

# THE ROLE OF PROXIMITY AND SOCIAL COMPARISONS ON SUBJECTIVE WELL-BEING\*

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## Abstract

Using longitudinal data from the German Socio-Economic Panel, we analyze the importance of modeling social comparisons when trying to determine their effect on subjective well-being. The contribution of the paper is twofold. On the one hand, we consider measures of social comparisons which assume that individuals compare themselves to each and all the other individuals along the income distribution and that individuals have a different sensitivity for those different comparisons. On the other hand, we consider the possibility that the type of social contacts and values or norms that individuals exhibit could influence the effect of social comparisons on subjective well-being. Interestingly, our results confirm that individuals' subjective well-being is affected not only by the comparisons the individual makes with others above themselves in the income distribution, but also by comparisons made with individuals below themselves. Moreover, it is relevant to consider the sensitivity of social comparisons to the proximity of incomes when evaluating the effect of social comparisons on subjective well-being. Additionally, we conclude that both social and cultural capital also shape the effect of social comparisons on subjective well-being and that the effect is different depending on whether or not comparisons with other individuals are sensitive to proximity.

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## I. INTRODUCTION

The relevance of social influences in the modeling of individual behavior has become increasingly important in the economic research agenda. Recent economic studies have explored the effects of social interactions on economic performance, welfare and subjective well-being (Gui and Sugden, 2005; Meier and Sutzler, 2008). Researchers have increasingly acknowledged that individuals' subjective well-being cannot be solely explained by individual characteristics but by social interactions (Bartolini, Bilancini and Pugno, 2008; Bartonili, Bilancini and Sarracino, 2013; Cramm, Moller and Nieboer 2012; Klein, 2012; Muffles and Heady, 2013, among others). Some of the most powerful predictors of subjective well-being, as reported in the related literature, are social comparisons, individual past income and social and cultural capital.<sup>1</sup>

The present paper contributes to this literature in different ways. The first contribution consists of incorporating from other disciplines (behavioral, inequality, etc.) the idea of to what extent the social comparisons differ depending on the individual's position along the income distribution. The novelty of this approach is to treat comparisons differently by assigning different weights depending on the distance with societal peers. The second contribution concerns the idea of to what extent the effect of social comparisons depends on exposure to social relationships or on the individual's norms and values. Indeed, as we show in the final section, this could be considered a new approach to the issue of reference group; a crucial matter when dealing with social comparisons.

The third contribution is the evaluation of the effect of simultaneous types of comparisons on subjective well-being. We analyze which effect on subjective well-being is larger, that related to either one's own current or past resources or comparisons with others' resources. These results could be helpful in designing and evaluating economic policies concerning deprivation. Finally, we consider the equivalent household income as it is a more appropriate measure than the household income adopted in most of the existing literature.

To perform the analysis we use the German Socio-Economic Panel over the period 1998-2011. First, our results confirm the importance of taking the whole distribution into account when dealing with social comparisons. Contrary to the

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<sup>1</sup> Our interest is not to propose or test any of the theories, but rather to evaluate the impact of the determinants of subjective well-being. We would like to point out the paper of Durayappah (2011) where different theories are presented.

previous literature, our results show that individuals' subjective well-being is affected not only when individuals compare with others above themselves in the distribution (upwards comparisons), but also when comparisons are made with individuals below themselves (downward comparisons). Moreover, these comparisons produce different effects on well-being depending on whether or not individuals compare themselves only with individuals close to them. Secondly, our evidence shows that the perceived ranking exerts a larger effect on subjective well-being than past income experiences. Thirdly, we find that both social and cultural capital shape the effect of social comparisons on subjective well-being in a different way depending on the sensitivity to proximity of societal peers of the measure of deprivation.

The current paper is structured as follows. Section 2 reviews the literature on subjective well-being and its determinants. In section 3 the formulation of the hypotheses is outlined jointly with the questions that emerge with these formulations and the empirical strategy is presented. In section 4 the dataset and the variables used in the analysis are described. The main results are discussed in section 5 and conclusions are set out in Section 6.

## **II. BACKGROUND**

### ***II.A. Subjective well-being***

Recent studies on well-being have suggested that well-being consists not only of a hedonic component that is often measured by subjective well-being but also a eudaimonic component that represents meaning of life, flourishing, or psychological well-being as described in Waterman (1993), and more recently in Diener et al. (2009), Delle Fave et al. (2011), Chen et al. (2012), and Sul, Kim and Choi (2012), among others. The conceptual distinction between these two types of well-being is under debate. Evidence thus far seems to suggest that subjective and psychological well-being are highly related. The present study focuses on the hedonic aspects of well-being, that is, on subjective well-being.

Subjective well-being is the scientific term used in psychology for an individual's evaluation of the intensity that the individual experiences in terms of positive and negative affect, happiness, or satisfaction with life (Stutzer and Frey, 2010). Although there exist many alternatives to measure subjective well-being, they can be grouped along two primary dimensions. The first dimension considers the distinction between

individuals' own judgments about life satisfaction and the positive-negative affect component of well-being (Diener 1984, 2000; Diener et al. 1999, 2009; Schimmack 2008; and Stutzer and Frey, 2010). However, as pointed out in Diener (2006), subjective well-being does not consider only how happy individuals are at a point in time but also how satisfied they are with their lives as a whole. The second dimension distinguishes between measures that capture a person's level of subjective well-being and the duration in one rather than another mental state. Because life satisfaction is a relatively stable construct, duration measures usually refer to affect (comprising feelings and moods).

Additionally, there is still an ongoing discussion in the economic literature of whether a link really exists between the underlying utility and reported measures of well-being. This link is of special interest to the economic literature, where one of the main focuses is on the measurability and interpersonal comparability of utility. Frey and Stutzer (2002) used the convention of reserving the term "utility" for describing individuals' choices between economic variables; however, self-reported well-being is related to "utility" in the sense that well-being helps predict individuals' economic choices. Subjective well-being, as a more general term, is more likely to represent the "experienced utility" (Lelkes, 2006a, 2006b). In particular, while life satisfaction coincides with an economic point of view on well-being and represents a possibility to satisfy own preferences (Diener, 1984), happiness reflects a degree to which an individual judges the overall quality of his own life as a whole favorably (Headey and Wooden, 2004).

Following Sacks, Stevenson and Wolfers (2010), we focus on life satisfaction rather than other measures of subjective well-being, such as happiness, for two additional reasons. First, life satisfaction is more commonly found in data sets than any other measure. Second, the previous literature in economics has largely focused on life satisfaction questions (even though researchers have tended to label these analyses as "happiness"). Thus, for direct comparability with the previous literature, we analyze similar questions.

## ***II.B. Determinants of subjective well-being***

A common result in the literature is that individuals' economic status or material circumstances affect their subjective well-being in a positive way. In the related literature, economic status is usually modeled by income. Existing evidence shows that

the level of utility or well-being varies positively with the level of income (for a comprehensive review of the relationship between income and subjective well-being see Clark, Frijters and Shields 2008). However, this positive relationship might no longer be positive when some other determinants are considered (Distante, 2013). Moreover, this effect is found to be positive up to a threshold beyond which utility remains largely invariant (Caporale et al., 2009). This idea is consistent with the assumption of diminishing marginal utility of consumption (or income) posited by neoclassical economic theory.

However, the motivation for the strong interest in subjective well-being comes from the surprising stylized fact called the Easterlin Paradox (Easterlin, 1974, 1995), which refers to people not reporting increasing levels of well-being despite the increase of income over time. Thus far, two non-alternative explanations of the Easterlin Paradox have been put forward in the literature (Clark, Frijters and Shields 2008 and Bartolini, Bilancini and Sarracino, 2013, among others) which are directly related to the nature of the comparisons that an individual makes.

One explanation is based on the existence of internal benchmarks, which involve aspirations and dynamic comparisons with one's own situation at different points of time.<sup>2</sup> The related literature highlights the existence of hedonic adaptation, which presumes that changes in people's living conditions have only a transitory effect on their well-being because people tend to adapt to their past experiences. The other explanation is based on external benchmarks and holds that comparisons are made among peers or relevant others such as neighbors, co-workers, parents, etc. These social comparisons assume that what matters to people is not their absolute level of resources but their level of resources relative to that of a selected group of individuals with whom they compare themselves. This is the well-known "*keeping up with the Joneses*" effect. Both explanations have well-established roots and, so far, have been widely supported by cross-sectional evidence (see Clark, Frijters and Shields 2008, and the references in following subsections).

Yet another explanation of the Easterlin Paradox, which is less widespread in the literature, also mentions the existence of norms and values (Conceicao and Bandura, 2008). People are happy when they feel they are doing "the right thing," whether the

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<sup>2</sup> Similarly, the notion of "societal expectations" appears in Zuzanek (2012). This notion refers to a generalized longing for better socioeconomic conditions compared with the past rather than with other income groups or countries.

right thing is determined by ethics, principles, religion, custom, or social context. These norms and values are called *cultural capital* in Muffles and Heady (2013).

However, these are not the only determinants of subjective well-being presented in the literature, which is extensive (some extended surveys are Diener et al., 1999, 2009; Frey and Stutzer, 2000, 2002; Dolan, Peasgood and White 2008 and Conceicao and Bandura 2008). A determinant of subjective well-being that has received increasing attention in the literature, but is not directly related to the explanations of the Easterlin Paradox, is *social capital*. The related literature, as we describe later on, shows that individuals with active social relationships tend to be happier.

All the determinants cited here follow the classification of *Capabilities* as defined by Sen (2005) and presented in Muffles and Headey (2013). Finally, the related literature also considers a set of socioeconomic characteristics that influence the level of self-reported well-being.

### **Social comparisons**

The role of social comparisons has been highlighted by sociologists and social-psychologists, namely Festinger (1954), who developed the Social Comparison Theory. This theory postulates that individuals make assessments of their situations by comparing themselves with other people. Related to this, Michalos (1985) proposed the Multiple Discrepancies Theory, which postulates that life satisfaction emerges from individuals' evaluations about what they currently have against multiple comparison standards. In economics, the modeling of social comparisons or the relative utility effect, or more generally, interdependent preferences, can be dated back to at least Veblen (1899) and Duesenberry (1949). These authors explored the thesis that households care not only about their own consumption level, but also about their consumption level relative to those of other households in their reference group.

The empirical analysis of such social comparisons usually presents some key issues (i) in terms of what kind of resources the comparisons are made; (ii) how to identify the reference or comparison groups; and (iii) how to model such comparisons.

