

When Does Economic Growth Improve Life Satisfaction? Multilevel Analysis of the Roles of Social Trust and Income Inequality in 46 Countries, 1981–2012

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Summary. — Governments across the world seek to promote a better life for their citizens, but thus far scholars have provided contradictory advice. While some argue that economic growth leads to higher subjective well-being, and others argue that it does not, we are the first to specify two conditions that make economic growth compatible with subjective well-being over time: increasing social trust and declining income inequality. Our methodological contribution is to combine micro- and macro-level data from a large sample of developing, transition, and developed countries and to explicitly distinguish the cross-country differences from the changes over time. We perform a multilevel analysis of harmonized data composed of the World Values Survey, the European Values Study, and macro-level indicators of economic growth and income inequality for 46 countries, observed from 1981 to 2012. Our results show that in the long run economic growth improves subjective well-being when social trust does not decline and, in richer countries, when income inequality reduces. These results are compatible with the recommendation that, to pursue durable improvements in people's subjective well-being, policy-makers should adopt a "promote, protect and reduce" policy agenda: promote economic growth, protect and promote social trust, and reduce income inequality.

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1. INTRODUCTION

As governments worldwide adopt policies designed to improve subjective well-being via economic growth, scholars provide mixed advice: some argue that economic growth improves people's subjective well-being, and others argue that it does not. The debate about the relationship between economic growth and subjective well-being has been recently revived thanks to the availability of internationally comparable and long-term time-series data on people's own evaluations of their well-being. Despite considerable efforts, the literature remains divided.

We argue that theoretical and methodological shortcomings created this divide. In terms of theory, scholars have been focusing on the wrong question. Instead of asking whether economic growth is compatible with subjective well-being, we need to hone in on the conditions under which it does so. Some scholars argue that contemporary societies should not expect significant improvement of subjective well-being from economic growth (Bartolini & Sarracino, 2015; Easterlin, 1974; Easterlin, McVey, Switek, Sawangfa, & Zweig, 2010; Layard, 2005); others contend that economic growth and increasing subjective well-being are associated over time (see e.g., Deaton, 2008; Inglehart, Foa, Peterson, & Welzel, 2008; Sacks, Stevenson, & Wolfers, 2012; Veenhoven & Vergunst, 2014). Country selection matters: some show that the relationship between growth and subjective well-being depends on whether they are developed, developing, or in transition (Bartolini, Mikucka, & Sarracino, 2015; Easterlin, 2009). Others argue that time span is a crucial factor: economic growth and the trends of subjective well-being

are associated in the short run, but this correlation vanishes in the long run (Clark, Flèche, & Senik, 2014; Bartolini & Sarracino, 2014; Easterlin *et al.*, 2010). None of these focus on the specific conditions that influence the relationship between growth and well-being.

To specify these conditions, we draw from the literature on the relationship between social capital and subjective well-being, on inequality and subjective well-being, and on economic growth, inequality and social capital (Bartolini & Sarracino, 2014; Bartolini, Bilancini, & Pugno, 2013; Bartolini, Bilancini, & Sarracino, 2013; Brady, Kaya, & Beckfield, 2007; Cleaver, 2005; Frank, 2007; Gould & Hijzen, 2016; Josten, 2004; Ono & Lee, 2013; Rözer & Kraaykamp, 2013; Zagorski, Evans, Kelley, & Piotrowska, 2014). Building on previous literature, we expect that the positive relationship between economic growth and changes of subjective well-being is conditional on increasing social trust

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and declining income inequality. We test this relationship in a sample of developing, transition, and developed countries.

Methodologically, we overcome some limitations of previous studies, which can be summarized as the following: analysis of small samples of, predominantly developed, countries; failure to explicitly distinguish between levels of macro-variables and their changes over time; limited number of control variables; and analysis of individual variables (such as life satisfaction) at aggregate level. We combine micro- and macro-level data to explicitly distinguish cross-country differences from the changes over time in analyzing a large sample of countries.

In sum, our theoretical and methodological contribution is to re-assess, with a more appropriate method, the relationship between economic growth and subjective well-being by specifying the conditions that make economic growth compatible with increasing subjective well-being over time. We extend previous literature by taking into account not only developed countries, but also a large sample of transition and developing countries. We employ a multilevel analysis of a harmonized dataset composed of the World Values Survey, the European Values Study, and macro-level indicators of economic growth and inequality from the 1980s to the 2000s. We find that economic growth improves subjective well-being when social trust increases and, in rich countries, when income inequality decreases.

2. BACKGROUND AND HYPOTHESES

(a) *Economic growth and well-being*

Previous research in the economic and sociological literatures operationalized well-being—sometimes referred to as quality of life—with people’s ability to fulfill their basic needs. Some operationalized quality of life with composite indicators, such as the Physical Quality of Life Index, and achieved mixed results (Bradshaw & Huang, 1991; Dixon, 1984; London & Williams, 1988; London & Williams, 1990; Stokes & Anderson, 1990). Other scholars concentrated on single dimensions of basic needs, such as nutrition, health, or education. This second stream of the literature analyzed large numbers of countries (mainly developing ones) with aggregated-level variables; the results are mixed evidence about the effectiveness of economic growth for the quality of life. Some argue that economic growth (often measured as levels of GDP) is beneficial to well-being as it improves food intake, infant survival, and life expectancy (Firebaugh, 1992; Firebaugh & Beck, 1994; Firebaugh & Goessling, 2004). Yet, as Firebaugh and Beck (1994) conclude: “until there is credible cross-national evidence that economic growth is irrelevant to welfare, development specialists will remain skeptical of results from sociological analyses of national welfare that fail to consider fully the effects of economic growth”.

