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# Relative income gains and losses and subjective well-being in Europe

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## Abstract:

This study aims to shed further light on the mechanisms of how relative income influences people's subjective wellbeing using four waves of data in the European Social Survey (ESS). The correspondents to the ESS are classified into finer sub-groups according to their income positions relative to the national average and their respective occupational group average earnings. A series of pooled cross-sectional ordered-probit models are estimated for the sub-groups and our results reveal hitherto new contrasting patterns of the influence of relative income on subjective wellbeing. Perhaps the most significant finding is that whilst relative gains have no significant impact on wellbeing in any group, relative losses do matter. Moreover, the low-income losers form the largest sub-group in society and the magnitude of their relative loss is positively associated with their subjective wellbeing. Therefore, the 'social comparison' effect is particularly evident amongst this group and could have significant implications for social mobility and economic dynamism.

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## 1. Introduction

This paper aims to investigate the empirical cross-sectional pattern of individual subjective wellbeing (SWB) across European states using four survey waves of the European Social Survey (ESS) for the period 2002 to 2008. We are particularly interested in exploring how individuals' perceptions of wellbeing (or life satisfaction) are affected by their level of income relative to the income of their peers. This relative income hypothesis has a distinguished lineage within economics [Veblen (1899) and Duesenberry (1948)] and contests the neoclassical perception of wellbeing or utility as a monotonically increasing function of income. In the empirical literature a growing body of evidence suggests that, apart from many other extrinsic and intrinsic factors, relative income exerts a significant influence on individuals' SWB through two distinctive mechanisms: a '*social comparison effect*' or a '*tunnelling effect*'. The distinction is based on the notions of 'envy' (our wellbeing is reduced when 'people like us' tend to do better – the 'social comparison effect') and 'signalling' (our wellbeing is also increased when others do better as it may indicate a brighter prospect for us – the 'tunnelling effect') that were originally discussed in Hirschman and Rothschild (1973). In the European context, while there is *prima facie* evidence to suggest the existence of both significant absolute and relative income effects on wellbeing, there is also evidence of an East-West divide, with '*tunnelling effects*' being more evident in Eastern European states [see, for example, Senik (2004)] and '*social comparison effects*' more evident in Western European states.

The relative income effects imply that individual SWB depends on the difference between an individual's actual income level and some reference point. The mechanisms for the reference point to influence wellbeing typically involve different individuals perceiving the reference point differently – either as a basis for social comparison (and thus envy) or alternatively as a target for self-aspiration. A vast literature has devised and tested a range of alternative measures of the reference point and generated contrasting empirical results [see, for example, van de Stadt *et al.* (1985) Cappelli and Sherer (1988), Clark and Oswald (1996), MacBride (2001), Bygren (2004), Ferrer-i-Carbonell (2005) and Luttmer (2005), Gregoriou *et al.* (2008)]. Nevertheless, the significance and the direction of the relationship between SWB and (reference) income are difficult to establish *a priori* in light of the two opposing dynamics. The net impact is further permeated by a number of ambiguities and controversies in the empirical literature concerning the identification of

the reference group and the measurement of reference income or points<sup>1</sup>. As the findings of recent studies suggest, the statistical significance of the relative income effects is indeed sensitive to the choice of alternative measures of the reference point, which begs the more fundamental question of to *whom* individuals compare themselves and *how*. Furthermore, the issue of heterogeneity in the relationship between SWB and income is rarely taken into consideration [for some exceptions see Clark *et al.* (2005) and Senik (2010)]. Within the same context, a question that has attracted relatively little attention is whether wellbeing responds asymmetrically to reference income for those situated above or below the reference point. Furthermore, heterogeneity in personal intrinsic values may complicate the matter further. Evidently, while certain individual heterogeneity in responses to social comparisons is usually controlled for in the literature, a deeper understanding of the subtle nature and intricate mechanisms of social comparison remains a fertile ground for further investigation.

This paper attempts to tackle a number of such issues and contributes to the existing empirical literature by: *i*) extending previous studies based on the ESS dataset (Caporale, et. al., 2009; Georgellis, et. al., 2009) to incorporate newer rounds of data and to adopt a new definition of the reference income which accounts for occupational heterogeneity; *ii*) investigating whether relative gains and losses in income from the reference point cause an asymmetric effect on SWB; and *iii*) investigating whether the effects of relative gains or losses on wellbeing differ between low- and high-income earners.

A central empirical issue here is the identification and measurement of the reference point. We approach this issue with reference to the occupations that individuals belong to. In either case of social comparison or tunnelling, the reference points must be relevant and readily observable by the individuals under study. In that sense, it is natural to assume that an individual's reference group should share some common income or work-related characteristics, for instance occupation.

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<sup>1</sup> Note that Di Tella and MacCulloch (2003) using US cross-sectional [General Social Survey (1972-2000)] and 23 waves of the Euro-Barometer Survey Series (1975-1997), totalling around 400,000 observations report that both relative income (individual income divided by average GDP) and GDP per capita produce a positive and significant coefficient. Of course, relative income is defined by reference to the average national income, which may not be the relevant reference income for individuals.

The ESS data permits us to shed more light on asymmetric and heterogeneous social comparison effects in a number of European states. We argue that due to the nature of the ESS dataset, the usual approach to, and interpretation of, the envy and tunnelling effects need to be re-examined. We depart from the usual practice of measuring relative income by the absolute level of the reference point and instead we measure the distance between individual incomes and the reference point to indicate relative income gains and losses. We classify the correspondents to the ESS into finer sub-groups including high-income gainers, high-income losers, low-income gainers, and low-income losers according to their income positions relative to the national average and their respective occupational group average earnings. Thus the gainers and losers are defined in a cross-sectional sense by the within-group distances from the group means. A series of pooled cross-sectional ordered-probit models of SWB are estimated for the sub-groups. Our results indicate that, for the whole sample, both absolute income and relative gains/losses exert a statistically significant influence on wellbeing. Moreover, we find evidence that relative gains and losses have asymmetric impacts on wellbeing. However, separate regressions based on sub-samples produce contrasting results. Whilst relative losses retain statistical significance, relative gains no longer significantly affect wellbeing. Furthermore, amongst the losers, the further an individual's income is below the reference point, the higher the wellbeing. Regressions for finer sub-groups further reveal that this phenomenon is primarily evident amongst the low-income losers. It turns out that as low-income individuals are located closer to, but still below, the reference points, their life satisfaction is actually lowered, and *vice versa*. We interpret this phenomenon to suggest that as low income earners move up the income ladder, their aspiration level is also raised, and perhaps so does the intensity and/or the direction of their comparison with their peers. As long as they remain below their reference point, their aspirations may increasingly become frustrations, which in turn reduce their life satisfaction.

The rest of the paper is structured as follows. Section 2 briefly reviews the theoretical and empirical literature on the effects of reference income on utility or SWB. Section 3 describes the dataset and empirical approach for the current study. Section 4 presents and discusses the main findings. The final section concludes.

## **2. Relative income and subjective wellbeing: theoretical and empirical antecedents**

Although the study of the effect of relative income on individuals' wellbeing has a long history in economics that dates back to Adam Smith, it was not until Hirsch's (1976) work on the significance of individuals' relative positions in the national distribution of income and wealth for economic growth that brought it to the centre stage of economic analysis. To Hirsch the social dynamics engendered by people's relative positions in the economy and society can impose a social limit to the growth process due to envy, excessive consumption and tendency towards accumulation of 'oligarchic wealth', and the ensuing distortion to efficient allocation of resources. Subsequently, numerous studies have highlighted and offered empirical support for social comparisons and relative income as determinants of individuals' wellbeing, pointing mostly to an 'envy' effect, whereby higher income of the peer group exerts a negative impact on individual wellbeing (see, e.g. Cappelli and Sherer, 1988; Clark and Oswald, 1996; MacBride, 2001; Stutzer, 2004; Ferrer-i- Carbonell, 2005; and Clark and Senik, 2010). In a related strand of the literature, the Hirschman-Rothschild conjecture suggests that individuals may use the observation of their reference group's income as a source of information about their own income prospects in the future (see also Levy-Garboua and Montmarquette, 2001), and hence any improvement in the reference income enhances their own utility. Senik (2004) finds that this 'tunnelling effect' is more likely to arise in environments of significant change, uncertainty, and volatility. We concur that in such environments, apart from the potential role of the informational base for individuals to assess their own future income prospects, the reference income can also be regarded as the 'certainty equivalence' for volatile individual incomes or a proxy indicator of their own life-cycle 'permanent income'. Since it is human inclination to desire certainty and assurance in situations of uncertainty, a rise in the 'certainty equivalence' increases the level of assurance and thus enhances one's own wellbeing. Insofar as the concept of permanent income is concerned, it is well established in economics that a rise in permanent income increases current, as well as future, consumption and thus current utility.