In the related literature, to assess the influence of other relevant individuals on the valuation of one's own material circumstances, resources have been measured by expenditure (Bookwalter and Dalenberg 2010), by wages (Tao and Chiou 2009), less frequently by wealth (Graham and Felton 2006; Ateca-Amestoy, Cortes and Moro-Egido 2013), and mostly by income (McBride 2001; Blanchflower and Oswald 2004a;

Ferrer-i-Carbonell 2005; Luttmer 2005; Clark, Frijters and Shields 2008 and most of the references in what follows).

Concerning the identification of relevant others, surveys usually contain no direct questions about the composition of the reference groups, with few exceptions (Kingdon and Knight 2007; Senik 2009; Clark and Senik 2010). One option for researchers is to exogenously impose the reference groups, and delimit the subjects of comparison based on some shared observable characteristics of the respondents (Ferrer-i-Carbonell 2005).<sup>3</sup> Another option is to estimate resources (mainly income or wages), equations and then compute the predicted resources of someone with similar characteristics (Clark, Frijters and Shields 2008).

In terms of how to model social comparison, a significant number of studies have investigated the role of reference income in shaping an individual's subjective well-being (from Duesenberry 1949; Easterlin 1995, 2003 to the more recent papers cited in this review, such as Bartolini, Bilancini and Sarracino 2013, with special mention of those at the beginning of the 2000s, namely McBride 2001; Blanchflower and Oswald 2004a; Ferrer-i-Carbonell 2005; Luttmer 2005; Durlauf 2006 and Clark, Frijters and Shields 2008, among others). Most of the existing evidence considers a *symmetric comparison effect*, that is, the extent to which a change in the group's reference income influences individual's well-being in a similar manner for everybody. In this approach, the reference income is mainly the mean income, the so-called *mean dependence framework*. McBride (2001), Blanchflower and Oswald (2004b), Ferrer-i-Carbonell (2005), Helliwell and Huang (2005), and Luttmer (2005) all found that the mean income in the reference group influences individual well-being negatively. However, there is some evidence of the opposite case (Senik 2004, 2008; Kingdon and Knight 2007; Caporale et al. 2009; Clark, Kristensen and Westergaard-Nielsen 2009; Clark and Senik 2010). These contradictory results could be explained by the existence of at least two possible effects: the standard negative influence associated to feelings of *envy*, where the good news of others is bad news for us; and *information* or *signal effects*, whereby the outcomes of the reference group contain information about the individual's own future prospects, that is, the advances of others can produce a positive influence on an individual's subjective well-being. Hirschman and Rothschild (1973) suggested that

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<sup>3</sup> The usual criteria to construct the reference groups is the geographical area where the respondent lives (Ferrer-i-Carbonell 2005; Blanchflower and Oswald 2004a; Luttmer 2005 and Graham and Felton 2006), the individual's age cohort (McBride 2001), educational level, age, and employment status (Van de Stadt, Kapteyn and van de Geer 1985) or region, age and educational level (Ferrer-i-Carbonell 2005).

individuals can derive positive utility from observing other people's progression and comparing it with the positive signal (they call this effect the *tunnel effect*). In line with social psychology research (Festinger 1954; Taylor and Lobel 1989), the *signal* effect suggests that others undergoing a similar experience may provide one with information about how to improve one's status, as well as serving as a model for the coping process. Existing evidence also indicates that subjective well-being can react as much to reference as to own income (e.g., Ferrer-i-Carbonell 2005; Luttmer 2005).

Alternatively, although more scarce in the literature, the *asymmetric comparison effect* refers to the extent to which a change in others' income can influence different individuals' well-being in a different manner. In his early work, Duesenberry (1949) compared individuals to peers above them in the income distribution. However, the opposite does not hold, that is, the income of others does not influence individual's well-being when they compare themselves to others below them in the income distribution. This means that people look upward when making comparisons. Thus, wealthier people exert a negative external effect on poorer people, but not vice versa. There are some examples in the literature that test *asymmetric comparison effects* but they are made under the *mean dependence* framework. McBride (2001) found that mean income had a larger effect on the well-being of richer individuals than on poorer ones. Ferrer-i-Carbonell (2005) found that being below the mean income had a negative effect on subjective well-being, while being above the mean had a non-significant effect on subjective well-being. However, as pointed out in Clark and Senik (2010), the two opposite effects in social comparisons, *envy* and *signal*, may explain the increase in the well-being of those who are relatively poor.

Notice that in both cases, *symmetric* and *asymmetric comparison effects*, the *mean dependence* framework is considered. This framework relies on a subtle assumption that individuals compare themselves only to the average income within each reference group. The *mean dependence* framework could imply that an individual with a given income would feel as happy in a society with low inequality (low dispersion in the income distribution) as in an economy with high inequality (high dispersion in the income distribution) and with the same mean income. This approach, which is very common in the literature, does not permit identifying whether individuals' subjective well-being is influenced to a different extent by the income of peers above them in the income distribution or by the income of peers below them in the income distribution.



We seek to contribute to this gap by proposing a way of modeling *comparison effect* that captures whether the individual's subjective well-being can be affected differently by interpersonal comparisons of incomes depending on the position of the individuals one compares oneself to, and additionally, that the individual treats the comparisons differently depending on the proximity of incomes.

To this end, we take advantage of recent evidence from other disciplines. Behavioral economics has proposed a model of inequity aversion (Fehr and Schmidt 1999; Bolton and Ockenfels 2000 and Cooper and Kagel 2013), which holds that individuals do care about the distribution of outcomes within their society and assumes that people feel *compassion* toward others with lower outcomes and *envy* toward those with higher outcomes. A recent work by Blanco, Engelmann and Normann (2011) using a set of games in an experimental setting found that all the subjects in their experiment show compassion. Under this approach, an individual might lose well-being even if he or she is at the top of the relevant income distribution. In happiness literature, there is also some evidence that inequality is negatively related with happiness (Conceicao and Bandura, 2008) and that there exists distaste or aversion to inequality (Di Tella, Alesina and MacCulloch 2004). For other approaches to relative income see Clark, Frijters and Shields 2008).

Close to the inequity aversion model, there is a literature concerning inequality indexes that also capture that concept, which has had little impact on the empirical application to subjective well-being. A concept proposed by Runciman (1966) and formalized by Yitzhaki (1979) also allows for the possibility that utility is differentially affected by the income distribution above and below the individual's income. This measure is called *relative deprivation*. This concept has also been used in health economics literature (see Deaton, 2003; Gravelle and Sutton, 2009). In his analysis, Runciman (1966) defined the degree of deprivation inherent in not having a specific characteristic as an increasing function of the proportion of persons in the reference group who have such a characteristic. Yitzhaki (1979) considered that given an individual income, the income distribution is split into two segments: the range of incomes for which the individual is deprived (i.e., those above him) and the range of incomes for which the individual is satisfied (i.e., those below him), which is called *affluence* in Deaton (2003).<sup>4</sup> The total deprivation assigned to a person is the sum of the

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<sup>4</sup> To avoid the confusion between this concept of satisfaction and the one coming from the measurement of subjective well-being, in this paper we adopt the denomination of *affluence* for comparisons with individuals with lower income.

deprivation inherent in all units of income the individual is deprived of and analogously for the total affluence of an individual.

Additionally, Paul (1991) proposed an index that fulfills the following properties: (i) the individual's *relative deprivation* should increase less than proportionally with respect to increases in the income of richer individuals; (ii) an increase in the income of a richer individual should produce more deprivation in poorer individuals that are close to the individual than in individuals that are further in the income distribution; and (iii) whenever the individual is richer, the lower the increase in the marginal deprivation. We have applied an equivalent reasoning to define *relative affluence*.

A recent proposal by Bossert and D'Ambrosio (2012) and Imedio-Olmedo, Bárcena-Martin and Parrado-Gallardo. (2013) considers that individuals compare themselves more to people with a similar income than to those who have a position that is perceived as being unattainable. These authors introduce a weighting scheme where more weight is attached to incomes that are closer in the distribution than to those that are further away.

To build the comparison effect, a final comment on some other existing alternatives is in order. The first alternative, which was proposed in Imedio-Olmedo, Parrado-Gallardo and Bárcena-Martin. (2012), assumes that individuals do not identify themselves with their own income, but feel they belong to a certain group. For example, in the case of *relative deprivation*, individuals identify themselves with the mean income of individuals who are poorer than they are, but compare themselves to individuals who have a higher income than they do. This feeling of deprivation, or alternatively affluence, is modulated through norms and individual values as altruism.<sup>5</sup>

The second alternative arises from challenging the assumption of the objective measures of social comparisons presented before, that is, individuals are able to rank themselves accurately in the income distribution. D'ambrosio and Frick (2007), Powdthavee (2009), Possel and Casale (2011), Guven and Sorensen (2012), Chang (2013) and Rözer and Kraaykamp (2012), among others, have explored how individuals' perceptions of where they rank relative to others impact on their self-assessed levels of well-being. Individual perceptions of relative standing may differ

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<sup>5</sup> Moreover, this index could also be considered as an index of the interaction of social comparisons and cultural capital we describe later as well.

considerably from their relative standing based on reported income. If this is the case, individual perceptions of relative standing turn out to be a stronger predictor of subjective well-being. In the same line, the idea of identity or self-image developed by Akerlof and Kranton (2000, 2010) and Chang (2013) shows that an individual's identity or self-image depends on the individual's assigned social category and the extent to which the individual's own given characteristics match the ideals of that category. Thus, an individual's positional identity depends on the social comparison made between personal income and the perceived reference level of personal income. An individual will enjoy an enhanced identity or self-image when he/she has a higher level of relative income than the reference level (i.e., the perception of being successful or superior), and will suffer anxiety and discomfort when his/her relative income is lower (i.e. if perceived as being a failure or under-achiever).

### **Hedonic adaptation**

The internal benchmark approach implies that there is an 'internal norm' which captures an individual's personal or 'inwardly-oriented' income experience (McBride 2001; Powdthavee 2007; Bookwalter and Dalenberg 2010). The problem that arises in this type of comparisons, as argued in Clark, Fijters and Shields (2008), Di Tella, Haisken-De New and MacCulloch. (2010), Pospel and Casale (2011), Gokdemir and Dumludag (2012) and Bartonili et al. (2013), is that changes in people's living conditions have only a transitory effect on their well-being because people tend to adapt to their past experiences. In other words, this argument posits that, sooner or later, the adaptation process erodes the increase in well-being produced by higher income. This process that reduces the hedonic effects of a constant or repeated stimulus is called *adaptation*.

