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Shiny Happy People:
A study of the effects income relative to a
reference group exerts on life satisfaction

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ABSTRACT¹

This study aims to causally evaluate the following hypotheses: i) that income, when evaluated relatively to a reference, is a significant determinant of life satisfaction; and ii) whether this effect changes in strength or direction depending on the reference group used for comparison and (or) the starting wealth levels. Aided by a fixed effects regression analysis on a large panel data sample from Peru and an income-framed life satisfaction question fundamental for a causal identification strategy, this investigation finds significant results for both. The findings suggest the importance of relative comparisons for regulatory and redistributive purposes, as well for other non income-related topics.

¹ I would like to thank Roberto Asmat for his invaluable help.

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"A house may be large or small, but as long as the surrounding houses are equally small, it satisfies all social requirements of a dwelling place. But let a palace arise by the side of this small house, and it shrinks from a house into a hut".

Karl Marx (1900; p.35)

" - Nunca alcanzarás a los ricos - le dice Luder a un amigo mundano y arribista - Cuando te mandes hacer tus ternos en Londres, ellos ya se los hacen en Milán. Siempre te llevarán un sastre de ventaja".

Julio Ramón Ribeyro (1989)

1. Introduction

That people incorporate their relative status when addressing their own 'utility' – wellbeing, welfare, life satisfaction, or happiness²- is a notion that has interested social thinkers throughout history. Indeed, since Aristotle's *Nicomachean Ethics*, relative comparisons "can be seen to figure in such things as Bentham's utilitarian ethics, Rousseau's *Discourse on Social Inequality*, and Kant's *Critique of Moral Reasoning*" (Suls & Wheeler, 2000; p. 3). Adam Smith's *Theory of Moral Sentiments* (1979[1759]) and Karl Marx's *Wage-Labor and Capital* (1900[1847]) also provide early notions in moral and social theory of the importance of relative comparisons for addressing subjective welfare issues.

When modeling the specific relationship between income and utility³, however, standard theoretical approaches –mostly in economics- tend to disregard this relative comparisons component (Frank, 1984). This, it is argued (Postlewaite, 1998), comes from the methodological difficulty that arises from incorporating relative concerns into a standard utility function: the more relative concerns one is able to include in the models, the more limited the ability is to impose constraints in the estimation of different behavioral equilibriums (Kuegler, 2009). Nonetheless, empirical evidence seems to suggest that relative income is indeed an important determinant of utility to look out for.

² For the purposes of this study, 'happiness', 'subjective wellbeing', 'life satisfaction' and 'utility' will be used interchangeably as equivalent concepts.

³ The literature suggests that happiness/subjective wellbeing/life satisfaction is a satisfactory proxy for the theoretical concept of 'utility' (Frey & Stutzer, 2002; Kuegler, 2009; Gerstenblüth et al., 2010).

Most notably, Richard Easterlin (1974, 1995, 2001) posited that the reason behind his ‘Easterlin Paradox’ –the notion that higher income does not necessarily show a significant relationship with higher levels of subjective wellbeing – was related to the fact that people want to earn ‘more’ and not ‘a lot’⁴.

In addition, the study of subjective wellbeing is everyday more predominant in the field of development research (OECD, 2013a; Chanfreau et al., 2008; Conceição & Bandura, 2008). This represents a conceptual shift in academia and policy-making from ‘objective’ ways of conceiving wellbeing into the incorporation of more ‘subjective’ nuances. However, the relevant research on subjective wellbeing tends to study several of its determinants (marriage, health, education, unemployment, age, etc.) in absolute terms (Gerstenblüth, Melgar, & Rossi, 2010; Luhmann, Hofmann, Eid, & Lucas, 2012). As what the trend has been with studies regarding income and subjective wellbeing (e.g. Deaton, 2008), then, incorporating relative standards into subjective wellbeing research might contribute greatly to obtaining a better grasp at the concept and its determinants.

In that sense, the motivation for this study is twofold. First, my main objective is to further contribute to the literature on relative income and its influence on subjective perceptions on life satisfaction through a study on the influence of several reference groups used for comparison. I would argue that this objective will be fulfilled through three main contributions: i) the possibility of addressing the life satisfaction measure while the sampled individuals are in an income-framed mindset; ii) the opportunity for performing causal inference through a unique panel data set and a reasonable identification strategy; and iii) studying the effects different referent points might have in shaping the relevant relative income people compare with (the district, neighborhood and the socioeconomic status). Secondly, I would argue that this investigation might further devote to the recent trend of studies that are trying to bring back the importance of human cognition and behavior into theoretical models of positive analysis and –especially, I would add– into policy-related issues aimed at reaching development (The World Bank, 2015).

For the purposes of this study, then, I will perform a regression analysis on six waves of three-year longitudinal data taken from the Peruvian National Household Survey (ENAHO) from 2007 to 2014. Peruvian panel data was chosen for two main reasons. First,

⁴ A deeper revision of this literature will be performed in Section 2.

it provides a unique opportunity to frame the surveyed individuals into thinking about their household income when addressing their perceived satisfaction with life. This might help to control *a priori* for other determinants of life satisfaction found in the literature in order to obtain more robust estimation findings. Secondly, Peru being a middle income country (The World Bank, 2016) allows for avoiding too many extremes in the sample: either widespread poverty or “post-materialist concerns” (Kuegler, 2009: p. 3).

The main findings suggest that, indeed, relative income is a significant determinant of life satisfaction, and that the found relationship advocates for ‘upward’ comparisons: people gain more wellbeing from ‘keeping up’. Also, results suggest that the proximity of the reference group is relevant for comparisons. Furthermore, they show that the direction of the comparison changes when socioeconomic status is taken as a reference group. Finally, it is likely that, for poor individuals, relative comparisons are not important, that these surge after a certain absolute income threshold.

The study will be structured as follows. First I will discuss the relevant theoretical and empirical framework regarding relative comparisons to study the hypothesized relationship between subjective perceptions of life satisfaction and relative income. Then, I will develop and describe the model that is to be empirically tested. Thirdly, I will describe the methodology and identification strategy that will be employed and their possible limitations. Then, the selected variables and their respective data sources will be explained. The next section will comprise the estimated results, an analysis and a discussion. Finally, I will conclude with some final remarks.

2. Literature review

In the following section I will review the relevant literature for the construction of the main theoretical and empirical framework. The theories of Social Comparison and Social Evaluation will be evaluated first; then, Reference Group theory. Finally, I will revise the relevant literature specifically on the relationship between relative income and life satisfaction.

2.1 Social Comparison and Social Evaluation Theory

Leon Festinger’s (1954) seminal work on social comparison provides the ground basis for the theoretical framework relevant to this study. This socio-psychological approach,

originally developed to expand on the “theory concerning opinion influence processes in social groups” (Festinger, 1954; p. 117), postulates that people evaluate their abilities by comparison with others when there is no objective standard of comparison available. He also posited that this tendency decreases the more different the ‘other’ is. This would imply that comparisons with professional peers, nuclear family, siblings, or friends would be most relevant (Kuegler, 2009) for empirical predictions (see Frank, 1984).

Pettigrew (1967) further expanded the concept into two tenets for his social evaluation theory: i) that people “learn about themselves by comparing themselves to others” (Pettigrew, 1967; p.243); and that ii) “the process of social evaluation leads to positive, neutral, or negative self-ratings which are relative to the standards set by the individuals employed for comparison” (Ibid.). In that sense, not only does the individual compare her own abilities or opinions with an ‘other’: she also evaluates this relative position. As a result, the individual might feel gratified or deprived depending on whether she situates above or below the perceived relative standard. These concepts are formally known as relative deprivation and relative gratification⁵ (Davis, 1959).