At a deeper level the social comparison or self-aspiration effects may reflect the intrinsic values that people hold over their life circumstances (Rojas 2005, 2007; Kasser and Ryan 1996). According to Rojas's (2007) Conceptual-Referent-Theory, individuals have different conceptions for happiness

and their judgements about happiness are based on different conceptual referents about what a happy life is. Such judgements are moulded by their upbringing, culture, tradition, religion, and environment, as well as education systems. Based on simple questions about what happiness is, Rojas establishes a typology of eight conceptual referents for happiness and presents evidence to show how the effects of income on wellbeing differ across individuals with different conceptual referents for happiness. In the context of the European Union, empirical evidence for supporting the moderating role of personal values in people's social comparisons is shown by Georgellis *et al.* (2009).

In the existing empirical literature, there are a number of alternative approaches to incorporating reference or relative income measures into the wellbeing regression equations. A commonly adopted approach is to model wellbeing ( $WB_i$ ) as an additive function of the reference income level ( $Y_i^*$ ), alongside individual income ( $Y_i$ ) and a set of control variables that depict personal and socio-economic characteristics ( $X_i$ ). A wellbeing function including a relative income term can be expressed as follows [Eq. 1].

$$WB_i = f(Y_i, Y_i^*, X_i) \quad [Eq. 1]$$

Where  $WB_i$  is the wellbeing of individual  $i$ ,  $Y_i$  is the individual's income,  $Y_i^*$  is the income of his/her reference group, and  $X_i$  is the vector of the usual socio-economic correlates of SWB [Di Tella *et al.* (2003)]. The presence of either the social comparison or tunnelling effect is empirically determined by the significance and sign of the coefficient on the measure of reference income  $Y_i^*$  – a significant and positive sign indicate self-aspiration and otherwise envy.

An alternative approach that has been adopted in more recent studies (Di Tella *et al.* (2003) and Senik, (2004; 2008)] is to replace the reference income variable by the distance between individual incomes and the reference income in the regression equation:

$$WB_i = f(Y_i, Y_i - Y_i^*, X_i) \quad [Eq. 2]$$

Senik (2004) terms the distance the '*residual income*'. In this study, we interpret the deviations as a measure of individuals' relative gains or losses from their reference points. We argue that with a typical cross-sectional dataset such as the ESS dataset, this measure of relative income is more appropriate than the conventional measure. The reason is that in such kind of datasets the time

dimension is usually short and the conventional measure of reference income only shows limited variations over time. Moreover, within any particular time period, the reference groups and thus the reference points are pre-determined and do not vary, but the distances between individual incomes and the reference points do vary widely. Therefore, including the relative gains/ and losses in the SWB equation can capture the significant cross-sectional variations in such measures on individuals' SWB. In the cross-sectional case, a change in the term  $Y_i - Y_i^*$  should be interpreted as the observed individual income being located further away from the reference point, either upwards in the case of a positive sign or downwards otherwise. The corresponding coefficient in the SWB equation measures how wellbeing is affected by relative gains or losses accordingly. For example, if the coefficient turns out to be negative, then the impact of the income deviations from the reference points on wellbeing is asymmetric between positive and negative deviations. Whilst further gains from the reference points would lower SWB, further losses (in terms of magnitudes), in contrast, would enhance wellbeing! In this case the conventional interpretation of the social comparison or tunnelling effects is not easily applicable since the reference income has very limited movements over a short time frame and thus no longer adequately serves the signalling function for individuals judging on their own wellbeing. Rather it is how the relative gains and losses from the reference points are perceived by the gainers and losers that matters for such judgements. It is worth pointing out that the potential outcome of further losses leading to further enhancement of SWB in the aforementioned situation is unusual, and we shall come back to this point when the empirical results are discussed.

In a recent analysis of the information contained in ESS Wave 3 by Clark and Senik (2010), another more sophisticated approach has been employed to utilise the new information on the intensity and direction of how people compare their incomes with their peers' income, as is reflected in Eq. 3.

$$WB_i = \alpha + \beta Y_i + \gamma_i f[Y_i - Y_i^*(k_i)] + \delta' X_i + \varepsilon_i \quad [\text{Eq. 3}]$$

This specification not only captures the individual heterogeneity in the intensity of relative income comparison, but also the different peer groups that individuals compare themselves to. In this approach, the impact of social comparison on wellbeing is ambiguous *a priori*, since the effect depends on the interaction between the intensity of comparison, the direction of comparison, and people's own income conditions. Since we use all Waves of the ESS and the previous Waves do not contain the same or similar information, this approach is not followed in the current study and



instead we adopt the approach summarised in Eq. 2. Nevertheless, by adopting nine different occupational categories and classifying individuals into four sub-groups, our empirical investigation can also capture the sub-group heterogeneity in the intensity, direction, and reference group of comparison through separate regression analysis for each sub-group.

### **3. Data and empirical specification**

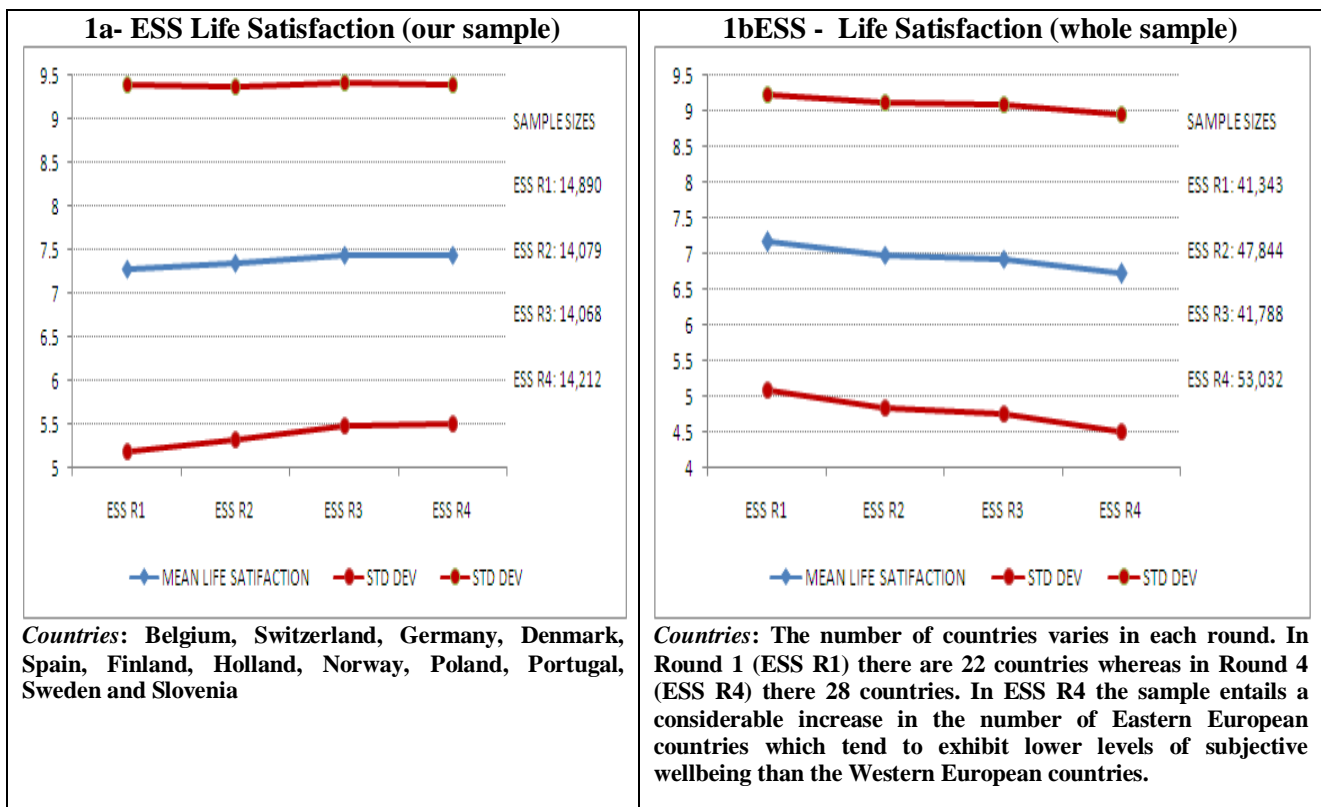
Our empirical analysis is based on data for twelve European countries drawn from the four Waves of the European Social Survey (ESS) from 2002 to 2009 (the ESS: freely available from <http://www.europeansocialsurvey.org>). The ESS is a multi-country survey which has covered practically all the European countries at various points over its four Waves so far.

For the purpose of this study we had to choose countries which appear in all four Waves and provide data on life satisfaction, income, and control variables for all the Waves. We restrict the sample to those of working age (16-70) and countries with missing data and inconsistencies (such as Austria, France, Estonia, and Hungary) were dropped, leaving twelve countries in the regression samples. The starting period is year 2002 and the end year is 2009 with roughly a two-year interval between the Waves. Since our reference income is based on occupation, we had to select individuals who are in employment. In order to make sure that individual are in employment the respondents were selected on the basis of the following criteria: (i) respondents who explicitly state their occupation *and* (ii) report employment status (either paid employee or self-employment status) *and* (iii) report positive working hours. Excluding observations with missing values for the main explanatory variables results in a sample of 57,249 observations, more or less equally distributed across the four Waves. Our final sample countries include Belgium, Switzerland, Germany, Denmark, Spain, Finland, Holland, Norway, Poland, Portugal, Sweden and Slovenia.