Subsequent studies answered the call by looking at the effects of economic growth—both in levels and in changes over time—for quality of life, as measured by life expectancy and mortality (e.g., Brady *et al.*, 2007; Shen & Williamson, 1997; Wimberley, 1990), nutrition and food consumption (e.g., Jenkins & Scanlan, 2001; Wimberley & Bello, 1992), and social well-being (e.g., El-Ghannam, 2002). While the literature differs in terms of variables, the number of countries and of years considered, and the methods adopted, it reaches similar results: economic growth is of secondary importance for the satisfaction of basic needs (Wimberley & Bello, 1992). Economic growth can matter for development, but these findings

prompt us to specify the conditions under which economic growth can improve well-being.

We draw on another literature stream developed around the relationship between wealth and health, the so-called “Preston curve.” In 1975, Preston provided the first evidence of a curvilinear relationship between national income per capita (in 1963 USD) and the level of life expectancy in the 1900s, 1930s, and 1960s (Preston, 1975). Preston documented that, cross-sectionally and within countries, richer people enjoy a higher life expectancy. This relationship, though, flattens beyond a threshold of about 500 USD per capita, implying that poorer people, more so than richer people, can expect higher returns to their life expectancy from an increase in their income. Preston was the first one to make the point that, during the 20th century, life expectancy increased independently of changes in income. This suggested that income explains only a small part of the overall variation of life expectancy. Subsequent research ascribed gains in life expectancy to education, fertility, urbanization, and low income inequality (Bloom & Canning, 2007; Brady *et al.*, 2007; Galea, 2007). Thus, at least in richer countries, economic growth seems to play a minor role in the relationship between economic development and physical well-being (Pritchett & Summers, 1996).

We build on this literature using life satisfaction, a proxy for subjective well-being, to assess the conditions under which economic growth is compatible with well-being. We posit two conditions: social trust and income inequality.

(b) *Social capital, economic growth, and subjective well-being*

Many argue that social capital, and trust in others in particular, enhances economic growth. They refer to Arrow’s dictum that economic backwardness in the world is rooted—at least in part—in the lack of interpersonal trust (Arrow, 1972). Theoretically, trust in others bolsters economic growth: with high levels of trust, formal institutions limit their expenditures on the enforcement of the daily and multitudinous economic agreements that comprise routine market activity. Meanwhile, businesses can operate in a safer, more efficient way. Under these conditions, governments and business can spend their resources on attracting new business and other activities that promote economic growth (Guiso, Sapienza, & Zingales, 2004; Knack & Keefer, 1997). Many empirical works found evidence of a positive cross-sectional correlation between proxies of social capital and economic growth (Beugelsdijk, De Groot, & Van Schaik, 2004; Helliwell & Putnam, 1995; Knack & Keefer, 1997; La Porta, Lopez-de Silanes, Shleifer, & Vishny, 1999; Narayan & Pritchett, 1999; Whiteley, 2000; Zak & Knack, 2001).

Alternative views argue that economic growth is actually detrimental to social capital (see Antoci, Sabatini, & Sodini, 2013; Bartolini & Bonatti, 2008; Hirsch, 1976; Hirschman, 1973; Olson, 1982; Polanyi, 1968). Economic growth erodes social capital because it extends market relationships—with their emphasis on selfish behavior—to an increasing share of the noneconomic sphere of people’s life, and as a result it crowds out social capital (Hirsch, 1976; Polanyi, 1968). Moreover, economic growth reduces the time available for social activity, 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. Indeed, scholars provided evidence of a negative relationship between trust in others and productivity growth from 1960 to 1992 in the USA (Helliwell, 1996), and a continued erosion of social capital despite the growing prosperity in the USA (Putnam, 2000). Cross-country time-series

data demonstrate the negative, significant, and long-run relationship between the trends of social capital and economic growth (Roth, 2009).

As documented in previous studies, social trust—and more broadly social capital—is particularly relevant for subjective well-being (Bartolini, Bilancini, & Pugno, 2013; Clark *et al.*, 2014; Helliwell, 2003; Uhlaner, 1989). Social capital can be defined as “networks together with shared norms, values and understandings that facilitate co-operation within or among groups” (OECD, 2001, p. 41). For individuals, social capital and the quality of their relationships positively correlate with their subjective well-being (Bruni & Stanca, 2008; Helliwell, 2006; Helliwell & Putnam, 2004). This correlation is significant also at aggregate level in cross-country analyses over time (Bartolini & Sarracino, 2014). Moreover, within countries, trends of aggregate social capital correlate significantly with trends of subjective well-being (Bartolini, Bilancini, & Pugno, 2013; Bartolini, Bilancini, & Sarracino, 2013; Bartolini and Sarracino, 2015; Brockmann *et al.*, 2009; Easterlin *et al.*, 2012). Because social capital can change, even in a relatively short time span (Sarracino & Mikucka, 2016), it can also be a target of policies for improving subjective well-being (Bartolini, 2014; Helliwell, 2011).

Recently, some scholars have pursued this idea further and postulated that social erosion feeds economic growth (Bartolini & Bonatti, 2002; Bartolini & Bonatti, 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, e.g., social capital. They find that the erosion of social capital induces consumers and producers to search for substitutes in the market. This initiates a process in which there is an acceleration of economic growth that further erodes social capital that, in turn, undermines subjective well-being.

(c) *The role of income inequality*

Over the last two decades many OECD countries have been characterized by increasing economic growth, and also increasing income inequality, declining social capital, and decreasing subjective well-being (OECD, 2008). What is more, available figures suggest that global income inequality will raise in coming years (Rougoor & van, 2015). The negative effect of income inequality on subjective well-being is rooted in the decreasing marginal utility of income and the erosion of both social solidarity and interpersonal relationships. Compared to people with low income, rich people derive relatively less utility from additional income, i.e., considering their large base of economic resources, more money does not make rich people happier. Thus, theoretically, in more unequal societies, average well-being should be lower (Oishi, Kesebir, & Diener, 2011), though this result is not always confirmed by empirical studies (Rözer & Kraaykamp, 2013; Zagorski *et al.*, 2014). A possible explanation for such controversial evidence is that the relationship between inequality and well-being depends on countries' level of development. For instance, Iniguez-Montiel (2014) shows that decreasing income inequality can plausibly reduce poverty and increase well-being in Mexico, a middle income country. Vice-versa Jiang, Lu, and Sato (2012) documented that in poor countries, such as China, an increase of income inequality is associated to lower well-being only within some groups, while they document an overall positive effect of inequality on well-being.

