) \tag{1}$$

where *W* is the economic concept of welfare or well-being, *y* stands for the family income and $y_r$ for the family income of the reference group. The vector of variables *X* includes individual and household socio-economic and demographic characteristics, such as age, education, number of children living in the household, and whether the individual works. The set of variables *X* that influence individual SWB has been discussed in the economic and psychological literature (see, for example, Argyle, 1999). In the present paper, the decision of which variables *X* have to be included is based on the literature and data availability.

The empirical analysis will be based on four different specifications of (1) so as to test for various hypotheses regarding the influence of income and the income of the reference group on SWB. The most simple specification is one which includes, next to *X*, only own family income as a determinant of SWB. This will be the first specification presented in the empirical analysis. A common assumption in economics is that family income (*y*) is positively related to well-being. In cross-section analysis, the income coefficient has been always found to be positive although not very large. Often, the utility or individual welfare function is believed to be concave in income and consequently income is introduced in logarithmic form. Here, this approach is followed.

A second specification will add the income of the reference group to the first specification. The reference income, $y_r$, is anticipated to be negatively correlated with individual well-being. In other words, the higher the income of the reference group, the less satisfied are individuals with their own income. This paper defines the reference income of an individual as the average income of the reference group, i.e. $1/N_i \sum_i y$, where *i* are the individuals who belong to the same reference group. $Y_r$ will be included in a logarithmic specification. So far, only a few other studies on satisfaction and income have included the income of the reference group in the regression (see, e.g., Clark and Oswald, 1996; Kapteyn and Herwaarden, 1980, Kapteyn *et al*., 1997, and McBride, 2001), and all found a negative coefficient.

A third specification assumes that SWB depends on the distance between the own and the reference group income. This is done by including the difference between the logarithm of the own income and the logarithm of the average income of the reference group, i.e. $Ln(y) - Ln(y_r)$. This variable is expected to have a positive impact on SWB, indicating that the richer an individual is in comparison with others the happier she will be. Similarly, if $y_r$ is larger than *y*, the larger the difference the unhappier the individual will be.

A fourth and last specification hypothesizes that income comparisons are not symmetric (see, Duesenberry, 1949; Holländer, 2001; Frank, 1985a,b). In this context, asymmetry means

that while the happiness of individuals is negatively affected by an income below the one of their reference group, individuals with an income above the one of their reference group do not experience a positive impact on happiness or well-being. This idea was introduced in 1949 by Duesenberry (1949, Chapter 2), who defended that poorer individuals are negatively influenced by the income of their richer peers while the opposite is not true, i.e. richer individuals do not get happier from knowing their income is above the one of their co-citizens.

To test for asymmetry, two new variables, *richer* and *poorer*, are created as follows:

$$
\begin{aligned}
&\text{If } y > y_r \text{ then} && \textit{richer} = \ln(y) - \ln(y_r) \\
& && \textit{poorer} = 0 \\
&\text{If } y < y_r \text{ then} && \textit{richer} = 0 \\
& && \textit{poorer} = \ln(y_r) - \ln(y) \\
&\text{If } y = y_r \text{ then} && \textit{richer} = 0 \\
& && \textit{poorer} = 0
\end{aligned}
\qquad (2)
$$

This fourth specification will include the set of explanatory variables *X*, own family income, and the two variables *poorer* and *richer*. According to the hypothesis the coefficient of the variable *richer* is expected to be non-significant, or at least of a smaller magnitude than the variable *poorer*.

Some economists have argued that people perceive income increases of the poorer as positive, so that income redistribution and taxation are justified from a Pareto optimality perspective (see Hochman and Rodgers, 1969). Kapteyn and van Herwaarden (1980) discuss this finding and present empirical results that support the opposite idea, namely that the higher the income of others the unhappier an individual is. Thus, increasing income of other individuals decreases individual happiness. This means that Hochman and Rodgers's (1969) argument is not justified. Nevertheless, if the asymmetry holds, then "…progressive income taxes are *necessary*

to allocational efficiency" (Duesberry, 1949, page 103). Evidently, testing for asymmetry as is done here is very relevant for this policy relevant issue.

An obvious question is how to define the reference group, i.e. who belongs to the reference group of each individual. Does it include individuals of a country, or ones with the same education level, age, gender or region? The literature is divided on this. For example, Easterlin (1995) implicitly assumes that individuals compare themselves with all the other citizens of the same country. 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. Van de Stadt *et al*. (1985) define the reference group according to education level, age, and employment status. In some studies, gender is also considered a relevant variable in defining a reference group.