The response variable to measure wellbeing is the widely used 11-point generalised life satisfaction question: “*All things considered, how satisfied are you with your life as a whole nowadays? Please answer using this card, where 0 means extremely dissatisfied and 10 means extremely satisfied*”. It is considered a reasonably valid and reliable indicator of the cognitive aspect of human wellbeing [see. for example, Kahneman and Krueger (2006)]. As in every survey (and the ESS is no exception) in which the individuals must report their SWB or satisfaction with life, approximately 75% of the respondents sort themselves close to the highest category of “*extremely satisfied*”. In our sample,

more than half of the respondents regard themselves as very satisfied with their life (reporting a life satisfaction score between eight and ten). Looking at all countries, less than one-tenth find themselves below the mid-point of five. It appears that for all countries in the sample, the majority of individuals are satisfied with their life, with the proportion of ‘very satisfied’ increasing in the latest Wave. Bear in mind that our sample consists mainly of Western European countries even though the ESS progressively started to incorporate more and more eastern European countries. The residents in East Europe tend to report lower levels of life satisfaction than their western counterparts and this is evident in ESS R3 and ESS R4 where the mean European satisfaction scores are reduced (see Figure 1).

**Figure 1 – Mean Life Satisfaction (with standard deviation)**



Income in the ESS data is reported in banded categories in Euros for the first three Waves and in national currency for the fourth Wave. We convert the income bands into a ‘continuous’ variable by calculating the mid-points for each banded category. For the lowest income band we assign a value of half of the upper bound and for the highest income category a value of 1.5 times the lower bound (as in Clark and Senik, 2010). In order to be consistent with the previous waves, in Wave 4 we convert national currencies into Euros for countries such as Switzerland, Denmark, Norway, Poland

and Sweden using the exchange rates provided by the ESS documentation. In addition, we convert annual income bands for some countries into weekly income bands to be comparable with those reported for the majority of the countries.

We define and calculate the reference income level for each individual for each period of the ESS surveys as the average household income of those in the same occupation, living in the same country, henceforth referred to as the ‘*occupational reference income*’. For each country and for each wave our classification yields nine different occupational mean incomes for the following occupations: (1) Legislators, senior officials and Managers; (2) Professionals; (3) Technicians and Associate Professionals; (4) Clerks; (5) Service Workers and Shop and Market Sales Workers; (6) Skilled Agricultural and Fishery Workers; (7) Craft and Related Trades Workers; (8) Plant and Machine Operators and Assemblers and (9) Elementary. Our choice of the occupational reference income (apart from accounting for heterogeneity) is motivated by responses to the question “*Whose income would you be most likely to compare your own with?*”, which was asked in Wave 3 of the ESS. The majority of respondents compare their income to people who share the same occupation [see Clark and Senik (2010)]. This *prima facie* evidence of within-occupational group comparison is also supported by Senik (2004, 2008) who shows that life satisfaction of individuals is strongly correlated with the income of their peers specialising in the same occupational category. The inclusion of different reference groups in the study is based on a number of considerations. First, the existence of multiple comparison groups reflects diverse coping strategies such as ‘self-enhancement’ and ‘self-improvement’ [Falk and Knell (2004)]<sup>2</sup>. Second, the adoption of a universal comparison category is at odds with the findings from social psychology that people intentionally opt for comparison groups from an ample range of available groups so as to meet their shifting objectives [Diener and Fujita (1997), p. 330].

We use log income to measure absolute income and the difference between log income and log reference income as a measure of relative gains or losses. The high-income and low-income earners are identified by calculating the average household income for each country in each year and treating individuals with household income higher (lower) than the national average to be high- (low-) income earners. Similarly, given the absolute income, we classify all individuals in the ESS

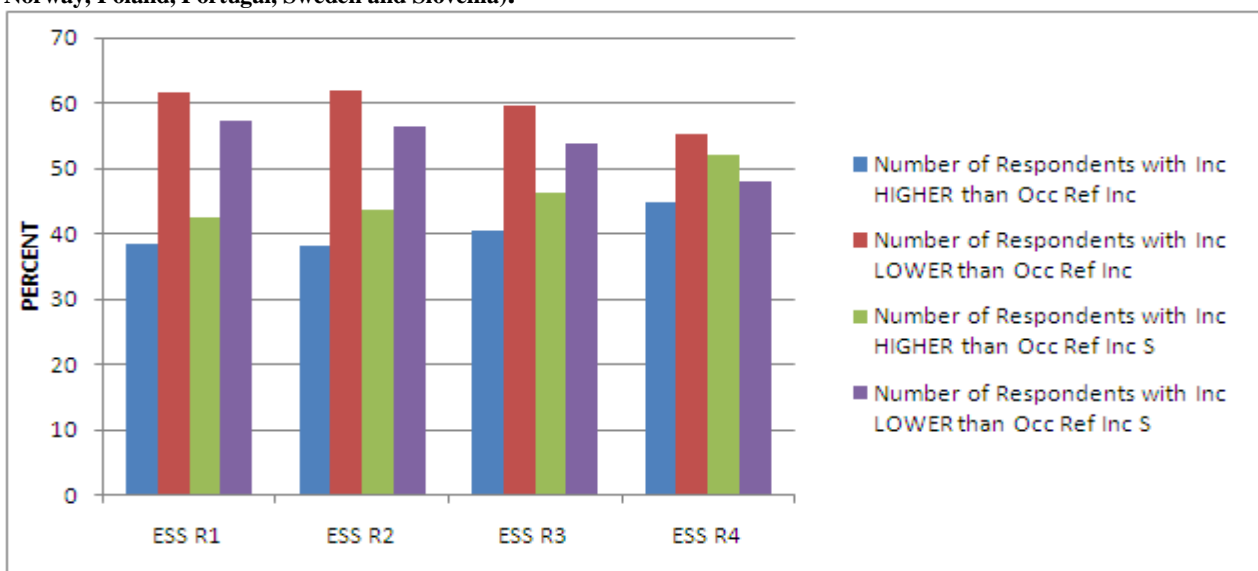
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<sup>2</sup> “Self-enhancement” refers to the phenomenon that people compare with those who are worse-off in order to make themselves feel better. The direction of comparison is therefore downward. “Self-improvement” refers to the phenomenon that people aspire to those who are more successful than themselves. The direction of comparison is thus upward and has an indirect positive effect on overall utility since it facilitates own effort and performance.

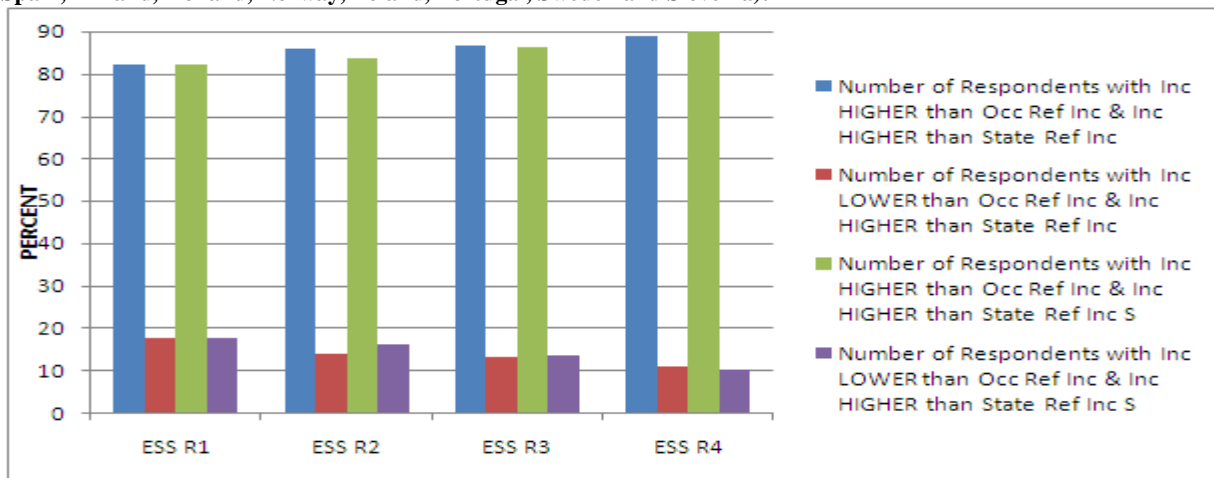
dataset into “*gainers*” or “*losers*”, depending on whether or not an individual’s household income is above (‘*gainer*’) or below (‘*loser*’) their occupational reference income. If we take the state reference income into account jointly then we yield **four** finer sub-groups of “*high-income gainers*”, “*high-income losers*”, “*low-income gainers*” and “*low-income losers*”.

Figures 2 – 2b present a detailed distribution of the relevant populations of these finer groups for our sample of twelve countries and the whole ESS sample. There is no significant difference between our sample and the whole ESS sample. It is apparent that the categories of “*high-income gainers*” and “*low-income losers*” make up the majority of both samples. Gainers account for 46% of our sample and losers 54%. In the finer classifications, the low-income losers are the largest group amounting to 47% of the sample; the high-income gainers are the second largest group with a 39% share; and the middle two groups (i.e. the high-income losers and low-income gainers) are comparatively small, accounting for about 7% each. As these numbers suggest, the distribution of relative income status of the individuals in the twelve European states is characterised by significant ‘fat tails’.

