Happiness and Inequality Aversion Worldwide

Paolo Verme

Department of Economics "S. Cognetti de Martiis"
University of Torino
and
School of Management SDA-Bocconi, Milano

First draft: July 2007

Abstract

The paper tests the importance of income inequality in predicting life satisfaction using a sample of over 260,000 world citizens covering 84 countries between 1981 and 2004. We find that income inequality is not a good predictor of income inequality across world citizens. The cross-section evidence is that higher income inequality measured at the country or regional level is not consistently associated with lower or higher individual life satisfaction. The same can be said for the static cross-country analysis. Higher inequality in countries is not consistently associated with lower or higher average life satisfaction. However, a cross-country dynamic analysis shows that increases in income inequality over time are associated with decreases in average life satisfaction. This result is rather robust across different specifications of the life satisfaction equation and for ginis calculated on different samples. Moreover, we find that, at any point in time, subjective inequality aversion is not really driven by the level of income inequality but by other individual factors including political orientation, freedom of choice, education, trust, gender and values.

JEL: D3, D6, I3, O57
Keywords: Happiness, Inequality, Inequality Aversion

1 Introduction

Income inequality has for long being considered as a possible element of social instability, social exclusion, distress or unhappiness. Historians have noted that social tensions erupt in societies undergoing rapid transformations and disequalising changes in material well-being rather than in poor or rich societies. Psychologists have highlighted the role of envy in determining happiness. Social welfare theorists have pinpointed the importance of relative rank in determining deprivation and well-being. The idea is simple. More unequal societies are expected to generate more envy, sense of deprivation and rising expectations which, in turn, should reduce happiness.

As we will see, both theory and empirical evidence are more complex than conventional wisdom and the impact of inequality on subjective well-being is controversial. This paper returns to this question and looks at whether and how income inequality may affect subjective well-being. We do this with some advantages vis-à-vis previous literature on the subject and trying to explore some innovative routes. The main advantage is that we dispose of possibly the largest data set used for this type of analysis, a combination of all European and World Values surveys carried out between 1981 and 2004. One innovation is that we consider explicitly a measure of subjective inequality aversion which is available in our database. The second is that we test two measures of income inequality, the gini calculated on income rank from within the survey and the gini calculated from household surveys and taken from a source external to our database. Third, we include a large set of controls including individual characteristics, personality traits, trust, individual values and social attitudes which should control for psychological and cultural attitudes towards inequality. Fourth, we study the impact of inequality on subjective well-being cross-section across a pooled sample of world citizens, cross-country and over time. And fifth, we put our results under systematic robustness tests confronting results across various specifications of the subjective well-being equation.

We find that the ginis we dispose of do not fully pass any of the robustness tests with one exception. The cross-section equations show that the gini is highly sensitive to various factors including the choice of regressors, robust and cluster estimates, country and year fixed effects and functional specifications. Depending on these factors, the gini can take any sign and being significant or non significant. Therefore, any inference based on one or even a few specifications is bound to be aleatory. This is true for both the cross-section and cross-country equations. Income inequality does not seem to have any robust effect on subjective well-being cross-section and cross-country. The marginal cross-country analysis presents instead a different story. Growth in income inequality is clearly associated with a decline in life satisfaction. Countries that experienced sharp rises in inequality have also experienced sharp declines in life satisfaction. This result stands our robustness tests with the exception of the equations that consider explicitly GDP growth. That is because GDP growth is positively and significantly associated with life satisfaction growth and negatively and significantly associated with income inequality growth. Therefore, including

GDP growth outweigh the impact of the gini on life satisfaction and turns the gini non significant. We also investigate the factors that may predict subjective inequality aversion and find that the gini is not a significant factor and that the most relevant factors are political orientation, freedom of choice, education, trust and gender.

The paper is organized as follows. Next section discusses theory and practice of the study of income inequality and happiness. Section 3 reviews the different interpretations of the concept of inequality aversion offered by the literature. Section 4 describes model, data and variables. Section 5 presents the results for the cross-section equations and section 6 the results for the cross-country static and dynamic equations. Section 7 focuses on the determinants of inequality aversion and section 8 concludes.

2 Income inequality

Studies on happiness have been rather consistent in finding that income is a good predictor of happiness across people and across country but not over time and over the life-cycle. Individuals or countries with a higher income have been shown to be happier (Blanchflower and Oswald 2000, Di Tella, MacCulloch and Oswald 2001, Inglehart 1990, Diener et Al. 1995) while longitudinal studies do not find a strong positive association between happiness and income (Easterlin, 1974, 1995, 2001; Diener et Al., 1999; Veenhoven, 1993; Mangahas, 1995; Ravallion and Lokshin 2000; Clark and Oswald, 1994). The inconsistent relation between happiness and income in longitudinal studies is generally explained with theories of relative deprivation or rising expectations. People consider their income relative to those of a reference group rather than absolute income and adjust expectations accordingly. These findings have induced researchers to look closer at the question of income inequality which can be looked at as a measure of social relative income. Indeed, some of the most prominent predictions about how income inequality may affect well-being derive from the study of relative income.

As an example, take two of the most popular theories on income and well-being which imply opposite predictions about income inequality. A seminal paper by Hirschman and Rothschild (1973) argued that people may appreciate inequality if this signals social mobility, a phenomenon dubbed by Hirschman as the 'tunnel' effect. People who can observe others around them moving upwards in the income scale increase their expectations about their own social mobility and this makes them happier because it improves expectations about the future. In such framework, a rise in inequality may be tolerated and appreciated, at least in the short-run.[1] Various other theories have instead emphasized the role of the relative position within a reference group. Runciman (1966) for example has devised a theory of relative deprivation based on the notion that the individual sense of deprivation can be explained by the relative position that the individual occupies in relation to

[1] In the long-run, if expectations for social mobility are not met inequality can turn into an explosive social device. Hirschman and Rothschild (1973) model predicts positive returns to increased inequality only if the benefits of expectations outweigh the cost of envy.

the self-selected reference group. Yitzhaki (1979) has formalized this concept applied to incomes and proposed to measure relative deprivation as the sum of the distances of a person's income from all incomes situated above in the income distribution and showed how this measure is in fact equivalent to the absolute gini coefficient (the gini multiplied by the mean). The prediction here is that increasing inequality increases relative deprivation and decreases subjective well-being.