The present study combines various criteria, so that the reference group contains all the individuals with a similar education level, inside the same age bracket, and living in the same region, i.e. West or East Germany. Education is divided in to five different categories according to the number of years of education, i.e. *less than 10*, *10*, *11*, *12*, and *12 or* more years of education. The age brackets are: *younger than 25*, *25-34*, *35-44*, *45-65*, and *66 or older*. This procedure generates 50 different reference groups. Notice that the reference group is assumed to be exogenous, which is standard in empirical work.[3]

[3] Falk and Knell (2000) present a theoretical model in which the reference group is endogenous.

# 4 Data and estimation procedure

## 4.1 The data

The empirical analysis uses the German Socio-Economic Panel (GSOEP)[4]. The GSOEP started in the former Federal Republic of Germany (West Germany) in 1984 and includes the former Democratic Republic of Germany (East Germany) since 1990. The present analysis uses the sub-sample 1992-1997. The number of missing observations is fairly small; for example, more than 90% of the individuals answer the SWB question. The objectively measured variables are characterized by very few missing observations. The sample includes about 16,000 individuals of which about 28% are Easterners. From the total sample, about 60% are workers and 48% are males. Table 1 presents some descriptive statistics. Table 1 indicates that the average SWB over the 6 year period considered is 6.883. This average is higher for Westerners than for Easterners. Note that the family income average is also higher in the West than in the East.

[Table 1 about here]

Later in Section 5, estimation results will be given for the whole sample as well as for the two sub-samples, i.e. Easterners and Westerners. This is done so as to capture possible differences between both regions due to the fact that both populations lived separately and under different economic and political circumstances for a very long time. Furthermore, SWB is better comparable between individuals with the same cultural background for whom the meaning of well-being and life satisfaction is fairly similar.

[4] The panel is described in detail by Wagner et al. (1993).

## 4.2 The estimation procedure

Individual well-being is not exactly observed. Instead a discrete ordered categorical variable SWB is observed. Consequently, the SWB question is estimated by means of an Ordered Probit model (see Maddala, 1983). The model here describes the latent unobservable variable, $SWB^*$ in the following way

$$SWB^*_{nt} = a + b\ y_{nt} + g\ y_{r,nt} + \sum_k d_k x_{k,nt} + e_{nt} \qquad (3)$$

where $n$ indicates the individual, $t$ the time, $x$ is a set of $k$ explanatory variables, $y$ represents income, $y_r$ reference income, and $e_{nt}$ captures the unobservables.

In order to make use of the panel structure of the data set, the estimation of Equation (3) also includes fixed time effects and individual random effects. The inclusion of fixed time effects, $T$, accounts for the yearly changes that are the same for all individuals. The most relevant example in this context is inflation. Thus, by including time fixed effects, it is not necessary to transform the monetary variables from nominal to real terms. The individual random effects account for the unobservable characteristics that are constant across time but different for each individual. For example, individual personal traits such as optimism and capacity to deal with adversities. In other words, the regression accounts for the fact that given personal characteristics $y$, $y_r$, and $x_k$, optimistic individuals tend to report higher SWB that pessimistic individuals. The error structure of Equation (3) is then rewritten as

$$e_{nt} = u_n + h_{nt} \qquad (4)$$

where $u_n$ is the individual random effect and $h_{nt}$ is the usual error term. As usual, the error terms are assumed to be random and not correlated with the observable explanatory variables. For

the case of the individual random effects, this seems a rather strong assumption as it implies that unobservable individual characteristics such as optimism and intelligence are not correlated with observable explanatory variables such as income and education. The most widely used solution so as to address this issue was proposed by Mundlak (1978). He allows for correlation between the individual random effects and some of the observable variables by assuming the following structure of this correlation (see also Chamberlain, 1980 and Hsiao, 1986):

$$u_n = \sum_j l_j \bar{z}_{j,n} + w_n \qquad (5)$$

The individual random effect $u_n$ is thus decomposed into two terms: a pure error term, $w_n$, which is not correlated with the observable explanatory variables; and a part that is correlated with a subset, $z_{j,nt}$, of the observable variables, $x_{k,nt}$, where $j \leq k$. The correlation between $z_{j,nt}$ and the individual random effect is assumed to be of the form $l \bar{z}_{j,n}$. The sub-set $z_{j,nt}$ includes variables such as income and years of education. Other variables such as age and gender are not assumed to be correlated with the unobservable individual random effect. The coefficient *ë* can be read as a correlation corrector factor without any further meaning for SWB, or alternatively an economic interpretation can be given to *ë*. Here, *ë* is assumed to only represent a statistical correction.