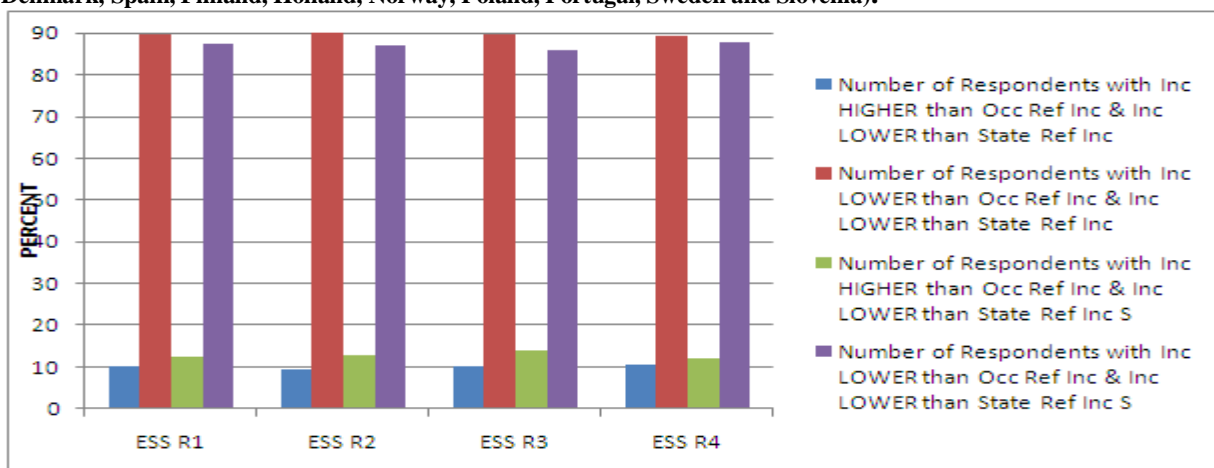
**Figure 2: Gainers vs. Losers.** The *first* and *second* columns refer to the whole ESS sample; the *third* and *fourth* columns refer to our sample (Belgium, Switzerland, Germany, Denmark, Spain, Finland, Holland, Norway, Poland, Portugal, Sweden and Slovenia).



**Figure 2a: High-income gainers vs. high-income losers. The *first* and *second* columns refer to the whole ESS sample; the *third* and *fourth* columns refer to our sample (Belgium, Switzerland, Germany, Denmark, Spain, Finland, Holland, Norway, Poland, Portugal, Sweden and Slovenia).**



**Figure 2b: Low-income gainers vs. low-income losers. The *first* and the *second* columns refer to the whole ESS sample; the *third* and *fourth* columns refer to our sample (Belgium, Switzerland, Germany, Denmark, Spain, Finland, Holland, Norway, Poland, Portugal, Sweden and Slovenia).**

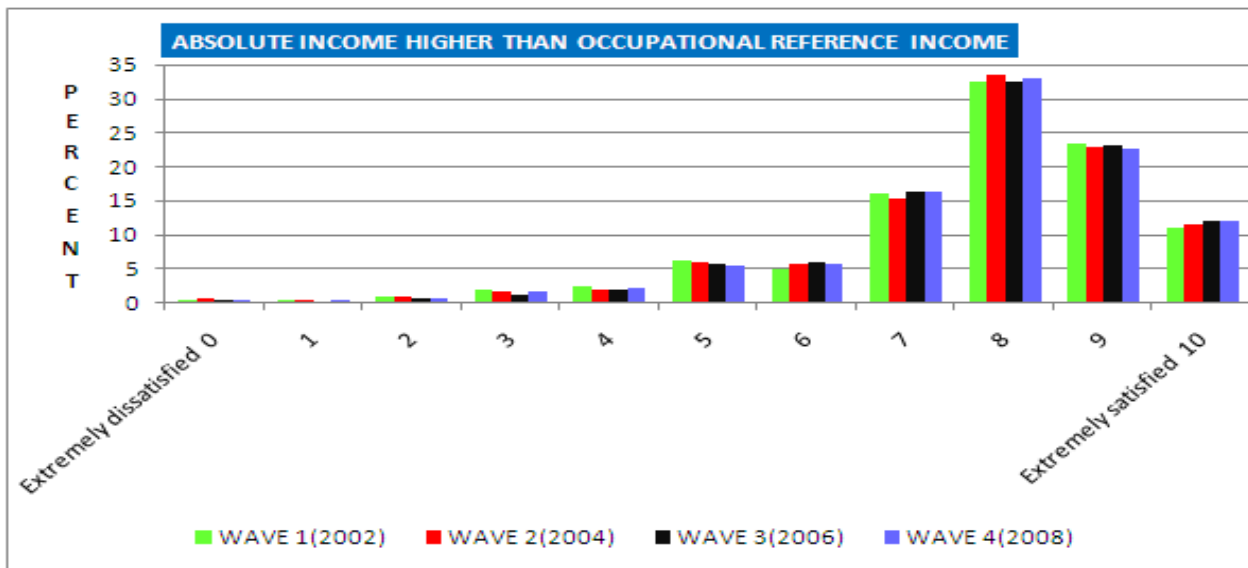


The ESS also contains information on personal values and beliefs, including information on whether respondents attend religious services and whether they pray regularly. Information on personal values is summarised by categorical variables capturing whether it is important for respondents: to think of new ideas and being creative; to be rich and own expensive things; to show abilities and being admired; to seek respect from others; to help people; and to follow traditions and customs. To some extent, such values reflect how much respondents focus on extrinsic or intrinsic values, a distinction which according to Kasser and Ryan (1993, 1996) is an important determinant

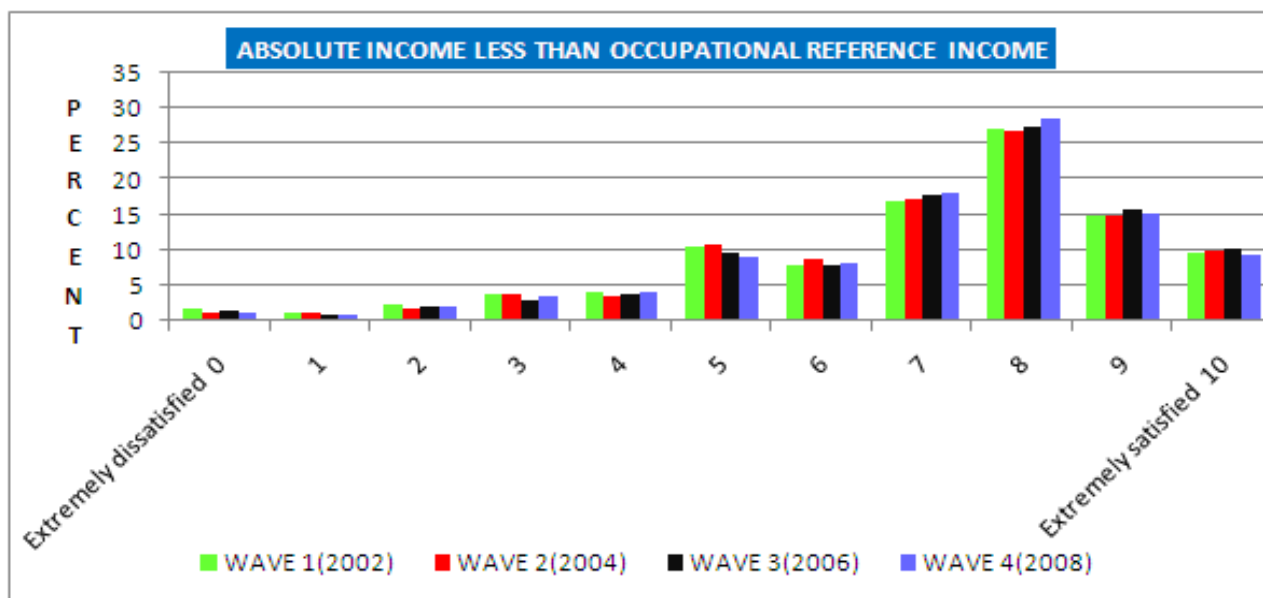
of life satisfaction. As Kasser and Ryan argue, persons who strongly focus on extrinsic goals tend to be relatively less happy, perhaps due to their higher aspiration levels. In this sense, income as well as reference income is likely to play a pivotal role for a materialistic individual's satisfaction with life whilst this might not be the case for a more altruistic or a more religious individual. Georgellis *et al.* (2009), using earlier waves of the ESS, have found that personal values exert a statistically significant explanatory power in SWB regressions. Other controls in the regression analysis include marital status, children, education health, social relations and interactions, and labour market characteristics. Information on past unemployment experience is also used to evaluate whether individuals' perceptions about their current economic situation is influenced by past income shocks, usually associated with unemployment.

As mentioned above, a main focus of this study is to investigate whether respondents below or above their reference income exhibit the same attitude towards life satisfaction. Figures 3a and 3b report the life satisfaction distribution for relative gainers and losers respectively.