The explanation for adaptation is that people change their aspiration levels (Frey and Stutzer, 2002; Conceicao and Bandura, 2008) when they experience the pleasure provided by additional material goods and services derived from income. Van Praag and Kapteyn (1973) find that increases in income shift aspirations upward and this preference shift destroys about 60–80% of the welfare effect of an increase in income. In consequence, the upward adjustment of expectations generates higher aspirations and lower subjective well-being.

Evidence suggests that adaptation exists and that it is relevant but not complete, at least when the whole population is considered. To control for income adaptation, the proposal in the related literature consists of including one's own past income several

periods backwards. Some examples are the lag for three years in the past as in Layard and Nickell (2009), one to four years as in Di Tella, Haisken-De New and MacCulloch. (2010), or lags between one and seven years in the past as in Di Tella and MacCulloch (2010). Di Tella, Haisken-De New and MacCulloch. (2010) also introduce the average of the four lags of income.

### **Social capital**

Social capital has received increasing attention in the empirical literature as a determinant of subjective well-being (Helliwell and Putnam 2004; Helliwell 2006; Bartolini et al. 2008, 2013; Leung et al. 2011; Cramm, Moller and Nieboer 2012; and Klein, 2012, among others). Although social capital has been a debated topic, there is currently no commonly agreed upon definition nor consensus of how to measure it (for a review see Sarracino, 2010). One of the main difficulties in defining social capital, as we will present below, is to determine whether it is an individual asset (Portes, 1998) or a collective resource (Putnam 2000).

According to the OECD (2001), which Putnam (2000) follows, social capital is defined as “networks together with shared norms, values and understandings that facilitate co-operation within or among groups.” As noted by Bartolini, Bilancini and Pugno (2008), there are two types of incentives that motivate such social connections. First, intrinsic social capital that consists of those components “that enter into people’s utility function”; and secondly, extrinsic social capital that means those components that do not “directly enter into people’s utility functions but are instrumental to something else that may be considered valuable.” In the economic literature, the importance of intrinsically motivated social connections has been already emphasized by using the term *relational goods* (Bartolini, Bilancini and Pugno 2011; Bartolini, Bilancini and Sarracino 2013). The definition of *relational goods* includes companionship, emotional support, social approval, solidarity, a sense of belonging and of experiencing one’s history, the desire to be loved or recognized by others, etc. These goods are produced on a smaller scale by family relationships or friendships and, on a larger scale, by many kinds of social events (club or association meetings, live sport events, etc.).

Following the distinction proposed by Putman (2000), the related literature has considered the difference between *bonding* and *bridging* social capital. *Bonding* relates to closed networks of people with the same background, whereas *bridging* entails cross-cutting ties (e.g., associations that bring citizens into contact with people from a cross-

section of society). Putman (2000) emphasized that *bonding* social capital is a means to “getting by,” while bridging social capital is a means to “getting ahead”. Sarracino (2010) proposes an excellent review of the evolution and alternatives of the definition and critical points of social capital.

In terms of existing results, many cross-sectional studies in the field of sociology and economics have shown that individuals with active social relationships tend to be happier with their lives, and that bridging social capital exerts the largest effect (Helliwell and Putman, 2004, among others).

### **Cultural capital**

Conceicao and Bandura (2008) show that people are happy when they feel they are doing “the right thing”, whether the right thing is determined by ethics, principles, religion, custom, or social context, that is, norms and values.<sup>6</sup> Following Sen’s work, Muffles and Heady (2013) define cultural capital as individual values and life goals. On the one hand, they consider work, family and social values as helping others, concern about society and volunteering. On the other hand, they also include life goals, such as economic goals (job success, affording luxuries, owning a house, etc.), family (importance of having children or a partner), and social goals (altruism, getting support from neighbors, good relationships with friends). In the literature it is shown that life goals matter for subjective well-being (Headey, 2008 and Muffles and Heady, 2013). In particular, evidence shows that, while social and family life goals make people feel happier, the effect of material goals is less conclusive.

Muffles and Heady (2013) also include risk attitudes as part of cultural capital. This component of cultural capital pertains to risk attitudes in the form of risk-seeking or risk-averse behavior while they influence people’s achievements and outcomes (Dohmen et al., 2011).

### **Interactions**

There are two types of interactions that could shape the effect of social comparison in subjective well-being. Empirical evidence from social psychology (e.g., Festinger, 1954) shows that there is a strong preference for comparing with less fortunate others (downward evaluations) but a desire for information about and contact with more fortunate others (upward contacts). Thus, if people choose to affiliate with worse-off

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<sup>6</sup> In a similar way Budría and Ferrer-i-Carbonell (2012) examine whether the rank effect differs between individuals endowed with different sets of non-cognitive skills and find a large heterogeneity on the importance of income comparisons.

(better-off) others in order to obtain self-enhancing information (self-improvement motivations), the influence from an improvement in others' resources on subjective well-being should be more (less) intense for those with more social contacts. Evidence suggests that the negative effect of others' improvement is larger for people who socialize more with their neighbors (Stutzer, 2004; Luttmer, 2005; Bartolini, Bilancini and Pugno, 2008; Poesl and Casale, 2011; Chang, 2013 and Ateca-Amestoy, Cortes and Moro-Egido 2013). A recent study by Clark and Senik (2010) reported that people compare themselves to the groups with whom they interact more frequently. The existing evidence has motivated us to not consider the usual reference groups, but the kind of groups that can be captured by the interaction of social comparison with social capital. Oshio et al. (2011) pointed out an additional reason: it is important to take a reference group into account, even if social comparisons consider the whole population.

The second interaction that should be taken into account concerns *cultural capital*. As cognitive dissonance theory implies, people experience cognitive strains and stress when the circumstances they face are not in accordance with their personal norms (Festinger, 1954). In a situation of large income disparity, people who value egalitarian norms and values could suffer from feelings of injustice and strain which may reduce their well-being. Egalitarian norms and values can come from a great variety of situations, such as political orientation (D'Ambrosio and Frick, 2007), level of social trust (Rozer and Kraaykamp, 2012), and others.

### **Socio-economic characteristics**

To end the review of the main determinants of subjective well-being, we briefly summarize the existing evidence about the most commonly considered socioeconomic characteristics. Being female is associated with larger levels of subjective well-being (van Praag, Frijters and Ferrer-i-Carbonell., 2003, among others). There is evidence of a convex shape in the relationship between subjective well-being and age (see Blanchflower and Oswald, 2004a and van Praag, Frijters and Ferrer-i-Carbonell., 2003, among others). With respect to marital status, although some variation can be observed across studies, it seems that, with respect to being single, being married has a positive effect on life satisfaction (Blanchflower and Oswald, 2004b; van Praag and Ferrer-i-Carbonell, 2004), while being separated, divorced or widowed is associated with the lowest levels of satisfaction (Helliwell, 2006). Although the relationship between each additional level of education and subjective well-being is positive, recent findings do

not show a clear effect. It seems that the expectations of highly educated individuals prompt them to report lower levels of satisfaction (Clark, 2003; Meier and Stutzer, 2008). Previous evidence has shown that unemployed individuals are substantially less satisfied with their life than workers, even when controlling for other characteristics such as lower income (see Frey and Stutzer, 2002 for a survey).

### III. HYPOTHESES AND EMPIRICAL MODEL

In line with the related literature (see for example D'Ambrosio and Frick, 2007), we assume that a standard well-being function to explain subjective well-being can be written as follows:

$$SWB_{it} = SWB(y_{it}, f(y_{it}, y_{jt}), g(y_{it}, y_{i,t-k}), SC_{it}, CC_{it}, II_{it}; X_{it}) \quad (1)$$

where  $y_{it}$  is individual  $i$ 's income at time  $t$ ;  $f(y_{it}, y_{jt})$  is social comparisons between the individual's own ( $y_{it}$ ) and the other's ( $y_{jt}$ ) income;  $g(y_{it}, y_{i,t-k})$  is internal comparisons between individual's own income at time  $t$  ( $y_{it}$ ) and the past income  $k$  periods backwards income ( $y_{i,t-k}$ );  $SC_{it}$  is the social capital of individual  $i$  at time  $t$ ;  $CC_{it}$  is the set of norms and values of individual  $i$  at time  $t$ ;  $II_{it}$  characterizes the effect of the intensity of individuals' social comparisons and either social or cultural capital; and  $X_{it}$  describes the individual's socio-economic characteristics that have been previously identified in the literature as usual correlates of individual self-assessed well-being.

We assume that individuals' subjective well-being is influenced positively by their own income level, which is represented by  $y_{it}$  in Equation (1). This hypothesis has also been studied as the *Absolute Income Hypothesis*. Socio-demographic characteristics are also standard in the literature on subjective well-being ( $X_{it}$  in Equation 1). The *Socio-economic Hypotheses* are based on the empirical regularities from previous studies. We consider the correlates gender, age, marital status, education and labor market status.

Additionally, we consider internal comparisons, that is, comparisons with own past income, that is, the *Hedonic Adaptation Hypothesis* ( $g(y_{it}, y_{i,t-k})$  in Equation (1)). We also include the distinction between bonding (closed networks) and bridging (cross-cutting ties) social capital (*Social Capital Hypothesis* in Equation 1) to capture the idea that social interactions generate relational goods and produce powerful positive

influences on individuals' subjective well-being. We expect a positive effect from both, with the latter having a larger influence on subjective well-being.

To capture the idea of cultural capital (*Cultural Capital Hypothesis*,  $CC_i$  in Equation 1), we take into account variables that reflect individual risk attitudes, values and goals.

Now we present the hypotheses which we try to contribute. First, we consider the *Social Comparisons Hypothesis* that relies on the individual's relative income ( $f(y_i, y_j)$  in Equation 1). The novelty is to assume that the effect of others' income on individual subjective well-being could be different depending on the position in the income distribution and, moreover, that interpersonal comparisons are treated differently in terms of the proximity of incomes. As pointed out in the background section, we also include two alternatives where the individuals do not consider their own actual income to make comparisons. One is to discard the assumption that individuals know the income distribution and their own position, and assume that individuals use the perceived ranking (not a novelty). The other one is to assume that individuals identify themselves with a specific group. We describe those novelties in detail when describing the variables we include in the different specifications.