The 'taste' for inequality may also be different for different people or different interest groups. Individual utility may be different across individuals and inequality aversion can vary. Poor people may appreciate inequality because the pay-offs of social mobility are greater than for richer people, an hypothesis which may explain for example why lower income people are the greater consumers of lotteries or hazard games. Psychologists have observed that the rich may dislike inequality because of a sense of justice, altruism or simply a sense of guilt due to their relative position. Public policy theories would argue that the poor dislike inequality because poor people favour redistribution by the state while the rich would appreciate inequality because they would be the net losers of redistributive policies. Both the poor and the rich would have good reasons to like or dislike inequality.

Empirical evidence on the relation between income inequality and subjective well-being is equally controversial. Some authors have found a negative and significant association between happiness and inequality. Morawetz et Al. (1977) have shown how two communities in Israel with different levels of income inequality differed in average happiness, where income inequality was found to be higher, average happiness was found to be lower. Schwarze and Harpfer (2002) find life satisfaction to be negatively correlated with inequality using the German socioeconomic panel over 14 waves. Hagerty (1999)[2] using aggregated data for eight countries finds that average happiness levels are lower where distributions are wider. On the contrary, Clark (2003) using the British panel finds a positive correlation between happiness and inequality for the employed population. Other authors have found a positive correlation for some groups and negative for others. A study by Alesina et Al.(2004) found that individuals tend to be less happy if inequality is high but that this effect is much stronger in the EU than in the US. Also, the poor and left-wing people in the EU are less happy if inequality is high while this phenomenon is not visible in the US. Graham and Felton (2006) looked at Latin American countries and found that inequality made people in upper quintiles happier and those in the poorest quintile less happy. A stream of studies also find inequality to be a non significant factor in explaining happiness. Senik (2004) does not find a significant correlation between happiness and inequality for Russia using the Russian Longitudinal Monitoring Survey. Studies by Clark and Oswald (2006) and Helliwell (2003) find no evidence that income inequality is correlated with happiness. According to Veenhoven (1996) "*Income inequality in nations appears almost unrelated to final quality of life as measured by average happiness* (...)" (p. 34).

There are many reasons why these studies may find inconsistent results. One possi-

[2] mimeo, quoted in Graham and Felton (2006)

bility is countries or group heterogeneity. Some population groups are more sensitive to inequality than other population groups and it may be difficult to isolate which groups behave homogeneously. When studies do not disaggregate by relevant group the net effect may be non significant. A second reason may be the use of controls in multivariate equations. Combining different sets of controls can lead to different results especially if controls include other measures of income or relative income which are likely to be correlated with the inequality measure under study. A third reason may be the number of observations used. With larger samples it is generally easier to find significant associations among variables. The gini coefficient is forcibly calculated on groups of individuals and this restricts the degrees of freedom making this variable less likely to be significant. A fourth reason could be the choice of the gini. Some studies use ginis exogenous to the survey used for the life satisfaction estimations, other use ginis calculated from the surveys used. For example, Alesina at AL. (2004) use the gini taken from the Deninger and Squire database and Helliwell (2003) uses the Gini taken from a World Bank database whereas Senik (2004) and Clark (2003) calculate the gini from within their own surveys. A fifth reason may be the different degree of information about inequality. Some groups of people may be better informed than others or people may be better informed about local inequality than about country inequality. Calculating the gini for countries, for regions or for smaller groups of people may change results significantly. A distinction should also be made between the role of inequality in determining average and individual life satisfaction. What matters for a country may be different from what matters for individuals. Finally, introducing statistical restrictions such as robust estimators, cluster options, country or year fixed effects may alter significantly the results for a variable calculated on aggregated units such as inequality.

These are some of the factors that we will try to account for in the empirical part. But before we do this it is important to clarify the question of inequality aversion which sits in between subjective well-being and income inequality.

3 Inequality aversion

Most studies on happiness and inequality consider a negative relation between these two variables as a sign of inequality aversion. For example, Clark (2003) argues that workers may not be inequality averse because he finds a positive relation between happiness and income inequality and Schwarze and Harpfer (2003) argue that Germans are only weakly inequality averse because a reduction in inequality does not increase well-being. This is an indirect way of considering inequality aversion. If higher inequality corresponds to lower life satisfaction this must be because people do not like inequality. This is a rather strong assumption given that people who dislike inequality could also be the group of happier people but it is one way of looking at inequality aversion.

In economic theory the concept of inequality aversion is derived from the concept of risk aversion. Inequality aversion is defined as the concavity of the utility function. If

an individual's utility of wealth function is strictly concave ($u'(w) > 0$ and $u''(w) < 0$) the individual will be averse to risk. Arrow, for example, proposed two measures of individual inequality aversion defined as 'absolute' risk aversion $R1(w) = -u''(w)/u'(w)$ and 'proportional' risk aversion $R2(w) = -wu''(w)/u'(w)$ (Feldstein 1968). Inequality aversion is also closely linked to the concepts of efficiency (defined as the sum of payoffs) and maxmin preferences (defined as the desire to maiximise the minimal payoff in a group). Game theory has shown how inequality aversion, efficiency and maxmin preferences may be conflicting objectives and theories that focused on inequality aversion behaviors are largely based on assumptions regarding the motivation of the utility function (Engelmann and Strobel, 2004). In this framework, it is the researcher task to clarify the concavity of the utility function and in the absence of empirical data or experiments this amounts to guess work on the part of the investigator.