How these relative comparisons derive into gratification or deprivation, what is more, might depend ultimately on which the motives that guide the comparisons are. On this matter, two relevant concepts are self-enhancement and self-improvement (Falk & Knell, 2004). People might choose to compare ‘downward’ –with the ones that are perceived to be worse off– in order to feel better about themselves (self-enhancement). On the other hand, a concept described as self-improvement relates to ‘upward comparisons’; this means that individuals might compare to more successful ‘others’ as a way of feeling motivated for further personal improvement. As one study demonstrates, contrary to their Western counterparts, Eastern Europeans are likely to ‘upwardly compare’ themselves to specific reference incomes, which might suggest different mechanisms through which they are given economic prospects to aspire to (Caporale et al., 2009).

The affect experienced in either of these comparative directions, however, might not be exclusive to each category. It might not necessarily be the case that ‘downward comparisons’, for instance, are performed in order to generate a ‘feel-good’ affective

⁵ For two seminal empirical studies on relative gratification and deprivation of American soldiers in the context of combat, its aftermath, and army life, see Stouffer et al. (1949) and Stouffer, Suchman, DeVinney, Star, & Williams (1949).

status. In this sense, Buunk et al. (1990) suggest that several are the factors that “moderate the tendency to derive positive or negative affect from upward and downward comparisons” (Buunk et al., 1990; p. 1238), which depend ultimately on what the individuals focus on when comparing to others. In the end, what these theoretical nuances propose is that concepts such as ‘self-enhancement’ –reviewed in the previous paragraph – might result not only from ‘downward comparisons’ but also from ‘upward’ ones depending on the specific affect each comparison generates. This evidently might pose several difficulties when trying to model human behavior in relation to relative standings.

Granted, social comparison theory has been brought to the forefront of socio-psychological research only very recently even though the general concept –as reviewed previously- dates from the 1950s (A. P. Buunk & Gibbons, 2007). For instance, one of these new perspectives recommends the incorporation of dual-process theories (Chaiken & Trope, 1999; Kahneman, 2012) to the general social comparison framework; the idea behind being that the act of comparing oneself to other people is not necessarily a conscious one. In this sense, many of the references we choose to compare with may just capture our attention without us exerting a decided and conscious effort.

This revised theoretical background brings into light several important concerns with respect to a general concept of social comparisons that undoubtedly contributes to the analysis of the empirical relationship between relative income and life satisfaction with which this study is concerned. However, several questions are still theoretically unanswered. Who do people normally compare to? In which situations do comparisons happen? Which ‘compared other’ is prioritized when evaluating relative enhancement, deprivation, gratification or improvement, for example? In order to answer these questions, reference group theory might pose some insights.

2.2 Reference Groups

‘Reference groups’ were first acknowledged by Hyman (1942) in a seminal study about subjective status. Concretely, the author found that subjective status not only depended on objective and absolute standards such as income, for example, but also on which social groups were chosen as comparison points. Contrary to Festinger’s theory of social comparisons, moreover, he argued that people not only compare themselves to groups similar to them –or to which they belonged- (a ‘membership group’), but that often they contrasted their status with ‘different others’ (a ‘reference group’, regardless of being

a member or not) (Pettigrew, 1967). Indeed, empirical research in the 1960s already suggested that these ‘different others’ were more likely to be chosen for comparison if the individual couldn’t know which objective standard was relevant for relative evaluation (Arrowood & Thornton, 1966).

This theoretical digression with classical social comparison theory was further developed in Merton (1968: p. 336), where he argued that “(...) it is the problems centered about this fact of orientation to non-membership groups that constitute the distinctive concern of reference group theory”. The implications of this development, however, are quite important for theoretical and empirical reasons. If the ‘similar other’ is no longer as important as it was for the social comparison theory framework, defining and discovering who is the relevant ‘different other’ might be an arduous –even barren– effort.

“Reference groups are, in principle, almost innumerable: any of the groups of which one is a member, and these are comparatively few, as well as groups of which is not a member, and these are, of course, legion, can become points of reference for shaping one’s attitudes, evaluations and behavior.” (Merton & Rossi, 1968; p. 287)

Adding non-membership reference groups is however only the first stage of the theoretical and empirical caveats. The literature also shows that ‘others’ are not the only additional reference groups that could be used for comparison. For instance, an individual might compare herself with her past self and her earlier living conditions; she could also contrast her present self with her goals and aspirations (Veenhoven, 1991; Michalos, 1985)⁶.

In an effort to systematize the seemingly endless combinations of reference groups one could compare to, one theoretical strategy has been to classify them in two categories: endogenous and exogenous⁷. Naturally, the former refers to those reference groups that exert an influence on the individual after having been actively chosen to do so (professional peers, for instance); the latter, to those that are given independently of the active action of choosing (siblings, relatives, some neighbors). Diener & Fujita (1997), on that subject, suggest that reference groups might be endogenously determined, among

⁶ See also Kelley & Thibaut (1959) for a general theoretical framework.

⁷ Although the relevant literature uses these terms, in the empirical section of this study I will use the terms ‘internal’ and ‘external’ to avoid confusion with the methodological terms ‘exogeneity’ and ‘endogeneity’ used for the identification strategy.

other things, if there is enough information available for comparison, and if the context is transparent enough.

Nonetheless, this categorization still presents difficulties. In fact, Merton & Rossi (1968) already recognized that what was in the need of further and more profound research was the problems related the processes used for the selection of relevant reference groups.

But while it is true that the multiplicity of reference groups the individual may compare to can exert several difficulties for the empirical testing of the theory, there have been several attempts to incorporate either endogenous or exogenous reference groups in models and estimations of 'utility', especially when knowledge of reference group is not existent (Kuegler, 2009). Endogenous reference groups have been modeled by Köszegi and Rabin (2006) in utility functions, for instance, in order to understand risk-based behavior (model which was then further developed in Köszegi & Rabin, 2007). Falk & Knell (2004), moreover, also address endogenous reference groups to estimate whether people choose their relative comparisons to fulfill motives of self-enhancement or self-improvement.

The majority of studies, however, use exogenous reference groups as assumptions for their estimations (Falk & Knell, 2004). Ravallion & Lokshin (2002) estimate the relative income of the area of residence as a main determinant for subjective perceptions of economic welfare in a sample of Russian adults. The same authors, in a following study for Malawi, argued that in contexts of low income, reference groups are unlikely to be endogenous, since people have less freedom to choose where to live and where to work in (Ravallion & Lokshin, 2005). In a study for South Africa, Kingdon & Knight (2007) use different exogenous relative measures –they are not only concerned with relative income– in a cross-section of households to assess relative concerns and their relation with subjective wellbeing measures. Finally, Ferrer-i-Carbonell (2005) study the German Socio-Economic Panel using exogenous controls of relative income (age and region, for example), and find significant results for the relationship with subjective wellbeing.

In sum, reference group theory provides some theoretical insights to further understand the notions of social comparison. Despite the fact that reference groups might be ubiquitous and influence subjective wellbeing in conscious and even unconscious ways,

being able to categorize them into endogenous and exogenous certainly represents an advantage when trying to estimate empirical models.

Having revised the two basic frameworks for this study, then, the next section will cover upfront the theoretical and empirical underpinnings of the relationship between relative income and subjective wellbeing which is addressed in this study.

2.3 Relative Income and Subjective Wellbeing

James Duesenberry (1967[1949]) provides the seminal theoretical underpinnings to begin to understand the hypothesized relationship. First, the author recognized that, despite the modeling of utility resorting to independent or absolute preferences in economics discipline, discussions on interdependent or relative concerns have always been present since the earlier days in the writings of Jevons and Marshall, for example (Duesenberry, 1967[1949]). With that in mind, for his theory of consumption and savings he proposed that relative income was indeed fundamental in determining utility, and that this link to wellbeing was asymmetric: the loss in wellbeing from earning less than a relative counterpart is greater than the welfare gain from earning more (Mayraz, Wagner, & Schupp, 2009).