**Figure 3a – Life satisfaction of gainers in our sample** (Belgium, Switzerland, Germany, Denmark, Spain, Finland, Holland, Norway, Poland, Portugal, Sweden and Slovenia).



**Figure 3b – Life satisfaction of losers in our sample** (Belgium, Switzerland, Germany, Denmark, Spain, Finland, Holland, Norway, Poland, Portugal, Sweden and Slovenia).

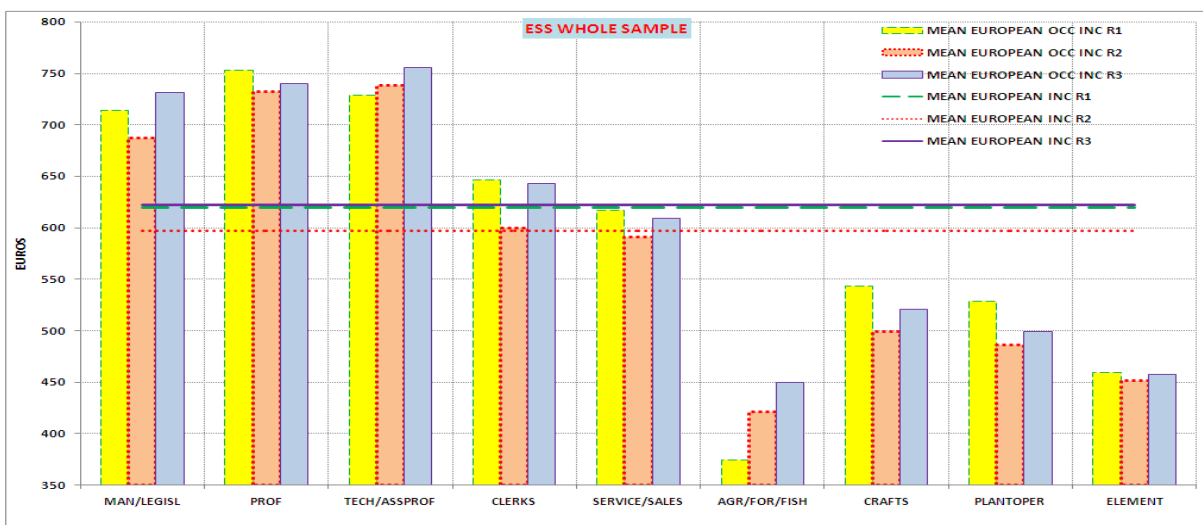


As Figures 3a and 3b suggest, the gainers report *proportionally* higher levels of life satisfaction than the losers. On average, 66% of the ‘gainers’ rate themselves as very satisfied (between eight and ten on the life satisfaction scale), whereas the corresponding percentage amongst the ‘losers’ is 51%. The distribution of Life Satisfaction scores is slightly skewed at the higher end for the gainers, and somewhat more even for the losers. Both distributions remain stable across different waves of the ESS. Therefore, without considering other factors that may affect wellbeing, ‘gainers’ appear to be happier than ‘losers’ in general.

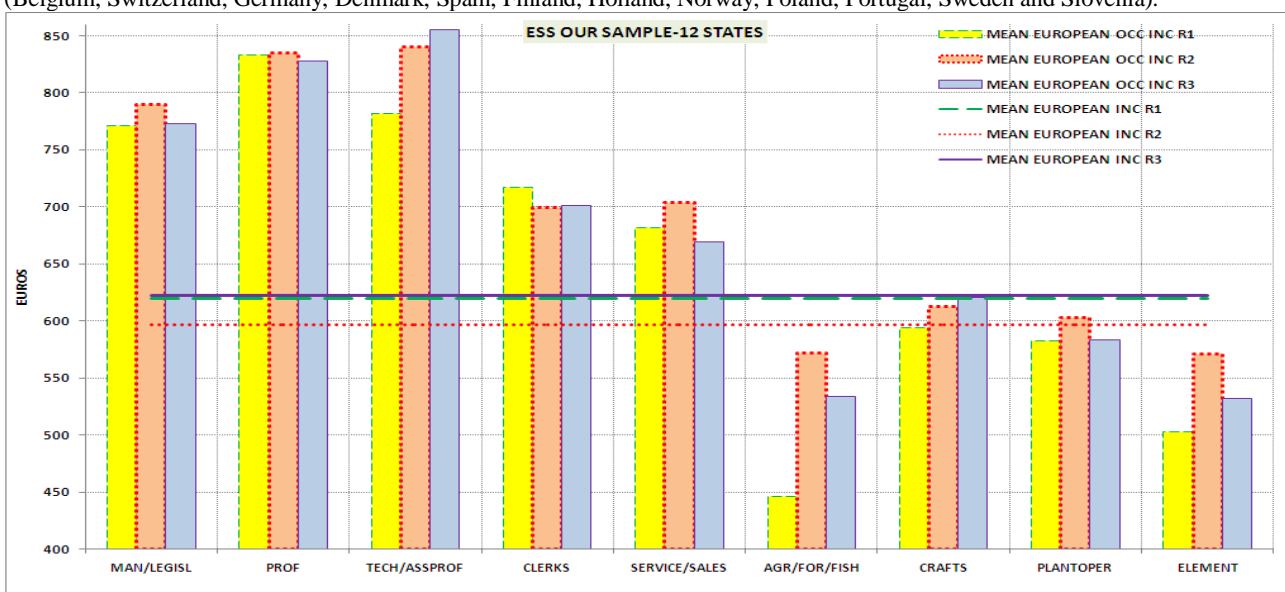
So far we have discussed the notion of occupational reference points and the state income that should be taken into account in order to define the position of the individual. The ESS asks the same question for first three waves (or rounds). More specifically, “Using this card, if you add up the income from all sources, which letter describes your household's total net income?” Then the respondent is presented with the following card which displays income levels in banded categories (all categories are expressed in Euros per week): ‘J: less than €40’, ‘R: €40-€70’, ‘C: €70-€120’, ‘M: €120-€230’, ‘F: €230-€350’, ‘S: €350-€460’, ‘K: €460-€580’, ‘P: €580-€690’, ‘D: €690-€1150’, ‘H: €1150-€1730’, ‘U: €1730-€2310’, ‘N: more than €2310’. During Wave 4 the banded categories were changed and a different method of measuring household income has been introduced (but the

wording of the question remained the same) in order to reflect each country’s income distribution. For example, many Western or Northern European respondents stated income more than €690 per week but that was not the case for Eastern or Southern European states. Figures 4a to 4d reveal the occupational reference points (which remain fairly stable) as well as the mean state income. We report the mean reference occupation income for the first three waves together with state mean income. We do the same for the fourth wave separately so as to account for the change in the banded income categories.

**Figure 4a – Occupational reference income and within-state mean income for ESS rounds 1, 2 & 3.** (All countries surveyed in each Round. Round 1: 22 countries, Round 2: 26 and Round 3: 23).

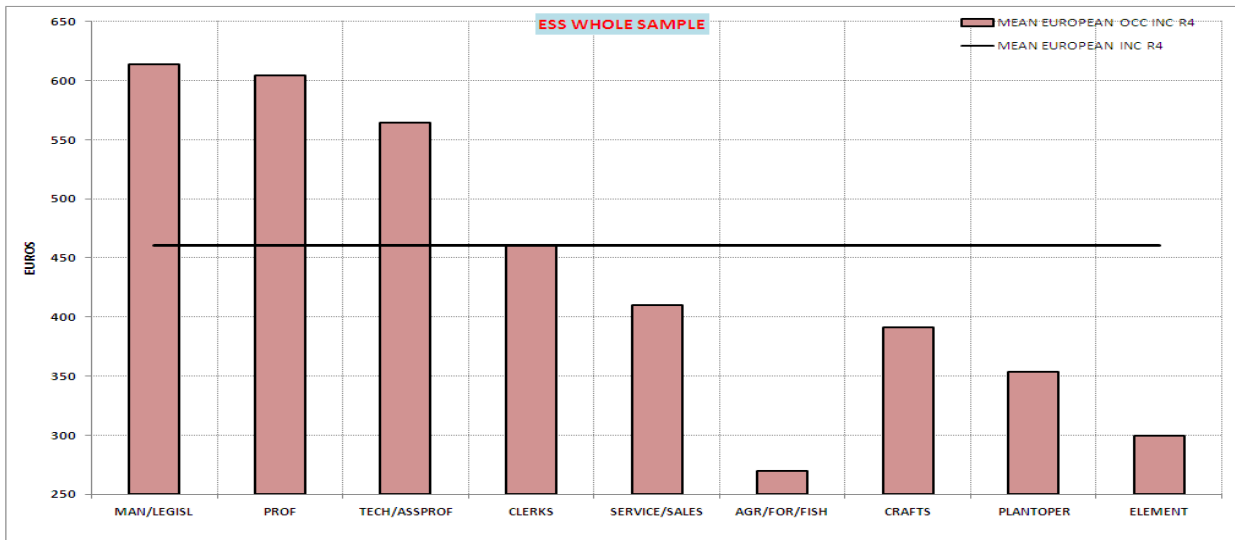


**Figure 4b – Occupational reference income and within-state mean income for ESS rounds 1, 2 & 3.** (Belgium, Switzerland, Germany, Denmark, Spain, Finland, Holland, Norway, Poland, Portugal, Sweden and Slovenia).

