Making economic growth and well-being compatible: the role of trust and income inequality

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Making economic growth and well-being compatible: the role of trust and income inequality

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Abstract

To what extent is economic growth liable to improve people's subjective well-being in the long run? Recent studies identified three possible answers: economic growth matters a great deal; economic growth does not matter at all; economic growth matters, but other things matter more. Each of these conclusions has different policy implications to promote people's well-being. Despite the progress of social science research, the disagreement persists for at least two reasons: first, current policy conclusions hinge on weak methodological grounds; second, the literature missed to identify the conditions shaping the relationship between economic growth and well-being.

Our paper addresses these issues overcoming some of the methodological shortcomings of previous literature. Additionally, we test the hypotheses that economic growth has a positive effect on subjective well-being in presence of increasing social trust and decreasing income inequality.

To this aim we use multilevel regression analysis and the integrated World Values Survey - European Values Study data-set. We confirm previous evidence showing that in the long run economic growth does not increase people's well-being. We also document that decreasing income inequality and non decreasing social trust allow a long-term positive relationship between economic growth and subjective well-being.

1 Introduction

Historically, material progress has been regarded as a mean to improve people's lives. Not by chance people's quality of life has significantly improved over the last two centuries, i.e. in the period when modern economic systems developed, income settled as a proxy of well-being, and economic growth became the way to pursue better lives.

However, the recent development of social sciences reconsidered the role of economic growth for well-being. Besides the traditional view that economic growth improves people's lives (Deaton, 2008, Inglehart et al., 2008, Sacks et al., 2010, Veenhoven and Vergunst, 2013), two other views have been proposed: 1. economic growth does not improve people's lives; 2. economic growth matters, but other aspects – such as social capital – matter more.

The first view was initially supported by Richard Easterlin's evidence of a null relationship between economic growth and well-being over time (Easterlin, 1974). According to this approach GDP is not a reliable measure of people's well-being and policy-makers should give up the idea of promoting economic growth if they are interested in durable improvements in people's well-being (Easterlin and Angelescu, 2009, Easterlin et al., 2010, Layard, 2005).

The second view acknowledges that economic growth is not the only ingredient of well-being and that also other aspects – such as social capital, freedom, or tolerance – matter for well-being (Bartolini et al., 2013a,b, Bruni and Porta, 2007). According to this view, policies to enhance people's well-being should made economic growth compatible with people's relational needs, i.e. with those aspects coming from the relationships with others and with the surrounding environment.

Summarizing, the role of economic growth for well-being, and whether and in which direction we should change modern economic policies, received particular attention in the academic and political discussion. However, the literature and related policy implications are subject to some methodological limitations. The fact that one of the main variables, economic growth, is clearly a country-level factor, pushed researchers towards research designs in which the units of analysis were countries. Hence, individual-level variables such as life satisfaction and happiness were also aggregated at national level and included as country characteristics.

However, this strategy is subject to several shortcomings. First, since subjective well-being is individual in nature, the inferences based on aggregate data may conceal the within-country variation, thus creating a risk of ecological fallacy.

Second, such design does not allow to distinguish between the effects of country- and individual-level factors, for example income and GDP, and it prevents from controlling for individual level correlates of subjective well-being, such as education, age, gender, marital and occupational status, etc. (Dolan et al., 2008). In such cases, multilevel regression is a better inference method as it allows to properly combine individual and aggregate level variables, maximizing the use of the available information. However, so far this technique has not been used in the debate about economic growth and well-being.

Furthermore, the analyses using aggregate data usually rely on small samples because the number of countries available for the analysis – especially countries with sufficiently long time-series – is limited. Hence the techniques currently adopted summarize a large amount of information in aggregated measures at the cost of losing precision and power. A possible way to overcome this shortcoming is to use information on several time points for each country, rather than characterizing each country with a single value representing the trend of the variable of interest (Goldthorpe, 1997). This strategy increases the number of observations, the degrees of freedom, and results in more accurate estimates.

The focus on aggregated data affected the choice of statistical methods. The small sample size (and the low number of degrees of freedom) induced the use of simple bivariate correlations or regression models with just one or two predictors. However, this strategy increases the risk that available results are the outcome of spurious correlations due to the omission of potentially confounding variables.

Finally, part of the literature misses to explicitly distinguish between relationships among the levels of variables (observed at single point in time) and relationships among trends of variables (i.e. changes which occur within countries). Although this distinction is sometimes neglected in interpreting regression results, it is relevant in this particular field of study. The Easterlin paradox, as well as the broader literature on the topic, is based on the evidence that the cross-sectional relationships (e.g., between levels of subjective well-being and GDP) differ from the relationships between the changes over time (e.g. between economic growth and trends of subjective well-being). For this reason, explicitly accounting for the difference between levels and trends of macro factors would allow to refine previous results improving their reliability.

The aim of this study is to contribute to the literature on economic growth and subjective well-being overcoming the methodological limitations of previous works. We provide evidence in two regards: 1. the role of economic growth for well-being over time; 2. the conditions under which economic growth improves people's well-being. The literature only rarely examined the conditions under which economic growth exerts a positive effect on subjective well-being. Previous studies documented that factors such as social capital or income inequality are important ingredients of people's well-being. It is plausible that these factors moderate the role of economic growth for well-being. Our analysis explicitly tests the hypothesis that economic growth positively affects people's subjective well-being when it is accompanied by decreasing income inequality and increasing trust in others.

We adopt a large sample of countries surveyed over a period of about 30 years, from early 1980s to 2008, using World Values Survey and European Values Study integrated data (WVS-EVS), and multilevel regression analysis.This technique allows to account for the effect of both macro factors and individual-level variables, thus overcoming the methodological limitations of the existing research. Accounting for several time points for each country allows us to preserve the macro-level sample size, as well as to explicitly distinguish between levels of macro factors and their trends.

The paper proceeds as follows: in the next section we summarize the state of the literature on the relationship between economic growth and well-being, and the role of social trust and income inequality. Section 3 illustrates the data, and section 4 explains the methodology adopted in the analysis. We describe our results in section 5, whereas section 6 draws the conclusions, the policy implications and the lines for future research.

2 Literature review

2.1 Subjective well-being and economic growth

Over the last decade the public and scientific debate has increasingly paid attention to subjective well-being, its measurement and correlates. Currently, governments, international institutions and political organizations are undertaking a number of initiatives to monitor, evaluate and possibly improve people's well-being (European Commission, 2009, OECD, 2011, Stiglitz et al., 2009).

This debate is possible thanks to survey questions in which interviewers ask respondents to provide an evaluation of their lives as a whole, i.e. of their subjective well-being. For example, subjective well-being is often observed through answers to survey questions such as: *"Taking all things together, how happy would you say you are?"* or *"All things considered, how satisfied are you with your life as a whole these days?"* (van Praag et al., 2003).

The reliability of these measures is supported by experimental evidence from several disciplines. For example, subjective well-being correlates with objective measures of well-being such as the heart rate, blood pressure, frequency of Duchenne smiles, and neurological tests of brain activity (Blanchflower and Oswald, 2004, van Reekum et al., 2007). Moreover, subjec-

tive measures of well-being are strongly correlated with other proxies of subjective well-being (Schimmack et al., 2010, Schwarz and Strack, 1999, Wanous and Hudy, 2001) and with the assessments about the respondent's well-being provided by friends, relatives or clinical experts (Kahneman and Krueger, 2006, Layard, 2005, Schneider and Schimmack, 2009).

The debate on subjective well-being became so relevant because it explored to what extent economic growth truly benefited people in modern societies (Easterlin, 1974). The available evidence is mixed. Some scholars argue that contemporary societies should not expect significant improvements for well-being from economic growth (Easterlin, 1974); some others contend this result showing that economic growth and increasing well-being are associated over time (see e.g. Deaton, 2008, Sacks et al., 2010, Stevenson and Wolfers, 2008, Veenhoven and Vergunst, 2013); other scholars point out that the sign of the relationship between these two dimensions is a matter of the set of considered countries (developed and developing countries vs. transition countries) or of the considered time perspective: economic growth and the trends of well-being are associated in the short run, but this correlation vanishes in the long run (Becchetti et al., 2011, Clark et al., 2012, Easterlin and Angelescu, 2009, Easterlin et al., 2010). Hence, to date, whether economic growth brings about a higher well-being or not is still a debated issue.