Further on, as revised in the introductory section, Richard Easterlin's (1974) seminal work on the relationship between income and happiness contributed to starting point in empirical research on the subject. His study found that higher income did not correlate with higher levels of subjective wellbeing when comparisons were made at the country level. This result also held when studying a time series specifically for the USA. He developed the hypothesis that this apparent absent link might be provoked by the need to earn 'more', and not 'a lot'⁸.

Since then, the literature on relative income and subjective wellbeing has grown richer with time. Studies have been conducted for high-income countries (Amendola, et al., 2015; Becchetti, et al., 2013), rural areas (Clark & Senik, 2014), transition countries (Becchetti & Savastano, 2009), middle-income countries (Kuegler, 2009), and so on⁹. In addition, the

⁸ He furthered studied this relationship in two following studies (Easterlin, 1995, 2001).

⁹ For further empirical findings, see also Ferrer-i-Carbonell (2005), Clark & Oswald (1996), Fitzroy et al. (2011), Falk & Knell (2004), Stutzer (2004), and Hopkins (2008) for a variety of estimation methods, samples, etc.

recognition that relative income does indeed play an important role in determining subjective wellbeing has also been able to influence, for example, standard conceptions of regulatory practices (Frank & Sunstein, 2001), alternative ways of conceiving and implementing public policy (Layard, 2006a, 2006b), or even the research on wage structures within firms (Frank, 1984).

Almost all the literature revised suggests a significant relationship between relative income and life satisfaction¹⁰, but most of them rely on estimations using time series or cross-section data. Aided by a specifically-framed life satisfaction question, a strategy for identifying causality and a panel data sample, this study will provide empirical estimations that will help to determine that the aforementioned relationship is causal. The following section will describe the model to be estimated.

3. The model

This section will be divided in two parts. First, I will describe some basic assumptions necessary for the model estimation. Then, I will develop the simple theoretical specifications that will serve as the basis for the regression analysis to be described in Section 4.

3.1 Assumptions

- **On the subjective wellbeing measure**

The literature revised so far on makes an important assumption that is worth discussing. The Life Satisfaction questions most surveys use to measure wellbeing rely on 'evaluative' measures of happiness. This is, they rely on a cognitive rationalization of the individual's living standards at the moment the question is being asked, (Dolan, 2015). Subjective wellbeing researchers, in that sense, propose that happiness should also be measured in terms of 'experiences' and 'purpose'. Indeed, evidence suggests that the effects several determinants have in subjective wellbeing measures vary considerably whether the latter is being calculated in 'evaluative', 'experienced' or 'purposeful' terms (Kahneman & Deaton, 2010; Dolan & Metcalfe, 2012)¹¹.

¹⁰ Notable exceptions: Stevenson & Wolfers (2008), Veenhoven (1991).

¹¹ See Dolan & Metcalfe (2012) and Dolan & White (2009) for a succinct review of the three different measurement techniques and their implications.

It is an act of transparency, then, to disclose that the Life Satisfaction question used for this study responds to ‘evaluative’ measures of subjective wellbeing, as the literature on this topic predominantly uses. Therefore, it is worth noting that had ‘happiness’ been measured through different approaches (‘experience’ or ‘purpose’), it is reasonable to assume that the expected results could have changed.

- **On the uniqueness of the Life Satisfaction question**

A closer look at the data and their sources will be performed in a specific section of this study. However, the nature of the Life Satisfaction question is worth discussing beforehand because it provides an important assumption regarding the model to be estimated. The question is framed in the following manner: *“Taking into consideration your household income, do you estimate your life to be – 4) Very Good, 3) Good, 2) Bad, 1) Very Bad?”* (INEI, 2014a) As noted, this question is framed slightly differently than a standard Life Satisfaction question¹², and allows the surveyed individual to focus on the effect income is expected to have on her subjective perception of wellbeing. Therefore, this framing provides a unique opportunity to study how individuals respond to subjective perceptions of their satisfaction with life while in this particular state of mind.

Life Satisfaction, defined in a broader sense in standard surveys, and as has been already noted, can be influenced by many variables and different reference groups, even at unconscious levels. Building a model that takes into account every control possible not only might be extremely difficult to construct, but also might even generate inconclusive results. In that sense, although the revised literature finds significant effects of several variables on subjective wellbeing, what this framing allows for, I would argue, is the building of a parsimonious model only including as explanatory variables measures of absolute and relative income, and controls for time-invariant individual characteristics of the sample (not only many of the controls used in the literature can be assumed to be invariant over time –gender, for example-, but also it is reasonable to assume that the change in others might not be that significant taking into account the nature of the sample of this study –age, for example-). Finally, this framing will be vital when discussing the identification strategy Section 4.

¹² For instance, “The following question asks how satisfied you feel, on a scale from 0 to 10. Zero means you feel ‘not at all satisfied’ and 10 means you feel ‘completely satisfied’. Overall, how satisfied are you with life as a whole these days?” (OECD, 2013b)

- **On 'externally' determined reference groups**

The reference groups selected for this study are the following: the neighborhood, the district, and the socioeconomic status. These have the advantage –it is reasonable to assume–, that they are 'forced' to the individual, which grants the possibility of avoiding actively constructed relative rank preferences by the studied sample with respect to actively chosen reference groups (Kuegler, 2009). In that sense 'forced' references might shed a brighter light on the nature of reference-based relative income comparisons, especially for further research regarding the effect that inequality can have on wellbeing.

On the other hand, even though the house one buys and the neighborhood one chooses to live in might be considered to be 'internally' chosen in some circumstances –even though it is reasonable to assume that the poorer the individual is, the less freedom she has to choose where to live (Ravallion & Lokshin, 2005)–, “since the world is not composed of perfectly homogeneous neighborhoods, some heterogeneity of social groups may be unavoidable (...) [, and also] even if people initially choose to be in homogeneous social groups, there are substantial transaction costs that prevent easily changing one's social group” (Postlewaite 1998: p. 794-795).

- **On the income measurements**

The household will be the level at which the income variable will be measured, and it will include only monetary and net measures. The reasons are the following. To begin with, this will be done as a matter of consistency: as stated previously, the life satisfaction question is framed at the household income level. Secondly, addressing the household income might help to control for random 'externally' determined references from within the household. Thirdly, monetary measures –instead of 'in kind ones'– allow for more homogenous estimations of the intended-to-be-studied reference group effects. Finally, using net income measures allows controlling for any pre-redistributive bias associated with considering gross income to be the actual measure of comparison among households.

On the other hand, relative income will be measured following Duesenberry (1967[1949]) as explained by Hopkins (2008): as the ratio between the household's

absolute income and the average income of a relevant reference group.¹³ The main reason behind the decision to sort the average incomes with respect to different reference groups is being able to study all the different nuances these might exert on the relationship between relative economic status and the studied subjective measure of life satisfaction. For instance, which reference groups are more salient? Does distance and proximity matter for comparison? These are some of the questions that can be addressed with this strategy.

3.2 The utility function and hypotheses

This study will estimate a model defined in the following manner. Similar to Kuegler (2009), the utility derived from income will be a function of absolute household income, the measure of relative income according to the relevant reference group, and controls for individual time-invariant characteristics. These last set of controls –which will be removed through fixed-effects estimations¹⁴– are based on the following assumption. The degree or direction of the effect relative income may exert on life satisfaction might also depend on some ‘invisible’ features of the individual that are supposed to be invariant over time. This could be represented as a particular ‘taste for equality/inequality’ characteristic of each agent and that may influence the relationship between relative income and life satisfaction.