A different interpretation of inequality aversion is offered by the practice of measuring inequality. For example, the general entropy class of inequality measures use an inequality aversion parameter α which can take any non negative value set by the researcher. The choice of this value will determine the 'weight' given to incomes located in different parts of an income distribution. The inequality aversion parameter represents the average aversion that the researcher thinks a society should have and it is a normative and arbitrary parameter set by the researcher. The functional form of the parameter may be derived from theory and assumptions about relative or absolute aversion but the parameter itself is set by the researcher.

More recently, researchers have attempted to measure inequality aversion directly with surveys. This can be done in at least two ways. One is to carry out laboratory-type experiments with groups of individuals and specifically designed questionnaires to derive from answers how individuals value inequality. Examples of this approach are the 'leaky bucket' experiments (Gevers et Al. 1979; Cowell, 1985; Amiel and Cowell 1992). This approach attempts to estimate the parameters of predefined relative or absolute inequality aversion utility functions by means of questionnaires. The second approach is to ask directly to respondents, say on a scale from one to ten, the degree of aversion to inequality. This is the approach followed by various social scientists and embedded in surveys such as the World and European Values Survey. The two approaches differ in that the first approach infers the degree of inequality aversion from a set of questions aimed at pinpointing the true attitudes of respondents towards inequality while the second approach simply accepts what people say when asked about inequality aversion.

This last approach is evidently a less precise method for assessing the true inequality aversion of individuals. What we are looking for is not disguised behind clever questions and answers are affected by personality, values, social norms and other psychological and circumstantial factors. However, the measurement of inequality aversion by means of such questions has a value in its own right. The situation is comparable to the situation faced by citizens when voting in democratic elections. People's vote is cast based on partial information about candidates and electoral programs and all voting citizens are given

equal weight even if they do not clearly understand who they are voting for or the content of the electoral program. In replying to a one to ten scale question on the desired level of inequality, respondents act in a similar manner. They simply give their vote on the degree of inequality they wish to have based on their own understanding and experience of the concept of inequality.

There are good reasons to use such approach in the context of subjective well-being. First, if we accept that we should be ruled by poorly informed voters there is no reason to deny to the same voters the right to express their own level of desired inequality and use this same level as a legitimate norm for social analysis. Second, using simple and straight questions on desired inequality allows for questioning large and wide ranging number of respondents, not just restricted groups of people such as students. And third, subjective well-being is largely influenced by subjective factors and subjective inequality aversion may be a factor that predicts happiness itself.

We have shown how the concept of inequality aversion can be interpreted in different though similar ways. Most authors who work on happiness define inequality aversion as the slope of the inequality measure. A negative sign of the inequality measure in a happiness regression is interpreted as inequality aversion. In this paper we will use the gini coefficient as a measure of income inequality and complement this information with a direct measure of inequality aversion derived from a question that asks respondents a straightforward question about the taste for inequality. Therefore, we take as a given the assumptions made on social inequality aversion in built in the gini coefficient while we add an individual measure of inequality aversion which controls for heterogeneity in individual taste for inequality. As a last task of this paper, we will also attempt to establish the factors that explain subjective inequality aversion.

4 Model, data and variables

Our objective is to determine how inequality and inequality aversion may be related to life satisfaction. Therefore, we have a set of regressors which are of primary interest and which include income, income inequality and inequality aversion. We call these variables the 'key' variables. We are also aware of a number of variables that in the past have been found to be relevant for life satisfaction and in addition we dispose of other variables that we think may contribute to explain life satisfaction well and which have been little used by the literature on happiness. We call these two sets of variables 'controls'.

Let H = Life satisfaction; X = Income rank; I = Income inequality; D = Desired inequality (the reversed scale of inequality aversion); W = A measure of the country's wealth; C = A vector of control variables; $\alpha, \beta, \gamma, \delta, \eta$ = Parameters to be estimated; ϵ = Error term normally distributed with zero mean; the subscript i stands for individuals; the subscript c stands for countries and the subscript y stands for years. Variables can be included or omitted depending on specifications. We estimate life satisfaction equations cross-section on a pooled world sample, cross-country and over time. The full models are

described as follows:

$$H_i = \alpha X_i + \beta I_{cy} + \gamma D_i + \delta W_{cy} + \eta C_i + \epsilon \tag{1}$$

$$H_{cy} = \alpha X_{cy} + \beta I_{cy} + \gamma D_{cy} + \delta W_{cy} + \epsilon \tag{2}$$

$$(H_{cy} - H_{c(y-1)}) = \alpha(X_{cy} - X_{c(y-1)}) + \beta(I_{cy} - I_{c(y-1)}) + \gamma(D_{cy} - D_{c(y-1)}) + \delta(W_{cy} - W_{c(y-1)}) + \epsilon \tag{3}$$

We call equation [1] the individual equation, equation [2] the cross-country equation and equation [3] the dynamic equation. Estimates for the individual equations are made with ordered logit while for the cross-country and dynamic equations we use OLS estimates. Depending from specification, robust and cluster options and country and year fixed effects can be added. We use the robust Huber-White sandwich estimator and regional clusters when these options are included. A number of reduced equations will also be used to test the robustness of results under various specifications.

The data set adopted is perhaps the largest data set ever used for studies on happiness and inequality. It has been compiled aggregating all rounds of the European and the World values surveys carried out between 1981 and 2004.[3] These surveys question individuals worldwide on happiness, personal values, social attitudes and individual attributes and include questions on income and inequality. The version of the data set we use contains 267,870 observations on individuals surveyed across 84 countries. Each country has been surveyed from a minimum of one to a maximum of four times. Therefore, the database allows us to work with individuals, countries and over time.