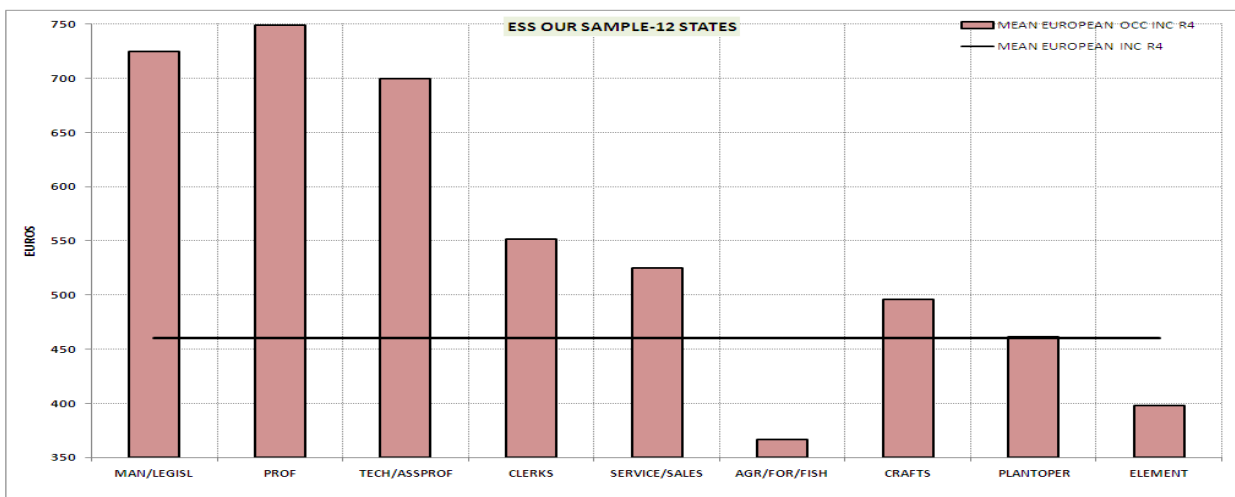




**Figure 4c – Occupational reference income and within-state mean income for ESS round 4.** (All countries surveyed in each Round 4: 28)



**Figure 4d – Occupational reference income and within-state mean income for ESS round 4.** (Belgium, Switzerland, Germany, Denmark, Spain, Finland, Holland, Norway, Poland, Portugal, Sweden and Slovenia).



As mentioned above, our empirical specification follows Eq.2. Because life satisfaction is an ordinal variable, we estimate ordered-probit models, as described in (Greene, 2003). The underlying assumption is that individuals' subjective evaluation of life satisfaction is determined by a transformation of their personal characteristics, values, and income status into a cardinal latent index, which is used as a proxy for the unobserved level of utility:

$$LS_i^* = \beta' z_i + e_i,$$

where  $z_i$  is a vector of explanatory variables, including log income and relative gains/losses,  $\beta$  is a vector of parameters to be estimated, and  $e_i$  is a random error term, normally distributed. We run seven sets of regressions, one for the whole sample, two for the gainers and losers respectively, and four for high-income gainers, high-income losers, low-income gainers, and low-income losers respectively. One econometric issue that is worth mentioning here is that in large survey datasets there is a common phenomenon of sample clusters. In our case the dependent variable is randomly selected but some explanatory variables (e.g. occupational reference income) are measured at higher level of aggregation. This typically leads to the problem of clustered errors. In our estimation we have considered this problem and have used cluster-robust standard errors using occupational reference income as the cluster variable.

#### 4. Empirical results

Table 1 presents the results of *weighted* life satisfaction regressions based on the whole sample.<sup>3</sup> By and large, the estimated coefficients are consistent with previous findings revealing important socio-economic effects on life satisfaction. For example, women living in Europe tend to be significantly happier than men, whilst age exhibits a U-shaped relationship with life satisfaction with the lowest level of life satisfaction around the age 44. Being married with children and good health are typical wellbeing boosters. The results show that primary and secondary (lower) education does not affect wellbeing, but those with high level of education are less satisfied with life compared with those with low level of education. In the literature the relationship between education and wellbeing has received considerable attention (see, e.g., Blanchflower and Oswald, 2004; Dolan, Peasgood, and White, 2008; Graham and Petinatto, 2001; and Clark, 2003). Educational qualifications may be related to unobservable characteristics at the individual level such as inspiration, incentive, aptitude and parental background. It is argued that education may be correlated with certain variables such as health and income and failure to control for such variables might result in biased coefficients on education. However, the inclusion of variables correlated with education might lead to the underestimation of education's full impact on life satisfaction. The

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<sup>3</sup> In large surveys such as the ESS, weights are usually provided to ensure that any derived results from the survey represent the population of interest as closely as possible. Failing to use weights in maximum likelihood estimation may invalidate the likelihood function. In order to address the issues we estimated both weighted and un-weighted regressions. Both approaches produce virtually identical qualitative results in terms of sign and significance with only negligible quantitative differences in the coefficients.

empirical results, unsurprisingly, are mixed and reveal either a negative or insignificant relationship between wellbeing and education.

[Table 1 about here]

Previous studies report that social interactions raise the life satisfaction of those involved [Pichler (2006), Georgellis *et al.*, (2009)]. At the national level, Helliwell and Putman (2004) report similar results for the U.S. whilst Meirer and Stutzer (2006) report that volunteering in the former East Germany contributes to higher levels of wellbeing. The positive relationship between social interaction and wellbeing is also evident in our results, which is in line with Sarracino's (2010) results that are based on a similar large-scale cross-sectional survey (the World Value Survey). Religion has a positive and significant impact on life satisfaction, which suggests that in situations of adverse events in life or social networks religion could offer comfort and shelter to enhance mental and physical wellbeing (see, for example, a recent summary in Lehrer, 2004) or alleviates depressive symptoms (Smith, McCullough and Poll, 2003). Unsurprisingly, living in an unsafe or deprived area is detrimental to life satisfaction.

Turning to the influence of labour market characteristics, the coefficients in Table 1 suggest that compared to those with an 'elementary occupation' (the omitted category) individuals in more professional occupations are less satisfied with life. Long working hours tend to depress life satisfaction, although being in a supervisory position mitigates the negative effects exhibited by occupational dummies and working hours. Information on past unemployment experience is also used to evaluate whether individuals' perceptions about life are influenced by past income shocks, usually associated with unemployment. Regaining the employment status within 12 months has a positive effect on SWB.

Regarding the role of personal values as a moderating factor of life satisfaction, the results show that a materialistic orientation, a tendency to show off ability or to seek respect from others tend to reduce life satisfaction, whereas being creative, following rules and traditions or being decision-makers typically enhance life satisfaction.

Consistent with previous empirical findings and insofar as the absolute and reference incomes are concerned, both are significant determinants of life satisfaction for the whole sample. Although absolute income retains its normally positive impact, what is novel in the current study is that due to the negative coefficient, relative gains and losses have asymmetric impacts on SWB – whilst further gains reduce SWB, further losses actually improve SWB. In other words, for the whole sample and across all the occupations, further increases in individual incomes from the occupational means are, on average, associated with deteriorations in life satisfaction, whereas further reductions in individual incomes from the occupational means are associated with improvements in life satisfaction.

In the above equation the term involving the distance between individual incomes and the reference points can either turn out to be relative gains or losses, and there is no explicit distinction between the two. Although the coefficient on the term is statistically significant, we do not know whether relative gains and losses are both significant for SWB. As a further check on the asymmetric effects of relative gains and losses, two separate regressions for gainers and losers were conducted and the results are reported in Table 1 under Specification 2 and 3 respectively. Now the nature of the asymmetry between relative gains and losses has changed completely: whilst relative losses remain significant, relative gains no longer matters. For the gainers (Spec. 2, Table 1), neither absolute income nor relative income (or relative gains) have statistical significance any more once the other aspects of their life domain have been taken into account. In contrast, for the losers (Spec. 3, Table 1) both absolute income and relative losses remain significant even if the other aspects in their life domain have been controlled for. What appears puzzling is that, amongst the losers, although a rise in income itself enhances life satisfaction, an improvement in their relative position is actually negatively associated with life satisfaction. In other words, amongst the losers, *ceteris paribus*, as individual incomes move closer to, but still below, the occupational means, the level of life satisfaction falls, and *vice versa*. Before we attempt to explain such a phenomenon, we investigate further if relative gains and losses are viewed differently by high- and low-income earners. The regression results for the four sub-samples of high-income gainers, high-income losers, low-income gainers and low-income losers are reported in the following set of tables.

[Table 2 about here]

Table 2 sheds further light on the contrast between relative gains and losses. In keeping with the above findings, relative gains have no statistical significance for life satisfaction, viewed either by the high-earners or low-earners. In contrast, relative losses are perceived differently by high earners and low earners: whilst the former take the relative loss in their stride, the latter's life satisfaction is significantly affected by the relative loss, in a way that is now familiar. Thus the afore-mentioned puzzle concerning all losers is now only applicable to the low-income losers!