Finally, the model will also test Duesenberry’s (1967[1949]) relative income asymmetry hypothesis in order to elucidate the direction of social comparison; this will be done through the inclusion of a quadratic control on the relative income measure¹⁵.

Therefore, the modeled utility function will be:

$$(1) \quad U = U(I, I/I_a, (I/I_a)^2, FE)$$

¹³ Hopkins (2008) also explains two other ways to approximate calculations of relative income: i) as the difference between absolute income and the average income of the relevant group; or ii) as rankings.

¹⁴ See Section 4 for the methodology details.

¹⁵ Scatterplots showing the non-linear relationship between life satisfaction and relative income can be found on Appendix A.

Where I represents absolute income at the household level, I/I_a the measure of relative income, $(I/I_a)^2$ the quadratic control for the asymmetry hypothesis, and FE the control for time-invariant individual characteristics.

As stated in Section 2, the literature suggests that people might engage in acts of self-enhancement or self-improvement when comparing themselves 'upwards' or 'downwards' with others. As Duesenberry (1967[1949]) would suggest, in that sense, it will be expected that people seek to achieve a higher income status relative to a relevant group, but that every rise in ranking will lead to diminishing marginal rises in life satisfaction.

Therefore, the following are the hypotheses expected to cast statistically significant results.

- a) A positive and significant coefficient associated with the relative income measure. Earning more income relative to the relevant reference group is expected to have a positive impact in the individual's subjective wellbeing.

$$(2) \quad \partial U / \partial (I/I_a) > 0$$

- b) A negative and significant coefficient associated with the quadratic control on the relative income measure. As the gap between absolute income and the reference group's average income widens (in ranking terms this could be interpreted as going up the comparison rankings), additional gains in subjective wellbeing are expected to exhibit diminishing returns: "the slope of the life-satisfaction and relative income relationship should be decreasing as relative income goes up" (Mayraz et al., 2009; p. 10).

$$(3) \quad \partial U / \partial (I/I_a)^2 < 0$$

- c) Due to the assumption of reference groups being 'externally' determined, the effect of more distant reference groups on the measures of subjective wellbeing is expected to be weaker than that of those closer to the household. In that sense, the coefficient for the relative income calculated at the district level, while still statistically significant, should be smaller than the one calculated at the neighborhood level.

$$(4) \quad \partial U / \partial (I / I_{ad}) < \partial U / \partial (I / I_{an})$$

Additionally, while the main objective of this study is to address the relevance of relative income in determining life satisfaction, it will also be important to elucidate whether measures of absolute income lose strength as determinants of life satisfaction when controlling for their relative calculations.

Finally, the literature also proposes that there should be differential effects regarding the influence of relative income in subjective wellbeing with respect to the relative socioeconomic status. This would mean that, for instance, being poor while addressing this relationship should provide different results compared to a situation when the individual is wealthier.

For example, Kuegler (2009) suggests that subjective wellbeing should decrease with respect to relative income if absolute income locates itself at subsistence levels. This would imply that the lower the absolute income levels, the more likely the individual is to exhibit a 'taste for equality': individuals would prefer to situate around the average income of their relevant reference group and not deviate. However, the reverse effect could also be true if the socioeconomic status is irrelevant for comparisons.

4. Methodology and Identification Strategy

This section will first describe the regression analysis that will be performed for the purposes of this study. Afterwards, the strategy for identifying causality will be explained. Finally, I will address some methodological limitations.

4.1 Regression analysis

It has been already stated that the main objective of this study is to address the causal relation between the relative economic status of the household with respect to several 'externally' determined reference points, and a measure of subjective perception of satisfaction with life that is framed with relation to absolute income levels. For that purpose, I will perform a fixed-effects regression analysis on a longitudinal¹⁶ sample that

¹⁶ For simplicity, 'longitudinal' and 'panel' data are terms that will be used interchangeably in this study.

comprises six three-year waves of panel data taken from the ENAHO, from 2007 until 2014, a total of 6,875 individuals and 20,625 observations.

The use of this unique longitudinal dataset allows for various kinds of methodological controls. To begin with, it allows controlling for individual heterogeneity (Baltagi, 2005): that is, subject-invariant characteristics of the studied sample that might lead to incurring in omitted variable bias when not controlled for (very usual in cross-section or time-series analysis). Furthermore, panel data may provide more insights into causal inference; in fact, three basic characteristics of causal linkages can be inferred by using panel data: statistically significant relationships; no omitted variable generating the alleged causal link between the two studied variables; and that the causal variable must exhibit time-precedence (Frees, 2010). Finally, panel data also allows for more degrees of freedom, less collinearity, more efficiency, less biases, the construction of more complicated behavioral models, and the study of the dynamics of adjustment, among other advantages (Baltagi, 2005).

The regression analysis on this longitudinal sample, it must be noted, presents one small caveat. Due to the fact that the dependant variable is an ordered categorical one – and not a continuous one in a strict sense-, a typical fixed-effects linear panel regression might generate biased and inefficient estimators (Park, 2009). What theory suggests to solving for this matter is using ordered logit or probit estimations (Rigterink, 2014); the problem with these methods, however, is that they don't allow for consistent fixed-effects parameter estimations (Lancaster, 2000), a problem known as 'incidental parameters problem' (Cameron & Trivedi, 2005).

To solve this issue, two efficient alternative solutions are found in the literature (Riedl & Geishecker, 2014): i) the recoding of the ordinal dependant variable into a binary one, which enables the model to run as a fixed-effects nonlinear panel regression (e.g. Senik, 2004; Clark, 2003; Chen, 2016); and ii) the use of the 'Blow-Up and Cluster' ordered logit estimator (bucologit) (Baetschmann, Staub, & Winkelmann, 2011), which combines the results generated by every plausible cut-off point estimations by conditional maximum likelihood (CML); specifically, it replaces "every observation by as many copies of itself as there are possible cut-off points and [estimates CML] on the thus expanded sample" (Rigterink, 2014: p. 111).

With that in mind, I will assume that the dependent variable –the four-point ordered categorical measure of life satisfaction- can be treated as continuous for the regression analysis¹⁷. Therefore, I will perform a fixed effects linear panel regression on the sample that will allow for a simpler interpretation and for the construction of a parsimonious model. To check for consistency, however, these fixed effects estimators will be compared with the ones provided by a fixed effect nonlinear panel regression, and also with the ‘bucologit’ estimators. Using these last two regression variations will provide consistency (or not) to the statistical significance of the fixed effects estimators generated by my specification.

The basic model to be estimated will then be:

$$(5) \quad LS_{it} = \beta_1 I_{it} + \beta_2 (I/I_a)_{it} + \beta_3 (I/I_a)^2_{it} + f_i + u_{it}$$

for $i = 1, \dots, 6875$ and $t = 1, 2, 3$ and where

- f_i is the unobserved effect and u_{it} the idiosyncratic time-varying shock (Glitz, 2015)
- I_{it} is the net monetary household income, I/I_a the measure of income relative to the average of the district, the neighborhood or the socioeconomic status, and $(I/I_a)^2$ a quadratic control for the former

It must also be noted that I will add one additional control for further estimations. Although not theoretically studied, it is likely that the number of household members has an effect in the measure of life satisfaction that is subject to household income levels. The more members are comprised in the household, the less satisfaction the individual is expected to express subject to the absolute income levels. Therefore, one last set of estimations will be comprised by the standard model with the addition of this new control, to see whether the findings change in relevance.

4.2 Causal inference

The identification strategy for causality relies, first, on the use of the longitudinal data sample, which allows for the observation of changes through time on the same observed

¹⁷ Norman (2010) provides evidence that assuming small-scaled categorical dependant variables as continuous can also provide unbiased estimators.

individuals. Therefore, it grants the possibility of analyzing the precedence in the explanatory variable's effect on the dependent variable, thus inferring for causality.