Rewriting equation (3) by incorporating the individual and time effects:

$$SWB^*_{nt} = a + t\ T + b\ y_{nt} + g\ y_{r,nt} + \sum_k d_k x_{k,nt} + \sum_j l_j \bar{z}_{j,n} + w_n + h_{nt} \qquad (6)$$

The model uses the common assumption that $E(w) = E(h) = 0$ and errors are normal distributed.

## 5. Estimation results

This section presents estimation results of the form of Equation (6), accommodating for the four different specifications presented in 3.2.[5] The discussion hereafter focuses on the income coefficients. The coefficients of the other variables do not present surprises for the connoisseur of the SWB literature. The interested reader is referred to Argyle (1999) and Ferrer-i-Carbonell (2001) for a survey. The pesudo-$R^2$ for all four regressions are at about 0.07 to 0.08. This is in accordance with the belief that only about 8 to 20% of individual SWB depend on objective variables and thus can be explained (Kahneman *et al.*, 1999).

First, the results for the most simple specification in which only family income and the control variables are included, is given in Table 2. It is shown that the income coefficient is significant and positively related to SWB for all three sub-samples, i.e. all Germans, Easterners, and Westerners. This result is in accordance with the usual findings, namely that richer individuals are, ceteris paribus, happier than their poorer co-citizens. The income coefficient is clearly larger for Easterners than for Westerners. This is in agreement with the literature, which suggests that (absolute) income is relatively more important for poorer individuals than for richer ones. Note that Easterners have a lower average income than the Westerners (see Table 1).

It is often argued that the relation between income and well-being is not very strong. To understand the importance of income for individual well-being, the family income coefficient has to be put into perspective. For that the income effect on SWB is compared with the effect of other variables. First, the impact of income on the SWB of a *representative individual* is calculated. Hereafter, the representative individual is someone who lives in Germany in 1996 and who shares all characteristics with the sample average. The expected SWB of the representative individual is

[5] The estimation procedure, namely Ordered Probit with individual random effects, is done with LIMDEP 7.0. Convergence was reached with the default convergence criterion and initial parameters, so that no further modifications were needed (Greene, 1998). As routine in Ordered Probit, the variance of the error term is standardized so that $s_h^2 = 1$. Thus, the total error variance is equal to $1 + s_w^2$.

equal to 3.762. This falls between the intercept term 6 and 7, which corresponds to the category 7 on the original 0 to 10 scale. This calculation shows that income is, after 'age', the individual characteristic that contributes the most to the expected SWB of 3.762. This implies that, for this representative individual, income is the second most relevant objective variable for SWB.

Second, the impact of income on SWB is compared with the impact of a change on other variables. For example, imagine that the representative individual is identical as before except that he or she lives alone. If this individual would start living with a partner, he or she would then increase expected SWB in the same quantity as if he or she would experience an income increase of 81%. Thus, for the representative individual who lives alone, an income increase of 81% brings about the same happiness as starting to live with a partner. These two examples seem to indicate that (a) the level of income is very important for individual SWB and (b) the importance of income for SWB is not irrelevant when comparing with the one of other variables.

Nevertheless, income changes do not lead to much improvements on SWB. For example, the representative individual needs an income increase of about 5000% in order to increase his or her expected SWB from 3.762 to 4.762. An expected SWB of 4.762 falls between intercept 7 and 8, which corresponds to 8 in the 0 to 10 scale. Remember that the representative individual expected SWB of 3.762 corresponds to 7. The income increase needs to be of about 340% in order to obtain an expected SBW of just above 4.060, which already corresponds to category 8 of the original 0 to 10 scale.

[Table 2 about here]

Table 3 presents the results for specification two, in which next to family income the average income of the reference group is included. The inclusion of the average income of the reference group does not change the family income coefficient significantly. The expected SWB for the representative individual is now 3.761, virtually the same as with the first specification. As

expected, the average income of the reference group has a negative impact on SWB (McBride, 2001). Actually, both income coefficients are very similar. For Westerners, the coefficient of the average income of the reference group is higher than the coefficient of own family income. For Easterners and for the total sample, this is the opposite. The results imply that if all individuals of the same reference group enjoy an income increase of the same magnitude, the expected SWB of them remains fairly constant.