Finally, a further contribution of this paper is the *Interaction Hypothesis*. This hypothesis combines the effect of social comparisons and the effect of social and cultural capital ( $H_i$  in Equation 1). The idea is to test to what extent exposure to social contacts or the existence of values and norms shape the influence of social comparisons on subjective well-being.

Relying on the achievements of the existing literature as extensively discussed by Ferrer-i-Carbonell and Frijters (2004) and considering the ordinal nature of subjective well-being data, we argue that analyses based on ordered discrete choice models should provide a better fit to equation (1). Given the nature of the latency and longitudinal characteristic of the dataset, two departures from the baseline model should be considered. First, to control for unobserved heterogeneity of individuals and fixed effects as in Ferrer-i-Carbonell (2005), we consider an ordered probit model augmented with individual random effects and Mundlak's corrections. It is now well documented that in such cases an OLS model provides equivalent results (Ferrer-i-Carbonell and Frijters, 2004). Secondly, we assume reported subjective well-being to be cardinal. That is, we assume that the distance between the categories of satisfaction carry a meaning. It



has been shown that assuming cardinality as opposed to regressing satisfaction with ordinal models is rather irrelevant for the results. Ferrer-i-Carbonell and Frijters (2004) and van Praag and Ferrer-i-Carbonell (2004) have shown that the sign of the coefficients is the same, the significance is the same, and the trade-offs between variables are roughly the same, which means that indifference curves are similar. We then use the probit adapted ordinary least squares (POLS) as developed by van Praag and Ferrer-i-Carbonell (2008). The advantage to this approach is that estimated coefficients can be directly interpreted as marginal effects. Additionally, this methodology will allow us to easily interpret the interaction terms, since we consider a linear regression between social comparisons and social and cultural capital.<sup>7</sup>

Bearing this in mind, we consider the following general specification of the cardinal version of the subjective well-being function ( $\overline{SWB}$ ):

$$\overline{SWB}_{it} = \beta_0 + \beta_1 y_{it} + \beta_2 f(y_{it}, y_{jt}) + \beta_3 g(y_{it}, y_{i,t-k}) + \beta_4 SC_{it} + \beta_5 CC_{it} + \beta_6 II_{it} + \delta' X_{it} + \gamma' DT_t + \bar{w}_i \eta + \lambda_i + \pi_{it}$$

for  $i=1, \dots, N$  and  $t=1, \dots, T$ . The error term of this equation, under Mundalk's transformation, can be rewritten as  $\varepsilon_{it} = \xi_i + \pi_{it}$ , where  $\xi_i$  is the random effect and  $\pi_{it}$ , the error term. The random effect is modeled with respect to a subset  $w_{it}$  of the covariates (the time-varying variables) where  $\xi_i | w_{it}(\mathcal{Y}_{it}) \sim N(\bar{w}_i \eta, \sigma_\xi^2)$  where  $\bar{w}_i = T^{-1} \sum_1^T w_{it}$ . This means that the correlation between  $w_{it}$  and the individual random effect  $\xi_i$  is assumed to be  $\bar{w}_i \eta$ . The subset of variables  $w_{it}$  includes variables that vary across time such as family income, years of education and members of the household. We also include  $\lambda_i$  individual specific error, which is normally distributed with zero mean and independent of the idiosyncratic error  $\pi_{it}$ . We then also incorporate time fixed effects, with a set of dummies for years,  $DT_t$ , and individual random effects,  $\zeta_i = \bar{w}_i \eta + \lambda_i$ .

Employing this empirical strategy, we adjust different regression models that correspond to the different modeling options  $f(y_{it}, y_{jt})$  described in the next section alongside their corresponding interaction hypothesis.

## IV. DATA AND VARIABLES

### IV.A. Data

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<sup>7</sup> As Norton, Wang and Ai. (2004) have shown, the interpretation of interaction terms in linear regression models does not extend to non-linear regression models, and the computation of the marginal effects and statistical significance of the parameters in the latter case involve an additional difficulty.

The empirical analysis in this work is based on data from the German Socio-Economic Panel (SOEP).<sup>8</sup> The SOEP is a wide-ranging representative longitudinal study of private households. The data provide information on all household members consisting of Germans living in the old and new German states, foreigners, and recent immigrants to Germany. The same private households, persons and families have been surveyed yearly since 1984 (SOEP “West”). In June 1990 the survey was extended to the territory of the former GDR (SOEP “East”). In 1994/95 an additional subsample of immigrant households was included to capture the massive influx of immigrants since the late 1980s. In 2002, a supplementary sample of high-income households was added to better represent the top end of the income distribution. Finally, in 1998, 2000, and 2006 more random samples were added, which increased the overall number of interviewed households. The data used in this analysis initially covers the period 1994 to 2011 (the most recent available data).

The main reason for choosing SOEP as a database is its longitudinal structure, which allows us to control for fixed unobservable characteristics at the individual level and to test for the role of hedonic adaptation. Moreover, the SOEP contains a sufficient number of observations for social capital and cultural capital indicators at the individual level, making it possible to explore the role of both forms of non-human capital. The SOEP also includes micro-data about demographic, economic, social, and political variables.

Due to both sample constraints and missing data, the final number of observations we have used is 162,167 person-year. The years for which we actually have observations for all variables of interest are 1994, 1996, 1997, 1999, 2001, 2005, and 2007. This substantial loss of information with respect to yearly data is mostly due to the fact that some indicators of social and cultural capital are not recorded on a yearly basis. Following the related literature that uses SOEP, we imputed the values for the years missing in between by taking the previous value observed in the case of a dummy variable and the average of the values between two years if available for that particular person for the rest of variables. We describe this process in detail when presenting the explanatory variables.

#### ***IV.B. Variables***

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<sup>8</sup> The data employed in this paper were extracted using the Add-On package PanelWhiz or Stata®. PanelWhiz (<http://www.PanelWhiz.eu>) was written by Dr. John P. Haisken-DeNew ([john@PanelWhiz.eu](mailto:john@PanelWhiz.eu)). See Haisken-DeNew and Hahn (2006) for details. The PanelWhiz generated a DO file to retrieve the data used here, and is available from the authors upon request. Any data or computational errors in this paper are our own.

## Definition of subjective well-being

The survey contains information about individuals' satisfaction with life as a whole, and also with their financial situation, housing, health, leisure and with their job for those who are working. The answers are elicited on a single item with an 11-point scale. We assume that each individual makes an evaluation of his/her utility and classifies it under one of the available categories. As a proxy to individuals' utility, we use the answer to the question about general satisfaction in our analysis. The exact question of the survey reads as follows: "*How satisfied are you with your life, all things considered? Please answer according to the following scale: "0" means completely dissatisfied, "10" means completely satisfied*". We denote the variable as *Satisfaction*. Table I presents summary statistics for all the variables included in the analysis for the last available year, which is 2011. For this year, mean satisfaction is 6.85 in our sample and shows little variation.

----- Insert Table I about here -----

The key variable in this analysis is individual's income ( $y_{it}$ ), which represents individual's resources. The income measure we consider is household income rather than personal income because it better accounts for the individual's real access to economic resources (Ferrer-i-Carbonell, 2005 and Bartolini, Bilancini and Sarracino, 2013). This measure is captured in the SOEP variable "adjusted monthly household net income". Monthly net household income gives a measure of the more regular income components received by all household members at the time of the interview (D'Ambrosio and Fricks, 2007). As pointed out in Bartolini, Bilancini and Sarracino (2013), "adjusted" refers to the fact that income is real and converted into euros for the year 2000.

In order to control for differences in household size and the economies of scale, we apply the modified OECD equivalence scale that assigns a value of 1 to the first adult in the household, 0.5 to each remaining adult, and 0.3 to each child. D'Ambrosio and Fricks (2007) also considered an equivalent income using the square root of the number of household members as a scale. We denote this variable as *Eq\_inc*. In our sample, the mean equivalent income for 2011 is 15.72 (measured in hundreds of euros).

## Social Comparisons

Based on individual's income ( $y_{it}$ ) defined above, we construct the indexes associated to the *Social Comparison Hypothesis*, which is represented by  $f(y_{it}, y_{jt})$  in Equation 1.

At this point, we make some general considerations about all of the indexes we consider for modeling social comparisons. First, in all cases we adopt the terminology *relative deprivation* and *relative affluence* to reflect the idea of comparisons to other individuals with higher and lower levels of income, respectively. Secondly, to interpret the results, we have to be aware of different effects that lie behind the social comparisons, some of which have already been presented in the background section. It is expected that *relative deprivation* will have a negative effect on subjective well-being, which means that an increase in the income of someone who is richer than you will lower your well-being (the *envy* effect). However, there exists another effect called the *signal* or *information* effect that could lead to a positive effect; reflecting the idea that an income increase of someone richer could be informative about an individual's own future prospects. Concerning *relative affluence*, if it exerts a negative effect on subjective well-being, it could reflect the *compassion* effect; whereas if the effect turns out to be positive, then there is a *pride* effect (Friedman and Ostrov, 2008).

As a benchmark, we consider the *asymmetric comparison effect* under the *mean dependence* framework.<sup>9</sup> This approach, which was presented in Ferrer-i-Carbonell (2005), allows us to test whether the position of the individual above or below the mean income affects subjective well-being differently. Following Ferrer-i-Carbonell (2005), we define the variables  $I_{1t}$  and  $I_{2t}$  as

$$I_{1t}(y_{it}) = \begin{cases} \bar{y}_t - y_{it} & \text{if } \bar{y}_t \geq y_{it} \\ 0 & \text{if } \bar{y}_t < y_{it} \end{cases} \quad I_{2t}(y_{it}) = \begin{cases} y_{it} - \bar{y}_t & \text{if } \bar{y}_t \leq y_{it} \\ 0 & \text{if } \bar{y}_t > y_{it} \end{cases}$$

where  $I_{1t}$  and  $I_{2t}$  measure how poorer or how richer the individual is with respect to average income ( $\bar{y}_t$ ), respectively. Ferrer-i-Carbonell (2005) showed that an individual might feel unhappy if his/her income is below the average, while those with a higher-than-average income will not be sensitive to income comparisons. If that is the case, the coefficient on the variable  $I_{1t}$  (how poorer) is expected to be negative, while on the variable  $I_{2t}$  (how richer) it is expected to be non-significant or of a smaller magnitude than that of  $I_{1t}$ . However, as we will show in our results, different effects cannot be

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<sup>9</sup> Since our main objective is to propose new indexes that account for different comparisons along the income distribution, we discard the symmetric comparison effect. All estimation results with this symmetric approach are available upon request.

ruled out in advance. Note that, although this option considers an asymmetric comparison, it is modeled under the *mean reference* framework.