Income inequality can also result in increasing crime, violence, and social conflicts, all of which reduce well-being

(Alesina & Giuliano, 2011; Blanco, 2013). Indeed, empirical studies suggest that when economic growth is accompanied by increasing income inequality, social linkages and feelings of solidarity and cooperation weaken, leading to an erosion of both social capital and subjective well-being (Alesina & La, 2006; Clark & D'Ambrosio, 2015; Clark, Frijters, & Shields, 2008; Josten, 2004; Graham & Felton, 2006; Gould & Hijzen, 2016; Gustavsson & Jordahl, 2008; Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Oishi *et al.*, 2011; Rothstein & Uslaner, 2005). More recently Barone and Mocetti (2016) contributed to this literature documenting a negative impact of inequality on trust only among rich countries. In other words, the authors suggest that the relationship between income inequality and social capital depends on countries' level of economic development.

The relationship between income inequality and economic growth is controversial (for a review, see Aghion, Caroli, & Garcia-Penalosa, 1999). The literature provides at least three interpretations. First, there is a trade-off between distributional equity and economic growth. This means that beyond a given threshold, equality eliminates the incentives to invest, thus hampering economic growth. Second, income distribution has no direct effect on economic growth, yet possible redistributive policies can be detrimental for savings and growth. In other words, transferring money from rich to poor people indirectly affects growth because poor people have lower probabilities to use the additional money for investments. Third, initial income inequality can be detrimental to long-term economic growth (Bénabou, 1996; Deininger & Squire, 1998). For instance, this is because high initial inequality might lead to an inefficient allocation of resources, thus limiting the possibilities of future long-term growth.

(d) *Hypotheses*

From the available literature we conclude that social trust (and, more broadly, social capital) and income inequality are two important correlates of people's well-being and of economic growth. We argue that economic growth positively correlates with increasing well-being when social trust increases and when income inequality decreases. Our hypotheses are as follows:

H 1. *The positive correlation between economic growth and subjective well-being is conditional on increasing social trust.*

H 2. *The positive correlation between economic growth and subjective well-being is conditional on declining income inequality.*

H 3. *The moderating effects of income inequality and social trust differ according to the level of countries' economic development. We expect that the moderating role of income inequality and social trust is stronger in rich countries.*

3. DATA AND METHOD

(a) *Methodological limitations of previous studies*

The literature on the relationship between economic growth and subjective well-being suffers from methodological limitations. First, economic growth—a country-level variable—led

researchers to designs in which the units of analysis were countries. At the same time, researchers aggregated well-being that is initially observed at the individual level. Such design does not allow to control for individual-level correlates of well-being, such as age, gender, and marital status (Dolan, Peasgood, & White, 2008; Powdthavee, 2010). 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 been applied in the debate about economic growth and well-being only by Oishi and Kesebir (2015).

Furthermore, the analyses using aggregate data rely on small samples because the number of countries available for the analysis—especially countries with sufficiently long time-series—is limited. The techniques previously adopted summarize a large amount of information in aggregated measures at the cost of a loss in 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 allows 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 previous results are the outcome of spurious correlations due to the omission of potentially confounding variables.

Finally, part of the literature does not explicitly distinguish between relationships among the levels of variables—observed at single point in time—and relationships among changes that occur within countries over time. This distinction is sometimes overlooked (e.g., model cross-country variation and do not account for changes over time Rözer & Kraaykamp, 2013; Zagorski *et al.*, 2014), however it is relevant for understanding whether economic growth and well-being are compatible over time, and the conditions under which this relationship occurs. 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 is necessary to refine previous results and to improve their reliability. In this regard we add to the work by Oishi and Kesebir (2015) testing a model in which we account for the moderating role of social trust, beyond income inequality, while controlling—among others—for the levels of GDP, trust, and inequality prevailing within countries.

(b) Data

We use the World Values Survey–European Values Study (WVS–EVS) integrated dataset covering the period 1981–2012 (EVS, 2011; WVS, 2009, 2015) and harmonize it with contextual-level data. 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 integrated dataset contains information for 112 countries and regions for a total of about 500,000 respondents. However, as the time-trends of macro variables are of particular interest in this analysis,

we consider only countries with at least 10 years of individual observations. Moreover, we limit the analysis of transition countries to the period after 1995 to single-out the effect of the v-shaped trend of economic growth and well-being characterizing these countries during the political, economic, and social transformation of the early 1990s (Bartolini *et al.*, 2015; Easterlin, 2009). The transformation altered the relationship among our variables of interest in unpredictable ways, well beyond what expected by the theory on economic growth and well-being. Hence, we limit the observation span to the period of relatively monotonic economic growth.

Our sample includes 46 developed, developing, and transition countries observed over the period 1981–2012. Our data end in 2012 because comparable figures on income inequality are not available for 2013 and 2014. Table 1 presents countries and years included in the analysis.

(c) Variables

We account for variables at individual level, country-wave level, and country level. Individual-level variables include life satisfaction as our main dependent variable, and a set of control variables, to account for the differences in sample composition between countries and waves. On country-wave and country level we account for GDP, social trust, and income inequality. Table 2 presents descriptive statistics.

We observe people's life satisfaction through the answers to the following question: "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. In the pooled sample, life satisfaction averages 6.79, and the distribution is skewed to the right with a median value of 7.

The literature on subjective well-being has identified a set of socio-demographic control variables that are usually included in happiness equations (Dolan *et al.*, 2008; Powdthavee, 2010; Yang, 2008). Our list of controls includes: gender, being married, and age (both linear and quadratic components). We do not control for individual income, employment status, and education because these variables can mediate the effect of economic development and growth for well-being (Oishi & Kesebir, 2015).