Life satisfaction is the key variable that we try to explain. The question asked is: "*All things considered, how satisfied are you with your life as a whole these days?*" Answers include a ten steps ladder where "1" is equal to "*Dissatisfied*" and "10" is equal to "*Satisfied*".

Income (X) is measured as self-positioning in a ten-steps income scale where the income brackets have been measured in local currency in each country. This is not self-perceived income but the positioning of individuals into income brackets and it is therefore a measure of income rank. In some sense, this is a more accurate indicator than self-reported income which is known to be underreported in household surveys worldwide.

[3]Data can be freely downloaded from: http://www.jdsurvey.net. We are grateful to the Values Study Group and World Values Survey Association for creating and making accessible the EUROPEAN AND WORLD VALUES SURVEYS FOUR-WAVE INTEGRATED DATA FILE, 1981-2004, (v.20060423, 2006). Aggregate File Producers: Análisis Sociológicos Económicos y Políticos (ASEP) and JD Systems (JDS), Madrid, Spain/Tilburg University, Tilburg, The Netherlands. Data Files Suppliers: Analisis Sociologicos Economicos y Politicos (ASEP) and JD Systems (JDS), Madrid, Spain/Tillburg University, Tillburg, The Netherlands/ Zentralarchiv fur Empirische Sozialforschung (ZA), Cologne, Germany:) Aggregate File Distributors: Análisis Sociológicos Económicos y Políticos (ASEP) and JD Systems (JDS), Madrid, Spain/Tillburg University, Tilburg, The Netherlands/Zentralarchiv fur Empirische Sozialforschung (ZA) Cologne, Germany.

That is because people are not asked to tell how much they earn but simply to say to which income bracket they belong. This measure of income is 'relative' in two ways. When respondents reply to the question they are immediately aware of rank because they self-assign their own income to one of the ten income classes. They have a clear sense of their relative position. It is also relative to the country surveyed. Income brackets have different lower and upper bounds in different countries and they are not adjusted at Purchasing Power Parity (PPP). Therefore, this measure when compared across countries does not compare absolute incomes but only rank.

We use three different ginis as measures of income inequality (I). The first is calculated by country and year using income rank (X) which makes it a measure of 'rank' inequality. We will refer to this measure as the 'gini country'. The second is calculated by region and year using the same income measure. We call this the 'gini region'. The third is the Gini coefficient taken from the United Nations University-World Institute for Development Economics Research (UNU-WIDER) database on inequality. This source puts together several cross-country databases on income inequality estimated from household income or consumption data. We call this last measure the 'gini wider'.

Desired inequality (D) is measured with a ten steps scale where "1"="*Income should be made more equal*" and "10"="*We need larger income differences as incentives*". This is a measure of subjective individual taste for inequality which is relative to the country specific situation. The reversed scale of this variable is interpreted as a measure of subjective inequality aversion.

We also use a large number of controls (C). The first is *GDP per capita* at Purchasing Power Parity (PPP) and at 2000 values. The variable has been extracted from the World Bank Indicators (WBI) database available from the World Bank web site.[4]

The second is a variable that measures freedom of choice and control over one own life. The question asked is: "*Please use this scale where 1 means "none at all" and 10 means "a great deal" to indicate how much freedom of choice and control you feel you have over the way your life turns out.*" This variable has been used by other studies before (Veenhoven, 2000) and has been found by Verme (2007) to be the single best predictor of life satisfaction worldwide using the same database we use. This variable captures two individual characteristics which cannot be separated with the data available. One is the intrinsic value attributed by individuals to the effective freedom of choice they enjoy (Sen 1987). The second is the locus of control. This is a concept which is central in psychology to the study of personality and it was first described by Rotter (1966). In substance, individuals can be divided into 'internals' and 'externals' according to where the locus of control is situated. The 'internals' are those people who feel that their own actions do not have any impact over the way their life turns out. They are people who tend to believe in destiny, chance or fate. The 'externals' are those people who feel that their own choices and actions will eventually determine their own future. Psychologists have known for long that this variable is related to freedom of choice and correlated with life

[4] Wired at www.worldbank.org.

satisfaction and there is now new evidence that this is amomg the best predictors of life satisfaction worldwide. Expectations for social mobility and inequality aversion may well be related to the freedom of choice and control over these choices and this variable is also a good measure of personality which we can expect to be related to inequality aversion.

The other control variables are as follows. A first set of variables measures *individual and family attributes* which are possible predictors of life-satisfaction. These are being unemployed (dummy), sex (female), age (continuous with the addition of age squared), a dummy for tertiary education and marriage status (dummy where one includes: "*married*" and "*living together as married*") and subjective health measured on a scale from one to ten. These are all variables which have been found in the past to explain life satisfaction well. A second set of variables is used as control variables for *personal values*. This includes the importance attributed by individuals to family and friends, the importance attributed to work relatively to leisure (importance of work/importance of leisure), the importance of politics and the importance of religion. All these variables are measured on a scale from one to four. The original variables assigned to one the value "*very important*" and to four the value "*Not important at all*". We reversed this order to make the variable increasing in life satisfaction.

A third set of variables measures *trust*. One is individual trust in people which is measured with a dummy variable where one is "*Most people can be trusted*" and zero is "*Can't be too careful*". A second variable measures individual trust in institutions, also reported as a reversed one to four scale. This variable is the average trust that individuals reported to have vis-à-vis a number of institutions including the army, police, justice system, parliament, civil service, press, companies and trade unions. A last set of variables were added to capture *social attitudes*. One is the attitude towards tax cheating. The question asked is whether respondents would cheat on taxes given the chance. Answers were measured on a scale from one to ten where one is "*Never justifiable*" and ten is "*Always justifiable*". The second variable is political orientation also measured on a one to ten scale where one stands for "*left*" and ten stands for "*right*". This last variable is known to be correlated with both life satisfaction and opinions on inequality (Alesina et Al., 2004).