[Table 3 about here]

Table 4 presents the results for specification three, in which average income of the reference group is substituted by the difference between own family income and reference income. As expected, the coefficient of the difference is positive, indicating that the larger own income is in comparison to the reference group income, the happier the individual is. Nevertheless, the coefficient of the difference between own income and reference groups income is only significant for the sub-sample of all Germans. Additionally, the income coefficient becomes now non-significant for all sub-samples. For this specification, the representative individual has an expected SWB of 3.740. If the individual experiences an income increase from about 3.500 to 15.000 DM per month, while the income of the reference group is maintain identical (3800 DM), his or her expected SWB increases to almost 10%, i.e. 4.106. This falls between the intercept terms 7 and 8, which corresponds to level 8 of the original 0 to 10 ranking. Imagine that this individual with an income of 15000 DM would now change his or her reference group and start comparing him of herself with a reference group with an average income of 15000 DM, the expected SWB would decrease to 3.916, corresponding to 7 in the original ranking.

[Table 4 about here]

Table 5 presents the results for specification four, which includes the variables *richer* and *poorer*. The family income coefficient is, as for the third specification, non-significant for all three sub-samples. Table 5 indicates that for Easterners the comparison income effect is symmetric, i.e. the variables *richer* and *poorer* have approximately the same magnitude. Nevertheless, these two variables are non –significant. Contrarily, for Westerners and for the whole sample, the comparisons are asymmetric. Concretely, the coefficient for *richer* is non-significant and smaller than the coefficient for *poorer*. The coefficient of the variable *poorer* is significant for both sub-samples. This yields the conclusion that for West Germans comparisons are, as postulated by Duesenberry (1949), asymmetric and upwards. This is in contradiction with McBride's (2001) findings who regresses SWB on a US data set. For Easterners, comparisons are symmetric.

[Table 5 about here]

## 6. Conclusions

This paper presented an empirical test of four hypotheses about the importance of income and "comparison income" for individual well-being. The empirical analysis has taken responses to a life satisfaction question as a measure for individual well-being or happiness. The data used is a sub-sample of a large German micro panel data set (GSOEP). The estimation results distinguish between (former) East and West Germans.

The relevance of the present study lies in two features. First, it contributes to the small empirical literature on the impact of interdependent preferences on individual well-being. This is specially true when looking at the studies that, as this one, use micro data and measures well-being by means of self-reported answers to a life satisfaction question. Second, it differs from other studies as it tests four different hypotheses of the relation between income and individual well-being. The four specifications are based on the following hypotheses: only own family

income is important, individual well-being depends on the income of the reference group or on the difference between own income and the average income of the reference group, and income comparisons are upwards. The empirical analysis estimates individual subjective well-being by means of an Ordered Probit model with individual random effect. The regression includes a large set of variables such as education and working status.

The main conclusions can be summarized as follows: (1) even if income has a small effect on individual well-being, the effect is not insignificant when compared to other objective variables; (2) the impact of income on individual well-being is larger for East Germans than West, which makes sense given that Easterners are poorer than Westerners; (3) increases in family income accompanied by identical increases in the income of the reference group do not lead to significant changes in well-being; (4) the larger own income is in comparison to the income of the reference group, the happier is the individual; and (5) for Westerners and for the total German sample the comparison effects are asymmetric; this means that poorer individual's well-being is negatively influenced by the fact that their income is lower than the one of their reference group, while richer individuals do not get happier from having an income above the average. In other words, comparisons are mostly "up-wards".

