Subjective well-being and income: A compromise between Easterlin paradox and its critiques

Rusen Yasar

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Abstract

Despite rising popularity of subjective well-being (SWB) as a proxy for utility, its relationship with income is still an unresolved issue. Those who follow the 'Easterlin paradox' suggest that relative income matters for individual SWB while average income is unrelated to average SWB, whereas the critics of this account find a significant positive association between average income and SWB as well, hence a similar pattern for individual and aggregate levels. This paper seeks a compromise between these two positions, and proposes a model which puts the emphasis on the interaction between individual and aggregate measures. It thus argues that the effect of relative income on SWB varies across countries as a function of average income, in addition to a relatively small direct effect of the latter, in partial agreement with some premises of both accounts. The model is tested cross-sectionally on the data from the latest wave of World Values Survey. The results from hierarchical mixed-effect models confirm the hypothesis on the decreasing significance of individual income with higher levels of economic development, and a relatively small fixed effect of average income. Further examination of data reveals that GDP explains part of cross-national differences, but there is still unaccounted variation especially in middle-income economies.

1   Introduction

The rising popularity of subjective well-being or happiness constitutes both a continuity with and a departure from mainstream economics. On the one hand, SWB

studies usually take this measure as a proxy for individual utility and thus remain within the utilitarian paradigm (e.g. Kahneman, Wakker and Sarin, 1997). On the other hand, the same perspective also takes SWB as a distinct measure of utility, and a better alternative than those conventionally endorsed in mainstream economics. Namely, when it is accepted that there are inherent limits on human cognition, hence the rationality of individual, it is no longer possible to assume that agents will make the best use of their income to maximize utility, nor that their consumption patterns reveal their utility-maximizing preferences (Kahneman, 1994; Kahneman et al., 2004). Therefore, the utility predicted at the time of a decision is not necessarily experienced by the outcome of this decision (Kahneman and Krueger, 2006; Kahneman and Thaler, 2006). Similarly, income may not be directly translated into well-being, and when it does, this may be due to a self-fulfilling belief focused on money as the ultimate indicator of achievement (Kahneman et al., 2006).

In this respect, a pressing question for economics has become one that many people ask themselves in their daily lives: does money buy happiness? And if money does buy happiness, is this simply because money is the main basis of social comparisons or it also has some intrinsic value which can be translated into well-being? The divergent answers to these questions can be grouped into two. The first group argue that the relationship between income and SWB reflects the happiness or satisfaction derived from one's relative position in society. This argument serves as the main explanation for the 'Easterlin paradox', according to which the relationship between income and SWB can be observed at the individual level of analysis, but not at the aggregate level. The second group argue that average SWB is also linked to average income. The cases of non-rising SWB despite rising income can be explained through certain qualifications, such as diminishing marginal returns, a satiation point, contextual factors or measurement issues, yet the overall pattern does not have to be radically different between individual and aggregate levels. Although this disagreement can be understood as a result of different empirical focuses, this paper seeks to find an additional explanation which can serve as a compromise between the two positions.

Based on the insights offered by the first group, it is accepted here that the relativity of income positions has an autonomous influence on SWB. But, following the second group, the extent of such an autonomous influence should be partially determined by the average level of income in each society, while the latter can also have a relatively small direct effect. Thus, it will be argued that the effect of average income can be observed as both direct and mediated through the relationship of relative income with SWB. More specifically, the association between relative income and SWB is more significant at lower levels of economic development and less significant at higher levels. Although this partially results from the overarching fact of diminishing marginal returns, the effect of relative income tends

to be stronger than this overall pattern, due to the autonomous influence of one's relative position in society. The next two sections will unpack the main debate in the literature and develop the main argument in relation to opposing positions. The third section will present the empirical strategy to test the argument through mixed-effect linear modelling. The fourth section will discuss the selection of data and variables to apply the specified models. The fifth section will summarize the findings of the analysis. Finally the sixth section will discuss how well these findings conform the argument.