The macro variable social trust is derived from aggregating the individual-level variable trust in others, which is observed through 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 & Mislin, 2012; Uslander, 2003).

Real GDP per capita is derived from the Penn World Table 9.0 (expenditure-side) and is expressed in international dollars of the year 2011 transformed into logarithm (Feenstra, Inklaar, & Timmer, 2015a, 2015b). As a measure of income inequality we use the Gini coefficient (based on individual income) from the World Income Inequality Database (UNU-WIDER, 2015).

At country level we include the average values of our macro variables (i.e., GDP, Gini coefficient, and social trust) over the observation period for each country. The inclusion of country averages in the model allows us to separate the effects of cross-country differences from the effects of changes which occurred within countries over time. We label the average values of macro variables as μ GDP, μ GINI, and μ Trust. At the country-wave level, we measure the changes

Table 1. *The sample used in the analysis.*

	Year of survey																						Total	
	1981	1982	1984	1989	1990	1991	1994	1995	1996	1997	1998	1999	2000	2001	2002	2004	2005	2006	2007	2008	2009	2011		2012
Argentina			889			954		1,047				1,236						977						5,103
Australia	1,152							1,991									1,374							4,517
Austria					1,299							1,409								1,451				4,159
Belgium					2,538							1,795									1,494			5,827
Canada		1,212			1,669								1,897											4,778
Chile					1,447				974				1,162					975						4,558
China					981			1,441						953					1,797				2,176	7,348
Taiwan							753											1,225						1,978
Colombia											2,984													2,984
Denmark	1,053				988							979								1,474				4,494
Finland					555				964				975				1,000				1,059			4,553
France	1,111				931							1,496						994		1,481				6,013
Germany	1,069				2,875					1,936		1,923						1,886		1,916				11,605
India					2,357			1,740						1,883										5,980
Ireland					988							962								944				2,894
Italy					1,912							1,919						947			1,415			6,193
Japan	1,050				881			970					1,198				1,014							5,113
South Korea					1,215									1,173										2,388
Mexico					1,370			768	1,372				1,458				1,471							6,439
Netherlands	1,019				960							992						977		1,519				5,467
New Zealand										1,094						834						772		2,700
Norway		953			1,151				1,113										1,016	1,068				5,301
Peru									1,160					1,476				1,472						4,108
Portugal												971								1,509				2,480
South Africa									2,827			0		2,951										5,778
Spain					3,862			1,161				1,106	1,159						1,076	1,459		1,148		10,971
Sweden		865			887				955			969						958		1,459		974	1,143	6,751
Switzerland				863					1,115										1,174	1,208				4,360
Great Britain	1,116				1,424						1,072	905					1,015				1,502			7,034
United States		2,229			1,778			1,478				1,188						1,239						7,912
Uruguay									972									861						1,833
Montenegro									219					989										1,208
Bulgaria										852		918					844			1,405				4,019
Belarus									1,980				879											2,859
Czech Rep.											1,087	1,855								1,706				4,648
Estonia									998			932								1,484		1,485		4,899
Hungary											635	970								1,502	984			4,091
Latvia									1,151			983								1,458				3,592
Lithuania										969		954								1,372				3,295
Moldova									965						943			1,025						2,933
Poland										1,078		1,051					945			1,365				4,439
Romania											1,183	1,093					1,576			1,333				5,185
Russia								1,955				2,392						1,872		1,417				7,636
Slovakia											1,041	1,281								1,405				3,727
Slovenia								973				966						992		1,318		1,039		5,288
Ukraine									2,480			1,109						878						4,467
Total	7,570	5,259	889	863	32,068	954	753	13,524	19,245	4,835	9,096	32,354	8,728	9,425	943	834	11,178	15,339	5,063	29,794	7,428	5,587	2,176	223,905

Source: WVS-EVS integrated dataset.

Note: The numbers show the sample size available for each year and country. The table shows the effective sample used in the analysis.

Table 2. *Descriptive statistics*

Variable	Mean	SD	Min	Max	Obs	Missing (%)
<i>Individual-level variables</i>						
Life satisfaction	6.92	2.32	1.00	10.00	238,869	0.7
Gender (woman)	0.53		0	1	241,217	0.0
Married	0.57		0	1	237,246	1.7
Age	44.40	17.16	15.00	100.00	240,558	0.3
<i>Country-level variables</i>						
μ GDP (ln, per capita)	9.71	0.76	7.38	10.70	46	0.0
μ Gini	35.66	9.37	23.91	59.29	46	0.0
μ Trust	0.33	0.15	0.08	0.68	46	0.0
transition countries	0.30		0	1	46	0.0
<i>Country-wave-level variables</i>						
Δ Gdp	-0.01	0.27	-0.91	0.62	173	0.0
Δ Gini	-0.09	2.68	-10.06	13.13	173	0.0
Δ Trust	0.02	0.44	-0.65	0.89	173	0.0

Source: WVS-EVS integrated dataset.

Notes: In the analysis all country-level variables are centered at grand mean.

of macro-variables that occurred in a given country over time. These changes are captured as deviations from country-specific means and they are labeled as Δ GDP, Δ GINI, and Δ Trust.

The coefficients estimated for the country averages (μ) and for the changes (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 life satisfaction on macro-variables, the coefficient of Δ GDP informs what changes of life satisfaction are associated to one unit change of economic growth over time. The coefficient for μ GDP informs what difference of life satisfaction is associated with one unit of GDP difference between countries.

(d) *Statistical method*

We use multilevel regression analysis to model people's life satisfaction as a function of both individual and country characteristics, including the changes over time 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 & 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 2 and 6. 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, 2005). In present case the total sample size at country-wave is $N = 173$.