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**Table 1: GSOEP 1992-1997: SWB and Family Income**

| | Total Sample | | Westerners | | Easterners | |
|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. | Mean | Std. Dev. |
| Subjective Well-Being, 0- 10 scale | 6.883 | 1.805 | 7.105 | 1.770 | 6.325 | 1.773 |
| Family income, DM net per month | 3846 | 1854 | 4066 | 1945 | 3295 | 1477 |
| Number Observations | 71911 | | 51472 | | 20439 | |
| Number of Individuals | 15881 | | 11527 | | 4354 | |

**Table 2: General Satisfaction, first specification**

Ordered Probit Individual Random Effect, GSOEP 1992-1997

| | Total | | Westerners | | Easterners | |
|---|---|---|---|---|---|---|
| | Coefficient | t-ratio | Coefficient. | t-ratio | Coefficient. | t-ratio |
| Constant | 13.039 | 21.064 | 10.666 | 14.670 | 18.941 | 14.875 |
| Dummy for 1992 | 0.223 | 15.527 | 0.350 | 20.516 | -0.065 | -2.289 |
| Dummy for 1993 | 0.177 | 11.978 | 0.265 | 14.978 | -0.033 | -1.184 |
| Dummy for 1994 | 0.115 | 7.605 | 0.182 | 10.096 | -0.049 | -1.700 |
| Dummy for 1995 | 0.129 | 8.633 | 0.161 | 9.128 | 0.046 | 1.611 |
| Dummy for 1996 | 0.096 | 6.110 | 0.113 | 6.076 | 0.038 | 1.306 |
| Ln(age) | -7.822 | -22.526 | -6.422 | -15.728 | -11.727 | -16.562 |
| Ln(age) ^ 2 | 1.039 | 21.763 | 0.840 | 14.954 | 1.593 | 16.356 |
| Age reaches a minimum at | 43.072 | | 45.747 | | 39.709 | |
| *Ln(family income)* | 0.248 | 16.672 | 0.163 | 9.415 | 0.334 | 10.726 |
| Ln(years of education) | 0.078 | 0.675 | 0.058 | 0.437 | 0.477 | 1.969 |
| Ln(number children at home +1) | -0.046 | -2.530 | -0.029 | -1.387 | -0.018 | -0.468 |
| Ln(number adults at home) | -0.116 | -6.354 | -0.092 | -4.432 | -0.108 | -2.758 |
| Male | -0.068 | -3.989 | -0.065 | -3.260 | -0.058 | -1.696 |
| Living together? | 0.146 | 10.954 | 0.176 | 11.754 | 0.158 | 4.714 |
| Worker | 0.194 | 15.538 | 0.147 | 9.861 | 0.331 | 14.133 |
| Easterner | -0.545 | -23.808 | | | | |
| Mean (ln(family income) | 0.449 | 15.690 | 0.485 | 14.653 | 0.517 | 8.461 |
| Mean (ln(years of education)) | -0.180 | -1.459 | -0.123 | -0.863 | -0.710 | -2.790 |
| Mean (ln(children at home +1)) | -0.079 | -2.585 | -0.133 | -3.764 | -0.014 | -0.230 |
| Mean (ln(adults at home)) | -0.184 | -5.565 | -0.115 | -3.045 | -0.538 | -7.317 |
| Intercept term 1 | 0.334 | 19.856 | 0.325 | 16.264 | 0.358 | 11.333 |
| Intercept term 2 | 0.815 | 40.522 | 0.779 | 31.990 | 0.896 | 24.390 |
| Intercept term 3 | 1.341 | 63.620 | 1.268 | 49.956 | 1.486 | 38.178 |
| Intercept term 4 | 1.768 | 83.795 | 1.681 | 65.814 | 1.938 | 50.118 |
| Intercept term 5 | 2.655 | 123.235 | 2.504 | 96.138 | 2.936 | 74.241 |
| Intercept term 6 | 3.209 | 148.728 | 3.040 | 116.618 | 3.530 | 88.921 |
| Intercept term 7 | 4.060 | 187.790 | 3.884 | 149.081 | 4.413 | 110.000 |
| Intercept term 8 | 5.372 | 244.027 | 5.204 | 197.750 | 5.728 | 135.968 |
| Intercept term 9 | 6.231 | 276.453 | 6.087 | 227.358 | 6.493 | 145.730 |
| Std Dev. of individual random effect | 1.019 | 136.823 | 1.045 | 116.029 | 0.948 | 68.638 |
| Number Observations | 71911 | | 51472 | | 20439 | |
| Num. of Individuals | 15881 | | 11527 | | 4354 | |
| Log Likelihood | -124201 | | -87986.2 | | -35823.4 | |
| Pseudo-R2 | 0.080 | | 0.084 | | 0.072 | |