More importantly, though, I would argue it relies on capturing exogenous variations in the explanatory variable of interest that affect the dependent variable only through this mechanism. In other words, it relies on capturing any shock that might provoke changes in relative income but that will not affect life satisfaction safe through these effects on relative income.

On the exogenously provoked changes in relative income, the reasoning is the following. The selection of reference groups at the neighborhood and district levels for the calculations of average income allows for developing the assumption that every person at these local levels will be similarly exposed to any local/global shocks experienced. Any natural disaster, economic crisis, or sudden boom in a specific and local economic activity, for example, should generate an effect in the community as a whole; as a result, the relative income measure should remain the same.

Therefore, it is reasonable to assume that any changes observed in the relative income gap are either driven by personal time-invariant characteristics (which are controlled for), or by any individual exogenous shock that makes the individual diverge from her neighbors (for instance, unique professional opportunities in their jobs, or the success of different management strategies in their businesses).

These shocks should not affect life satisfaction directly, however. Since the life satisfaction question frames the individual into thinking about their income while answering, it is plausible to argue that these exogenous events only affect these measures of subjective wellbeing through the changes in the relative income gaps. For instance, a unique professional opportunity should affect life satisfaction if it were framed in a broader sense; the assumption I make is that, by framing the survey question around income, this shock should not affect wellbeing safe through the changes in relative income.

In conclusion, it is reasonable to assume that the estimated model not only grants endogeneity controls for omitted variables, but also for causality concerns.

4.3 Limitations

One important setback found during the investigation has been the lack of larger timeframes for robustness checks. Since the model's assumption is that relative income affects subjective wellbeing simultaneously, introducing either lagged or leaded measures of the former variable should provide statistically insignificant results, hence controlling for robustness. This test might be however implausible to perform when the panel sample comprises timeframes of three years for each wave. For the purposes of this study, nonetheless, similar relevant literature linking relative income and subjective wellbeing already revised finds significant results without this kind of checks, which certainly might give important insights into the theoretical and empirical strength of the model.

On the other hand, concerns about reverse causality might arise. Intuitively, it could be argued that not feeling 'well' with your current life conditions may provide a motivational impulse to earn more and improve the relative income standing with respect to the relevant reference groups. I would argue that this logic is at the least inaccurate for the following reason. It may be reasonable to assume that motivation and prospects of aspiration are the main drivers of the supposed reverse causal direction (from life satisfaction towards relative income); however, this relationship might likely be (either) i) indirect and probably small, and (or) ii) not simultaneous –as the link between relative income and life satisfaction is supposed to be–. Regarding the first observation, people might improve their income after feeling motivated to do so; however, it is likely this causal link happens through indirect means, like developing new skills through education, for example.

With respect to the second observation, even if the current state of subjective wellbeing has an effect on the relative income gap, it can be argued that this effect will be significant in a deferred period: the individual might feel motivated in t_0 ; the future impact -if any- has no clear specific date of occurrence. In this sense, while reverse causality concerns might be plausible, as stated it is unlikely that these affect the causal inference estimated in this study.

5. Data and Variables

As stated in the previous section, for the purposes of this study I analyze a sample of six three-year waves of panel data from the ENAHO, from 2007 –year when a rotating

panel sample started being collected- until 2014¹⁸. The resulting sample comprises of 6,875 individuals and 20,625 observations. It is also worth noting that the ENAHO is directed at the head of the household (regardless of gender). He or she is the one interviewed and addresses not only the questions directed to him/her, but also the ones meant at the household level. Becker (1974) provides a theoretical approach that grants consistency to this survey method for getting accurate responses at the household level.

The variables used for the analysis and their respective sources of information are the following¹⁹:

- **Dependent variable**

- ***Subjective Perception of Life Satisfaction subject to Household Income Levels:*** For this subjective measure I refer to ENAHO's Module 85 on Governance, Democracy and Transparence (INEI, 2014a), and specifically to question 37: "*Taking into consideration your household income, do you estimate your life to be - 4) Very Good, 3) Good, 2) Bad, 1) Very Bad?*". So, the dependent variable is measured as an ordered four-point scale, in which 1 is assumed to imply a very low reported subjective measure of wellbeing with respect to the current household income, and 4 a very high one.

- **Independent variables**

- ***Net Monetary Income at the Household Level:*** For the income measurement I refer to ENAHO's 'Sumaria' (Module 34)²⁰ (INEI, 2014c), and specifically to the net monetary income at the household level (ingmo2hd). This variable is measured as the sum of the following types of net monetary income: from the main dependent and independent economic activities, from the secondary dependent and independent economic activities,

¹⁸ Although data for the year 2015 is also officially available, there are some computational problems that impede the data from being used for building the panels.

¹⁹ Descriptive statistics about the variables can be found in Appendix B.

²⁰ The Module 'Sumaria' includes several calculated variables for the surveyed households; among them, various types of income and spending measures.

extraordinary work-related income, domestic transfers, international transfers, property rents, and other extraordinary income.

- **Relative Income:** This variable is defined as the ratio between absolute income and the average income of the proposed reference group. The latter is calculated after sorting the observations by 'Ubigeo', 'Conglomerado' and 'Pobreza' which is the coding used by the ENAHO to differentiate the district level, the neighborhood (area comprised by 120 households), and the levels of poverty/non-poverty (INEI, 2014b), respectively. The calculated ratio will thus represent the agent's relative income with respect to every relevant reference group.
- **Relative Income Squared:** It is the squared relative income ratio explained above.
- **Number of Household Members:** Also taken from ENAHO's Sumaria Module (INEI, 2014c), this variable measures how many individuals are considered to be members of the household.

6. Findings

This section will be divided into five parts. In the first four I will present the estimation results and provide analysis and interpretation for them. Following that, in the last part I will discuss some relevant implications in light of the framework revised in Section 2.

6.1 The district as an 'externally' determined reference group

The following are the results of the fixed-effects regressions²¹ for the relationship between relative income and subjective wellbeing taking into account the district as an 'externally' determined reference group.

²¹ (1) represents the linear panel regression, (2) the nonlinear panel regression, and (3) the bucologit estimations.

Table 1: Fixed-effects regression results at the district level

	(1)	(2)	(3)
	LS	LS	LS
income	0.000 (3.53)***	0.000 (4.41)***	0.000 (3.48)***
relative income	0.045 (3.01)***	0.189 (2.32)**	0.218 (2.59)***
squared rel. inc.	-0.009 (3.44)***	-0.048 (3.11)***	-0.050 (3.15)***
constant	2.554 (254.79)***		
N	19880	9842	11657

*** p<0.01 ** p<0.05 * p<0.1

As Table 1 shows, all coefficients are significant at 5 and even 1% levels for all variables. The estimators prove to be also significant when checking for consistency through the two additional regressions, which suggests the following. To begin with, absolute income has a positive and statistically significant relationship with subjective wellbeing: *ceteris paribus*, the more income rises in absolute terms, the higher the perceived wellbeing will be. However, the effect seems to be very small.

Also, and as expected, the coefficient for relative income at the district level shows a positive and statistically significant sign. Therefore, any change in the relative income gap that leaves the individual better off with respect to the average district income impacts subjective wellbeing on a positive manner. This might indicate a certain 'taste for inequality', at least at the local level: individuals feel better when they positively difference their status from their exogenously given peers; rises in relative income ranking are enjoyed by the agents.

Since the studied relationship is assumed to be non-linear, furthermore –and in line with Duesenberry's hypothesis–, the negative and statistically significant coefficient for the quadratic control on relative income suggests a comparison-concave utility function (Clark & Oswald, 1998). Agents might enjoy deviating from the selected reference group; however,

every change in deviation generates smaller amounts of additional wellbeing the better she objectively is with respect to the aforementioned reference group. Therefore, this result suggests an asymmetric relationship: changes at the bottom of the distribution towards the average income generate bigger increments in utility compared to those experienced at the top.