Departing from this benchmark, we model our contribution, that is, we incorporate the possibility that individual's well-being is affected differentially depending on the position and distance of the individuals to whom one compares oneself. There is an extensive theoretical literature on inequality and behavioral economics that, to the best of our knowledge, has had little impact on the empirical application (see some exceptions in D'Ambrosio and Frick, 2007 and Oshio et al., 2011). Based on that literature, we propose a set of indexes to characterize the influence of the income distribution (including income dispersion) on subjective well-being. Following Fehr and Schmidt (1999), the effect of these indexes on subjective well-being represents the well-being loss or gain from disadvantageous and advantageous inequality.

The first index assumes that an individual considers the whole distribution when he/she compares his/her situation to that of others, and gives the same weight to all of those comparisons. According to Yitzhaki (1979) and Hey and Lambert (1980), the *relative deprivation* for an individual reflects the idea that each individual compares his/her income with each and all of the incomes of the interval  $[0, y_{Mt}]$ , where  $y_{Mt}$  is the maximum level of income in a population at time  $t$ , and  $F(\cdot)$  is the income distribution. This index is based on the theory of relative deprivation articulated by Runciman (1996). The *relative deprivation* for an individual with income  $y_{it}$  with respect to another individual with income  $y_{jt}$  can be represented by

$$a_{it}(y_{it}, y_{jt}) = \begin{cases} y_{jt} - y_{it} & \text{if } y_{jt} \geq y_{it} \\ 0 & \text{if } y_{jt} < y_{it} \end{cases}$$

The total *relative deprivation* experienced by an individual with income  $y_{it}$  with respect to all other individuals can be expressed as:

$$A_{it}(y_{it}) = \int_0^{y_{Mt}} a_{it}(y_{it}, y_{jt}) dF(y_{jt})$$

The index is equal to zero for the highest income. Following Hey and Lambert (1980) for relative affluence, the total individual's *relative affluence* reflects that an individual may care about being richer than other individuals. Therefore, the index is defined as:

$$a_{2t}(y_{it}, y_{jt}) = \begin{cases} y_{it} - y_{jt} & \text{if } y_{jt} \leq y_{it} \\ 0 & \text{if } y_{jt} > y_{it} \end{cases} \quad A_{2t}(y_{it}) = \int_0^{y_{it}} a_{2t}(y_{it}, y_{jt}) dF(y_{jt})$$

Hence, with this index, the deprivation (affluence) felt by an individual with a given income level is given by the aggregation of income differences with respect to those richer (poorer) than him/her, and it is zero with respect to those that have less (greater) income. These *relative deprivation* and *affluence* measures have the advantage of being individual rather than reference group specific.

The second index considered incorporates the idea that the individual compares to each and all individuals but treats the comparisons differently. In particular, the individual puts more weight on incomes that are closer to him/her, that is, an individual is more affected by changes that occur closer to his/her own income (Bossert and D'Ambrosio, 2012<sup>10</sup> and Imedio-Olmedo, Bárcena-Martin and Parrado-Gallardo., 2013). For the case of deprivation, given income level  $y_{it}$ , the differences with others' income are weighted by a function,  $\omega_{y_{it},h}(\cdot)$ , whose support is the interval  $[y_{it}, y_{it} + h]$ ,  $h > 0$ . Equivalently, differences with others' income are weighted by a function,  $\omega'_{y_{it},h}(\cdot)$ , whose support is the interval  $[y_{it} - h, y_{it}]$ ,  $h > 0$  for affluence. The conditions over the weighting function ensure that the individual with income  $y_{it}$  does not feel deprivation in relation to incomes greater than  $y_{it} + h$ , or affluence with respect to incomes lower than  $y_{it} - h$ , and the differences of income are assigned a decreasing weight. That is, individuals compare themselves with similar individuals (in terms of income) rather than with those whose income is perceived as unattainable. There are two assumptions over this index that are certainly restrictive, but make the analytical treatment of the problem tractable: the width of the intervals that individuals consider is assumed to be identical for all of them and the weighting criteria also coincide. Thus, the *deprivation* and *affluence* corresponding to income  $y_{it}$  are:

$$B_{1t}(y_{it}) = \int_0^{y_{it}} a_{1t}(y_{it}, y_{jt}) \omega_{y_{it},h}(y_{jt}) dF(y_{jt}) \quad B_{2t}(y_{it}) = \int_0^{y_{it}} a_{2t}(y_{it}, y_{jt}) \omega'_{y_{it},h}(y_{jt}) dF(y_{jt})$$

where functions  $a_{1t}(y_{it}, y_{jt})$  and  $a_{2t}(y_{it}, y_{jt})$  are defined in the previous index. For the present analysis we consider  $h$  to be half of the mean income, although we have used different values of parameter  $h$  for the estimations.

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<sup>10</sup> The authors describe a large variety of indexes they call proximity-sensitive deprivation measures.

The third index was proposed by Paul (1991). The idea underlying this index is that the individual compares him/herself to each and all individuals but treats the comparisons differently in the following way: (i) the individual's deprivation should increase less than proportionally with respect to the increases in the incomes of richer individuals; (ii) an increase in the income of a richer individual should produce more deprivation in the poorer individuals that are close to the individual than in those that are further in the income distribution; and (iii) whenever the individual is richer, the smaller the increase in the marginal deprivation. Paul (1991) proposed this index as an alternative index to overcome the fact that previous indexes presented in the literature were not sensitive to transfers. An equivalent reasoning applies for affluence. Thus, the specific indexes for *relative deprivation* and *affluence* are, respectively:<sup>11</sup>

$$C_{1i}(y_{ii}, y_{ji}) = \begin{cases} \left(\frac{y_{ji}}{y_{ii}}\right)^{1/\beta} - 1 & \text{if } y_{ji} > y_{ii} \\ 0 & \text{if } y_{ji} \leq y_{ii} \end{cases} \quad C_{2i}(y_{ii}, y_{ji}) = \begin{cases} \left(\frac{y_{ii}}{y_{ji}}\right)^{1/\beta} - 1 & \text{if } y_{ji} \leq y_{ii} \\ 0 & \text{if } y_{ji} > y_{ii} \end{cases}$$

where  $\beta \in (1, \infty)$  and reflects the degree of sensitivity to income transfers among the better-off or worse-off. Thus, parameter  $\beta$  can be considered an aversion parameter to deprivation and affluence. For example, the larger the  $\beta$ , the less sensitive an individual's deprivation to changes in the incomes of those far from him/her. We have assumed that parameter  $\beta$  is the same for deprivation and affluence, and for all individuals.

These three different measures of deprivation allow us to determine who the relevant others are and how the importance of others' income for the individual is assigned. Although the discussion on the reference group is relegated to section 6, the way these two issues are modeled has two advantages with respect to the usual approach to reference groups. First, unlike the related literature, the reference group is not an exogenous classification of the population in cells (Ferrer-i-Carbonell, 2005). Secondly, we can easily determine the effect on the final results of a small change in the parameters included in the formulation of the indexes. That is, with the usual approach, it is not so easy to analyze changes in the effect of deprivation on subjective well-being when the criterion of making cells is modified, for example age bracket or level of education. Therefore, although the existence of parameters in the construction of

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<sup>11</sup> McBride (2001) and Distante (2012) also use the idea of a ratio but with respect to the average income of the reference group, that is, under the mean dependence framework. The findings suggest that the impact of mean income is more severe for the poor.

indexes could produce the same “exogeneity” problem as the cells approach, the former explanation turns this aspect into an easy way to explore the robustness of the results.

Finally, as described in the background, we also include some indexes to measure situations in which individuals do not consider their own income for the social comparisons. The first alternative is an index that lies in the same spirit of those presented before, that is, it assumes that individuals compare themselves to each and all individuals, but additionally it is assumed that individuals feel they belong to the group of individuals with whom they are comparing themselves. In particular, an individual with income  $y_{it}$  feels deprivation with respect to those richer than him/her, that is, those with incomes in the interval  $(y_{it}, y_{Mt}]$ , but feels he/she belongs to the group of individuals with income less or equal to  $y_{it}$ , (i.e., those with incomes in the interval  $[0, y_{it}]$ ) and identifies himself/herself with the mean income of this group (Imedio-Olmedo, Parrado-Gallardo and Bárcena-Martin., 2012). Therefore, *relative deprivation* and *affluence* felt by an individual with income  $y_{it}$  with respect to an individual with income  $y_{jt}$  are defined as:

$$d_{1t}(y_{it}, y_{jt}) = \begin{cases} y_{jt} - m(y_{it}) & \text{if } y_{jt} > y_{it} \\ 0 & \text{if } y_{jt} \leq y_{it} \end{cases} \quad d_{2t}(y_{it}, y_{jt}) = \begin{cases} M(y_{it}) - y_{jt} & \text{if } y_{jt} < y_{it} \\ 0 & \text{if } y_{jt} \geq y_{it} \end{cases}$$

where  $m(y_{it})$  is the mean income of the set of individuals with an income less than  $y_{it}$  and  $M(y_{it})$  is the mean income of the set of individuals with an income greater than or equal to  $y_{it}$ . Thus, the total *deprivation* and *affluence* corresponding to income  $y_{it}$  are<sup>12</sup>:

$$D_{1t}(y_{it}) = \int_0^{y_{Mt}} d_{1t}(y_{it}, y_{jt}) dF(y_{jt}) \quad D_{2t}(y_{it}) = \int_0^{y_{Mt}} d_{2t}(y_{it}, y_{jt}) dF(y_{jt})$$

The second alternative consists of assuming that individuals do not know the actual distribution of income, and therefore consider the perceived income ranking. Given that there are no direct questions about the perceived ranking in the German Panel (SOEP), we follow the positional identity proposal of Chang (2013) to model this social comparison. After perceiving the relative income, an individual can experience a gain or loss in positional identity and then reach a higher level of utility or suffer a decrease in utility. Hence, the measure of positional identity is:

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<sup>12</sup> Bárcena and Imedio (2008) also showed that for  $y_{it} > 0$ ,  $D_{1t}(y_{it}) \geq A_{1t}(y_{it})$  and  $D_{2t}(y_{it}) \geq A_{2t}(y_{it})$ .



$$h(\tilde{y}_{it}) = h((y_{it} - \hat{y}_{it}), Z_{it})$$

where  $\tilde{y}_{it}$  is the perceived ranking calculated as the difference between individual  $i$ 's personal income ( $y_{it}$ ) and the reference income ( $\hat{y}_{it}$ ) that individual  $i$  uses to make comparisons with his/her own personal income. This perceived ranking  $\tilde{y}_{it}$  measures the extent to which an individual's own personal income matches the ideal of his/her assigned category. The disadvantage of this measure is that, unlike the other indexes, it disregards the idea of differentiating deprivation and affluence.