**Table 3: General Satisfaction, second specification**

Ordered Probit Individual Random Effect, GSOEP 1992-1997

| | Total | | Westerners | | Easterners | |
|---|---|---|---|---|---|---|
| | Coefficient | t-ratio | Coefficient. | t-ratio | Coefficient. | t-ratio |
| Constant | 14.470 | 20.615 | 11.983 | 14.796 | 20.452 | 13.759 |
| Dummy for 1992 | 0.220 | 15.367 | 0.348 | 20.427 | -0.071 | -2.479 |
| Dummy for 1993 | 0.177 | 11.974 | 0.266 | 15.053 | -0.037 | -1.329 |
| Dummy for 1994 | 0.115 | 7.559 | 0.181 | 10.051 | -0.052 | -1.799 |
| Dummy for 1995 | 0.129 | 8.614 | 0.160 | 9.091 | 0.044 | 1.549 |
| Dummy for 1996 | 0.096 | 6.160 | 0.114 | 6.119 | 0.038 | 1.289 |
| Ln(age) | -7.693 | -21.543 | -6.303 | -14.860 | -11.635 | -16.446 |
| Ln(age) ^ 2 | 1.017 | 20.603 | 0.819 | 13.996 | 1.572 | 16.045 |
| Age reaches a minimum at | 43.995 | | 46.781 | | 40.508 | |
| *Ln(family income)* | 0.248 | 16.801 | 0.167 | 9.698 | 0.333 | 10.727 |
| Ln(years of education) | 0.112 | 0.971 | 0.081 | 0.605 | 0.503 | 2.082 |
| Ln(number children at home +1) | -0.046 | -2.542 | -0.028 | -1.372 | -0.016 | -0.433 |
| Ln(number adults at home) | -0.114 | -6.299 | -0.093 | -4.516 | -0.104 | -2.652 |
| Male | -0.064 | -3.678 | -0.064 | -3.191 | -0.055 | -1.639 |
| Living together? | 0.144 | 10.808 | 0.175 | 11.718 | 0.156 | 4.679 |
| *Ln[average Income Reference Group]* | -0.226 | -3.469 | -0.206 | -2.682 | -0.244 | -1.845 |
| Worker | 0.197 | 15.771 | 0.150 | 10.067 | 0.331 | 14.162 |
| Easterner | -0.598 | -21.615 | | | | |
| Mean (ln(family income) | 0.456 | 16.065 | 0.486 | 14.813 | 0.535 | 8.753 |
| Mean (ln(years of education)) | -0.126 | -1.012 | -0.063 | -0.435 | -0.626 | -2.404 |
| Mean (ln(children at home +1)) | -0.084 | -2.751 | -0.143 | -4.045 | -0.019 | -0.304 |
| Mean (ln(adults at home)) | -0.185 | -5.580 | -0.113 | -2.986 | -0.544 | -7.420 |
| Intercept term 1 | 0.333 | 19.859 | 0.325 | 16.270 | 0.358 | 11.335 |
| Intercept term 2 | 0.815 | 40.519 | 0.779 | 32.024 | 0.896 | 24.391 |
| Intercept term 3 | 1.341 | 63.604 | 1.268 | 49.954 | 1.485 | 38.182 |
| Intercept term 4 | 1.768 | 83.739 | 1.679 | 65.731 | 1.937 | 50.118 |
| Intercept term 5 | 2.655 | 123.200 | 2.503 | 96.096 | 2.936 | 74.239 |
| Intercept term 6 | 3.208 | 148.708 | 3.038 | 116.572 | 3.529 | 88.913 |
| Intercept term 7 | 4.060 | 187.781 | 3.883 | 149.038 | 4.411 | 109.992 |
| Intercept term 8 | 5.372 | 244.190 | 5.203 | 197.872 | 5.726 | 135.961 |
| Intercept term 9 | 6.232 | 276.681 | 6.085 | 227.560 | 6.492 | 145.683 |
| Std Dev. of individual random effect | 1.018 | 136.815 | 1.044 | 116.065 | 0.947 | 68.581 |
| Number Observations | 71911 | | 51472 | | 20439 | |
| Num. of Individuals | 15881 | | 11527 | | 4354 | |
| Log Likelihood | -124252 | | -88048.9 | | -35829.9 | |
| Pseudo-R2 | 0.0800 | | 0.0834 | | 0.0714 | |