2.2 Social capital and subjective well-being

The literature on subjective well-being pointed out that beyond economic growth, other factors matter for well-being and, among these, social capital seems to be a particularly relevant one (Bartolini et al., 2013a, Clark et al., 2012, Helliwell, 2002, 2008, Uhlaner, 1989). Previous studies refer to social capital as "networks together with shared norms, values and understandings that facilitate co-operation within or among groups" (OECD, 2001, p. 41). A number of experiments documented that people's social capital is related to subjective well-being and, more specifically, that the quality of the relationships among people has a relevant impact on well-being (Becchetti et al., 2009, Bruni and Stanca, 2008, Helliwell, 2006, Helliwell and Putnam, 2004). This suggests that social capital can be a target of policies for well-being (Bartolini, 2014, Helliwell, 2011) as it is not crystallized and it can vary over time even in a relatively short term (Fidrmuc, 2012, Sarracino, 2012).

The individual level association between social capital and well-being is accompanied also by the relationship at aggregated level. A recent study by Bartolini and Sarracino (2015) explores the relationship among economic growth, social capital and well-being at aggregated level. The authors compare the trends of social capital – as proxied by the share of people participating in groups and associations – with the trends of subjective well-being and of GDP per capita. Results inform that in the long run the trends of group membership are significantly and positively correlated with subjective well-being, whereas economic growth is not. The authors reach the same conclusion also for another proxy of social capital: social trust, available in the European Social Survey. Also in this case, the coefficients associated with the trends of social capital are strongly and significantly associated with the trends of well-being, whereas GDP shows a weaker correlation (Bartolini and Sarracino, 2015). Another part of the literature confirmed that trends of aggregated social capital significantly correlate with trends of subjective well-being within countries (Bartolini et al., 2013a,b, Bartolini and Sarracino, 2014, Brockmann et al., 2009, Easterlin et al., 2012).

2.3 Social capital and economic growth

A large share of the economic literature agrees that social capital, and in particular trust in others, enhances economic growth. Many works refer to Arrow's words describing trust as one of the elements of every commercial transaction and ascribing some of the backwardness in the world – at least in part – to the lack of trust in other people (Arrow, 1972).

Many empirical works found evidence of a positive cross-sectional correlation between proxies of social capital and economic growth (Beugelsdijk et al., 2004, della Giusta, 2010, Helliwell and Putnam, 1995, Knack and Keefer, 1997, La Porta et al., 1999, Narayan and Pritchett, 1997, Whiteley, 2000, Zak and Knack, 2001). Social capital, and particularly trust in others, supports economic growth in many ways: it lowers the possibilities for opportunistic behaviors and makes economic transactions safer and cheaper, thus freeing economic resources and enhancing business. Higher social capital reduces the need for formal institutions to enforce agreements reducing "principal-agent" problems. Similarly, reliability of public officers is a good condition to attract greater investments and further economic activity (Knack and Keefer, 1997). Finally, social capital can enhance economic activity also through indirect channels, such as helping voters to overcome the collective action problem in monitoring officials (Knack and Keefer, 1997).

Despite the strong evidence of the role of social capital for economic growth, alternative views argue that economic growth can have detrimental effects on social capital (see Hirsch (1976), Hirschman (1973), Olson (1982), Polanyi (1968) and more recently Bartolini and Bonatti (2008), and Antoci et al. (2013)). According to this literature, economic growth erodes social capital because it extends market relationships – with their emphasis on selfish behavior – to an increasing share of the non-economic sphere of people's life, thus crowding out social capital (Hirsch, 1976, Polanyi, 1968). Moreover, economic growth reduces the time available for social relationships, introduces a trade-off between time spent working and time spent in social relationships, and contributes to an environment characterized by poorer quality of intimate and social relationships.

In a pioneering study on 17 developed countries, Helliwell (1996) provides evidence of a negative relationship between trust in others and productivity growth from 1960 to 1992. This conclusion is consistent with research showing that over the last 30 years U.S. – one of the richest countries in the world – experienced erosion of social capital while growing more prosperous (Putnam, 2000). Similarly, Roth (2009) documented that the changes of social trust over time were negatively correlated with economic growth during the '90s. More recently Sarracino (2011) confirmed the previously observed positive correlation between the stock of social capital and GDP across countries. The author documented a negative and significant relationship between the time-trends of social capital and economic growth using long time-series and three different proxies of social capital.

Recent literature pursued this idea further and postulated that economic growth can be the outcome of social erosion (Bartolini and Bonatti, 2002, 2008). Bartolini and Bonatti proposed a model in which economic growth is the outcome of a substitution process in which private and expensive goods replace free goods, such as social capital. The authors show that the erosion of social capital induces consumers and producers to search for substitutes in the market initiating a self-feeding process: an acceleration of economic growth further erodes social capital and undermines people's well-being.

2.4 The role of income inequality

Available evidence suggests that, whenever economic growth is accompanied by an increase in income inequality, social linkages and feelings of solidarity and cooperation get weaker, thus hampering social capital and subjective well-being. Vice-versa, when economic growth is not associated with increasing income inequality, the effects of economic growth on social capital over time are not significant (Sarracino, 2011). This evidence suggests that changes of income inequality may moderate the relationship between economic growth and social capital, thus affecting also subjective well-being (Frank, 2007). Remarkably, over the last two decades many OECD countries have been characterized not only by economic growth, disappointing trends of social capital and of well-being, but also by increasing income inequality (OECD, 2008).

There are many reasons to expect that income inequality has also a negative effect on sub-

jective well-being. The most common one refers to the decreasing marginal utility of income. Since richer people get relatively less utility from an additional income compared to poorer people, then in more unequal societies people's well-being is on average lower. Income inequality can also result in negative social externalities (such as crime, violence, social cleavages) hindering people's well-being (Alesina and Giuliano, 2009). Another explanation points out that risk aversion and considering prospects for own future mobility may induce aversion to income inequality as a way to minimize personal risk. The impact of inequality on well-being can also be mediated by other-regarding preferences such as fairness and reciprocity (Fong et al., 2006): income inequality hinders people's well-being when it is considered an outcome of an unfair process (Chapple et al., 2009). It is worth emphasizing that the above mentioned mechanisms are not mutually exclusive.

Several papers document that higher income inequality is associated with lower social capital (Alesina and La Ferrara, 2006, Kawachi et al., 1997, Putnam, 2000, Rothstein and Uslaner, 2005), and lower well-being (Clark and D'Ambrosio, 2014, Clark et al., 2008, Graham and Felton, 2006, Oswald, 1997, Senik, 2009), whereas the relationship with economic growth is more controversial (see Aghion et al., 1999, for a review). At least three different interpretations can be identified in the literature: 1. there is a trade-off between distributional equity and economic growth; 2. income distribution does not directly affect economic growth, but possible redistributive policies can be detrimental to savings and growth; 3. initial income inequality can be detrimental to long-run economic growth (Benabou, 1996).

Independently from the underlying mechanisms, there are reasons to believe that income inequality can contribute to shaping the relationship over time between economic growth, social capital and well-being. In particular, it is plausible that when economic growth is associated to increasing income inequality and to declining social capital, subjective well-being declines (Josten, 2004, Sabatini, 2008). This is because the positive impact of economic growth on well-being is more than compensated by the erosion of social capital, by the increase in income inequality and by the interaction between the latter two forces.

Overall, available evidence suggests that in the long run social capital matters more for well-being than economic growth. Furthermore, the relationship among these three variables seems moderated, at least in part, by income inequality. If confirmed, this evidence would call for more nuanced economic policies to promote economic growth and well-being. However, despite the number of studies available, this evidence hinges on fairly weak econometric models, and on results derived from small samples or analysis of single countries. Our contribution explores the relationship among economic growth, social trust, income inequality and well-being trying to overcome the limitations of previous studies and to provide a sounder framework to define policies for well-being.