Finally, what the estimations also show is that the positive effect relative income exerts on happiness (*ceteris paribus*) is stronger than the one absolute income exerts. This might go in line with Easterlin's (2001, 1995) hypothesis that it is not necessarily earning 'a lot' what matters, but earning 'more' than the rest.

6.2 The neighborhood as an 'externally' determined reference group

The following are the results of the fixed-effects regressions for the relationship between relative income and subjective wellbeing taking into account the neighborhood as an 'externally' determined reference group.

Table 2: Fixed-effects regression results at the neighborhood level

	(1)	(2)	(3)
	LS	LS	LS
income	0.000 (4.03)***	0.000 (5.19)***	0.000 (3.58)***
relative income	0.061 (3.08)***	0.212 (1.97)**	0.266 (2.57)**
squared rel. inc.	-0.015 (2.63)***	-0.070 (2.27)**	-0.070 (2.45)**
constant	2.554 (208.76)***		
N	19880	9842	11657

*** p<0.01 ** p<0.05 * p<0.1

Analogously to the estimations at the district level, all coefficients prove to be significant at 5 and even 1% levels for all variables and prove to be statistically significant after the consistency checks. Absolute income is likely to exert a positive impact on the measure of subjective wellbeing, but again in a very small scale. Furthermore, relative income also exhibits a positive relationship with subjective wellbeing, and its quadratic version also

suggests a comparison-concave utility function. Finally, it seems as the effect relative income presents on subjective wellbeing is stronger than the one absolute income exerts on the latter.

Moreover, as expected, when compared to the estimations at the district level the neighborhood seems to generate a stronger influence. While the estimator for relative income at the district level is 0.045, the neighborhood level presents a coefficient of 0.061. Although still very small magnitudes, it is reasonable to conclude that a proximity effect exists: the reference group will generate a stronger influence in the agent the closer this reference group is perceived to be. In this specific case, the neighborhood is defined as an area comprised of 120 households, while the district level responds to Peruvian political demarcations, and as such can have a variety of population sizes bigger than the 120 households that define the neighborhood.

6.3 The socioeconomic status as an 'externally' determined reference group

Finally, the last Table presents the results of the fixed-effects regressions for the relationship between relative income and subjective wellbeing taking into account socioeconomic status as an 'externally' determined reference group. As stated before, this variable categorizes the individuals as being in extreme poverty, poverty, and at non-poverty levels²².

Table 3: Fixed-effects regression results by socioeconomic status

	(1)	(2)	(3)
	LS	LS	LS
income	0.000 (5.72)***	0.000 (6.48)***	0.000 (4.66)***
relative income	-0.033 (2.85)***	-0.165 (2.83)***	-0.162 (2.63)***
squared rel. inc.	0.001 (2.38)**	0.002 (1.65)*	0.002 (2.01)**
constant	2.593 (362.85)***		
N	19880	9842	11657

*** p<0.01 ** p<0.05 * p<0.1

²² Descriptive statistics for these statuses can be found on Appendix C.

Before interpreting the results, a first digression about the causality assumption must be made for this particular case. Since the relevant 'externally' determined reference group doesn't have a particular location –except, of course, the national level- it is problematic to assume the same exogeneity concerns explained in the causal inference subsection. Local shocks, for example, might affect some groups of non-poor people and others not, biasing the income averages for the identification strategy.

Nonetheless, the estimators still prove to be statistically significant at giving insight into the studied relationship, at least for a significant correlation. What is more, they cast significantly different results. While absolute income still proves to be statistically significant and positively correlated with the life satisfaction measure, relative income now presents a significant but negative relationship. This would imply that, when comparing with individuals that happen to share the same socioeconomic status, any deviation from the average income would be worse for subjective wellbeing. The positive and also significant quadratic control for relative income helps to further understand this interpretation by demonstrating the convexity of the life satisfaction function: when comparing to similar others, it is likely that individuals exhibit a certain 'taste for equality' or 'class conscience' by this convergence towards their reference group.

To expand on this interpretation, the following estimations might shed a brighter light. Since there seems to be a 'taste for equality' or 'class conscience' effect when sharing similar socioeconomic status, there must probably be additional nuances if the individual is poor or non-poor. For that purpose, in the following Tables the sample will be sorted by these two categories and will use the district and neighborhood levels for comparison to be able to address causal inference at the local level.

Table 4: Fixed-effects regression results at the district and neighborhood levels for the poor

	Neighborhood			District		
	(1) LS	(2) LS	(3) LS	(1) LS	(2) LS	(3) LS
income	0.000 (2.45)**	0.000 (2.43)**	0.000 (2.72)***	0.000 (2.78)***	0.000 (2.38)**	0.000 (3.00)***
relative income	-0.021 (0.51)	-0.290 (1.40)	-0.193 (0.98)	-0.021 (0.50)	-0.287 (1.29)	-0.249 (1.18)
squared rel. inc.	0.004 (0.29)	0.071 (1.21)	0.037 (0.66)	-0.001 (0.08)	0.065 (1.15)	0.028 (0.50)
constant	2.460 (112.03)***			2.457 (122.53)***		
N	6243	2693	3414	6243	2693	3414

*** p<0.01 ** p<0.05 * p<0.1

As Table 4: Fixed-effects regression results at the district shows, the only statistically significant effects for the poor both at the district and neighborhood levels are present in the estimators for absolute income. While relative income and its squared control repeat the pattern observed in the previous estimations –which could suggest a comparison-convex utility-, the coefficients are not statistically significant. I would argue that this could mean two things: either the estimation presents some sort of bias/insufficient number of observations, or there is an intuitive behavior that applies specifically to poor individuals. The poorer the agent is, the less likely it is for her to focus on relative comparisons. This might suggest relative comparisons have an effect on life satisfaction only from a certain threshold of ‘essential’ or ‘basic’ income levels, before which the agent has in mind the survival of her household. In that sense, observing the estimation results for the non-poor could give more clues on that relationship.

Table 5: Fixed-effects regression results at the district and neighborhood levels for the non-poor

	Neighborhood			District		
	(1) LS	(2) LS	(3) LS	(1) LS	(2) LS	(3) LS
income	0.000 (3.13)***	0.000 (4.16)***	0.000 (2.81)***	0.000 (2.17)**	0.000 (2.90)***	0.000 (2.14)**
relative income	0.073 (2.90)***	0.348 (2.26)**	0.397 (2.71)***	0.048 (2.51)**	0.206 (1.73)*	0.277 (2.34)**
squared rel. inc.	-0.018 (2.72)***	-0.127 (2.90)***	-0.112 (2.71)***	-0.007 (2.88)***	-0.046 (2.70)***	-0.046 (2.54)**
constant	2.606 (160.99)***			2.617 (206.89)***		
N	13637	5484	6281	13637	5484	6281

*** p<0.01 ** p<0.05 * p<0.1

As can be clearly noted, the non-poor subsample estimations exhibit statistically significant coefficients for all the relevant variables. Furthermore, they suggest the comparison-concave utility analyzed in the general model: not only relative comparisons are important, but individuals enjoy higher status with respect to the reference group, even though every marginal increase in relative ranking provides smaller extra amounts of life satisfaction every time.

What is more, these results contribute to confirming the intuition behind the importance of income thresholds when addressing relative comparisons. For the non-poor, comparisons are important, even more so that their absolute income levels; exactly the opposite happens when looking at the 'poor' subsample, as seen before. This might imply, as suspected, that there is an income threshold that proves its relevance for determining utility through relative comparisons.