The three-level design allows distinguishing between the effects of country-specific variables which refer to average levels of macro factors (μ GDP, μ GINI, and μ Trust), and the effects of the country-wave-specific values which refer to the changes taking place over time (Δ GDP, Δ GINI, and Δ Trust). The model is formally described in Eqns. (1)–(3).

$$\begin{aligned}
 LS_{iyc} = & \alpha_{yc} + B_K \cdot X_{iyc} + \beta_1 \cdot \mu GDP_c + \beta_2 \cdot \Delta GDP_{yc} \\
 & + \beta_3 \cdot \Delta GDP_{yc} \cdot \mu GDP_c + \beta_4 \cdot \Delta GDP_{yc} \cdot Transition_c \\
 & + \beta_5 \cdot \mu Gini_c + \beta_6 \cdot \Delta Gini_{yc} + \beta_7 \cdot \Delta GDP \cdot \Delta Gini_{yc} \\
 & + \beta_8 \cdot \mu GDP \cdot \Delta Gini_{yc} + \beta_9 \cdot \Delta GDP_{yc} \cdot \mu GDP_c \cdot \Delta Gini_{yc} \\
 & + \beta_{10} \cdot \mu Trust_c + \beta_{11} \cdot \Delta Trust_{yc} + \beta_{12} \cdot \Delta GDP \cdot \Delta Trust_{yc} \\
 & + \beta_{13} \cdot \mu GDP \cdot \Delta Trust_{yc} \\
 & + \beta_{14} \cdot \Delta GDP_{yc} \cdot \mu GDP_c \cdot \Delta Trust_{yc} + \epsilon_{iyc}
 \end{aligned} \tag{1}$$

$$\alpha_{yc} = \gamma_c + \tau_{yc} \tag{2}$$

$$\gamma_c = \gamma_0 + v_c \tag{3}$$

In this model life satisfaction (LS_{iyc}) is regressed on a set of individual- (i), country-wave- (y), and country-level (c) predictors. In Eqn. (1), coefficient β_1 informs about the effect of average GDP observed in a given country, and β_2 informs about the main effect of economic growth. Coefficient β_3 informs about whether the role of economic growth for life satisfaction depends on countries' wealth, while β_4 accounts for the different relationships between economic growth and life satisfaction in transition countries. The coefficient β_7 tells how the effect of economic growth varies with the changes of income inequality, and coefficient β_{12} informs how the effect of economic growth varies with the changes of social trust. To account for the possibility that the moderating effect of income inequality and social trust for life satisfaction depends on the economic development of a country, we estimate the coefficients β_9 and β_{14} . The main effects of the changes of income inequality and social trust are captured by the coefficients β_6 and β_{11} , and coefficients β_8 and β_{13} allow these effects to differ with the economic development of a country. Coefficients β_5 and β_{10} capture the effects of cross-country differences in the average levels of income inequality and social trust. X_{iyc} is a vector of individual-level control variables, while B_K is a vector of respective coefficients.

In the model (see Eqns. 2 and 3), the only coefficients allowed to vary randomly are the random intercepts τ_{yc} and v_c . In other words, the average life satisfaction is allowed to vary randomly across country-waves and across countries

(random intercept model). As a robustness check, we investigated the stability of the results if random slopes are included in the model (see Table 4, Appendix 5).

4. RESULTS

Table 3 shows the results of multilevel estimation of the null model (i.e., model including only the fixed and random intercepts), and of further four models: Model 1 accounts for levels

and trends of GDP, Model 2 accounts for levels and trends of GDP and income inequality, Model 3 accounts for levels and trends of GDP and social trust, and Model 4 accounts for GDP, income inequality, and social trust. AIC values indicate that models 2–4 represent a statistically significant improvement over the null model.

The coefficients of socio-demographic control variables have all the expected signs. The significant coefficients of age and age squared document the existence of the usual U-shaped relationship between age and well-being: people's life satisfac-

Table 3. Multilevel regression of subjective well-being on individual- and country-level predictors

	Null model	Model 1	Model 2	Model 3	Model 4
<i>Individual-level variables</i>					
Gender (woman)		0.03 (1.75)	0.04 (1.90)	0.04 (1.89)	0.04 (1.89)
Married		0.61 (22.51)***	0.60 (25.52)***	0.60 (25.46)***	0.60 (25.44)***
Age		-0.02 (-9.06)***	-0.02 (-8.74)***	-0.02 (-8.74)***	-0.02 (-8.74)***
Age ²		0.00 (12.71)***	0.00 (13.16)***	0.00 (13.28)***	0.00 (13.27)***
<i>Country-level variables</i>					
μ GDP		0.82 (5.39)***	0.86 (4.77)***	0.88 (5.20)***	0.86 (4.77)***
μ Gini		0.03 (1.45)	0.03 (1.36)	0.03 (1.41)	0.03 (1.36)
μ Trust		0.63 (1.04)	0.78 (1.26)	0.92 (1.53)	0.77 (1.25)
Transition countries		-0.89 (-3.49)***	-0.83 (-3.12)**	-0.81 (-3.12)**	-0.83 (-3.13)**
<i>Country-wave-level variables</i>					
Δ GDP		0.20 (1.67)	0.08 (0.57)	0.07 (0.58)	0.08 (0.57)
Δ GDP \times trans. countries		1.58 (7.24)***	1.63 (6.74)***	1.69 (6.97)***	1.63 (6.79)***
Δ GDP \times μ GDP		0.13 (0.61)	-0.04 (-0.24)	0.10 (0.38)	-0.05 (-0.26)
Δ Gini			-0.01 (-0.83)	0.00 (0.04)	-0.01 (-0.81)
Δ Trust			0.43 (13.17)***	0.42 (12.88)***	0.42 (12.88)***
Δ Gini \times μ GDP			-0.02 (-0.75)		-0.01 (-0.74)
Δ Trust \times μ GDP				0.09 (2.29)*	0.09 (2.30)*
Δ Gini \times Δ GDP			-0.02 (-0.85)		-0.02 (-0.78)
Δ Trust \times Δ GDP				0.18 (3.07)**	0.18 (3.07)**
Δ Gini \times Δ GDP \times μ GDP			-0.08 (-2.48)*		-0.08 (-2.48)*
Δ Trust \times Δ GDP \times μ GDP				0.13 (1.63)	0.13 (1.63)
AIC	959,853	1,234,946	953,293	953,221	953,222
Model's df	0	11	16	16	19
Country var(_cons)	0.94	0.25	0.27	0.27	0.27
Country-year var(_cons)	0.17	0.11	0.07	0.08	0.07
var(Residual)	4.33	4.28	4.21	4.20	4.20
N (individuals)	223,905	223,905	223,905	223,905	223,905
N (countries)	46	46	46	46	46
N (country-waves)	173	173	173	173	173

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

tion is higher in early and late stages of life, and it reaches a minimum in adulthood. Married people are on average more satisfied with their lives than unmarried people, whereas we do not find any significant difference between men and women.