How do we explain such a puzzle? It should be noted that for low-income losers to move closer to the reference points, they usually have to undergo training and education, have more working experience, work harder, or receive a promotion. In the process, their aspiration levels rise, and they also tend to interact with better educated, more skilled, more motivated, and perhaps more competitive fellow workers. Consequently, the intensity of their comparison with their peers might increase, and the direction of their comparison might also increasingly point upward (or the 'glass-half-full' mentality switching to the 'glass-half-empty' mode, see also the discussion in Clark and Senik, 2010). As their incomes approach, but still remain below, the reference points, their aspirations might increasingly become frustrations and both the intensity and direction of their comparison with peers are very likely to adversely affect their quality of life (see also similar discussion in Stutzer, 2005). Conversely, the further away is an individual's income from the reference point, usually the lower is the individual's skill and aspiration level, and hence the lower the intensity of comparison becomes. In this case, the individual's SWB might well increase. The rising contentment with moving away from the reference point may be also explained with reference to how people perceive and evaluate their life chances. As their income is further away from the reference point, they may perceive the likelihood of working harder and earning a higher income to be dwindling. As that likelihood becomes very low, they may simply attach very low weight to the value of any outcome that is associated with competing harder in the rat-race for wealth whilst give more weights to other outcomes that are likely to enhance wellbeing.

In a final set of regressions for the sub-group of low-income losers, we replace the personal values by the interaction terms between personal values and relative losses (see Table 3). It turns out that the relative losses term by itself has lost statistical significance, but the interaction between personal values and relative losses has generated further intricate patterns. For those low-income losers who show strong tendency to follow traditions, seek respect or to make decisions, relative losses no longer matter for life satisfaction. For those low-income losers who are strongly materialistically

motivated or eager to show ability, any loss relative to the reference point adversely affects their SWB, as is usually expected. The puzzle that rising relative losses actually improve SWB is now only observed among those low-income losers who regard themselves to be strongly creative or rule-followers. For such individuals, moving closer to the occupational mean income but still being stuck below it is possibly particularly disappointing or frustrating.

[Table 3 about here]

In interpreting our empirical results a note of caution needs to be raised concerning the issue of causation - as it is the case with all correlational analyses. For example, the majority of the studies report that the marriage and wellbeing are positively correlated but it is unclear whether marriage is the cause or the consequence of happiness [Stutzer and Frey (2006)]. Likewise this investigation cannot establish whether other socio-economic factors such as social capital or health cause wellbeing or vice versa. From the perspective of a *post hoc* analysis of the relationship between a set of variables, we have tried to act in accordance with two criteria of causation: the statistical associations that exist between the variables and the elimination of spuriousness, at least to the extent in which certain standard control variables were included in the analyses. The third criterion of causation, temporal precedence, however, is unclear given that the ESS has a repeated cross-sectional design rather than a longitudinal one. Nevertheless, addressing explicitly such a 'causal question' was not the scope of this paper. Rather than finding out what causes what, the objective of this article is to address heterogeneity and asymmetries in people's perception of reference incomes. Another point to note is that our sample comprises mainly western European states, which, from the perspective of generality, may introduce the self-selection bias into our results.

## **5. Conclusions**

This study sets out to investigate further the empirical relationship between subjective wellbeing and income, measured in both absolute and relative terms, across individuals in different European Union member states using the four waves of the ESS. Consistent with earlier findings, both relative and absolute income effects are significant for the whole sample of all individuals. However, more careful investigations of individuals classified into finer sub-groups reveal some different and interesting new results. When individuals are classified into two groups of gainers and

losers, the relative income effects are no longer significant for the gainers but remain significant for the losers. Moreover, amongst the losers, as their incomes get closer to, but still below, the reference points, their SWB actually decreases, and *vice versa*. Further investigations of individuals classified into four sub-groups show that this phenomenon is strikingly evident amongst the low-income losers, particularly those who regard themselves to be highly creative. We take such evidence to suggest that the phenomenon of social comparison is the strongest amongst the lower income losers with complex changes in the intensity and direction of comparison as well as intricate patterns of psychological perceptions of relative gains and losses in their incomes. Given the very large size of this group of individuals (nearly a half of the sample size), the puzzle of rising relative losses associated with increasing life satisfaction may have important implications for social mobility and economic dynamism. In earlier works on relative income hypotheses, social comparison could lead to a ratchet-up effect on aggregate consumption (as in Duesenberry's work) or impose a social limit on economic growth largely through increasingly intensified competition for 'oligarchic wealth' (as in Hirsch's work). To the extent that our results suggest a potential lack of self-aspiration and/or a potential lack of the enjoyment of the fruits of their labour amongst a significant proportion of the disadvantaged individuals in the twelve EU states, it is perhaps of even more considerable policy significance to investigate the circumstances and mechanisms of social comparison even further.

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**TABLE 1: ORDERED PROBIT**

DEPENDENT VARIABLE: LIFE SATISFACTION: 0 “Not Satisfied At All”... 10 “Extremely Satisfied”	SPEC. 1 WHOLE SAMPLE		SPEC. 2 ABOVE OCCUPATION REFERENCE INCOME		SPEC. 3 BELOW OCCUPATION REFERENCE INCOME	
	Coef.	p-val	Coef.	p-val	Coef.	p-val
<b>PERSONAL CHARACTERISTICS</b>						
Male	-0.116	0.000	-0.122	0.000	-0.119	0.000
Age	-0.041	0.000	-0.037	0.000	-0.044	0.000
Age <sup>2</sup>	0.000	0.000	0.000	0.000	0.001	0.000
Married	0.231	0.000	0.218	0.000	0.236	0.000
Separated	-0.212	0.000	-0.211	0.005	-0.213	0.000
Divorced	0.024	0.212	0.024	0.482	0.026	0.273
Widowed	-0.025	0.378	-0.093	0.124	-0.011	0.746
<i>Omitted: Never in Couple</i>						
Kids at Home	0.043	0.000	0.037	0.023	0.046	0.004
Subjective General Health <sup>1</sup>	-0.308	0.000	-0.320	0.000	-0.300	0.000
How Religious the Respondent Is <sup>2</sup>	0.028	0.000	0.019	0.000	0.034	0.000
<b>EDUCATION</b>						
Primary	0.001	0.981	0.100	0.248	-0.028	0.588
Lower Secondary	-0.044	0.320	0.021	0.805	-0.057	0.272
Upper Secondary	-0.082	0.066	-0.018	0.835	-0.094	0.076
Tertiary	-0.153	0.001	-0.104	0.233	-0.155	0.005
<i>Omitted: Not Completed Primary</i>						
<b>LABOUR MARKET/OCCUPATION</b>						
Log Working Hours <i>plus</i> Overtime	-0.031	0.002	0.034	0.031	-0.072	0.000
Responsible for Supervising Other Employees	0.022	0.045	0.033	0.034	0.008	0.590
Experienced Unemployment in the last 12m	-0.174	0.000	-0.141	0.000	-0.184	0.000
Member Trade Union (Currently)	-0.014	0.255	-0.003	0.853	-0.021	0.203
Member Trade Union (Past)	-0.040	0.003	-0.044	0.034	-0.032	0.072
<i>Omitted: Not Member of Trade Union</i>						
Managers & Legislators	-0.042	0.271	0.012	0.827	-0.065	0.217
Professionals	-0.051	0.162	-0.004	0.945	-0.073	0.140
Technicians & Associated Professionals	-0.060	0.041	0.003	0.951	-0.092	0.020
Clerks	-0.048	0.067	-0.045	0.248	-0.045	0.206
Service & Sales	-0.012	0.587	0.030	0.353	-0.043	0.148
Agricultural & Fishing	0.022	0.495	0.045	0.348	0.009	0.833
Craft	-0.011	0.634	0.000	0.997	-0.014	0.646
Plant Operators	-0.015	0.536	0.026	0.467	-0.048	0.141
<i>Omitted: Elementary</i>	-0.042	0.271	0.012	0.827	-0.065	0.217
Income Hardships	-0.369	0.000	-0.377	0.000	-0.363	0.000
<b>SOCIAL CHARACTERISTICS</b>						
Social Meetings With People-How Often <sup>3</sup>	0.060	0.000	0.067	0.000	0.057	0.000
Anyone To Discuss Intimidate Matters	0.250	0.000	0.234	0.000	0.257	0.000
Local Area Unsafe <sup>4</sup>	-0.079	0.000	-0.074	0.000	-0.081	0.000
<b>PERSONAL VALUES (1 “Not Like Me At All”...6 “Very Much Like Me”...)</b>						
Important To Be Creative <sup>5</sup>	0.042	0.000	0.047	0.000	0.036	0.000
Important to be Rich <sup>5</sup>	-0.046	0.000	-0.044	0.000	-0.047	0.000
Important to Show Abilities <sup>5</sup>	-0.034	0.000	-0.043	0.000	-0.027	0.000
Important To Follow Rules <sup>5</sup>	0.031	0.000	0.034	0.000	0.029	0.000
Important To Make Own Decisions <sup>5</sup>	0.014	0.005	0.011	0.130	0.015	0.023
Important To Get Respect From Others <sup>5</sup>	-0.017	0.000	-0.017	0.006	-0.018	0.001
Important To Follow Traditions <sup>5</sup>	0.015	0.000	0.018	0.002	0.015	0.005
Important To Seek Fun <sup>5</sup>	0.052	0.000	0.052	0.000	0.052	0.000
<b>EUROPEAN STATES</b>						
Switzerland	0.128	0.000	0.229	0.000	0.068	0.150
Germany	-0.132	0.000	-0.020	0.545	-0.208	0.000
Denmark	0.493	0.000	0.564	0.000	0.442	0.000