2 Background

There is little disagreement on whether income is related to SWB; the answer is almost always yes in one form or another. The main point of contention is rather when, how and why income matters. It is arguably compatible with common sense to say that income always brings well-being, irrespectively of whether we are talking about an affluent individual or a society which is economically developed, because similarly rational individuals will translate the opportunities created by higher income into higher levels of well-being. However, as the above introductory statements highlighted, it is difficult to sustain this view once the rationality assumption is dropped. Indeed, since the first publication of what has come to be known as 'Easterlin paradox' (Easterlin, 1974), the benchmark has been the view that there is no universal direct link between income and well-being. What makes Easterlin's hypothesis a 'paradox' is the claim that income-SWB link exists at the individual level, but is not observed at the aggregate level; in other words, individuals derive happiness from higher income, but the economic growth of a society does not increase the overall or average happiness (Easterlin, 1974, 1995).

Although this observation has been labelled as a paradox, the relativity of income positions and changing aspirations have served as the standard explanation from the beginning. Focusing on relativity or income comparisons, it can be argued that agents derive their well-being by comparing their status to certain reference points in society, which change as a function of the societal level of economic development, and an increase in their individual income proportional to the increase in that reference will not contribute to their well-being (Clark, Frijters and Shields, 2008). In the same vein, the individual behaviour can be understood in terms of the effect of increased income being offset by changing aspirations which concomitantly become more difficult to satisfy (Easterlin, 2001). It should be noted that this explanation conforms to the challenge posed by Kahneman's framework, as discussed above, in the sense that the predicted utility of increased income does not translate into experienced utility, since the utility function is reshaped by more demanding aspirations.

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Nonetheless, other pieces of evidence which suggest that higher levels of average income do indeed increase average well-being should not be ignored. First of all, cross-sectional studies consistently find a positive association; although this relationship is weaker at the higher levels of average income, a log-linear pattern is quite apparent (Deaton, 2008). Second, some findings also challenge Easterlin's longitudinal argument, claiming that economic growth brings happiness, strongly in the short run and moderately in the long run (Hagerty and Veenhoven, 2003). In this respect, the disagreement between Easterlin and his critics is usually centred on the specificities of the data used in the analysis, such as the selection of cases (Easterlin, 2005*b*, Cf. Veenhoven and Hagerty, 2006). Third, non-rising average SWB can be attributed to the particular features of relatively affluent societies, as they passed a satiation point of basic needs, beyond which absolute levels of income matter very little (Di Tella and MacCulloch, 2010). While this can be seen as an implication of diminishing marginal returns, Easterlin (2005*a*) is also sceptical about the claim that marginal returns can serve as an explanation for the insignificant relationship at the aggregate level. In general, although cross-sectional comparisons return positive results in a log-linear pattern, this provides 'a questionable basis for inferring change over time' (Easterlin and Sawangfa, 2010, p. 190).

In a comprehensive reassessment of the Easterlin hypothesis, Stevenson and Wolfers (2008) find similar patterns for within-country and across-country relationships of income and happiness, and a positive association between economic growth and rising happiness; they thus argue that both cross-sectional and longitudinal analyses point to the same conclusion and a universal pattern. In order to challenge the Easterlin hypothesis on the longitudinal front, they also draw on a detailed examination of the data commonly used to support it. In this respect, Japan constitutes a crucial case, because its non-rising average SWB can be observed over a period encompassing a wide array of economic development levels, not limited to its high-income phase. However, according to Stevenson and Wolfers (2008), changing survey questions are responsible for the failure to measure increasing SWB, and for each formulation of the question, there is indeed a positive relationship with growing economy in the corresponding time period (pp. 46-56). While there are many cases that they present to support this positive relationship, Easterlin and Sawangfa (2010) find their evidence unsatisfactory due to a failure to take into account the differences between short-term and long-term relationships.

Given the diversity of arguments and findings in favour of and against the Easterlin hypothesis, it is difficult to disregard either side of the literature. Indeed, they may both be correct despite the consistent disagreements, since the divergent conclusions result from, at least partially, from choices regarding the selection of data, methods and operationalization of variables (Graham, 2011). In this sense,

it is not a coincidence that criticisms and counter-criticisms as outlined above are centred on data-related and methodological issues. Yet it is not possible to eschew such limitations completely, and this study does not have a claim to be an exception in this regard. Instead, this paper is motivated by an intuition that possible explanations for the income-SWB link may not be exhausted. Therefore, the intended contribution to this debate will be offering a different perspective which derives insights from both sides, but also modifies several of their basic premises. The following discussion develops the main argument with regard to the two sides of the overall debate to find such a perspective.