Results of models 1–4 show that the relationship between economic growth and life satisfaction is statistically not significant (ΔGDP). The only exception are transition countries where economic growth correlates with increasing life satisfaction ($\Delta\text{GDP} \times \text{transition}$). Moreover, the coefficient of μGDP indicates that people living in richer countries are more satisfied than those living in poorer countries. These results are consistent with previous evidence, and in particular with the Easterlin paradox (Bartolini & Sarracino, 2014; Easterlin *et al.*, 2010). Furthermore, they support the previous evidence that transition countries are an exception to the paradox (Bartolini *et al.*, 2015; Easterlin, 2009).

Among the remaining two variables measuring changes over time (ΔTrust and ΔGini), only social trust has a statistically significant association with life satisfaction, i.e., in our sample of countries, the increase in social trust correlates with higher life satisfaction. To investigate the moderating effects of trust and inequality, we included interactions between economic growth and changes of social trust and income inequality. Consistently with our expectations, the interaction between economic growth and the change of social trust ($\Delta\text{Trust} \times \Delta\text{GDP}$) is positive and statistically significant. This result does not depend on countries' wealth: the coefficient of the interaction $\Delta\text{Trust} \times \Delta\text{GDP} \times \mu\text{GDP}$ is not statistically significant. Also the interaction of economic growth with the changes of income inequality ($\Delta\text{Gini} \times \Delta\text{GDP}$) is negative, and statistically insignificant. However, the negative and significant sign of the interaction term $\Delta\text{Gini} \times \Delta\text{GDP} \times \mu\text{GDP}$

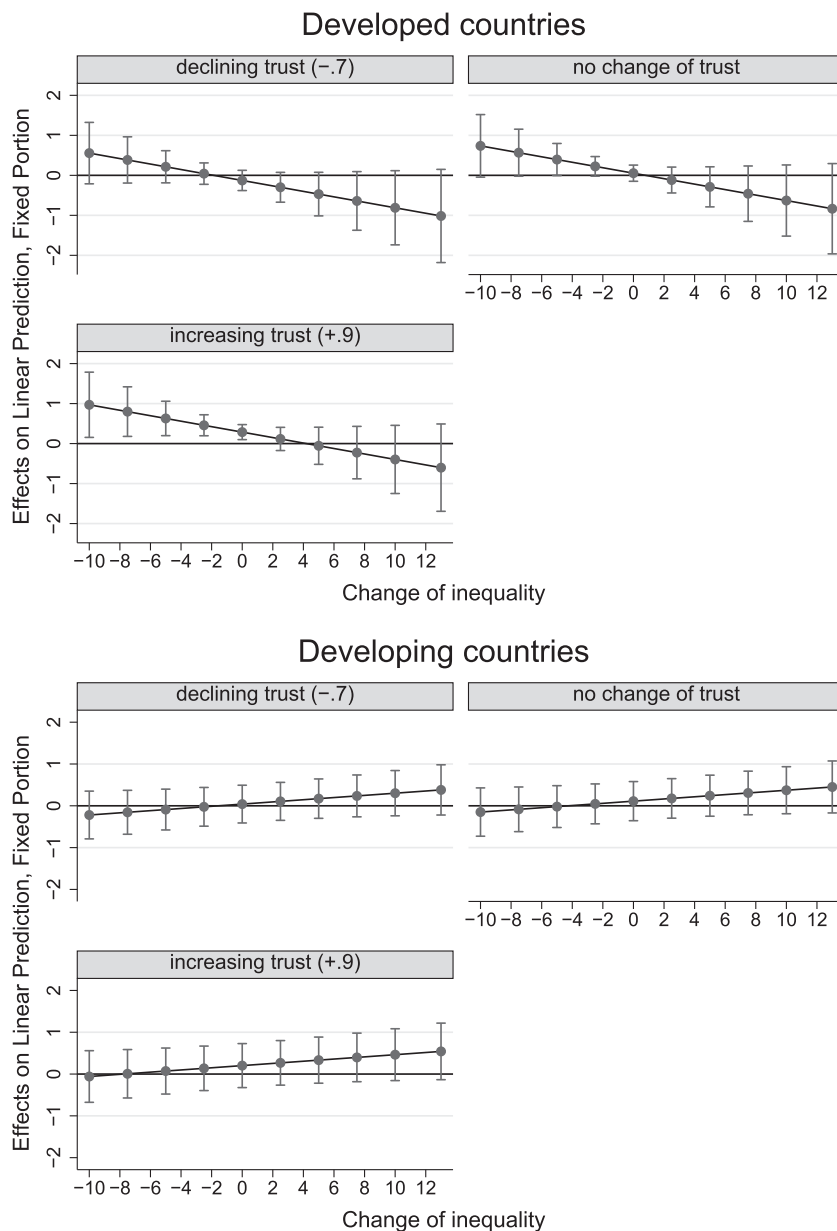


Figure 1. Effect of economic growth on life satisfaction depending on changes of inequality and social trust. The marginal effects for developed and developing countries account for the moderating effect of countries' wealth; both predictions assume the median GDP in the respective group. Note: The graph shows the predicted effect of GDP on life satisfaction with 99% confidence intervals.

indicates that in rich countries increasing income inequality erodes the life satisfaction gains from economic growth more than in poor countries. In other words, in rich countries economic growth combined with reducing income inequality correlates with people's life satisfaction.