Following Clark, Frijters and Shields (2008) and Chang (2013),  $\hat{y}_{it}$  is defined as the predicted value of personal income estimated by a standard equation that includes a set of socio-economic characteristics including gender, age, marital status, educational attainment, employment status, and work experience.<sup>13</sup> The vector  $Z_{it}$  is a set of variables also related to an individual's positional identity, including the attributes and prescriptions for the social category assigned to the individual. These variables reflect the importance of other social factors in shaping an individual's preference for positional concern through the influences of family background, personal experiences and the value judgments of social and economic institutions (Chang, 2013). We have chosen a variable that reflects home ownership and health status to measure background. The reason for not including the variables proposed in the literature, apart from data availability, is that we may be reflecting the same idea we are trying to capture with the interactions between social comparisons and social and cultural capital.

### **Hedonic adaptation**

The existence of a process of hedonic income adaptation has been modeled in the literature by including one's own past household income. We propose modeling hedonic adaptation through the weighted mean of the last years of income for each individual with larger weights for incomes closer in time. As we do not have the same number of past observations for all individuals, we have chosen to consider the four past incomes based on the results of previous literature and taking into account that more lags could imply the loss of more years and observations. This decision means that the period under consideration starts in 1998. Moreover, we have dropped individuals that did not report income in four periods in a row, while for the rest we have imputed incomes. Therefore, to model the term  $g(y_{it}, y_{i,t-k})$  in Equation (1) we use

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<sup>13</sup> Recall that this is one of the strategies proposed in the related literature to build reference groups.

$$g(y_{it}, y_{i,t-k}) = \sum_{t=T-4}^T \left( \frac{\delta^{T-t}}{\sum_{\theta=1}^4 \delta^{\theta}} y_{it} \right)$$

For this study we have chosen different values of  $\delta$  such as 0.25, 0.50 and 0.75. The average values of discounted past incomes are very similar to the average equivalent income.

### **Social capital**

Respondents in the German Panel (SOEP) are also asked about how often they meet with friends and relatives and about their active membership in a political party, a church or other religious organization, and/or a sports, leisure or cultural group and about their belonging to a trade union or professional association. Thus, we include two different types of social capital: *bonding* and *bridging* social capital. As suggested by Sabatini (2009), we use the information about the frequency of contacts with friends and relatives to construct the categorical variable *SC-Bonding*. This variable takes the value of 1 if the respondent meets with friends and relatives at least once a month, and 0 otherwise. The empirical approximation to *bridging* social capital is a linear index constructed using individuals' answers about their membership in associations, organizations or groups. Principal components analysis<sup>14</sup> is used to derive the weights.

### **Cultural capital**

Following Muffles and Heady (2013), we use different groups of variables to measure cultural capital or norms and values: willingness to take risk, life goals/values and level of concern. Attitudes toward risk, that is, either risk-seeking or risk-averse behavior, could influence subjective well-being while influencing people's achievements and outcomes. We consider the variable *Risk*, which measures the willingness to take risks from 0-none to 10-very

In the literature it is shown that life goals matter for subjective well-being (Headey, 2008). These life goals can be divided into economic goals (job success, owning a home and affording things), family goals (importance of having children or a partner), and social goals (being there for others, being fulfilled, good relationships with friends, political activity, travel). Every question is of the type "*Importance of*" and

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<sup>14</sup> Principal components analysis is a statistical procedure using a set of variables to extract the few orthogonal linear combinations of the variables that capture the common information in the most satisfactory way. Consistently, the first principal component of a set of variables is the linear index of all the variables that capture the largest amount of information common to all the variables. Thus, our dependent variables that use information coming from different domains are additive and linear (Van Praag and Ferrer-i-Carbonell, 2004).

answers are rated from 1–very important to 3–not very important. Using principal components analysis, we derive the weights with which each of those dimensions enter into each of the indexes. We normalize the indexes so that they are between 0 and 1. The indexes are labelled *Eco\_goal*, *Fam\_goal* and *Soc\_goal* with a mean of about 0.40, 0.22 and 0.50, respectively. According to Headey (2008), economic goals represent zero sum and family and social life goals positive sum domains. In zero sum domains, gains for one always imply losses for others, whereas in positive sum domains, gains do not come at the cost of others or even improve the gains of others.

As described above, information on risk attitudes and life values was not collected every year in the German Panel (SOEP). Following Muffles and Heady (2013), we imputed the values for the years missing in between by taking the average of the values between 2 years if available for that particular person. The existing evidence shows that social and family life goals make people feel happier (for a review, see Muffles and Heady, 2013). However, the effect of material goals is less conclusive. Indeed, some analyses show that material goals have no effect on subjective well-being, while others find a negative effect.

To capture individual values, the related literature such as D’Ambrosio and Fricks (2007) use political orientation, but we discarded it due to a potential reverse causation between satisfaction and political orientation. Instead, we consider a group of variables that reflects whether the individual is not at all concerned (value 1), concerned (value 2) or very concerned (value 3) about economic development, finances and the environment. Again using principal components analysis, we consider the index *Worries*, which is also normalized between 0 and 1.

### **Interactions**

To capture whether or not social and cultural capital and social comparisons have a reciprocal effect, we include the interaction terms for the variables that represent the social comparisons and social and cultural capital. Recall that some of the interactions could reflect the existence of the reference group as an alternative to the way it is built in the literature.

### **Socio-economic characteristics**

In this group we include socio-economic characteristics that are commonly considered in the literature. We define the categorical variable *Male*, which is coded 1 if the individual is male, and 0 otherwise. In our sample, 48% of the individuals are male. The

age of the respondent is included with the variable *Age* measured in years. In order to test nonlinearity in the relationship between subjective well-being and age we also include age squared in the statistical analysis below (*Age squared*). The average age in the sample is 52.54 years. To cover marital status, we define a categorical *Non-Single* that takes the value of 1 if the individual has never married. In our sample, 47% of the individuals has never been married. We incorporate information about the type of household, defining a set of dummy variables *Couple\_child*, *Couple\_nochild*, *Single\_child* and *Single\_nochild*. In our sample, the percentage of couples with and without children is 15.8% and 37.4%, respectively, and the proportion of singles with and without children is 5.2% and 41.6%, respectively.

The variable *YearsEducation* measures the number of years of formal education, with an average of 12 years in our sample. We define the dummy variables *Full-time* and *Part-time* to control for individuals' labor market status. In our sample, 48.8 % of the individuals have a full-time contract, while 6.4% have a part-time contract.

## V. RESULTS

We present the estimation results for our life satisfaction regression models in Table II. Each column of the table corresponds to a specification of social comparisons. In particular, we present the results with the width of the interval for comparisons,  $h$ , which is half of the average income; with the aversion parameter,  $\beta$ , which is 1.5 and 1.75, and with the discount factor,  $\delta$ , which is 0.50. For the sake of simplicity, we have omitted the estimated parameters corresponding to the *Socio-economic Hypotheses*, Mundalk's correction and country effects from the tables.<sup>15</sup> The sign and statistical significance of the estimated coefficients of the variables corresponding to the *Socio-economic Hypotheses* match the evidence from previous studies. In particular, we find that males are less satisfied, and satisfaction increases with age. Never being married increases satisfaction, and couples with children are also happier. Years of education have a negative effect over satisfaction, showing that the more educated a person is, the higher the expectations, and therefore the more difficult to satisfy. Having a full-time job makes individuals more satisfied only when social comparisons are made in terms of perceived income rank.

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<sup>15</sup> The full set of results for all variables and parameter configuration is available from the authors upon request.

There is a surprising effect on satisfaction in terms of individual's own equivalent income (the so-called *Absolute Income Hypothesis*). Own income does not exert any effect in almost all cases and a negative effect in the case of index  $I(y_{it})$  and perceived ranking  $h(\bar{y}_{it})$ . We find the usual positive effect of own income on subjective well-being only for the index in which individuals compare themselves with the whole population, and treat all comparisons equally,  $A(y_{it})$ . However, the negative or null effect is not new in the literature. Distante (2013), for example, found such a negative effect, but also that this effect occurs mainly for individuals with high and low levels of self-reported satisfaction. The interpretation of negative or null effect lies in different arguments. First, as Distante (2013) pointed out, the social comparison effect offsets the absolute income effect to the point that absolute income has no effect or it turns out to be negative. Second, the negative effect, as presented in McBride (2001), could be interpreted as the result of two opposite effects. There is a positive effect that comes from the increase in resources, consumption and hence satisfaction, but there is also a negative effect that lies in the fact that the increase in income could be due to an increase in working hours, which decreases satisfaction. Third, as in Caporale et al. (2009), income could increase the level of utility or well-being up to a threshold level, beyond which utility remains largely invariant. This idea is consistent with the assumption of diminishing marginal utility of consumption (or income) in neoclassical economic theory. Finally, as pointed out by Di Tella, Haisken-De New and MacCulloch. (2010) and Distante (2013), it could be that when the temporal dimension is added, absolute income matters very little for subjective well-being because of adaptation in the long run. We will go back to this point later on when we discuss the hedonic adaptation hypothesis.

In terms of social comparisons, we have confirmed the existence of *asymmetric comparison effects*, since the effects of *relative deprivation* and *affluence* on subjective well-being are different. As discussed in the background section, asymmetry is described in the related literature in the sense that people look upward when making comparisons, while our findings suggest that asymmetry implies that both comparisons (upward and downward) have an effect on satisfaction. In particular, *relative deprivation* has a negative effect on satisfaction, that is, the more deprived the individual is, the unhappier he or she will be, with the exception of index  $A(y_{it})$ . The magnitude of the effect is larger when the comparisons are treated differently. In

particular, the effect of deprivation is larger when individuals become less sensitive to people far from them (that is, either while  $\beta$  is increasing or with a decreasing weighting function, see for example  $B(y_{it})_{h=\bar{y}_i/2}$  or  $C(y_{it})_{\beta=1.75}$ , which display a similar effect). The identification process behind index  $D(y_{it})$  leads to the lowest effect.