3 Data

We use the World Values Survey - European Values Study (WVS-EVS) integrated data set covering the period 1981-2009 (EVS, 2011, WVS, 2009). In the course of both WVS and EVS surveys, individual country research agencies and institutions collected data on representative samples of adult populations (aged 18 or older). The questionnaires were uniformly structured and the translation into national languages from the English questionnaire was closely monitored. The modes of data collection included face-to-face and phone interviews in case of WVS, face-to-face interviews (either computer assisted (CAPI) or on pen-and-paper (PAPI)) in case of EVS, and an internet panel (Finland in EVS).

The integrated data set contains information for 102 countries and regions for a total of about 420,000 respondents. However, as the time-trends of macro factors are of particular interest in this analysis, we consider only countries with time-series of at least 10 years and 2 waves of observation. Moreover, we limit the analysis of transition countries to the period after

Table 1: Descriptive statistics.

variable	mean	sd	min	max	obs	missing (%)
Individual level variables:						
subjective well-being	66.01	22.22	0.00	100.00	263474	3.6
gender (woman)	0.53	0.50	0.00	1.00	273366	0.0
married	0.58	0.49	0.00	1.00	271409	0.7
unemployed	0.08	0.27	0.00	1.00	265840	2.8
secondary education	0.29	0.45	0.00	1.00	268629	1.7
tertiary education	0.19	0.39	0.00	1.00	268629	1.7
age (centered)	3.76	17.08	-28.00	64.00	269642	1.4
age^2 (centered)	305.95	388.39	0.00	4096.00	269642	1.4
subjective health problems	0.01	0.93	-1.24	2.76	235316	13.9
household income (1-10)	0.11	2.07	-8.00	8.00	273366	0.0
income missing flag	0.15	0.35	0.00	1.00	273366	0.0
membership	0.52	0.50	0.00	1.00	261235	4.4
trust in others	0.31	0.46	0.00	1.00	260828	4.6
Country level variables:						
initial level of GDP	8.46	1.30	5.76	10.39	47	0.0
initial level of Gini	35.13	9.34	23.93	63.00	47	0.0
initial level of social trust	0.31	0.14	0.05	0.63	47	0.0
transition countries	0.36	0.49	0.00	1.00	47	0.0
developing countries	0.21	0.41	0.00	1.00	47	0.0
Country-wave level variables:						
economic growth (trend of GDP)	0.31	0.31	0.00	1.52	152	0.0
trend of Gini	0.99	4.77	-14.09	31.53	152	0.0
trend of social trust	0.01	0.07	-0.19	0.24	152	0.0

Source: WVS-EVS integrated data set.

1995 to single-out the effect of the v-shaped trend of economic growth and well-being characterizing these countries during the economic crisis of the early 1990s. The v-shaped trend makes estimating the long-term trend of GDP problematic. Hence, we limit the observation span to the period of relatively monotonic growth.

Our sample includes 47 countries: 20 developed, 10 developing, and 17 transition countries. Figure 1 presents the countries, and the periods included in the analysis.

3.1 Variables

We account for variables at individual level, country-wave level, and country level. Individual level variables include the subjective well-being, which is our dependent variable, and a set of controls. On country-wave and country level we account for GDP, social trust, and income inequality (see Table 1 for descriptive statistics).

Subjective well-being We observe people's well-being through the answers to the following two questions:

- life satisfaction: *"All things considered, how satisfied are you with your life as a whole these days? Please use this card to help with your answer"* with answers coded on a 10-point scale, from 1 – *dissatisfied* to 10 – *satisfied*, and
- happiness: *"Taking all things together, would you say you are (read out and code one answer): 1 Very happy, 2 Rather happy, 3 Not very happy, 4 Not at all happy"*.

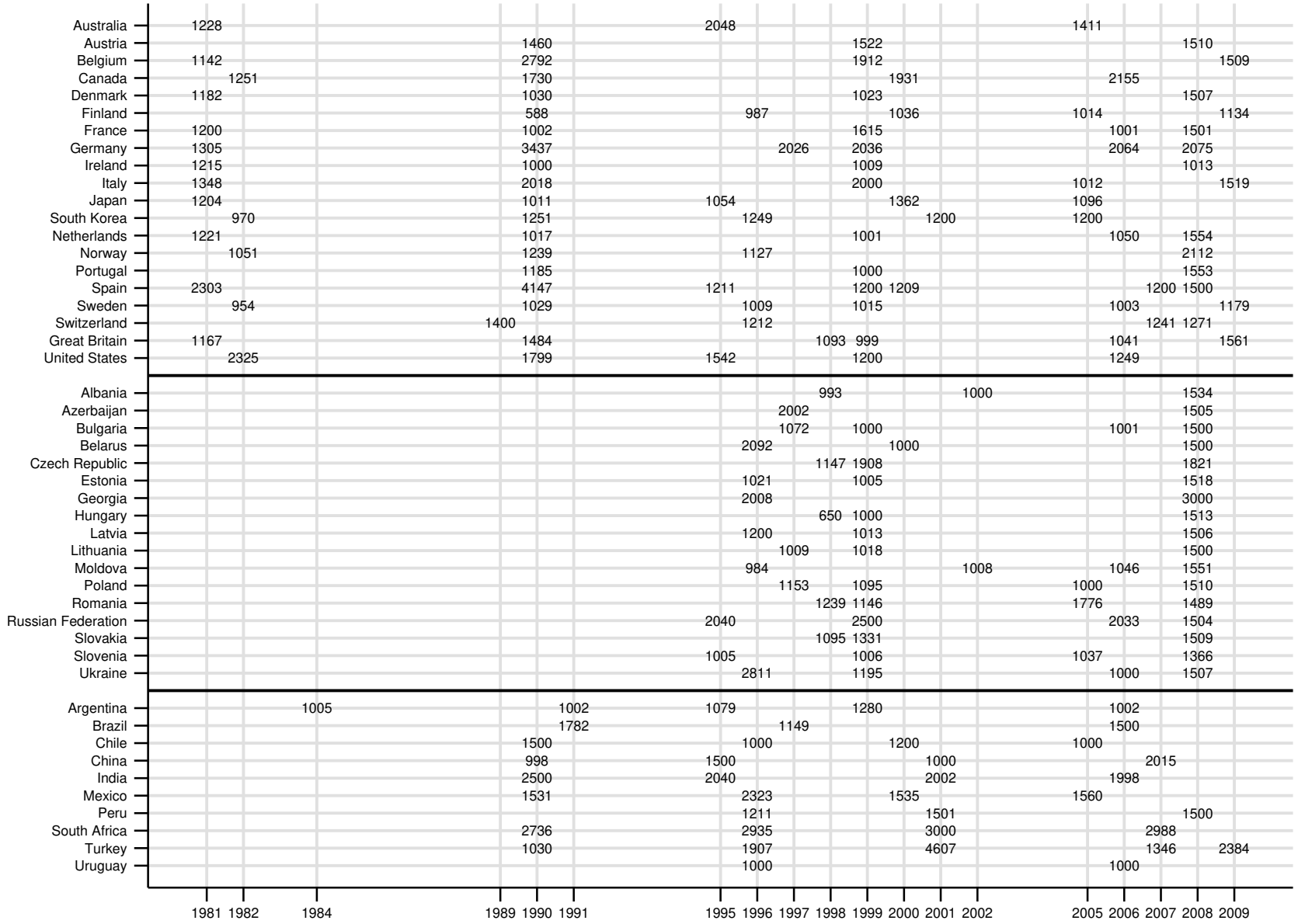


Figure 1: The sample under study: countries included in the analysis (developed countries in the upper panel, transition countries in the middle panel, and developing countries in the lower panel), and the sample size available for each year.

We standardize and sum both variables to generate an index of well-being. For consistency the scale of happiness is reversed. The index of well-being ranges on a scale from 0 to 100 where higher values indicate higher subjective well-being.