3 Theory

The argument proposed here is that the effect of average income on average SWB is both direct and mediated through relative income, as the significance of the latter diminishes with higher average levels. The argument implies partial agreement and disagreement with the two sides as outlined above. With regard to the theory inspired by the Easterlin paradox, it agrees that relative income has an autonomous influence distinct from a putative universal income-SWB relationship which would otherwise be reflected in average levels. Yet it disagrees that the average level is largely uninfluential; instead, this may have both a direct effect, albeit possibly dwarfed by that of relative income, and a mediated effect shaping the relationship between relative income and SWB. It follows that, with regard to the critics of the Easterlin paradox, the main argument agrees that there is an underlying log-linear relationship between income and SWB in general, which can explain a possible positive association between average levels and decreasing effects of relative income. However, this is not taken to mean that patterns must be exactly similar for within-country and cross-country observations, nor that the relevance of relative income is a simple reflection of such a universal pattern.

The idea that rising average income brings relatively small increases in SWB and flattening curves for relative income is highly similar to the model proposed by Clark, Frijters and Shields (2008). This idea is further strengthened by the findings that countries with high levels of SWB are also those with less unequal SWB (Fahey and Smyth, 2004), and that economic growth reduces the inequality in SWB (Clark, Flèche and Senik, 2016; Veenhoven, 2005), which can be seen as a corollary of relative income curves getting flatter with narrower ranges of SWB, due to high levels of either average SWB itself or economic development. However, the model proposed by Clark, Frijters and Shields (2008) leaves little room for the direct effect of real and average income, and for an independent

effect of relative income from average income, as given in their equation (p. 100):

$$U = \beta_1 \frac{y}{y + A} + \beta_2 \ln(\frac{y}{\bar{y}})$$

where y denotes real income, $\bar{y}$ national average, and A a positive constant. In their words, "[t]he functional form here is deliberately chosen to ensure that the benefit of an across-the-board proportional rise in income tends to zero as income goes to infinity: a general rise in income leaves the second term unchanged, and has an effect on the first term which tends to zero as income increases" (Clark, Frijters and Shields, 2008, p. 100).

Taking inspiration from the overall form of this model, the aim here is twofold. First, in order to account for a possible direct effect of national average, this will be included as an independent term. While it is not taken as converging to zero, the diminishing returns will be given by a logarithmic form $\beta_1 \ln(\bar{y})$. Understanding relative income as the distance from the average in the form $(y - \bar{y})$, instead of a ratio of it in the form $y/\bar{y}$, will ensure that individual agents in a given distribution will be positioned around this average. Second, the choice of this conception of relative income is crucial for distinguishing its autonomous influence from the mediation of a universal income-SWB relationship. Here the intuition is that multiplying real income with the inverse of average income is analogous to retrieving the slope of the former from a log-linear curve of the latter. More specifically, $\bar{y}$ is constant for a given national distribution but variable across time or countries; if the latter variation occurs along a log-linear curve, $1/\bar{y}$ gives its slope for each specific distribution.

The argument proposed above implies that this slope should be part of the coefficient of relative income to account for the mediated effect of the national average, in addition to a fixed component of the coefficient which stands for the autonomous influence; thus this coefficient can be written as $(\beta_2 + \beta_1/\bar{y})$. Thereby, the overall functional form of the argument will be given as:

$$u(y|\bar{y}) = \alpha + \beta_1 \ln(\bar{y}) + (\beta_2 + \frac{\beta_1}{\bar{y}})(y - \bar{y})$$

where α is a constant, the first non-constant term integrates the direct effect of national average, and the second term represents relative income with a coefficient which is partially fixed and partially dependent on the slope of the first term. This equation is visualized in Figure 1, where the black lines represent the effect of relative income in separate distributions, and the blue curve displays the log-linear relationship alone.