5 Happiness and inequality across world citizens

5.1 The standard model

In table 1 we report the results of the standard model that we would use working with a pooled world sample of individual observations. Estimations are made with an ordered logit model which includes robust standard errors, regional clusters, country and year dummies. Robust standard errors are particularly indicated for working with large samples and regional clusters are introduced because the number of observations at the regional level is rather small and observations are likely to be rather homogeneous within regions.

Country and year fixed effects are added to account for unobserved country and time heterogeneity.

The gini coefficient is positive and significant. On average, people living in countries with higher income rank inequality tend to be happier. All other variables in the model are significant with the exception of tertiary education. With a positive sign we find income rank, desired inequality, GDP, freedom, being female, being married, health, trust people and institutions, importance of friends and family, importance of religion and right-wing political orientation. These are the factors that are associated with increased life satisfaction and the signs are largely consistent with previous findings on these variables. Regressors with a negative sign are being unemployed, age, importance of work, importance of politics and tolerance towards tax cheating. These are also variables that have been found in the past to be negatively associated with life satisfaction. In order of importance (z-stat. rank), freedom and health are the two most relevant factors followed by age, income and the importance of religion.

[Table 1]

The results presented in table 1 are rather standard and consistent with previous literature with the exception of the variable freedom which is a rather new finding in the happiness literature. Our results confirm Verme (2007) which found freedom to be the best predictor of life satisfaction using the combined European and World Values Surveys. Instead, as already discussed, the result for the gini is contrary to the conventional wisdom that wants inequality to make people less happy and consistent with only a part of the theory and of the empirical literature. In the next sections we put the gini under scrutiny to test the robustness of this finding.

5.2 Sensitivity analysis

In this section, we propose a systematic approach to test the robustness of the gini coefficient as a possible predictor of life satisfaction. The sensitivity analysis consists in comparing the sign and significance of the gini coefficient across different specifications of the life satisfaction equation. We do this by testing how the gini behaves using different ginis, different functional specifications, robust and cluster estimations, year and country fixed effects, different sets of regressors and different groups of individuals or countries.

The gini coefficient is by definition a measure calculated on a distribution. Some studies use the gini coefficient calculated on countries and others use coefficients calculated on smaller units such as regions. The rationale for the choice is that people may be informed or care about national rather than regional inequality or vice-versa. This is substantially an assumption put forward by the researcher. These ginis can be calculated using income measures found in the data used or can be extracted from other databases and merged with the data in use. These two types of ginis may provide different results because calculated on different samples and populations or different measures such as income, consumption or wealth.

One other source of conflicting results may be due to the use of robust and cluster analysis. In a study that uses a world database it can be recommended to use both. Robust standard errors are more reliable with large samples and the small number of observations available at the regional level may indicate that these observations come from a relatively small spatial area. Using regional cluster analysis can improve estimations which are bias due to within region homogeneity. However, statistically speaking, this poses a problem vis-à-vis measures calculated by country because it reduces significantly the standard error.

Also, a pooled sample based on a world database which includes countries and years naturally requires to account for country and year fixed effects which can be done by simply introducing the respective dummies into the equations. This controls for countries and years heterogeneity and helps to improve estimates on individual life satisfaction. However, the gini is calculated at the country level and country fixed effects can reduce the standard error of the gini coefficient significantly. Moreover, this effect can be 'cumulated' with the effect due to robust and regional cluster analysis altering remarkably results.

In table 2 we present a set of 12 different specifications of the ordered logit life satisfaction equation introducing and omitting robust and cluster effects and year and country fixed effects. The same equations are repeated for the three different ginis proposed; the gini country, gini region and gini wider.

Results are rather different across equations and across ginis. The robust option does not alter significantly the outcome for any of the ginis but introducing the regional cluster option reduces visibly significance for all ginis and turns the gini country and the gini regional non significant. Where significant, the gini country shows a negative sign and the gini regional and gini wider a positive sign (eqs. 1-3). Year and country fixed effects complicate the picture further. Year fixed effects reverses the sign of the gini country while the country fixed effects makes it non significant. In the case of the gini regional and the gini wider it is the country fixed effects that reverse the sign (eqs. 4-6). Combining both robust and cluster options and year and country effects leads to unpredictable results driven by the 'dominance' of the various option on the final coefficient (eqs. 7-12). Therefore, the gini sign and significance is very unstable and largely depends on the options introduced in the life satisfaction equation. Also, the three ginis provide remarkably different results with the gini region behaving more like the gini wider than the gini country despite the fact that both the gini country and gini region are constructed from the same variable and that the gini world and gini wider are both constructed at the country level.

[Table 2]

The weak or non significance of the gini may also be due to the fact that the relation between life satisfaction and income inequality is non linear. To test for a non linear association we run two separate equations one with the gini and the gini squared and the second with the gini divided into four quartiles. Results are shown in table 3 for the three ginis considered and using the full model used in table 2 (eq. 12). The gini squared and the gini classes do not turn the coefficient significant for the gini country or the gini region.

The gini wider is significant and with a negative sign as in table 2. The squared gini is non significant while the gini wider divided into classes shows some evidence that higher inequality leads to lower life satisfaction.