Socio-demographic control variables The literature on subjective well-being has identified a set of socio-demographic control variables that are usually included as controls in happiness equations (Dolan et al., 2008, Powdthavee, 2010). Our list of controls includes: gender, being married, being unemployed, education (two dichotomous variables for secondary and tertiary education, respectively), membership in associations, trust in others (Sabatini, 2009), age (both linear and quadratic components), subjective health and household income. The latter variable is measured on a 10 points scale and centered on country-wave specific median. Missing values have been flagged and replaced with the median values.

Social trust The macro variable social trust is derived from aggregating the individual level variable trust in others. Trust in others is captured by the answers to the question *"Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people"*. Answers take value 1 if the respondent declares that people can be trusted, 0 otherwise (for a discussion of validity of this question see: Johnson and Mislin, 2012, **?**).

GDP Real GDP per capita (retrieved from: Heston et al., 2012) is expressed in international dollars of the year 2000 transformed in logarithm.

Income inequality As a measure of income inequality we use the Gini coefficients from the Standardized World Income Inequality Database (SWIID) (Solt, 2009).

Initial level of country endowments and country-specific trends over time At country level we include the values of our macro variables (i.e. GDP, Gini coefficient, and social trust) observed in the initial year of observation for each country. The inclusion of initial values in the model allows us to separate the effects of the cross-country differences from the effects of trends within countries. We label the initial values of macro variables as μGDP, μGini, and μST.

At country-wave level we measure the changes of macro-variables that occurred in a given country over time. These changes are captured as predictions from country-specific regressions of the macro-variables on time. Trends are labeled as ΔGDP, $\Delta GINI$ and ΔST and their computation is described below: in case of continuous macro variables (i.e. GDP or Gini index) we use the linear model of Equation 1, where MV stands for "macro variable":

$$\mathrm{MV_c} = \alpha_{MV} + \beta_{MV}\mathrm{Year_c} + \epsilon_{MV} \tag{1}$$

where the index c stands for countries. The model is estimated for each country separately and its coefficients are used to compute the predicted values of the macro variables according to the following formula:

$$\Delta\mathrm{MV}_c = (\mathrm{Year}_c - \mathrm{Year}_{ic}) \cdot \beta_{MV} \tag{2}$$

where c stands for countries and $Year_{ic}$ is the initial observation year for country c. As a result, the trend variables are always zero for the initial observation year.

In case of social trust, derived from the dichotomous individual level variable trust in others, we use the logit model of Equation 3:

$$\ln \frac{p(Trust)}{1-p(Trust)} = \alpha_{ST} + \beta_{ST} \text{Year}_c + \epsilon_{MV} \quad (3)$$

This model is repeated for each country (c) separately. To predict the values of social trust, we first compute the marginal effects and then we follow the same formula of equation 2.

The initial levels (μ) and the values estimated for the trends (Δ) of macro variables can be interpreted similarly to within-individual and between-individual effects in regression models for panel data. For example, in a model regressing subjective well-being on macro-variables, the coefficients of ΔGDP inform about what changes of subjective well-being are associated to one unit change of economic growth. The coefficients for μGDP inform about what difference of subjective well-being is associated with one unit of GDP difference between two countries.

Figure 2 shows the initial levels of aggregated subjective well-being, GDP, income inequality, and social trust along with the estimated yearly trends.

The cross-country differences of subjective well-being are considerable: developed countries stand out with high initial levels of subjective well-being and small changes over time; transition countries have very low initial levels of well-being and positive trends; developing countries stay in between with regard to both initial levels and trends. The graph also shows that subjective well-being grows more in countries where initial levels are lower.

The pattern of levels and trends of GDP resembles the one observed for subjective well-being. The growth in developed countries was rather slow, whereas the initial levels were high. In transition countries the low initial levels were accompanied by fast growth. Developing countries are situated in between these two extremes confirming the correlation of low initial levels with high subsequent economic growth.

The negative correlation between initial levels and trends is less visible in case of income inequality. Furthermore, the high initial levels of inequality characterize developing countries, whereas developed and transition countries have fairly similar initial levels followed by modest growth rates.

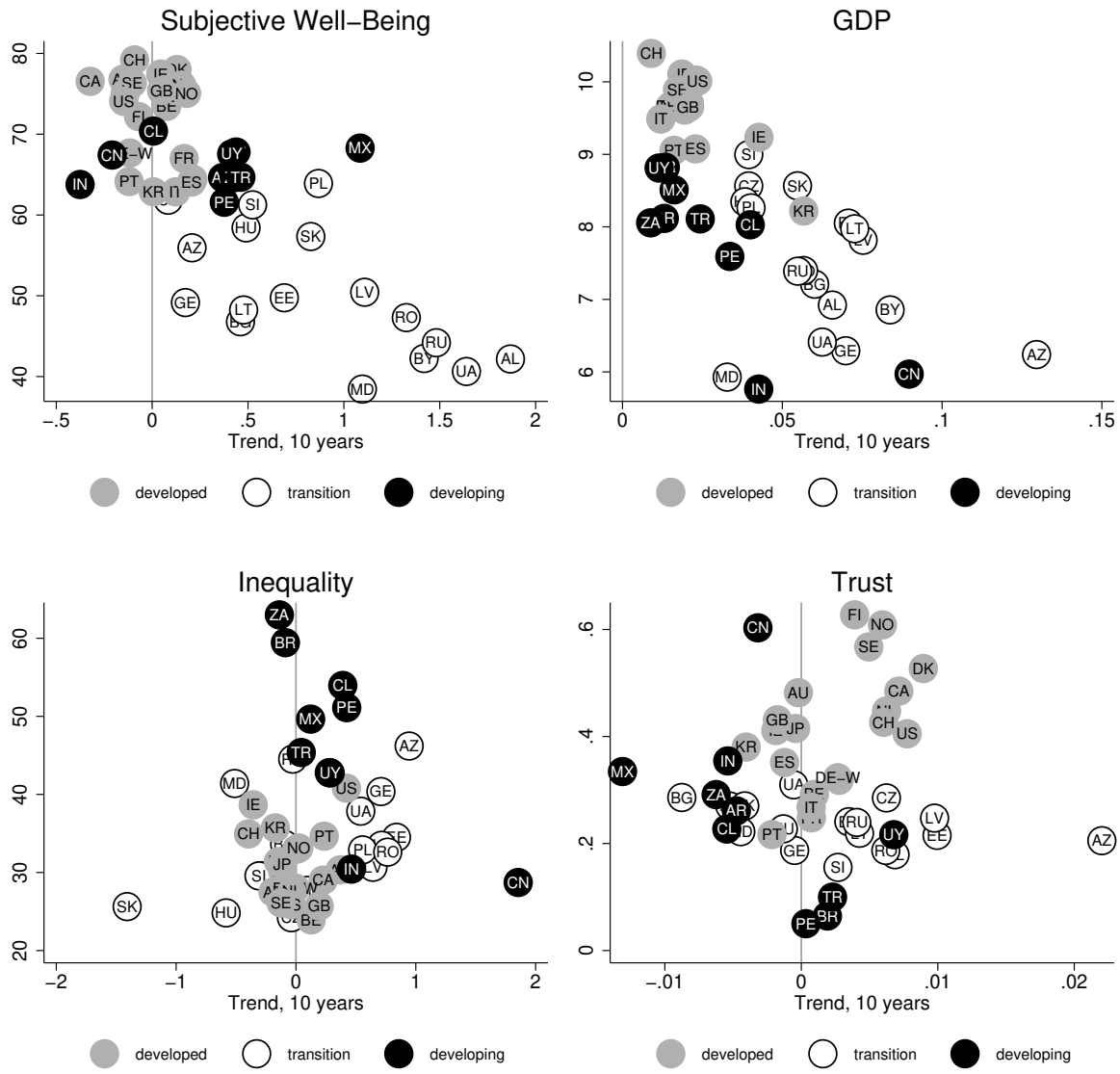
Also in case of social trust the correlation between the initial levels and the trends appears weak. In Peru, Brazil and Turkey people report, on average, the lowest initial levels of social trust (about 10%). On the contrary, in Finland, Norway and China social trust is, on average, the highest (about 60%). Despite the large variability among initial levels, the trends of social trust have limited variability and are concentrated around zero.