In sum, the main argument of this paper seeks a compromise between the claims in favour of and against the Easterlin paradox by approximating the distribution specific relationships between relative income and SWB, and the overall

Figure 1: Approximation of absolute and relative income curves
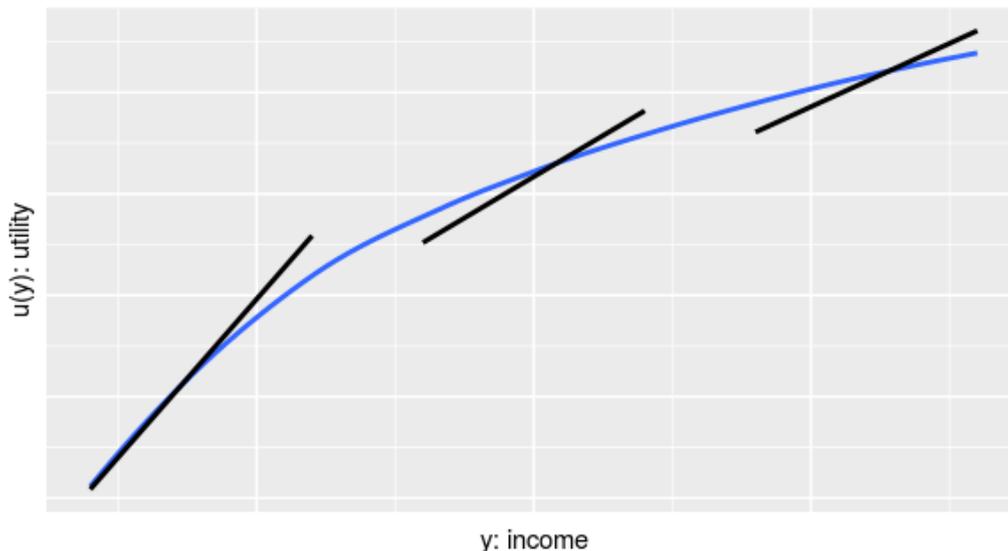
logarithmic relationship between absolute income and SWB. By doing so, it concedes to the Easterlin paradox the idea that there is a fixed component of the coefficient of relative income, and concedes to its critics the idea that average income has direct and indirect effects on SWB. The mediated effect of national average can be seen as a common ground, as it allows the slope of relative income to follow that of absolute income, but it also serves as an explanation for the Easterlin paradox according to Clark, Frijters and Shields (2008). The present argument tilts their model towards the critics of the Easterlin paradox by increasing the vertical differences across relative income curves, but puts a greater emphasis on their fixed and autonomous influence as well. These theoretical discussions will be translated into an empirical strategy in the next section.

4   Empirical strategy

There are some strategic choices to be made before building a statistical model for empirical testing. The first one is concerned with longitudinal and cross-sectional options. As discussed above, these do not constitute perfect substitutes for each other, and longitudinal analyses tend to confirm the Easterlin hypothesis while cross-sectional analyses tend to find the opposite. The main problem with the former is limited availability of data covering sufficiently long periods of time. In particular, the even more restricted availability of individual-level panel data eliminates the possibility of testing in the same model variables measured at individual

and country-levels. In this respect, it is difficult to claim the generalizability of findings beyond a group of countries that can be represented by those where suitable data are available. For this reason, the following discussions will adopt a cross-sectional logic, while it is acknowledged that this may not yield the same results for separate time series. In other words, 'higher income across countries' will not necessarily mean 'rising income in a country'.

The second choice is concerned with fixed-effect or mixed-effect (multilevel, hierarchical) regression models. Since cross-national datasets are built on country-based samples, the problem of non-independence of observations should be addressed in one of these ways. Fixed-effect models are used extensively to study SWB (e.g. Alesina, Di Tella and MacCulloch, 2004; Helliwell and Huang, 2014), but there are several drawbacks associated with them. For instance, country-level indicators, such as average income, are likely to be confounded with the fixed country effects, as documented by Verme (2011) with regard to multicollinearity and high sensitivity of results to the fixed effects. In this respect, mixed-effect models provide a useful alternative, and their use in SWB studies has become increasingly popular (e.g. Ahn et al., 2015; Delhey and Dragolov, 2014). Furthermore, one of the main objectives of the empirical strategy is modelling variable slopes for each country, for which mixed-effect models are better equipped. This focus also constitutes the main contribution of this paper to previous analyses based on multilevel models.