[Table 3]

One other question is how other regressors interact with and alter the coefficient of the gini. We test this effect first on three income related variables including GDP, income rank and desired inequality (table 4) and then we test different other sets of regressors (table 5). Controlling for GDP is important to abstract from the debate on wealth and inequality. We want to see the impact of inequality on life satisfaction irrespective of countries' wealth. Controlling for income which is the same measure used for calculating income inequality poses some other challenges. On the one hand, we control for income rank. People's taste for inequality may well depend on where they are located in the income distribution and for this reason we should expect that controlling for income rank enhances the explanatory power of the gini. On the other hand, the gini is a measure of dispersion of income. A greater gini signals greater dispersion but a greater dispersion has also an impact on both the gini and the income coefficients of the life satisfaction equation. Therefore the net effect on the gini coefficient of using the combination of these variables can be unpredictable.

A similar argument can be used for desired inequality. The reverse of this variable can be interpreted as a measure of inequality aversion and we said that this is one of the possible measures. In principle, using a subjective measure of inequality aversion should clarify the impact of the gini on life satisfaction. If I wish for more inequality in a society with low inequality I will be less happy than a person who wishes for less inequality. However, combining this measure with the gini means having a subjective measure of inequality aversion interacting with the inequality aversion parameter in built in the gini measure. Moreover, the sign itself of the gini is interpreted as a measure of inequality aversion. Therefore, we are really working with three similar but different measures of inequality aversion at once.

Table 4 shows the results for the ordered logit regressions. GDP and income enhance the significance of both the gini country and the gini region coefficients (eqs. 1 and 2). However, GDP maintains the negative sign of the gini while income reverses the sign. Desired inequality also reverses the sign of these two ginis while still being significant (eq. 3). The gini wider is instead much more stable with consistent positive signs. If we restrict the sample to the balanced sample for all variables considered, the desired inequality variable makes the gini country and gini region coefficients change once more while the gini wider is still stable with positive signs (eqs. 7-12). Therefore the problem of instability due to the introduction of other key regressors relates to the gini country and gini region but not to the gini wider.

[Table 4]

In table 5 we test different specifications of the life satisfaction equations using groups of different regressors representing respectively freedom, individual characteristics, trust, values and social attitudes as described in the data section. These are all aspects that could influence the way people look at inequality. The gini country and the gini region are again very unstable measures changing sign depending from the specification of the model while this effect is not visible for the gini wider. Changing the number of observations also alters some of the results for the gini and the gini region while the sign is still stable for the gini wider.

[Table 5]

What table 4 and 5 indicate is that the gini country and the gini region which are both calculated using the income rank variable are very unstable subject to different specifications. This may be due to either the nature of the income variable used or to the meaning of this variable. Income rank has a variance limited by definition having only ten equidistant possible values. What determines inequality is the 'weight' represented by the number of observations present in each income class. This same weight is also present in the gini wider but plays a minor role (few households have the same income) and the income variable on which this measure is calculated can take any value which determines greater variance and greater range. One possibility is that this greater variance and range allow for more precise estimates of the gini coefficient. A second possibility is that people care less about income rank inequality than about income inequality which would make the gini country and the gini region more unstable but this is unlikely. If anything, people are better informed about their relative rank on a ten steps ladder rather than about their relative income on a ladder constructed on all incomes in society. Therefore, we should deduct that the visible difference between the gini country and the gini wider in terms of stability of the coefficient under specifications with different regressors is mainly due to a statistical artefact. This difference is nevertheless important because rarely discussed in empirical studies. Moreover, it does not make the gini wider a necessarily better measure of income inequality. As observed in table 2, the gini wider can also change of sign because of country fixed effects.

We saw in table 4 that including income improves the significance of the gini but reverses the sign. One possibility explored in other works and consistent with part of the theory is that different income groups have different appreciations of inequality. For example, the poor and the rich may appreciate inequality because for the poor it signals mobility and for the rich keeps their relative position while the middle class could be inequality averse because the potential losses of increased inequality outstrip the benefits. This is tested in table 6 where we run separate regressions for three income classes; the lower class for income ranks included between one and three, the middle class for income ranks included between four and seven and the upper class for income ranks included between eight and ten. Where the coefficient is significant, it is positive for the first two income classes and negative for the upper class. This result does not entirely vanish if

we introduce robust, cluster, year and country effects. Therefore, there are some (weak) indications that income classes respond differently to income inequality with higher income classes being more inequality averse than middle and lower income classes.

[Table 6]

Next, we grouped countries by world regions attempting to join together countries with similar features in terms of economic development and historical background. We then run a separate regression for each of these regions using both the gini country and the gini wider. Results are shown in table 7. Considering the gini country, only four regions pass the test maintaining sign and significance in all three equations with robust, cluster and country effects. These are the Baltics and the Commonwealth of Independent States (CIS) countries which together account for all countries of the Former Soviet Union (FSU) and Oceania. In these regions, inequality reduces life satisfaction significantly. Vice-versa, in one region (South-Asia) inequality increases life satisfaction. When we use the gini wider, world regions that maintain sign and significance across the three specifications are Southern Europe and Central-Eastern Europe which both show a negative sign and Sub-Saharian Africa and Oceania both with a positive sign. Where coefficients are significant in table 7, they are roughly split equally between positive and negative signs across the world regions. Therefore, we find relatively little consistency across the world regions, across specifications and between the use of the two ginis. Again, results are not very robust.

[Table 7]

As a final test we check the robustness of the gini as compared with other factors which we know to be important for explaining life satisfaction and which are also calculated at the country level such as gdp and average freedom by country and year. We run individual bivariate ordered logit equations using these measures and adding progressively the robust and cluster options (columns 2), the year and country fixed effects (column 3) and both robust and cluster and country and year fixed effects (column4). As shown in table 8, only the gini suffers from non significance once these restrictions are applied.