Spain	0.033	0.200	0.082	0.034	-0.003	0.933
Finland	0.387	0.000	0.452	0.000	0.342	0.000
Holland	-0.036	0.093	-0.024	0.462	-0.041	0.162
Norway	0.003	0.935	0.053	0.332	-0.017	0.719
Poland	-0.003	0.961	0.036	0.696	-0.046	0.582
Portugal	-0.591	0.000	-0.664	0.000	-0.551	0.000
Sweden	0.156	0.000	0.230	0.000	0.098	0.002
Slovenia	-0.141	0.000	-0.083	0.137	-0.193	0.000
<i>Omitted: Belgium</i>						
<b>TIME</b>						
Year of Interview 2003	-0.006	0.816	0.007	0.870	-0.012	0.720
Year of Interview 2004	0.033	0.017	0.032	0.135	0.036	0.053
Year of Interview 2005	-0.005	0.876	0.008	0.867	-0.016	0.675
Year of Interview 2006	0.051	0.001	0.039	0.081	0.061	0.002
Year of Interview 2007	0.052	0.046	0.036	0.355	0.063	0.070
Year of Interview 2008	0.049	0.000	0.053	0.011	0.046	0.019
Year of Interview 2009	0.058	0.016	0.045	0.188	0.076	0.029
<i>Omitted: Year of Interview 2002</i>						
<b>INCOME – REFERENCE INCOME</b>						
Ln (Net Income) <sup>6</sup>	0.166	0.001	0.104	0.149	0.196	0.003
Ln (Net Income <i>minus</i> Reference Income) <sup>7</sup>	-0.105	0.029	-0.032	0.667	-0.160	0.014
/Cut1	-3.198		-3.147		-3.241	-3.198
/Cut2	-2.942		-2.926		-2.971	-2.942
/Cut3	-2.597		-2.605		-2.617	-2.597
/Cut4	-2.228		-2.246		-2.241	-2.228
/Cut5	-1.944		-1.956		-1.958	-1.944
/Cut6	-1.445		-1.489		-1.438	-1.445
/Cut7	-1.127		-1.173		-1.116	-1.127
/Cut8	-0.530		-0.548		-0.534	-0.530
/Cut9	0.403		0.438		0.353	0.403
/Cut10	1.196		1.325		1.052	1.196
<hr/>						
Number of Observations	<b>53,383</b>		<b>24,687</b>		<b>28,696</b>	
Likelihood Ratio - $\chi^2(59)$	18795.08		6918.51		10644.12	
Prob > $\chi^2$	0.000		0.000		0.000	
Pseudo R <sup>2</sup>	0.090		0.077		0.091	
Log Likelihood	-94517.863		-41110.975		-53158.93	

1: Categorical Variable: 1 'Very Good', 2 'Good', 3 'Fair', 4 'Bad', 5 'Very Bad'

2: Categorical Variable: 0 'Not At All Religious' ... 10 'Very Religious'

3: Categorical Variable: 1 'Never', 2 'Less Than Once a Month', 3 'Once a Month', 4 'Several Times a Month', 5 'Once a Week', 6 'Several Times a Week', 7 'Every Day'

4: Categorical Variable: 1 'Very Safe', 2 'Safe', 3 'Unsafe', 4 'Very Unsafe'

5: Categorical Variable: 1 'Not Like Me At All', 2 'Not Like Me', 3 'A Little Like Me', 4 'Somewhat Like Me', 5 'Like Me', 6 'Very Much Like Me'

6: Ln (Household Net Income, All Sources)

7: Ln (Household Net Income, All Sources) *minus* Ln (Mean Household Net Income, All Sources, by Occupation, by State and by Round).

**TABLE 2: ORDERED PROBIT ESTIMATES**

DEPENDENT VARIABLE: LIFE SATISFACTION: 0 "Not Satisfied At All"... 10 "Extremely Satisfied"	SPEC. 4		SPEC. 5		SPEC. 6		SPEC. 7	
	ABOVE OCC REF INC & ABOVE STATE INC		BELOW OCC REF INC & ABOVE STATE INC		ABOVE OCC REF INC & BELOW STATE INC		BELOW OCC REF INC & BELOW STATE INC	
	Coef.	p-val	Coef.	p-val	Coef.	p-val	Coef.	p-val
<b>INCOME – REFERENCE INCOME</b>								
Ln (Net Income) <sup>6</sup>	0.098	0.216	0.536	0.022	0.331	0.131	0.146	0.037
Ln (Net Income <i>minus</i> Reference Income) <sup>7</sup>	-0.018	0.824	-0.319	0.208	0.111	0.967	-0.121	0.083
Number of Observations	<b>20948</b>		<b>3547</b>		<b>3739</b>		<b>25149</b>	
Prob > $\chi^2$	0.000		0.000		0.000		0.000	

Notes: All variables in Table 1 were used to produce Table. Full Table is available upon request.

OCC REF INC: Occupational Reference Income

STATE INC: Mean State Income

See also Figure 2a, Figure 4a, 4b, 4c and 4d.

TABLE 3

DEPENDENT VARIABLE: LIFE SATISFACTION: 0 "Not Satisfied At All"... 10 "Extremely Satisfied"	SPEC. 1		SPEC. 2		SPEC. 3		SPEC. 4		SPEC. 5		SPEC. 6		SPEC. 7	
	WHOLE SAMPLE		ABOVE OCCUPATION REFERENCE INCOME		BELOW OCCUPATION REFERENCE INCOME		ABOVE OCC REF INC & ABOVE STATE INC		BELOW OCC REF INC & ABOVE STATE INC		ABOVE OCC REF INC & BELOW STATE INC		BELOW OCC REF INC & BELOW STATE INC	
	Coef.	/p-val/	Coef.	/p-val/	Coef.	/p-val/	Coef.	/p-val/	Coef.	/p-val/	Coef.	/p-val/	Coef.	/p-val/
<b>PERSONAL VALUES (1 "Not Like Me At All"...6 "Very Much Like Me"...) </b>														
Important To Be Creative X LN (Inc - Ref Inc)	-0.005	0.805	0.119	0.003	-0.039	0.069	0.111	0.005	-0.243	0.394	0.494	0.111	-0.037	0.086
Important To Be Rich X LN (Inc - Ref Inc)	0.046	0.005	-0.125	0.000	0.096	0.000	-0.121	0.000	0.544	0.014	-0.732	0.010	0.091	0.000
Important To Show Abilities X LN (Inc - Ref Inc)	0.026	0.094	-0.136	0.000	0.078	0.000	-0.132	0.000	0.315	0.148	-0.626	0.018	0.073	0.000
Important To Follow Rules X LN (Inc - Ref Inc)	-0.016	0.298	0.098	0.001	-0.049	0.005	0.099	0.001	-0.309	0.143	0.357	0.151	-0.046	0.010
Important To Make Own Decisions X LN (Inc - Ref Inc)	-0.055	0.024	-0.133	0.008	-0.032	0.249	-0.150	0.003	-0.485	0.175	0.023	0.955	-0.034	0.227
Important To Get Respect from Others X LN (Inc - Ref Inc)	0.002	0.898	-0.048	0.127	0.013	0.462	-0.046	0.144	-0.084	0.705	-0.219	0.398	0.013	0.468
Important To Follow Traditions X LN (Inc - Ref Inc)	-0.001	0.955	0.070	0.031	-0.012	0.520	0.078	0.018	-0.081	0.726	0.047	0.869	-0.012	0.537
Important To Seek Fun X LN (Inc - Ref Inc)	-0.047	0.002	0.140	0.000	-0.095	0.000	0.136	0.000	-0.248	0.234	0.869	0.002	-0.093	0.000
<b>INCOME – REFERENCE INCOME</b>														
Ln (Net Income) <sup>6</sup>	0.183	0.000	0.111	0.123	0.217	0.001	0.101	0.204	0.597	0.010	0.373	0.089	0.166	0.018
Ln (Net Income <i>minus</i> Reference Income) <sup>7</sup>	-0.062	0.262	-0.072	0.450	-0.099	0.172	-0.035	0.727	0.372	0.472	-0.556	0.314	-0.058	0.454
<b>Number of Observations</b>	<b>53383</b>		<b>24687</b>		<b>28696</b>		<b>20948</b>		<b>3547</b>		<b>3739</b>		<b>25149</b>	
Likelihood Ratio - $\chi^2(59)$	18213		6703		10421		5493		1012		1247		9255	
Prob > $\chi^2$	0.000		0.000		0.000		0.000		0.000		0.000		0.000	
Pseudo R <sup>2</sup>	0.088		0.075		0.089		0.074		0.078		0.085		0.089	
Log likelihood	-94808		-41218		-53270		-34410		-5962		-6681		-47204	