In this respect, the proposed associations will be tested against a null hypothesis that SWB is only shaped by relative income and several other individual factors which have been identified by previous works in the field. Recognizing that part of the random variation can also come from the country-level, the baseline will be set by the following equation estimating well-being (U) with a random-intercept model:

$$U_{ic} = \alpha + \beta r_{ic} + \sum_n \zeta_n X_{n,ic} + \upsilon_c + \varepsilon_{ic} \tag{1}$$

where subscripts denote individual i from country c, the variable r is relative income, X represents n control variables, υ is country-level error term resulting in varying intercepts and ε is the individual-level error term. On this basis, the first step will be testing the significance of the country-level indicator of interest given by y for average income:

$$U_{ic} = \alpha + \beta r_{ic} + \gamma \ln(y_c) + \sum_n \zeta_n X_{n,ic} + \upsilon_c + \varepsilon_{ic} \tag{2}$$

While this model provides a preliminary test for the direct effect of average income, considering this alongside the mediated effect will require variable coefficients of relative income across countries, hence rewriting β as $\beta_c = \hat{\beta} + \hat{\upsilon}_c$, where

$\hat{v}_c$ introduces the random slopes to the model. Additionally, the effect of relative income is conceptualized as depending on average income as well, which expands the equation to $\beta_c = \hat{\beta} + \theta \ln(y_c) + \hat{v}_c$. Incorporating this with the equation (2) will result in an interaction term in the fully specified model:

$$U_{ic} = \alpha + \hat{\beta} r_{ic} + \gamma \ln(y_c) + \sum_n \zeta_n X_{n,ic} + \theta \ln(y_c) r_{ic} + \hat{v}_c r_{ic} + v_c + \varepsilon_{ic} \quad (3)$$

In this sense, the main argument will be tested with respect to the following estimates: $\hat{\beta}$ should remain positive and significant to show that relative income has an autonomous influence even after other aspects of income are accounted for; γ should also be positive and significant to show the direct effect of average income, but it should be relatively small as one can expect with regard to the contentious findings in previous studies; and θ should be negative to show that the overall effect of relative income decreases with higher values of the average.

5   Data and variables

The sixth wave (2010-2014) of World Values Survey (WVS, 2016) will be used to test the model proposed above. In addition to general requirements of data quality, this dataset satisfies two particularly important conditions: a reasonable degree of variation in average income, and a sufficiently large number of countries. For the first condition, although Deaton (2008) does not find WVS fully adequate due to the underrepresentation of lower income countries, the sixth wave corrects this shortcoming to a certain extent. More importantly, WVS is more accessible than alternative options, such as Gallup World Poll, and thus more widely used in SWB studies. Since the main motivation of this paper is to offer an additional perspective to the existing debates, the reliability of which can be tested with different datasets, the more accessible and widely used option will be the reasonable choice.

For the second condition, one of the often ignored methodological requirements of multilevel modelling is that the number of countries should conform to general sample size standards (Snijders and Bosker, 1999, p. 140). According to more definite estimates of this sample size, the absolute minimum for a simple multilevel model should be around 25 countries, and higher for more complex models (Bryan and Jenkins, 2016). Since the proposed model includes a country-level variable, random slopes and a cross-level interaction term, the target should be somewhat above 25. The sixth wave of WVS contains representative samples from 60 countries (although two will be dropped due to missing variables), which can be taken as satisfactory with regard to the degree of complexity of the tested model.

Existing studies increased the number of country-level observations in several ways. One option is appending European Values Survey data into WVS (e.g. Rözer and Kraaykamp, 2012), which biases the sample towards Europe and high-income countries. Another option is focusing only on WVS but using all waves (e.g. Bjørnskov, Dreher and Fischer, 2010), which biases the sample towards the countries which take place in a higher number of waves. The added value of this strategy is also dubious due to low variability for each country across time or similarity of time trends across countries (Verme, 2011, p. 126). Finally, a usually underplayed issue with the earlier waves of WVS, to which Stevenson and Wolfers (2008) draws attention, is that not all national samples were representative, since mostly urban and more affluent citizens of lower income countries were interviewed during these surveys (pp. 13-14).