[Table 8]

6 Happiness and inequality cross-country

6.1 Static analysis

We showed that introducing the country fixed effects makes the gini non significant while introducing the country's GDP reduced the significance of the gini. Therefore countries heterogeneity matters and people in different countries look at inequality in different ways. The question is whether we can pinpoint different typologies of countries that behave in

similar manners so as to understand what are the critical country factors that explain different appreciations of inequality. In figure 1 we plot the gini country and gini wider against average life satisfaction calculated by country and year. In none of the two graphs we can clearly visually trace a linear or non-linear relation between the gini and life satisfaction. The qudratic fit is weakly negative for the gini country and U-shaped for the gini wider. The gini wider is more dispersed than the gini country but this is due to the nature of the income variable that originates both ginis.

[Figure 1]

To check whether different patterns exist for different groups of countries as we did for the individual equations we joined countries by geographical area and plot again the gini against life satisfaction using both the gini country and the gini wider (Figure 2). The gini and life satisfaction do not show any clear association but we can see some homogeneous groups of countries in these two dimensions which are roughly located in the same positions using either of the two ginis. The wealthy nations of Europe and North-America are found in the upper left-hand side with high levels of life satisfaction and average or below average income inequality. The countries of Central and Latin America enjoy high levels of life satisfaction together with high levels of inequality. The emerging economies of Asia, North Africa and the Middle-East are all located around average levels of both life satisfaction and inequality while the low income transitional economies have low life satisfaction combined with below average inequality. Sub-Saharian Africa is an outlier in that enjoys average levels of life satisfaction combined with high levels of inequality.

[Figure 2]

Next we test the cross-country correlation between income inequality and life satisfaction. As before, we try different specifications introducing and removing robust, country and year effects and we also repeat the exercise for both the gini country and gini wider (table 9). The gini country is never significant while the gini wider is significant in 7 of the 12 equations. This is expected given that the gini country is not really comparable cross-country. In the last equation of the gini wider this variable is significant but changes of sign and the change seems due to the introduction of the country fixed effects. Also for the cross-country analysis, the gini is not a very robust predictor of life satisfaction.

[Table 9]

6.2 Dynamic analysis

We now ask the question of whether changes in income inequality determine changes in life satisfaction across-countries. To do this we calculated percentage changes in average life satisfaction calculated for each country and year and percentage changes of the gini coefficient for both the gini country and gini wider. As already mentioned, countries have

been surveyed between 1981 and 2004 from a minimum of one to a maximum of four times. Therefore we dispose of a minimum of one to a maximum of three time spells for each country where each time spell can vary in length. As we are working with changes over time and given that we carry out a cross-country analysis we do not use year fixed effects or regional cluster estimates. In table 10 we report the results of the OLS regressions for both the gini country and the gini wider.

There seems to be a clear negative association between changes in income inequality and changes in life satisafction. An increase in income inequality reduces significantly life satisfaction. For the gini country and using all available observations the coefficient for the most restricted model is -0.071 and weakly significant. It is non significant at the 5% level but significant at the 10% level. For a one percentage increase in the gini, life satisfaction decreases by 0.071 percent. Restricting the gini country to the gini wider sample increases the negative coefficient to 0.117. Using the gini wider increases further the coefficient to -0.146. A one percentage increase in the gini wider decreases life satisfaction by 0.146 percent. The sign of the coefficient is consistent across all specifications for both ginis including those with country fixed effects and robust standard errors.

Figure 3 plots marginal changes in life satisfaction against marginal changes in the two ginis considered. The figure confirms what the regressions suggested. For both ginis the relation is negative and quasi-linear (as shown by the quadratic fit drawn in the picture) with the gini wider showing a more marked negative relation.

[Table 10]
[Figure 3]

Combining the growth of inequality with other key variables such as changes in GDP and income rank complicates the picture and changes results but provides one additional important insight. Life satisfaction growth is negatively and significantly associated with the gini growth for both the gini country and gini wider. This is confirmed in table 11 where the Pearson correlation coefficients are reported for the ginis, GDP growth and income rank growth. However, life satisfaction growth is also positively and significantly associated with GDP growth and GDP growth, in turn, is negatively and significantly associated with the gini country growth. In table 12 we report OLS estimations combining the gini country growth with GDP growth and income growth. It is evident that the gini country is significant only when GDP growth is not included into the equation. The collinearity of GDP growth with the gini growth turns the gini non significant.

This is an important result. First, according to our data, growth in GDP does improve life satisfaction unlike other results such as the seminal paper by Easterlin (1974) for the US. Second, if growth in GDP improves life satisfaction but reduces inequality and inequality, in turn, reduces life satisfaction, the net effect of these two concomitant factors can make the gini non significant. A counterfactual of this argument is provided by using the gini wider in place of the gini country. The gini wider is not significantly related to GDP as shown in table 11. Indeed, when we use the gini wider growth this is always

significant in the life satisfaction growth equations (table 12) with one exception of one of the two equations where the GDP growth coefficient is positive and significant (column 7). It is also noticeable that the sign of gini growth never changes for both ginis and is always negative confirming the result that the growth of income inequality reduces life satisfaction.

[Table 11]
[Table 12]

7 Inequality aversion

We said that happiness researchers tend to interpret a negative sign of the gini coefficient in the life satisfaction equation as inequality aversion. This is also what we did in previous sections. Having at our disposal a direct measure of the inverse scale of inequality aversion which we called 'desired inequality' we can test whether this claim is true by regressing the same set of variables used thus far against desired inequality. If people are inequality averse and desired inequality measures the inverse scale of inequality aversion, we should observe a negative association between income inequality and desired inequality. Results are shown in table 13. The gini is non significant in the equations with the gini country and gini regional while it is significant but with a positive sign in the gini wider equation. The most relevant factors for desired inequality are a right-wing political orientation, the income rank, freedom and tertiary education. People with these characteristics wish for more inequality. These factors are followed in importance by being female and trust people and institutions and people with these characteristics tend to desire less inequality. These results are remarkably consistent across the three types of ginis. Therefore, it would seem that is not inequality per se which determines inequality aversion but other factors related to income rank, personality and social attitudes.