4 Method

We use multilevel regression analysis to model people's well-being as a function of both individual and country characteristics, including the trends of our macro variables. The advantage of multilevel over OLS method is to correctly model hierarchical data that do not satisfy the basic assumption of independence of observations (such as the multi-country WVS-EVS with individuals nested within country-waves nested within countries). Failing to address this issue may lead to biasing downward the standard errors of the estimates, which in turn can result in wrongly rejecting or supporting theoretically important conclusions (Bryk and Raudenbush, 1992, Luke, 2004).

We estimate a three-level model with individuals i nested within country-waves j, nested within countries c. The number of waves observed per country varies between 3 and 8 (in case of Spain). Such a small average cluster size at level 3 is not an obstacle for estimating the effect at this level because what matters is to have a sufficient total sample size at country-wave level (Snijders, 2005b). In present case the total sample size is $N = 152$.

The three-level design allows distinguishing between the country-specific levels of macro variables (μGDP, $\mu GINI$, and μST) and the country-wave-specific values which refer to the



Note: Country codes:
Developed countries: AT Austria, AU Australia, BE Belgium, CA Canada, CH Switzerland, DE-W Germany, DK Denmark, ES Spain, FI Finland, FR France, GB Great Britain, IE Ireland, IT Italy, JP Japan, KR South Korea, NL Netherlands, NO Norway, PT Portugal, SE Sweden, US United States;
Transition countries: AL Albania, AZ Azerbaijan, BG Bulgaria, BY Belarus, CZ Czech Republic, EE Estonia, GE Georgia, HU Hungary, LT Lithuania, LV Latvia, MD Moldova, PL Poland, RO Romania, RU Russian Federation, SI Slovenia, SK Slovakia, UA Ukraine;
Developing countries: AR Argentina, BR Brazil, CL Chile, CN China, IN India, MX Mexico, PE Peru, TR Turkey, UY Uruguay, ZA South Africa.
Note: trends are estimated as in equation 1 and 3.

Figure 2: Trends and average levels of macro factors: aggregate subjective well-being, GDP (ln, per capita), income inequality (Gini coefficient), and social trust.

changes taking place over time (ΔGDP, $\Delta GINI$, and ΔST). The model is formally described in Equations 4-6.

$$\begin{aligned} \text{SWB}_{ijc} = \alpha_{0jc} + \mathbf{B_K}\mathbf{X}_{ijc} + \beta_1 \mu\text{GDP}_c + \beta_2 \Delta\text{GDP}_{jc} + \\ + \beta_3 \mu\text{Gini}_c + \beta_4 \Delta\text{Gini}_{jc} + \beta_5 \Delta\text{GDP}\Delta\text{Gini}_{jc} + \\ + \beta_6 \mu\text{ST}_c + \beta_7 \Delta\text{ST}_{jc} + \beta_8 \Delta\text{GDP}\Delta\text{ST}_{jc} + \\ + \mathbf{B_N}\text{wave}_{jc} + \epsilon_{ijc} \end{aligned} \tag{4}$$

$$\alpha_{0jc} = \gamma_{00c} + \tau_{jc} \tag{5}$$

$$\gamma_{00c} = \gamma_{000} + \nu_c \tag{6}$$

In this model subjective well-being is regressed on a set of individual, country-wave, and country level predictors. In Equation 4, coefficient β_1 informs about the effect of GDP observed in a given country in the initial year of observation, and β_2 informs about the main effect of economic growth. Coefficient β_5 informs about how the effect of economic growth varies with the trend of income inequality, and coefficient β_8 informs how the effect of economic growth varies with the trend of social trust. The main effects of the trends of income inequality and social trust are captured by the coefficients β_4 and β_7. Coefficients β_3 and β_6 capture the effects of cross-country differences in the initial levels of income inequality and social trust. $\mathbf{X}_{ijc}$ is a vector of individual level control variables (including, among others, household income and trust in others), and wave_{jc} is a vector of wave dummies ($\mathbf{B_K}$ and $\mathbf{B_N}$ are vectors of respective coefficients).

In the model (see Equations 5 and 6), the only coefficients allowed to vary randomly are the random intercepts τ_{jc} and ν_c. In other words, the average subjective well-being is allowed to vary randomly across country-waves and across countries (random intercept model). We estimate our results with Stata statistical software, with robust standard errors.

Random effect multilevel models (as the one used in this analysis) assume that the random effects are not correlated with the explanatory variables; if this assumption is not met, the results are not consistent. Therefore we validate the analysis by estimating models with fixed intercepts (dummy variables) for countries and country-waves (Snijders, 2005a). Note that this robustness check is only possible for the variables that vary within countries, because country dummies absorb the effects of predictors which are constant for countries. Results in Table 3 in the Appendix show the overall consistent estimation results, although significance of coefficients differs between models (Cheah, 2009).

5 Results

Table 2 shows the results of multilevel estimation of the null model (i.e. model including only the fixed and random intercepts), as well as four incrementally developed models: Model 1 accounts only for level and trends of GDP and for the control variables, Model 2 accounts also for income inequality, Model 3 accounts for social trust, and Model 5 accounts for both income inequality and social trust.

AIC values indicate that models 1-4 represent a statistically significant improvement over the null model. The relative likelihood function does not allow to choose with certainty the best model, therefore we consider all of them.

Socio-demographic control variables are omitted from Table 2 for brevity, but their coefficients have all the expected signs. For instance, being unemployed is strongly and significantly associated with lower well-being. The significant coefficients of age and age squared document the existence of the usual U-shaped relationship between age and well-being: people's subjective well-being is higher in early and late stages of life, and it reaches a minimum in early

adulthood. People with secondary or tertiary education have higher well-being than people with primary education: the higher the level of education, the stronger the relationship with well-being. People with more health problems tend to report lower well-being, whereas richer people are on average happier than poorer ones. Finally, also the controls for individual social capital, i.e. participation in groups and associations and trust in others, have the expected positive signs: people who trust others and members of associations report on average a higher well-being.[1]

Table 2: Multilevel regression of subjective well-being on individual and country level predictors.

	Null model	Model 1	Model 2	Model 3	Model 4
Individual level variables:					
household income		0.96	0.96	0.97	0.97
		(6.88)***	(6.88)***	(6.88)***	(6.88)***
income missing		1.09	1.09	1.10	1.10
		(4.93)***	(4.93)***	(4.95)***	(4.96)***
trust in others		2.14	2.14	2.14	2.14
		(7.67)***	(7.66)***	(7.66)***	(7.66)***
Country level variables:					
initial level of GDP		4.71	4.74	4.74	4.76
		(7.37)***	(7.31)***	(8.35)***	(8.25)***
initial level of social trust				7.79	9.26
				(2.86)**	(2.86)**
initial level of Gini			−0.01		0.03
			(−0.20)		(0.52)
transition countries		−0.99	−0.74	0.26	0.70
		(−0.58)	(−0.44)	(0.16)	(0.43)
developing countries		8.06	8.45	9.18	9.31
		(4.80)***	(4.40)***	(5.93)***	(5.52)***
Country-wave level variables:					
trend of GDP		3.74	4.66	2.83	3.84
		(1.77)	(1.86)	(1.32)	(1.64)
trend of social trust				−8.70	−6.89
				(−0.54)	(−0.43)
trend of inequality			0.15		0.14
			(1.21)		(1.13)
trend of GDP x trend of trust				16.47	14.15
				(0.86)	(0.75)
trend of GDP x trend of inequality			−0.21		−0.21
			(−2.01)*		(−2.19)*
AIC	1,730,135	1,691,672	1,691,676	1,691,672	1,691,675
Country var(_cons)	73.24	3.35	3.80	2.46	2.67
Country-year var(_cons)	17.79	10.24	9.81	10.28	9.90
var(Residual)	386.02	317.60	317.60	317.60	317.60
rho statistics, country	0.15	0.01	0.01	0.01	0.01
rho statistics, country-year	0.04	0.03	0.03	0.03	0.03
Model's df	0	23	26	26	29
N (individuals)	196,661	196,661	196,661	196,661	196,661
N (countries)	47	47	47	47	47
N (country-waves)	152	152	152	152	152

* $p < .05$, ** $p < .01$, *** $p < .001$; t statistics in parentheses

Note: Control variables include: gender, age (linear and quadratic component), being married, being unemployed, education (dummies for secondary and tertiary education), and subjective health problems.