The interpretation of these interaction terms and their significance is complex and definite conclusions cannot be made on the basis of regression coefficients (for more details, see: Brambor, Clark, & Golder, 2006). 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 life satisfaction for various scenarios of changes in income inequality and social trust. Marginal effects are presented in Figure 1.

The marginal effects inform that the relationship between economic growth and life satisfaction is moderated by the changes of social trust and income inequality, but the relationship takes different forms depending on countries' wealth. The marginal effects predicted for developed countries show that the relationship between economic growth and life satisfaction is positive when trust increases and inequality declines or remains stable. However, if income inequality increases or social trust does not increase, then economic growth in developed countries does not increase people's life satisfaction. On the other hand, the marginal effects predicted for developing countries show that the relationship between economic growth and life satisfaction remains statistically insignificant. This result is consistent with the prediction by Hirschman (1973). In sum, these results suggest that rich countries have more to gain in terms of well-being from economic growth when income inequality decreases and social trust increases.

5. ROBUSTNESS CHECKS

Present results are robust to the following changes in model specifications:

1. Our model did not include any random slopes, i.e., we assumed that all variables have the same effect on life satisfaction in all countries. As this assumption may be false, we investigated the robustness of the results to the inclusion of random slopes in the model. We did this in two variants. First, we included at the country level a random slope for Δ GDP. In this way we allowed random cross-country differences in the effect of changing GDP on life satisfaction. Second, we included at country level random slopes for four individual-level variables: gender, marital status, age, and age squared. Results, shown in columns (2) and (3) of Table 4 are consistent with our main analysis.
2. The economic crisis of 2008 might have affected the relationship among our variables of interest in unpredictable ways. Hence, we limit the time-series to the period before 2007 to check that our results are not driven by possible spurious correlations linked to the crisis. Our results are robust to the exclusion of the data from 2007 onward, as shown in column (4) of Table 4.
3. Finally, WVS-EVS data are sometimes collected in countries with poor research infrastructures, thus in some cases data quality may be questioned. Although research on data quality has a long tradition (Groves, 1987), information on quality of widely used surveys is not readily available. Moreover, it is not clear how to deal with recognized cases of poor data quality. We test the robustness of our results to poor-quality data by focusing on two measures.

First, we investigate the effect of quality of data documentation. Documentation of secondary data sometimes omits important information, such as response rates, procedures used to translate the questionnaires, pre-test of the questionnaire, and fieldwork control (Kołczyńska & Schoene, 2017). If the above-mentioned information is missing in the study documentation for a given country-wave, we treat it as a case of poor documentation quality, and a likely indicator of lower quality of data.

The countries and years affected by low data quality according to this specification are: Australia (1981, 1995), Austria (1990), Belgium (1981, 1990), Canada (1982, 1990), Chile (1996, 2000, 2006), China (1995), Czech Rep. (1998), Denmark (1981, 1990), Finland (1990, 1996), France (1981, 1990), Germany (1981, 1990), India (1990, 1995), Ireland (1981, 1990), Italy (1981, 1990), Japan (1981, 1995, 2000, 2005), South Korea (2001, 2005), Mexico (1995, 1996), Moldova (2002), Netherlands (1981, 1990, 2006), Norway (1982, 1990, 1996), Spain (1990), Sweden (1982, 1996), Switzerland (1989, 1996), Turkey (1990, 1996, 2001), Macedonia (2001), Great Britain (1981, 1990, 1998), United States (1982, 1990, 1995, 1999), and Uruguay (1996).

As a second measure of poor data quality we use presence of duplicate cases (Słomczyński, Powako, & Krauze, 2017). We select countries and waves with at least 10 non-unique records. These are: Belarus (1996), India (2001, 2006), Japan (1981), South Korea (2005), Latvia (2008), Mexico (1995, 1996), and United States (1982).

In both cases, we mark countries and waves of presumably lower data quality with a dichotomous variable and include this variable in the model. Our results are robust to low data quality, as shown in columns (5) and (6) of Table 4.

6. CONCLUSIONS

In this article we explore the conditions under which economic growth is compatible with life satisfaction over time. In recent years, the lively debate that followed the pioneering studies on the relationship between economic growth and subjective well-being over time (Easterlin, 1974) reached a crossroad. As a result, it is not clear which policies could enhance life satisfaction. We provide empirical support for the argument that changes of income inequality and social trust moderate the relationship between economic growth and life satisfaction.

We found that economic growth does not correlate with life satisfaction in non transition countries. This corroborates Easterlin's finding that although people are on average happier in richer countries, increasing GDP does not result in growing life satisfaction (Easterlin, 1974). However, the contrary holds for transition countries where people's life satisfaction positively and significantly correlates with economic growth. Also this result is consistent with previous literature documenting that transition countries are an exception to the Easterlin paradox (Bartolini *et al.*, 2015; Easterlin, 2009).

Moreover, our study documents that, in our sample of 46 countries, changes of social trust positively and significantly correlate with life satisfaction. This result confirms previous evidence showing that in the long run social capital is a major predictor of life satisfaction (Bartolini & Sarracino, 2014). Moreover, our analysis provides new evidence that the increase of social trust correlates more strongly with life satisfaction in rich countries than in poor ones. The changes of inequality, on the other hand, do not significantly correlate with life satisfaction, consistently with previous studies which

failed to report consistent results (Rözer & Kraaykamp, 2013; Zagorski *et al.*, 2014).

Two factors moderate the relationship between economic growth and life satisfaction: social trust and inequality. In the whole sample of countries we found that when economic growth is accompanied by an increase in social trust, GDP growth positively correlates with life satisfaction, thus confirming our first hypotheses. On the other hand, the moderating effect of income inequality changes with the wealth of a country. In rich countries economic growth, combined with reducing income inequality, is beneficial for people's life satisfaction. In other words, rich countries have more to gain in terms of well-being from economic growth when it is accompanied by declining income inequality. This result only partially supports our second hypothesis, and it lends some support to the third hypothesis.