[Table 13]

8 Conclusion

The paper used a large world database to test the importance of income inequality in predicting life satisfaction. We found that income inequality is not a good predictor of income inequality across world citizens. This variable does not stand most of the robustness tests that we conducted. The same can be said for the static cross-country analysis. However, a cross-country dynamic analysis showed that increases in income inequality are associated with decreases in life satisfaction. This result is rather robust across specifications and types of ginis. Moreover, we find that subjective inequality aversion is not really driven by the level of income inequality but by other factors including political orientation, freedom, education, trust and gender. These, rather than income

inequality, are the factors that best explain subjective inequality aversion across world citizens.

References

Alesina, A., R. Di Tella, and R. MacCulloch (2004). Inequality and happiness: Are europeans and americans different? *Journal of Public Economics 88*, 2009–2042.

Amiel, Y. and F. A. Cowell (1992). Measurement of income inequality: Experimental test by questionnaire. *Journal of Public Economics 47*(3-26).

Blanchflower, D. G. and A. J. Oswald (2000). Well-being over time in britain and the usa. *mimeo wired at: http://www.dartmouth.edu/ blnchflr/papers/Wellbeingnew.pdf*.

Clark, A. E. (2003). Inequality aversion and income mobility: a direct test. *Delta Working Papers* (11).

Clark, A. E. and A. J. Oswald (1994). Unhappiness and unemployment. *Economic Journal 104*(424), 648–659.

Cowell, F. A. (1985). A fair suck of the sauce bottle, or what do you mean by inequality? *Economic Record 61*, 567–579.

Diener, E., M. Diener, and C. Diener (1995). Factors predicting the subjective well-being of nations. *Journal of Personality and Social Psychology 69*(5), 851–864.

Diener, E., E. M. Suh, R. E. Lucas, and H. L. Smith (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin 125*(2), 276–303.

DiTella, R., R. J. MacCulloch, and A. J. Oswald (2001). Preferences over inflation and unemployment: Evidence from surveys on happiness. *American Economic Review 91*(1), 335–341.

Easterlin, R. A. (1974). Does economic growth improve the human lot? In P. A. David and M. W. Reder (Eds.), *Nations and households in economic growth: Essays in honour of Moses Abramovitz*. New York Academic Press.

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

Easterlin, R. A. (2001). Income and happiness: Towards a unified theory. *The economic journal 111*(473), 465–484.

Engelmann, D. and M. Strobel (2004). Inequality aversion, efficiency and maxmin preferences in simple distribution experiments. *American Economic Review 94*(4), 857–869.

Feldstein, F. S. (1968). On the measurement of risk aversion. *The Economic Journal* (1), 58–59.

Gevers, L., H. Glesjer, and J. Rouyer (1979). Professed inequality aversion and its error component. *Scandinavian Journal of Economics 81*, 238–243.

Graham, C. and A. Felton (2006). Inequality and happiness: Insights from latin america. *Journal of Economic Inequality 4*, 107–122.

Helliwell, J. F. (2003). How's life? combining individual and national variables to explain subjective well-being. *Economic Modelling 20*, 331–360.

Hirschman, A. (1973). The changing tolerance for income inequality in the course of economic development. *Quarterly Journal of Economics 87*(4), 544–566.

Inglehart, R. F. (1990). *Culture shift in advanced industrial society*. Princeton University Press.

Mangahas, M. (1995). Self-rated poverty in the philippines, 1981-1992. *International Journal of Public Opinion Research 7*, 40–55.

Morawetz, D., E. Atia, G. Bin-Nun, L. Felous, Y. Gariplerden, E. Harris, S. Soustiel, G. Tombros, and Y. Zarfaty (1977). Income distribution and self-rated happiness: Some empirical evidence. *The economic journal 87*(347), 511–522.

Ravallion, M. and M. Lokshin (2000). Identifying welfare effects from subjective questions. *Economica* (68), 335–357.

Rotter, J. B. (1966). Generalised expectancies of internal versus external control of reinforcements. *Psychological monographs 80*(609).

Runciman, W. G. (1966). *Relative Deprivation and Social Justice*. Reports of the Institute of Community Studies. London, Boston and Henley: Routledge and Kegan Paul.

Schwarze, J. and M. Härpfer (2003). Are people inequality averse, and do they prefer redistribution by the state? a revised version. *IZA Discussion Paper* (974).

Sen, A. (1987). *Commodities and Capabilities*. Amsterdam: Oxford University Press, Oxford Indian Paperbacks.

Senik, C. (2004). When information dominates comparison. learning from russian subjective panel data. *Journal of Public Economics 88*, 2099–2133.

Veenhoven, R. (1993). *Happiness in nations: Subjective appreciation of life in 56 nations 1946-1992*. Rotterdam Erasmus University Press.

Veenhoven, R. (1996). Developments in satisfaction research. *Social Indicators Research* (37), 1–46.

Veenhoven, R. (2000). Freedom and happiness: A comparative study in 46 nations in the early 1990's. In E. Diener and E. Suh (Eds.), *Culture and subjective wellbeing*, pp. 257–288. MIT press.

Verme, P. (2007). Happiness and freedom. Paper presented at the conference "Policies for Happiness", Certosa di Pontignano, Siena 14-17 June 2007.

Yitzhaki, S. (1979). Relative deprivation and the gini coefficient. *The Quarterly Journal of Economics 93*(2), 321–324.