6.4 Additional controls

Finally, Table 6: Fixed-effects regression results adding the shows general estimation results after adding for an additional control: the number of Household Members. Intuitively, this is a variable that could alter life satisfaction subject to household income levels

independently of the changes the absolute income variable might suffer. The following are the estimations.

Table 6: Fixed-effects regression results adding the No. of Household Members as controls

	District			Neighborhood			Socioeconomic status		
	(1) LS	(2) LS	(3) LS	(1) LS	(2) LS	(3) LS	(1) LS	(2) LS	(3) LS
income	0.000 (3.74)***	0.000 (4.67)***	0.000 (3.59)***	0.000 (4.25)***	0.000 (5.41)***	0.000 (3.65)***	0.000 (5.68)***	0.000 (6.51)***	0.000 (4.60)***
relative income	0.052 (3.43)***	0.233 (2.82)***	0.259 (2.97)***	0.069 (3.43)***	0.257 (2.35)**	0.309 (2.94)***	-0.030 (2.51)**	-0.139 (2.32)**	-0.141 (2.25)**
squared rel. inc.	-0.010 (3.79)***	-0.055 (3.52)***	-0.056 (3.41)***	-0.016 (2.84)***	-0.078 (2.51)**	-0.077 (2.68)***	0.000 (2.10)**	0.002 (1.31)	0.002 (1.61)
no. househ. mem.	-0.014 (2.62)***	-0.084 (3.01)***	-0.076 (2.77)***	-0.013 (2.45)**	-0.077 (2.78)***	-0.071 (2.60)***	-0.007 (1.37)	-0.056 (1.97)**	-0.045 (1.62)
constant	2.604 (131.01)***			2.595 (124.49)***			2.618 (134.50)***		
	19880	9842	11657	19880	9842	11657	19880	9842	11657

*** p<0.01

** p<0.05

* p<0.1

As the results suggest, the additional control does not alter the previously estimated results drastically. Only when taking into account the socioeconomic status as an 'externally' determined reference it is not possible to asseverate the estimators' statistical significance through the consistency checks. For the district and neighborhood levels, however, the coefficients are significant; specifically for the added control, moreover, the expected coefficient sign holds: more household members have a negative effect in the life satisfaction measure holding everything else constant.

6.5 Discussion

In light of the theoretical framework analyzed in Section 2, the findings suggest that individuals socially compare 'upwards' when taking exogenous reference groups as points of comparison. The feeling of being relatively deprived when below in relative ranking levels seems to be a motivating factor for 'keeping up with the Joneses' (Becchetti et al., 2013) through a mechanism of self-improvement. This is evidenced in the significant comparison-concave utility estimations, which suggests that every move upwards in the relative rankings when the absolute position is at the bottom generates disproportionately higher rises in satisfaction than when at the top. Individuals, in that sense, might be

'followers' in Clark & Oswald's terms (1998): the best response to a shock that leaves them worse-off might be to 'keep up'.

This finding also contributes to the perennial discussion regarding income inequality and its effects. Independently of whether it is morally desirable to build more equal societies, these findings suggest that people might thrive in unequally distributed environments in order to maximize their life satisfaction measures. In this sense, relevant comparisons could also help understand the degree of social mobility within a specific context, at least in pure income-related terms. Should policy incentivize 'upward' comparisons then? The evidence proposes that the relationship between inequality and happiness depends coincidentally on the degree of social mobility (Alesina, et al., 2004); also, that happiness is more uniformly distributed in countries where income is similarly distributed (Veenhoven, 2011[1990]).

On the other hand, if people compare 'upwards' in order to 'keep up', there might be significant externalities imposed by the wealthier into the poorer (Stutzer, 2004). Granted, these could be positive: for instance, more incentives to generate wealth and economic dynamics. However, there is also a chance that people, when feeling 'obliged' to 'keep up', could incur in destabilizing consumption patterns, for example (Dupor & Liu, 2003): over-indebtedness, for instance, might arise and compromise future income and wealth. Comparing their relative status, furthermore, might lead people to alter their savings levels (Duesenberry, 1967[1949]) or attitudes towards risk (Koszegi & Rabin, 2007).

Does this interpretation open the door for government intervention? Dupor & Liu (2003), for instance, would argue that these externalities are comparable to the ones responsible for overpollution: just as the former exists due to the fact that polluters do not internalize the cost of polluting on others, overconsumption, for example, exists because individuals don't take into account the comparative nature of wellbeing, the fact people will tend to consume to 'keep up' with the relevant reference groups. This would clearly suggest that the optimal tax policy would require relevant modifications in order to consider these new set of externalities (Oswald, 1983).

It is especially because of this last implication that the study's second set of findings are of vital importance. Relative comparisons seem to be not necessarily ubiquitous or follow the same direction. The results not only suggest that 'class conscience' might

change the direction of the relationship between relative income and life satisfaction –as noted by the comparison-convex utility estimation– in the sense that people are not likely to enjoy deviating in terms of status when they compare themselves to ‘similar others’²³. The findings also suggest that there is likely to be an income threshold before which relative comparisons simply do not matter. When faced with subsistence worries, people only care about their income in absolute terms, which suggests, as Veblen (2007[1899]) famously posited, that comparisons are of a conspicuous nature. It seems that relative comparisons come into place only when absolute income levels reach a certain point of subsistence-related satisfaction.

If relative comparisons only matter after a certain income threshold, then, the externalities associated with upward comparisons would not affect every individual the same way pollution, for instance, does. For regulatory purposes, in that sense, should the state intervene to correct for the effect of externalities, a very thorough identification of all the nuances related to relative comparisons must be taken into account.

Another topic of policy research that needs to be further explored is related to redistributive concerns. What the ‘externalities’ previously explained also imply is that there could be a need for ‘happiness redistribution’. Since ‘upward comparisons’ sustain the underlying implication that relative gains in happiness for the wealthier could generate losses in happiness for the poorer (Paul & Guilbert, 2013), there might be some space for redistributive policies that take happiness into account instead of only income. Especially nowadays where the goal of public policy towards development is shifting towards more utilitarian objectives (Ng & Ho, 2006), designing interventions to redistribute happiness might not sound that far-fetched. For instance, the Royal Government of Bhutan measures an index for ‘Gross National Happiness’ (Nelson, 2011).

These are just some of the relevant topics of discussion that arise from the findings this study has presented. They however only relate to the relevance of relative income in determining life satisfaction. The study of relative concerns on a broader sense might shed light in topics such as assimilation of immigrants, insurrection, class mobility, or even treason, jealousy, to name a few social phenomena (Merton & Rossi, 1968). Further research that intends to develop causal relationships –as this study pretends– is therefore necessary in order to get a better understanding of relative comparisons.

²³ These findings are consistent with Amendola et al. (2015) on the different effects inequality ‘between’ and ‘within’ reference groups have on life satisfaction.

7. Conclusions

The findings in this study suggest a causal and significant relationship between relative income and life satisfaction through several instances of relative comparisons. Relative income, in that sense, does seem to be a stronger determinant of life satisfaction than absolute income measures. Furthermore, this relationship is likely to imply that agents compare themselves with others on the basis of social-improvement: relative comparisons are expected to be 'upwardly' directed. Some nuances were discovered, however. First, the proximity of the 'externally' determined reference group matters. Secondly, when addressing socioeconomic status as the 'externally' determined reference group, agents appear to exhibit 'class conscience' and enjoy converging to their status relatively more than diverging. Finally, poor individuals do not seem to care about relative comparisons: there appears to be an income threshold before which only measures of absolute income are statistically significant, which suggests that comparisons, as Veblen posited, are of a conspicuous nature.