The interpretation of the negative (positive) effect of deprivation on satisfaction is that the feelings of *envy* produced by comparisons dominates (does not dominate) the *signal* effect associated with the value of the information about others' good news. The results could be interpreted in two different but complementary ways. On the one hand, when the comparisons are more sensitive to closer individuals, the envy effect is more intense, that is, we feel more envy towards those in similar positions in the income distribution than in positions that we consider unattainable. On the other hand, it could be that the information individuals obtain when comparing with individuals closer to them is less comprehensive, since they are similar to them, so that information does not play the role of signaling future prospects. Therefore, for both reasons, indexes that treat social comparisons differently exert a negative effect on subjective well-being. Equivalently, when comparing with all the population and not distinguishing among those comparisons<sup>16</sup>, the *signal* effect dominates the *envy* effect.

For the case of *relative affluence*, we find a positive effect on satisfaction. In terms of the magnitude of the effect, we again find that it is larger when the comparisons are sensitive to proximity, (see for example  $C(y_{it})_{\beta=1.5}$  or  $C(y_{it})_{\beta=1.75}$ , where the effect increases when  $\beta$  increases). Only the case of  $B(y_{it})_{h=\bar{y}_i/2}$  supports the previous evidence in the literature in the mean dependence framework (Ferrer-i-Carbonell, 2005, among others) where downwards comparisons had no effect on satisfaction. In the case of  $A(y_{it})$ , *relative affluence* is found to have a negative effect on satisfaction. The identifying process behind  $D(y_{it})$  again leads to the lowest effect on satisfaction. The interpretation of these findings is done as before in terms of which effect dominates, the *pride* effect or the *compassion* effect. When the comparisons are made with the whole distribution and all comparisons are treated equally, we find that the *compassion* effect dominates the *pride* effect. It could be that knowledge of the situation of others when comparing with all people leads to stronger feelings of *compassion*. However, if comparisons are made with closer and therefore “more similar” individuals, the *pride* feeling is stronger.

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<sup>16</sup> We do not consider the mean dependence framework for this discussion.

The alternative to the actual distribution of income, as pointed out before, is the *perceived ranking*. Our results suggest, as expected, that the larger the perceived ranking, the higher the satisfaction.

Now we consider comparisons but with an internal benchmark, that is, the hedonic adaptation process. We find that the effect of the variable habituation is very robust to different formulations of deprivation and affluence, but it is small and positive. This implies, as in the related literature (see Di Tella, Haisken-De New and MacCulloch., 2010), that adaptation is not complete; the initial impact of earning more income does not vanish over time.<sup>17</sup> This finding allows us to give a comprehensive interpretation of the null effect of own income on subjective well-being described before. The combination of the absolute income hypothesis and the adaptation hypothesis for indexes  $B(y_{it})_{h=\bar{y}_t/2}$ ,  $C(y_{it})_{\beta=1.5}$  and  $C(y_{it})_{\beta=1.75}$  shows that own income has a positive, although small, effect on subjective well-being, not in the short-run but in the long run (see Di Tella, Haisken-De New and MacCulloch. 2010).

Our estimation results confirm the *Social Capital Hypothesis* as well. Visiting friends and relatives at least once a month and engaging in social organizations increase individuals' general satisfaction. In line with previous studies, the results suggest that bridging social connections exert a larger effect and are among the strongest correlates of subjective well-being in terms of the magnitude and significance of the estimated coefficients (Helliwell and Putnam, 2004).

In terms of *cultural capital* our results are as expected. Economic goals, in general, do not have any effect on satisfaction, but when family and social goals are important for the individual, then satisfaction increases. Satisfaction decreases with the level of concern or worry about society.<sup>18</sup>

Concerning the interactions, we find first that *Bonding* social capital does not influence the social comparison effect on satisfaction. Secondly, *Bridging* social capital mitigates the effect of social comparisons on satisfaction in the case of deprivation and affluence for indexes that treat the comparisons differently, that is  $B(y_{it})$  and  $C(y_{it})$ . If we consider the index where all comparisons are treated equally,  $A(y_{it})$ , then bridging social capital mitigates (enhances) the effect of relative affluence (deprivation).<sup>19</sup> In

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<sup>17</sup> In dealing with job satisfaction, Bygren (2004) found that individuals primarily consider more general comparisons (others in their occupation or labor market), while comparisons with co-workers and their own past seem to be of minor importance.

<sup>18</sup> Remember that the scale goes from 1 to 3; the greater the value, the lesser the importance.

<sup>19</sup> The enhancing effect is closely in line with Senik (2004), Kingdon and Knight, (2007), Senik (2008); Caporale et al. (2009) and Ateca et al. (2013).

general, for deprivation, the interpretation for the mitigating effect of the interaction is that for people who socialize more with cross-cutting ties the *signal* effect gains importance and partially compensates the negative feelings of envy, since socialization makes the comparisons more salient. For affluence, the negative sign shows that more participation and affiliation with people in cross-cutting networks makes the individual aware of others' circumstances, leading to a larger *compassion* effect.

Finally, with respect to cultural capital, we find that family goals do not influence the effect of social comparisons. Secondly, in terms of deprivation, the effect of economic goals differs depending on how the individual treats the different social comparisons. When individuals are more sensitive to comparisons with others closer to them, that is  $B(y_{it})$  and  $C(y_{it})$ , a lower degree of concern about the economy, in general, mitigates the effect of social comparisons. If individuals do not differentiate,  $A(y_{it})$ , then this concern enhances the social comparisons. Interestingly, we find that, in general, among individuals that are more sensitive to individuals closer to them, the effect of social goal is the opposite to economic goals in terms of deprivation. Third, *relative affluence* is only shaped by social goals, that is, the lower concern about social goals, the lower the effect of affluence. Family goals do not have any effect.

To sum up, the main findings are as follows. First, our results confirm the importance of taking into account the whole distribution when dealing with social comparisons. Contrary to the previous literature, our results confirm that individuals' subjective well-being is affected not only by the comparisons individuals make with others above themselves in the distribution (upwards comparisons) but also by the comparisons they make with individuals below themselves (downward comparisons). Moreover, those comparisons exert a different effect on well-being depending on whether or not individuals compare themselves only to closer individuals. In particular, the *signal* and *compassion* effects dominates the *envy* and *pride* effects, respectively, when social comparisons are not sensitive to proximity, while the opposite occurs if individuals assign more importance to comparisons with closer individuals.

The second conclusion is that the larger effect on subjective well-being comes from the perceived ranking, which exerts a larger effect on subjective well-being than past income experiences and absolute income. Moreover, we find that the process of adaptation is not totally present, implying that an increase in income has long-run effects. Thirdly, we find that both social and cultural capital shape the effect of social



comparisons on subjective well-being in a different way depending on whether or not comparisons with other individuals are sensitive to proximity. In particular, cross-cutting ties are the relevant dimension of social capital in the sense that they can shape the influence of social comparisons on subjective well-being. Moreover, assigning greater importance to economic goals or social goals has the opposite effect on shaping the effect of social comparisons.

## **VI. CONCLUSIONS AND DISCUSSION**

The analysis of subjective well-being measures as a proxy for the utility function could influence theory and policy design. In the theoretical literature, there are a large number of studies in which preferences displaying some kind of externality are included to improve the predictions made under time-separable preferences in different economic scenarios. Additionally, as pointed out in Clark, Frijters and Shields (2008) there are many ways to connect the economics of happiness literature with theoretical economic models of taxation, labor supply, economic growth, savings, poverty, wage profiles, migration, and consumption. Therefore, the effort in the empirical literature to seriously model the relative income effect could benefit from the models by providing “greater behavioral realism in Economics”. The empirical work, in terms of social comparisons and adaptation hypothesis, could contribute to a better understanding of individuals’ behavior, which in turn can be used to predict behavior or to evaluate public policies.

In this respect, the contribution of this paper is to incorporate some formulations to measure the importance of others and the proximity of relevant others in evaluating individuals’ feelings of deprivation and affluence, and therefore their effect on subjective well-being. We consider different formulations, all of which assume that first, the individual compares his/her income with all the other individuals in the income distribution; and second, that the importance given to these comparisons differs across individuals, who give either the same or less importance to incomes that are further apart in the income distribution, even when taking into account only the closest individuals. Alternatively, we consider that individuals identify with the mean income of the group they are not comparing with, and also the possibility that individuals do not know the entire income distribution, and therefore use the perceived rank of the individual in the income distribution.

Another contribution to the literature consists of the inclusion of own past incomes to capture the possible process of adaptation in a different way from the

literature. In this case, we consider that income further in the past is less relevant than income closer in the past.

Finally, we also consider to what degree social connections and the individual's norms and values are important in terms of their capability to shape the effect of social comparisons on subjective well-being.

The main findings confirm, first, that individuals' subjective well-being is affected by the whole income distribution, but in a different manner depending on whether the comparisons are upwards or downwards. Moreover, this effect is also different if the social comparisons are equally relevant for the individual or not. We also find that an increase in income has a long-run effect, that is, the adaptation process is not complete. Interestingly, we also find that social and cultural capital shape the effect of social comparisons on subjective well-being in a heterogeneous way.

Throughout this work, we have addressed the formation of reference groups in a non-explicit way. On the one hand, to address the measurement of social comparisons we have chosen indexes which are formulated in such a way as to incorporate parameters that allow introducing different value judgments when considering comparisons. By doing so, we can choose not only whether to give more importance to comparisons with peers and less importance to comparisons with more distant others, but also the way in which the different weights are assigned. Obviously, as discussed in the section in which the indexes were presented, this type of modeling involves exogenously imposing the type of function and the values of the parameters of the measures. However, the analysis of changes in the results due to the different methodological options permits drawing some enriching conclusions, and even analyzing the robustness of the findings. On the other hand, the interactions with social capital show that the effect of social comparisons becomes clearer when considering the group with whom the individual has more social relations.