Source: WVS-EVS integrated data set.

[1] The complete set of results are available upon request to the authors.

5.1 Easterlin paradox

We start by investigating our results concerning the Easterlin paradox. Results of Models 1-4 show a positive but statistically insignificant coefficient of economic growth for well-being. This evidence does not support the hypothesis that in the long run subjective well-being correlates with economic growth.

It is worth noting that, on the contrary, the coefficient of the initial level of GDP is consistently positive and statistically significant. These two results together provide a typical example of the Easterlin paradox: at any point in time GDP and well-being are positively associated, but this relationship vanishes over time.

5.2 The moderating role of social trust and income inequality

To investigate the moderating effects of social trust and income inequality, we included in our models the interactions between economic growth and the trends of income inequality and of social trust. The interaction of economic growth with the trends of income inequality is negative and statistically significant. This is consistent with our expectation that when income inequality declines, economic growth becomes more positively associated with subjective well-being. The interaction between economic growth and the trend of social trust is positive, which is consistent with our expectations, but statistically insignificant.

However, the interpretation of interaction terms and their significance is complex and definite conclusions cannot be made on the basis of regression coefficients (Brambor et al., 2006). In particular, note that the coefficients of interaction terms reported in the table refer to situations when the values of all other variables are zero, including also the interacted variables.

To better understand the moderating role of social trust and inequality, we estimate marginal effects to calculate the strength and statistical significance of the relationship between economic growth and subjective well-being for various trends of income inequality and of social trust. Marginal effects are presented in Figure 3.

The marginal effects inform that the relationship between economic growth and subjective well-being is moderated by the trends of both social trust and income inequality.

In conditions of decline of social trust or of either stable or increasing income inequality, economic growth is not related to subjective well-being. Moreover, if an increase of inequality is accompanied by a decline of social trust, then the relationship between economic growth and subjective well-being becomes negative – even though it still remains statistically insignificant.

However, there are conditions when economic growth significantly correlates with subjective well-being. This happens when declining inequality is combined with non-decreasing social trust. In other words, declining income inequality and non-declining social trust seem to be pre-conditions of the statistically significant and positive relationship between economic growth and individual subjective well-being.

5.3 Main effects of trends of income inequality and social trust

To visualize the joint effect of the trend of inequality, social trust, and of economic growth we calculate the predictions and present them graphically. Figure 4 shows the combined effects of trends of income inequality and economic growth on subjective well-being. Figure 5 shows the same effects for trends of social trust and economic growth.

The net effect of economic growth and of the trend of income inequality is positive in most countries. The most positive effects was estimated for Ireland (2008) and South Korea (2005) which experienced strong economic growth combined with declining income inequality. On the contrary, the exceptionally strong Chinese economic growth was in 2007 associated to only moderate levels of subjective well-being and it was accompanied by a tremendous growth of income inequality. U.S. stand in the middle of the chart (modest economic growth and increase

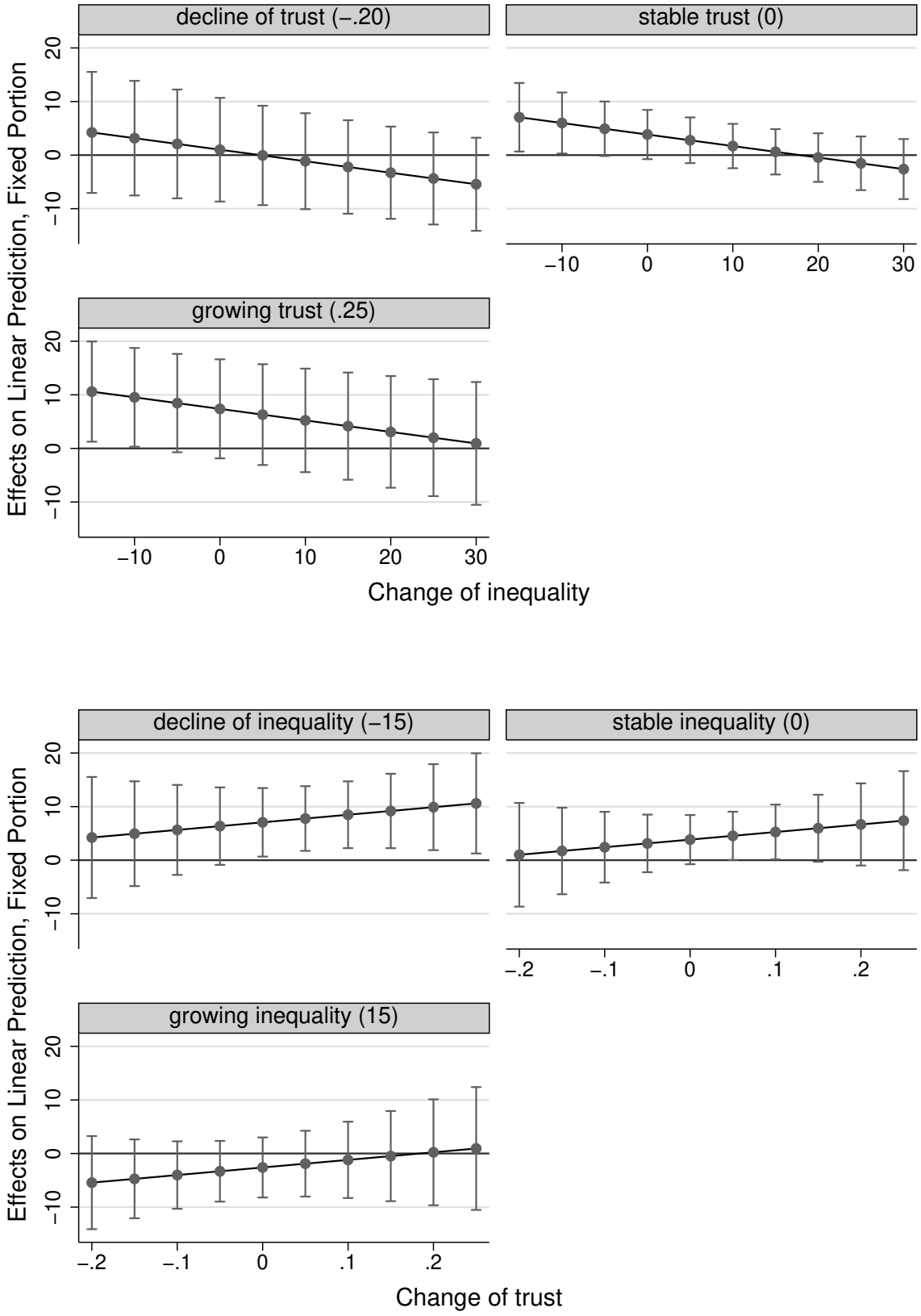
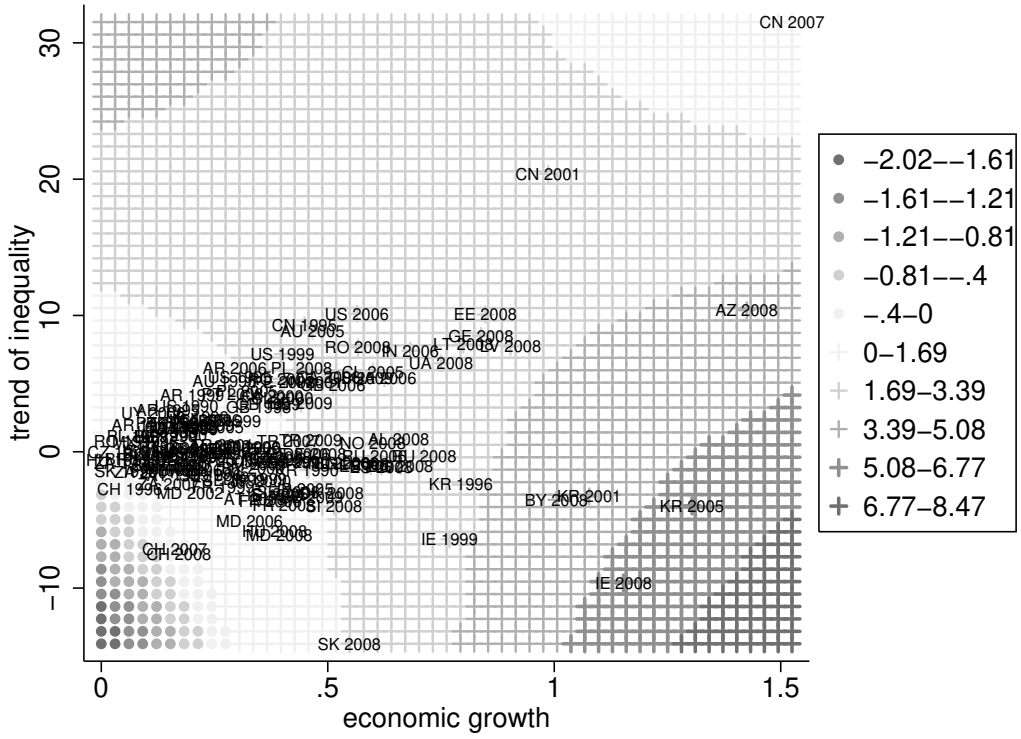