**Table 4: General Satisfaction, third specification**

Ordered Probit Individual Random Effect, GSOEP 1992-1997

| | Total | | Westerners | | Easterners | |
|---|---|---|---|---|---|---|
| | Coeff. | t-ratio | Coeff. | t-ratio | Coeff. | t-ratio |
| Constant | 13.646 | 20.239 | 11.184 | 14.330 | 19.746 | 13.643 |
| Dummy for 1992 | 0.222 | 15.434 | 0.350 | 20.492 | -0.069 | -2.398 |
| Dummy for 1993 | 0.176 | 11.901 | 0.265 | 14.948 | -0.036 | -1.273 |
| Dummy for 1994 | 0.114 | 7.542 | 0.182 | 10.063 | -0.051 | -1.765 |
| Dummy for 1995 | 0.129 | 8.575 | 0.161 | 9.091 | 0.045 | 1.561 |
| Dummy for 1996 | 0.095 | 6.088 | 0.113 | 6.060 | 0.038 | 1.285 |
| Ln(age) | -7.619 | -20.941 | -6.196 | -14.235 | -11.582 | -16.147 |
| Ln(age) ^ 2 | 1.009 | 20.038 | 0.807 | 13.404 | 1.569 | 15.791 |
| Each minimum reach at | 43.554 | | 46.378 | | 40.120 | |
| Ln(family income) | 0.109 | 1.644 | 0.033 | 0.413 | 0.176 | 1.325 |
| Ln(yrs. education) | 0.090 | 0.780 | 0.074 | 0.557 | 0.476 | 1.963 |
| Ln(children+1) | -0.045 | -2.475 | -0.028 | -1.340 | -0.017 | -0.442 |
| Ln(adults) | -0.114 | -6.276 | -0.091 | -4.373 | -0.106 | -2.706 |
| Male | -0.067 | -3.899 | -0.063 | -3.170 | -0.057 | -1.685 |
| Living together? | 0.144 | 10.858 | 0.175 | 11.701 | 0.155 | 4.643 |
| *Ln(Fam.inc.) –Ln(Avg(IncRefGroup)* | 0.138 | 2.130 | 0.131 | 1.682 | 0.158 | 1.229 |
| Worker | 0.195 | 15.629 | 0.148 | 9.940 | 0.332 | 14.165 |
| Easterner | -0.574 | -21.376 | | | | |
| Mean (ln(f.inc) | 0.455 | 15.868 | 0.489 | 14.756 | 0.527 | 8.591 |
| Mean (ln(years edu)) | -0.136 | -1.086 | -0.088 | -0.606 | -0.636 | -2.421 |
| Mean (ln(ch+1)) | -0.078 | -2.559 | -0.133 | -3.758 | -0.014 | -0.215 |
| Mean (ln(adults)) | -0.180 | -5.448 | -0.111 | -2.943 | -0.535 | -7.270 |
| Mu(01) | 0.334 | 19.856 | 0.325 | 16.263 | 0.358 | 11.333 |
| Mu(02) | 0.815 | 40.514 | 0.779 | 31.979 | 0.896 | 24.393 |
| Mu(03) | 1.341 | 63.595 | 1.268 | 49.921 | 1.485 | 38.181 |
| Mu(04) | 1.768 | 83.748 | 1.680 | 65.757 | 1.937 | 50.120 |
| Mu(05) | 2.655 | 123.172 | 2.504 | 96.068 | 2.936 | 74.249 |
| Mu(06) | 3.209 | 148.640 | 3.039 | 116.521 | 3.530 | 88.926 |
| Mu(07) | 4.060 | 187.661 | 3.884 | 148.935 | 4.413 | 110.007 |
| Mu(08) | 5.371 | 243.906 | 5.204 | 197.577 | 5.728 | 136.000 |
| Mu(09) | 6.231 | 276.344 | 6.086 | 227.211 | 6.493 | 145.762 |
| Std Deviation Ui | 1.018 | 136.771 | 1.045 | 115.967 | 0.947 | 68.615 |
| Number Observations | 71911 | | 51472 | | 20439 | |
| Num. Of Individuals | 15881 | | 11527 | | 4354 | |
| Log Likelihood | -124199 | | -87984.9 | | -35822.6 | |
| Pseudo-R2 | 0.080 | | 0.083 | | 0.072 | |