Furthermore, the contributions of this study open two doors in need of further research. The first one relates to the policy-related and redistributive implications. As seen in the discussion sub-section, having evidence for the importance of relative comparisons to wellbeing clearly modifies the way inequality concerns, for instance, are regularly studied. Is inequality so 'bad' if it fuels individuals to improve by ways of 'keeping up'? On the other hand, if –as can be interpreted– wealthier people impose 'happiness-related' externalities to poorer agents, should redistribution address these concerns? These are vital topics in relation to developmental preoccupations.

In that same line, this study also opens the door for discussions about the relative nature of several other relationships through the study of reference group effects. The assimilation of immigrants, for instance, a very polarizing political topic nowadays, could present several theoretical and empirical underpinnings related to reference group theory, and especially –as this study proves–, to how relative concerns are significant in determining life satisfaction.

In the end, it would seem that individuals are indeed social animals. That their mansions become huts when a bigger one is constructed next door. At least when

addressing their income-wellbeing relationship, as this study suggests, that seems to be the way it works.

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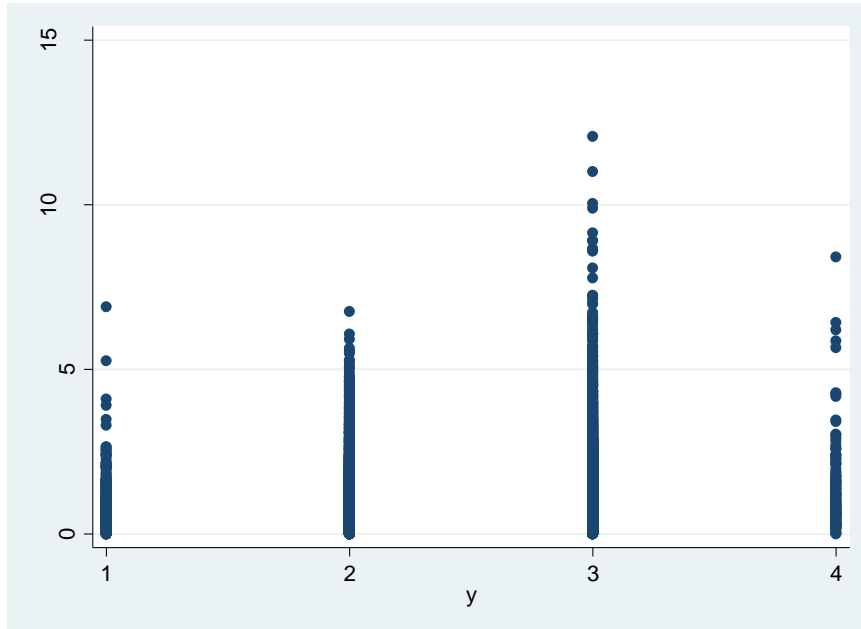
countries. Ludwig-Maximilians Universität München.

<http://doi.org/10.5897/JAERD12.088>

9. Appendices

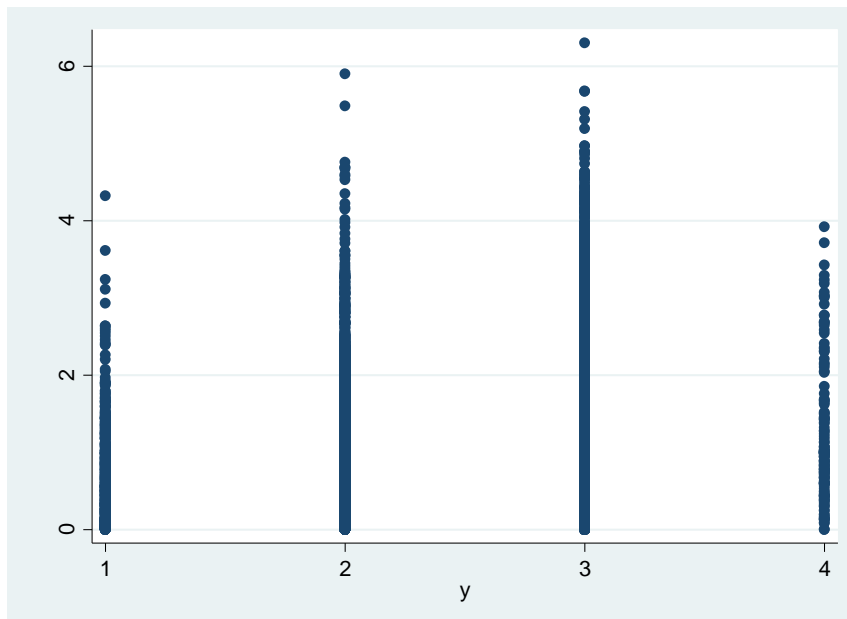
9.1 Appendix A

Graph 1: Scatterplot of relative income calculated at the district level and the life satisfaction measure



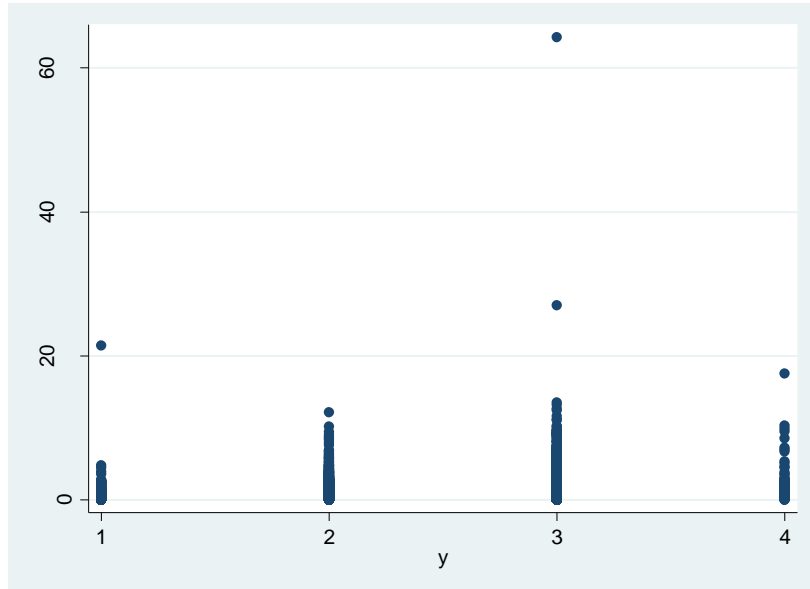
Source: INEI

Graph 2: Scatterplot of relative income calculated at the neighborhood level and the life satisfaction measure



Source: INEI

Graph 3: Scatterplot of relative income calculated regarding socioeconomic status and the life satisfaction measure



Source: INEI

9.2 Appendix B

Table 7: Summary of variables and basic descriptive statistics

	Obs	Mean	Std. Dev.	Min	Max
Income	20.625	16.380,89	22.010,90	0	607.168,00
Rel. Inc. Nei.	20.625	0,9285	0,7209	0	6,30
Rel. Inc. Dist.	20.625	0,9039	0,8609	0	12,07
Rel. Inc. Soc.	20.625	0,8923	1,1179	0	64,23
Sq.Rel. Inc. Nei.	20.625	1,3819	2,2850	0	39,71
Sq.Rel. Inc. Dist.	20.625	1,5580	4,0639	0	145,67
Sq.Rel. Inc. Soc.	20.625	2,0457	30,0512	0	4.125,91
No. Hous. Members	20.625	3,71	2,15	1	16

Source: INEI

9.3 Appendix C

Table 8: Socioeconomic status distribution according to income

	Obs	Mean	Std. Dev.	Min	Max
Ext. Poor	1.681	3.342,56	4.032,60	0	50.569
Poor	3.786	7.527,56	8.095,14	0	90.913
Non-poor	12.536	21.246,31	25.242,89	0	607.168

Source: INEI