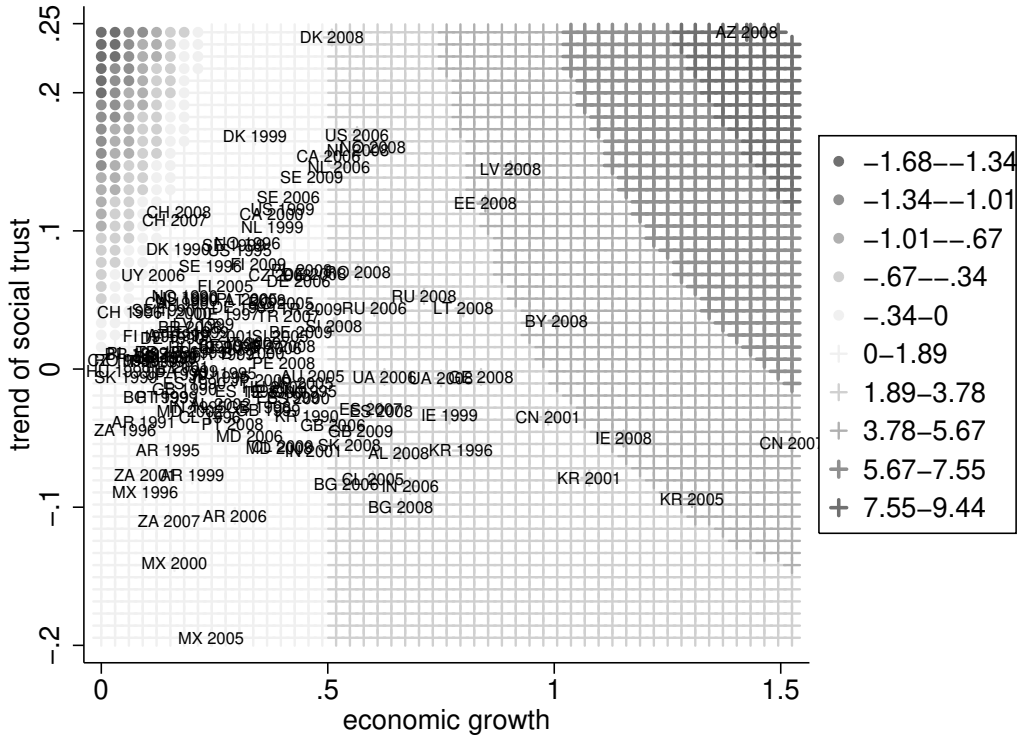
Figure 3: Effect of economic growth on life satisfaction depending on changes of inequality and social trust.



Note: Country codes:
Developed countries: AT Austria, AU Australia, BE Belgium, CA Canada, CH Switzerland, DE-W Germany, DK Denmark, ES Spain, FI Finland, FR France, GB Great Britain, IE Ireland, IT Italy, JP Japan, KR South Korea, NL Netherlands, NO Norway, PT Portugal, SE Sweden, US United States;
Transition countries: AL Albania, AZ Azerbaijan, BG Bulgaria, BY Belarus, CZ Czech Republic, EE Estonia, GE Georgia, HU Hungary, LT Lithuania, LV Latvia, MD Moldova, PL Poland, RO Romania, RU Russian Federation, SI Slovenia, SK Slovakia, UA Ukraine;
Developing countries: AR Argentina, BR Brazil, CL Chile, CN China, IN India, MX Mexico, PE Peru, TR Turkey, UY Uruguay, ZA South Africa.

Figure 4: Combined effect of trends of income inequality and economic growth on subjective well-being. The figure shows the values of the macro variables predicted from the long-term trends (see eq. 2). Values on the y-axis show the within country change of Gini index. The value for the initial observation of a country is set to zero and all the values for the subsequent years are expressed as a predicted difference from the initial year. On the x-axis we report the within country change of the logarithm of GDP. Country-waves are marked by their two-digits codes and the year.

in income inequality) which has a weakly positive effect on well-being. Given the U.S. trend of inequality, a doubling of the growth rate of the economy would have not significantly improved people's well-being.



Note: Country codes:
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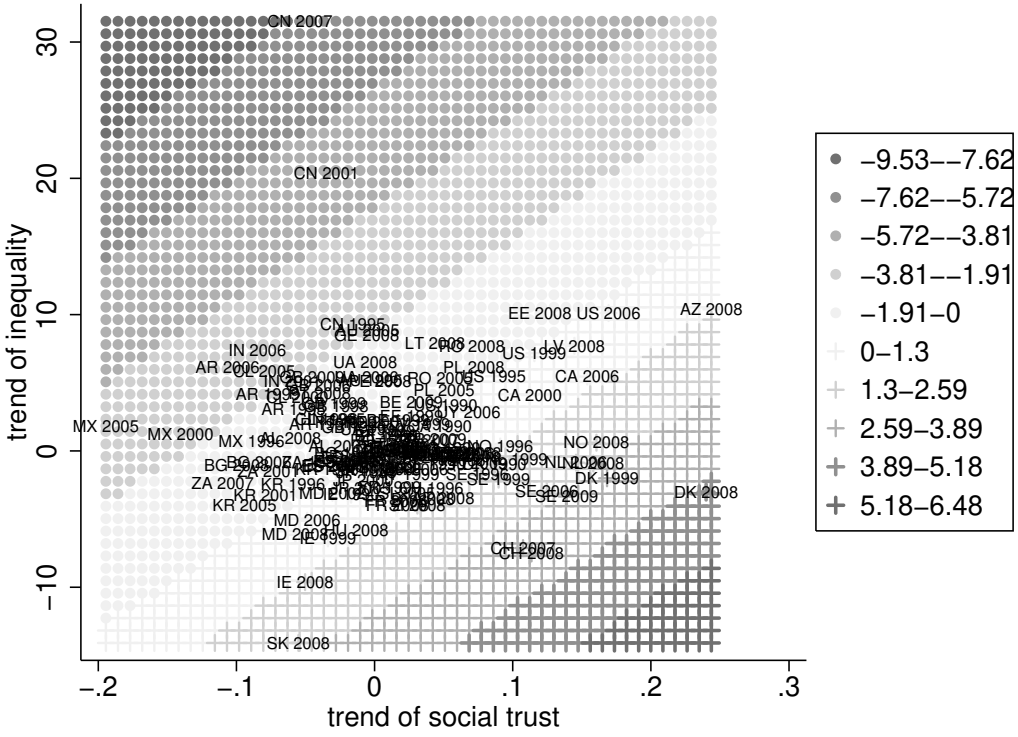
Transition countries: AL Albania, AZ Azerbaijan, BG Bulgaria, BY Belarus, CZ Czech Republic, EE Estonia, GE Georgia, HU Hungary, LT Lithuania, LV Latvia, MD Moldova, PL Poland, RO Romania, RU Russian Federation, SI Slovenia, SK Slovakia, UA Ukraine;
Developing countries: AR Argentina, BR Brazil, CL Chile, CN China, IN India, MX Mexico, PE Peru, TR Turkey, UY Uruguay, ZA South Africa.