This study has limitations. The main one is that we do not observe the individual trend of life satisfaction and social cap-

ital. Rather we focus on the trends of averages. This choice is a natural consequence of the available data: as of now, there are no panel data-sets that have the variables needed to measure life satisfaction and social trust, and that also cover developed, developing, and transition countries. There is hope in current data harmonization efforts that could lead to the creation of panel surveys relevant to this task.

Our results provide two pieces of good news. First, under certain conditions, economic growth is accompanied by increasing life satisfaction. Second, we suggest which conditions can make economic growth and life satisfaction compatible. An important message for policy-makers wishing to pursue durable improvements in people's well-being is that they should adopt a "promote, protect and reduce" policy: promote economic growth, protect and promote social trust, and reduce income inequality.

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APPENDIX A. RESULTS OF ROBUSTNESS CHECKS

Table 4. Multilevel regression of subjective well-being on individual and country level predictors^g

	(1)	(2)	(3)	(4)	(5)	(6)
	Reference Model	Random slopes		Year <2007	Quality	
		Δ Gdp	individual		Duplicates	Documentation
<i>Individual-level variables</i>						
gender (woman)	0.04 (1.89)	0.04 (1.89)	0.05 (2.46)*	0.02 (1.09)	0.03 (1.68)	0.03 (1.68)
married	0.60 (25.44)***	0.60 (25.44)***	0.58 (22.92)***	0.60 (21.68)***	0.60 (25.34)***	0.60 (25.35)***
age	-0.02 (-8.74)***	-0.02 (-8.74)***	-0.02 (-8.98)***	-0.02 (-7.93)***	-0.02 (-8.69)***	-0.02 (-8.69)***
age ²	0.00 (13.27)***	0.00 (13.27)*****	0.00 (12.33)***	0.00 (13.05)***	0.00 (13.05)***	0.00 (13.04)*****
<i>Country-level variables</i>						
μ GDP	0.86 (4.77)***	0.86 (4.79)***	0.75 (3.93)***	0.86 (4.12)***	0.85 (4.58)***	0.85 (4.56)*****
μ Gini	0.03 (1.36)	0.03 (1.36)	0.03 (1.37)	0.03 (1.34)	0.03 (1.42)	0.03 (1.36)
μ Trust	0.77 (1.25)	0.77 (1.25)	0.73 (1.13)	0.90 (1.40)	0.92 (1.46)	0.84 (1.34)
transition countries	-0.83 (-3.13)**	-0.83 (-3.12)**	-0.79 (-3.01)**	-0.78 (-2.44)*	-0.79 (-2.90)**	-0.81 (-3.02)**
<i>Country-wave-level variables</i>						
Δ GDP	0.08 (0.57)	0.08 (0.54)	0.04 (0.27)	0.24 (1.18)	0.18 (1.17)	0.23 (1.37)
Δ GDP \times trans. countries	1.63 (6.79)***	1.65 (6.79)***	1.69 (7.13)***	1.69 (3.93)***	1.65 (6.86)***	1.56 (6.59)***
Δ GDP \times μ GDP	-0.05 (-0.26)	-0.06 (-0.31)	-0.05 (-0.28)	-0.24 (-0.80)	-0.21 (-1.05)	-0.18 (-0.76)
Δ Gini	-0.01 (-0.81)	-0.01 (-0.69)	-0.01 (-0.93)	0.00 (0.05)	-0.00 (-0.39)	-0.01 (-0.50)
Δ Trust	0.42 (12.88)***	0.42 (12.89)***	0.42 (12.58)***	0.37 (10.57)***	0.42 (12.37)***	0.42 (12.37)***
Δ Gini \times μ GDP	-0.01 (-0.74)	-0.02 (-0.74)	-0.02 (-0.85)	-0.02 (-0.97)	-0.01 (-0.77)	-0.02 (-0.88)

Table 4 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	Reference Model	Random slopes		Year	Quality	
		Δ Gdp	individual	<2007	Duplicates	Documentation
Δ Trust \times μ GDP	0.09 (2.30)*	0.09 (2.30)*	0.09 (2.27)*	0.11 (3.29)**	0.09 (2.25)*	0.09 (2.24)*
Δ Gini \times Δ GDP	-0.02 (-0.78)	-0.02 (-0.65)	-0.03 (-1.03)	0.02 (0.50)	0.00 (0.12)	-0.00 (-0.05)
Δ Trust \times Δ GDP	0.18 (3.07)**	0.18 (3.06)**	0.16 (2.85)**	-0.04 (-0.50)	0.15 (2.16)*	0.15 (2.15)*
Δ Gini \times Δ GDP \times μ GDP	-0.08 (-2.48)*	-0.07 (-2.30)*	-0.08 (-2.46)*	-0.10 (-1.78)	-0.09 (-1.97)*	-0.10 (-2.03)*
Δ Trust \times Δ GDP \times μ GDP	0.13 (1.63)	0.13 (1.63)	0.12 (1.62)	0.22 (2.39)*	0.13 (1.36)	0.13 (1.36)
duplicates					-0.37 (-3.12)**	
documentation quality						0.02 (0.27)
<i>AIC</i>	953,222	953,224	951,019	743,029	921,267	921,274
Model's df	19	19	19	19	20	20
Country var(_cons)	0.27	0.27	0.29	0.28	0.27	0.27
Country var(trend of GDP)		0.04				
Country var(married)			0.02			
Country var(woman)			0.01			
Country var(age)			0.00			
Country var(age ²)			0.00			
Country-year var(_cons)	0.07	0.07	0.07	0.08	0.07	0.07
var(Residual)	4.20	4.20	4.16	4.30	4.23	4.23
<i>N</i> individuals	223,905	223,905	223,905	173,857	216,142	216,142
<i>N</i> country-waves	173	173	173	136	167	167
<i>N</i> countries	46	46	46	46	46	46

Source: WVS-EVS integrated dataset. *Life satisfaction and happiness were rescaled to values 0–100.

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

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