**Table 5: General Satisfaction, fourth specification**

Ordered Probit Individual Random Effect, GSOEP 1992-1997

| | Total | | Westerners | | Easterners | |
|---|---|---|---|---|---|---|
| | Coefficient | t-ratio | Coefficient | t-ratio | Coefficient | t-ratio |
| Constant | 13.679 | 20.283 | 11.253 | 14.415 | 19.738 | 13.637 |
| Dummy for 1992 | 0.219 | 15.199 | 0.346 | 20.264 | -0.069 | -2.388 |
| Dummy for 1993 | 0.174 | 11.792 | 0.264 | 14.880 | -0.036 | -1.273 |
| Dummy for 1994 | 0.114 | 7.487 | 0.181 | 10.020 | -0.051 | -1.765 |
| Dummy for 1995 | 0.128 | 8.548 | 0.160 | 9.079 | 0.045 | 1.557 |
| Dummy for 1996 | 0.096 | 6.136 | 0.114 | 6.152 | 0.038 | 1.284 |
| Ln(age) | -7.617 | -20.947 | -6.210 | -14.278 | -11.577 | -16.137 |
| Ln(age) ^ 2 | 1.009 | 20.044 | 0.809 | 13.447 | 1.568 | 15.780 |
| Age reaches a minimum at | 43.548 | | 46.346 | | 40.119 | |
| *Ln(family income)* | 0.100 | 1.496 | 0.019 | 0.234 | 0.175 | 1.319 |
| Ln(years of education) | 0.090 | 0.778 | 0.069 | 0.519 | 0.476 | 1.964 |
| Ln(children+1) | -0.045 | -2.518 | -0.029 | -1.390 | -0.017 | -0.443 |
| Ln(adults) | -0.112 | -6.149 | -0.087 | -4.160 | -0.106 | -2.702 |
| Male | -0.067 | -3.946 | -0.065 | -3.249 | -0.057 | -1.684 |
| Living together? | 0.139 | 10.418 | 0.168 | 11.165 | 0.155 | 4.602 |
| *Richer than average* ($Ln(Y) - Ln(Y_r) > 0$) | 0.079 | 1.173 | 0.037 | 0.456 | 0.153 | 1.156 |
| *Poorer than average* ($Ln(Y_r) - Ln(Y) > 0$) | -0.189 | -2.826 | -0.208 | -2.602 | -0.161 | -1.216 |
| Worker | 0.195 | 15.594 | 0.147 | 9.892 | 0.332 | 14.161 |
| Easterner | -0.575 | -21.435 | | | | |
| Mean (ln(family income) | 0.463 | 16.074 | 0.503 | 15.078 | 0.527 | 8.561 |
| Mean (ln(years of education)) | -0.134 | -1.073 | -0.082 | -0.564 | -0.637 | -2.423 |
| Mean (ln(children at home +1)) | -0.080 | -2.626 | -0.137 | -3.862 | -0.014 | -0.216 |
| Mean (ln(adults at home)) | -0.183 | -5.522 | -0.116 | -3.061 | -0.535 | -7.266 |
| | | | 0.263 | | | |
| Intercept term 1 | 0.334 | 19.854 | 0.325 | 16.259 | 0.358 | 11.332 |
| Intercept term 2 | 0.815 | 40.499 | 0.779 | 31.959 | 0.896 | 24.390 |
| Intercept term 3 | 1.342 | 63.561 | 1.268 | 49.875 | 1.485 | 38.179 |
| Intercept term 4 | 1.769 | 83.696 | 1.681 | 65.687 | 1.937 | 50.120 |
| Intercept term 5 | 2.656 | 123.112 | 2.504 | 96.007 | 2.936 | 74.247 |
| Intercept term 6 | 3.209 | 148.563 | 3.040 | 116.443 | 3.530 | 88.925 |
| Intercept term 7 | 4.061 | 187.562 | 3.884 | 148.831 | 4.413 | 110.002 |
| Intercept term 8 | 5.372 | 243.763 | 5.204 | 197.444 | 5.728 | 135.992 |
| Intercept term 9 | 6.231 | 276.163 | 6.087 | 227.068 | 6.493 | 145.744 |
| Std Dev. of individual random effect | 1.018 | 136.698 | 1.044 | 115.908 | 0.947 | 68.583 |
| Number Observations | 71911 | | 51472 | | 20439 | |
| Num. of Individuals | 15881 | | 11527 | | 4354 | |
| Log Likelihood | -124194 | | -87977.3 | | -35822.6 | |
| Pseudo-R2 | 0.080 | | 0.083 | | 0.072 | |