Therefore, although we have not constructed reference groups in an explicit manner as in the related literature, we have captured the idea of reference groups by using parameters such as interactions with social capital. This implicit formation of reference groups allows us to conclude, first, that to the extent that comparisons are made to closer individuals, changes in others' incomes have a stronger effect, and the signal and compassion effects have a smaller influence. Second, the greater the intensity of social relationships with closer others in the income distribution is, the stronger the effects of social comparison

The implication of these findings in terms of theoretical models is that utility is not necessarily additively separable in income or consumption, with all that this assumption entails from the traditional economic models as pointed out by Clark, Frijters and Shields (2008). Specifically, from our results, the implication is that it is relevant to include a non-linear function of the social comparisons as an argument of the utility function. This leads from the result that treating distances differently implies different effects. Another possible implication is that since social and cultural capital are relevant for the effect of social comparisons, the formation of social networks should be incorporated in the analysis of growth, inequality, taxation, labor supply, etc. All these considerations will be relevant in evaluating and designing different policies.

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**Table I: Descriptive statistics for year 2011**

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Subjective well-being</b>				
<i>General Satisfaction</i>	6.851	1.753	0	10
<b>Absolute concern<sup>(a)</sup></b>				
<i>Eq Inc</i>	15.72	8.823	0.362	181.2
<b>Habituation<sup>(a)</sup></b>				
$g(y_{it}, y_{i,t-k})_{\delta=0.25}$	15.64	8.738	0.361	229.5
$g(y_{it}, y_{i,t-k})_{\delta=0.50}$	15.57	8.545	0.644	239.0
$g(y_{it}, y_{i,t-k})_{\delta=0.75}$	15.51	8.455	0.848	251.8
<b>Relative concern<sup>(a)</sup></b>				
$I_1(y_{it})$	2.922	3.313	0	165.4
$I_2(y_{it})$	2.893	7.068	0	15.39
$A_1(y_{it})$	4.142	2.765	0	15.36
$A_2(y_{it})$	4.142	6.949	0	165.4
$B_1(y_{it})_{h=\bar{y}_i/2}$	0.760	0.453	0	1.486
$B_2(y_{it})_{h=\bar{y}_i/2}$	0.776	0.476	0	1.476
$B_1(y_{it})_{h=\bar{y}_i}$	1.829	1.288	0	5.601
$B_2(y_{it})_{h=\bar{y}_i}$	1.981	1.670	0	5.280
$C_1(y_{it})_{\beta=1.25}$	0.332	0.653	0	19.02
$C_2(y_{it})_{\beta=1.25}$	0.332	0.400	0	7.475
$C_1(y_{it})_{\beta=1.50}$	0.253	0.423	0	11.02
$C_2(y_{it})_{\beta=1.50}$	0.253	0.292	0	4.854
$C_1(y_{it})_{\beta=1.75}$	0.205	0.309	0	7.374
$C_2(y_{it})_{\beta=1.75}$	0.205	0.230	0	3.513
$D_1(y_{it})$	5.764	2.887	0	15.36
$D_2(y_{it})$	8.564	10.28	0	165.4
<b>Perceived Ranking</b>				
<i>Perc Income</i>	0.141	0.044	0	1
<b>Social Capital</b>				
<i>Bonding-SC</i>	0.390	0.488	0	1
<i>Bridging-SC</i>	0.238	0.181	0	1
<b>Cultural Capital</b>				
<i>Risk</i>	4.369	2.273	0	10
<i>Eco_Goals</i>	0.398	0.181	0	1
<i>Fam_Goals</i>	0.219	0.229	0	1
<i>Soc_Goals</i>	0.491	0.156	0	1
<i>Worries</i>	0.484	0.240	0	1
<b>Socio-Economic Characteristics</b>				
<i>Full-time contract</i>	0.488	0.500	0	1
<i>Part-time contract</i>	0.064	0.245	0	1
<i>Non-single</i>	0.532	0.499	0	1
<i>Male</i>	0.481	0.500	0	1
<i>Age</i>	52.54	18.00	21	101
<i>Years Education</i>	12.09	2.621	7	18
<i>Couple_child</i>	0.158	0.365	0	1
<i>Single_child</i>	0.052	0.222	0	1
<i>Couple_nochild</i>	0.374	0.484	0	1
<i>Single_nochild</i>	0.416	0.493	0	1

<sup>(a)</sup>All variables concerning individuals' income are measured in hundreds of euros.

**Table II: Estimation results for different alternatives of social comparisons**

	$I(y_{it})$	$A(y_{it})$	$B(y_{it})_{h=\bar{y}_t/2}$	$C(y_{it})_{\beta=3/2}$	$C(y_{it})_{\beta=7/4}$	$D(y_{it})$	$h(\bar{y}_{it})$
<b>Individual's Income</b>							
<i>Eq_inc</i>	-0.218*** (0.024)	0.098*** (0.019)	0.001 (0.001)	0.005 (0.004)	0.000 (0.002)	-0.003 (0.002)	-0.021** (0.010)
<i>Relative Deprivation</i>	-0.265*** (0.025)	0.034* (0.020)	-0.385*** (0.055)	-0.199** (0.089)	-0.310*** (0.115)	-0.064*** (0.010)	0.173*** <sup>(a)</sup> (0.042)
<i>Relative Affluence</i>	0.227*** (0.024)	-0.093*** (0.019)	-0.058 (0.049)	0.301** (0.121)	0.549*** (0.127)	0.004* (0.003)	
<i>Habituation</i>	0.002* (0.001)	0.002* (0.001)	0.002* (0.001)	0.002** (0.001)	0.002* (0.001)	0.002* (0.001)	0.002* (0.001)
<b>Social Capital</b>							
<i>Bonding-SC</i>	0.065*** (0.012)	0.070*** (0.019)	0.076*** (0.027)	0.043*** (0.015)	0.044*** (0.016)	0.089*** (0.027)	0.043* (0.022)
<i>Bridging-SC</i>	0.363*** (0.041)	0.192*** (0.061)	0.481*** (0.073)	0.500*** (0.054)	0.481*** (0.056)	0.032 (0.087)	0.820*** (0.075)
<b>Cultural Capital</b>							
<i>Risk</i>	0.005** (0.002)	0.005** (0.002)	0.005** (0.002)	0.005** (0.002)	0.005** (0.002)	0.005** (0.002)	0.005** (0.002)
<i>Eco_goals</i>	0.034 (0.047)	-0.026 (0.067)	-0.013 (0.094)	0.051 (0.060)	0.048 (0.062)	-0.038 (0.093)	0.150* (0.081)
<i>Fam_goals</i>	-0.209*** (0.037)	-0.207*** (0.052)	-0.336*** (0.075)	-0.209*** (0.045)	-0.205*** (0.047)	-0.199*** (0.070)	-0.184*** (0.061)
<i>Soc_goals</i>	-0.313*** (0.055)	-0.261*** (0.080)	-0.663*** (0.117)	-0.197*** (0.067)	-0.192*** (0.070)	-0.216* (0.112)	-0.314*** (0.095)
<i>Worries</i>	0.931*** (0.028)	0.906*** (0.041)	0.783*** (0.056)	1.023*** (0.036)	1.018*** (0.038)	0.889*** (0.058)	1.314*** (0.047)
<b>Interactions</b>							
<i>RelDep*Bonding-SC</i>	0.001 (0.001)	-0.004 (0.004)	-0.032 (0.021)	0.000 (0.035)	-0.004 (0.047)	-0.006 (0.004)	0.003 <sup>(a)</sup> (0.004)
<i>RelDep*Bridging-SC</i>	0.002 (0.003)	0.087*** (0.013)	0.273*** (0.064)	0.442*** (0.124)	0.622*** (0.163)	0.087*** (0.014)	-0.059*** <sup>(a)</sup> (0.013)
<i>RelAffl*Bonding-SC</i>	-0.004 (0.003)	0.000 (0.001)	0.006 (0.019)	0.053* (0.030)	0.063 (0.038)	0.000 (0.001)	
<i>RelAffl*Bridging-SC</i>	0.068*** (0.010)	0.007** (0.003)	-0.168*** (0.056)	-0.209** (0.090)	-0.231** (0.116)	0.007*** (0.002)	
<i>RelDep*Eco_goals</i>	-0.002 (0.004)	0.038*** (0.013)	0.172** (0.074)	0.319*** (0.122)	0.412*** (0.157)	0.031** (0.013)	-0.008 <sup>(a)</sup> (0.015)
<i>RelDep*Fam_goals</i>	-0.003 (0.003)	0.000 (0.010)	0.089 (0.058)	0.031 (0.085)	0.030 (0.112)	-0.001 (0.010)	-0.008 <sup>(a)</sup> (0.011)
<i>RelDep*Soc_goals</i>	-0.009** (0.004)	-0.017 (0.016)	0.154* (0.090)	-0.429*** (0.149)	-0.531*** (0.194)	-0.018 (0.017)	-0.016 <sup>(a)</sup> (0.018)
<i>RelDep*Worries</i>	-0.008*** (0.002)	0.016* (0.009)	0.188*** (0.044)	0.047 (0.088)	0.068 (0.115)	0.016* (0.009)	-0.076*** <sup>(a)</sup> (0.009)
<i>RelAffl*Eco_goals</i>	0.030*** (0.010)	-0.001 (0.004)	-0.006 (0.067)	-0.042 (0.112)	-0.059 (0.143)	-0.002 (0.003)	
<i>RelAffl*Fam_goals</i>	-0.001 (0.007)	-0.003 (0.003)	0.062 (0.052)	-0.074 (0.087)	-0.106 (0.110)	-0.002 (0.002)	
<i>RelAffl*Soc_goals</i>	-0.011 (0.013)	-0.010** (0.005)	0.228*** (0.083)	-0.352*** (0.128)	-0.448*** (0.165)	-0.006* (0.003)	
<i>RelAffl*Worries</i>	0.013** (0.007)	-0.006** (0.002)	0.033 (0.041)	-0.343*** (0.066)	-0.411*** (0.086)	-0.004** (0.002)	
<i>Constant</i>	3.655*** (0.360)	-0.999*** (0.288)	0.527*** (0.093)	0.097 (0.082)	0.161** (0.076)	0.606*** (0.096)	-0.813*** (0.234)
<i>Socio-economic Characteristics</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Mundalk's correction</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Time dummies</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Number of Observations</i>	162167	162167	162167	162167	162167	162167	162167

Standard errors in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

<sup>(a)</sup> The estimated parameter corresponds to perceived ranking. It does not reflect deprivation or affluence, although for the sake of clarity it is presented on this line in the table.