Figure 5: Combined effect of trend of social trust and economic growth on subjective well-being. The figure shows the values of the macro variables predicted from the long-term trends (see eq. 2). Values on the y-axis show the within country change of social trust. The value for the initial observation of a country is set to zero and all the values for the subsequent years are expressed as a predicted difference from the initial year. On the x-axis we report the within country change of the logarithm of GDP. Country-waves are marked by their two-digits codes and the year.

Figure 5 informs about the net effect of trends of social trust and of economic growth for well-being. The most positive effect is predicted for Azerbaijan in 2008 were positive trends of social trust coincided with strong economic growth. In Ireland (2008), China (2007), and South Korea (2005) the positive effect of economic growth for well-being has been moderated by the decline of social trust.

Summarizing, our results suggest that when economic growth is associated to non declining trends of social trust and declining trends of income inequality, then its relationship with well-being is positive. Figure 6 shows the relative importance of trends of inequality and of social trust for the relationship between economic growth and subjective well-being. The dots in the scatterplot represent the area in which economic growth is negatively correlated with subjective well-being, whereas the squares represent the area in which economic growth is positively correlated with subjective well-being. China provides a particularly interesting example:

since 1995, the country has been on a path of increasingly negative relationship between economic growth and subjective well-being. These shifts are accompanied by slightly decreasing trends of social trust (x-axis) and dramatically increasing trends of inequality (y-axis), despite the tremendous Chinese economic growth. This evidence is consistent with previous within-country studies on China (Bartolini and Sarracino, 2014, Brockmann et al., 2009, Easterlin et al., 2012) and provides a perfect example of a country where economic growth fails to improve people's well-being and is associated to disappointing trends of social trust and of inequality. At the other extreme are countries such as Denmark and Switzerland which are characterized by positive relationships between economic growth and subjective well-being. U.S. are situated on the border between positive and negative correlation of economic growth and subjective well-being. The U.S. experience positive trends of social trust, but also an increase in inequality which can explain the flat relationship between economic growth and well-being. Overall, the message conveyed by Figure 6 is that it is possible to identify sets of countries in which the relationship between economic growth and subjective well-being is positive. These are countries experiencing non declining trends of social trust and declining trends of inequality.



Note: Country codes:
Developed countries: AT Austria, AU Australia, BE Belgium, CA Canada, CH Switzerland, DE-W Germany, DK Denmark, ES Spain, FI Finland, FR France, GB Great Britain, IE Ireland, IT Italy, JP Japan, KR South Korea, NL Netherlands, NO Norway, PT Portugal, SE Sweden, US United States;
Transition countries: AL Albania, AZ Azerbaijan, BG Bulgaria, BY Belarus, CZ Czech Republic, EE Estonia, GE Georgia, HU Hungary, LT Lithuania, LV Latvia, MD Moldova, PL Poland, RO Romania, RU Russian Federation, SI Slovenia, SK Slovakia, UA Ukraine;
Developing countries: AR Argentina, BR Brazil, CL Chile, CN China, IN India, MX Mexico, PE Peru, TR Turkey, UY Uruguay, ZA South Africa.

Figure 6: Effect of economic growth on subjective well-being as a function of trends of social trust and of income inequality. The figure shows the values of the macro variables predicted from the long-term trends (see eq. 2). Values on the y-axis show the within country change of Gini index. The value for the initial observation of a country is set to zero and all the values for the subsequent years are expressed as a predicted difference from the initial year. On the x-axis we report the within country change of social trust. Country-waves are marked by their two-digits codes and the year.

6 Conclusions

The availability and reliability of subjective well-being data – i.e. self-reported evaluation of one's own life – allowed to investigate to which extent economic growth improves people's well-being. In recent years, the lively debate that followed the pioneering studies on the relationship between economic growth and well-being over time (Easterlin, 1974) reached a cross-road: which policies are necessary to enhance people's well-being?

The answer is at the center of an intense debate where mainly three alternative views are at stake. Some scholars argue that economic growth does not bring about higher well-being. Hence, policy-makers who wish to enhance people's quality of life should abandon GDP as a measure and as a policy tool for well-being (Layard, 2005). Some other scholars support the view that GDP is a reliable measure of how well a society is doing and that its role for the measurement and the pursuit of people's well-being should not be downsized (Sacks et al., 2010, Stevenson and Wolfers, 2008, Veenhoven and Vergunst, 2013). Still, other scholars argue that GDP matters for well-being, but that other factors – such as social capital – matter more. According to the last view, policy-makers should adopt policies to make economic growth compatible with people's relational needs to enhance well-being (Bartolini et al., 2013a,b).

Summarizing, the fundamental issue is which strategy should policy-makers choose and, in particular, which is the role of economic growth for well-being. From this point of view, the literature supporting the previous alternative views is limited by some shortcomings: i. previous studies rely on aggregated, national level figures which limit the sample size at the cost of losing precision and power; ii. in such studies, the proxies of well-being are aggregated at country level, thus creating a risk of ecological fallacy; iii. previous studies do not account for country-specific stages of development which might bias the results because they pool together different countries; iv. previous analyses adopt simple bivariate correlations, or simple regression models with few predictors thus increasing the risks of drawing conclusions on the basis of spurious correlations due to the omission of potential confounding variables; v. part of the literature misses to distinguish between relationships among levels and relationships among trends of well-being and GDP.

Present work tries to overcome the limitations of previous studies to explore whether economic growth correlates with well-being and, possibly, which conditions shape this relationship. We considered the moderating role of social trust and of income inequality for well-being using multilevel modeling.

Our figures support the hypothesis that in the long run, i.e. for periods of at least 10 years, economic growth is not accompanied by increasing well-being. At face value this evidence lends support to the view that modern policies for well-being should abandon economic growth as their target. However, we also identify a set of conditions that moderate this relationship. In particular, we provide evidence that, when economic growth is accompanied by declining income inequality and non declining social trust, also people's well-being increases. This finding provides two good news. First, under certain conditions economic growth is accompanied by well-being in the long run. Second, we have two hints about which conditions can make economic growth and well-being compatible. Hence, the important message of present work is that policy-makers wishing to pursue durable improvements in people's well-being should adopt policies that promote economic growth while protecting and promoting social trust, and limiting economic inequalities.

This study has limitations. The main one is that we do not observe the individual trend of subjective well-being and social capital. Rather we focus on the trends of averages. This choice is a natural consequence of the availability of data at hand. Hopefully, the development of comparative, panel surveys in the future will help overcome this limitation.

7 Appendix

Table 3: Comparison of the estimation obtained with fixed-effects and with random-effects specification

	Fixed-effects estimation	Random-effects estimation
individual variables:		
individual income	0.95	0.97
	(10.23)***	(6.88)***
income missing	1.25	1.10
	(4.79)***	(4.96)***
individual social trust	2.12	2.14
	(9.09)***	(7.66)***
country level variables:		
GDP initial level	–	4.76
		(8.25)***
social trust initial level	–	9.26
		(2.86)**
inequality initial level	–	0.03
		(0.52)
transition countries	–	0.70
		(0.43)
developing countries	–	9.31
	–	(5.52)***
country-wave level variables:		
trend of GDP	10.72	3.84
	(6.03)***	(1.64)
trend of aggregate social trust	−31.86	−6.89
	(−2.70)**	(−0.43)
trend of inequality	−0.07	0.14
	(−0.40)	(1.13)
trend of GDP x trend of trust	18.50	14.15
	(1.01)	(0.75)
trend of GDP x trend of inequality	−0.24	−0.21
	(−1.93)	(−2.19)*
N	196,661	196,661

* $p < .05$, ** $p < .01$, *** $p < .001$; t statistics in parentheses

Note: Control variables include: gender, age (linear and quadratic component), being married, being unemployed, education (dummies for secondary and tertiary education), and subjective health problems.

Source: WVS-EVS integrated data set.

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