As for the particularities of variables, first, life satisfaction will be preferred as a measure of SWB over happiness, or over an index combining the two, while both options are available in WVS data. This strong preference is due to its likelihood of being derived from more stable and less momentary evaluations. For example, it is found more strongly associated with material variables (Diener et al., 2010), with indicators derived from the capabilities approach as opposed to a strictly hedonistic understanding (Anand, Krishnakumar and Tran, 2011), and with income (Kahneman and Deaton, 2010; Krueger and Schkade, 2008). Although it is not a perfect substitute for experienced utility, it provides a better approximation for these reasons. It is measured on a scale of 1-10, higher values meaning more satisfaction, which provides a large enough range to treat the measurement as numeric rather than ordered. Following van Praag and Ferrer-i-Carbonell (2008), it is assumed that respondents make the necessary cardinal judgements when answering the question, and the numerical value of their expressed satisfaction is meaningful enough that further cardinalization is not essential. Thus the models will be built on linear regression.

The income of respondents is also reported on a scale of 1-10, constructed with nationally defined brackets. Thus each value gives the decile of individual income within the respective national distribution. This measurement will be taken to represent relative income. Although relativity can be understood in terms of comparison with a reference point which is not necessarily the same for everyone living in a country, the argument advanced in this paper is concerned with relativity in terms of the national average. In this sense, the decile-type measurement will be taken as the normalized distribution of relative income according to national reference points. The real levels of individual income could also have been included by simulating these through known national parameters. However, one of these parameters, the national average, is already included in the model; for this reason, this practice is not adopted in order to avoid any confounding effect. For the average, the analysis will follow the standard practice in using the

purchasing power parity-based GDP per capita, as reported by the World Bank.

Finally, regarding control variables, the aim is to build a model as extensively as possible, since ecological correlation may influence the relative strength of individual and national incomes (Ma and Zhang, 2014). The studies of SWB are not limited to its relationship with income, and many other individual and social factors are found to be associated with well-being. These include health, employment status, personal autonomy, social trust/capital, trust in institutions, demographics, etc. (e.g Dolan, Peasgood and White, 2008; Helliwell, 2003; Helliwell and Putnam, 2004; Inglehart et al., 2008; Layard, 2005), which can be found in the survey data with individual-level measurement. These factors are arguably interrelated to income, and the direction of causality may be in either direction. In this sense, their inclusion in the model as control variables will serve the purpose of accounting for other indirect effects of income on SWB. For example, in addition to the variables adopted from previous studies, subjective perception of social class is included to control for one's position in society, so that income ranks more clearly represent the comparisons made in monetary terms; and similarly education level is included to control for possible ways in which agents can translate income into social status. No country-level controls are used, mostly because the low number of countries would damage the reliability of estimates with additional variables. Instead, the relevance of unobserved country characteristics can be informally deduced from the extent of random effects.

6   Analysis

The main argument will be evaluated by testing how well the specified model fits with the data from the WVS sixth wave. The results of the multilevel linear models are summarized in Table 1. The table initially presents an empty 'variance component model' in the first column to differentiate the random variation in individual and country levels. The equation (1) follows in the second column with only individual level fixed effects, and the equation (2) in the third column introduces the country-level fixed effect of GDP per capita. The only difference in the fourth column is random slopes for relative income. The fifth column presents the full model as specified by equation (3), with the addition of the cross-level interaction term. The model goodness of fit is assessed by comparing the difference in deviance statistics between each model and the previous one. Since all comparisons return statistically significant χ^2, the full model can be endorsed as providing an important improvement in explanatory power as compared to smaller models.

To begin with the variance component model, approximately 11% of the total random effects is due to the country-level variance, which indicates the adequacy

Table 1: Mixed-effect linear models, DV: life satisfaction

	Model 1: Random intercepts		Model 2: Random intercepts (1)		Model 3: Random intercepts (2)		Model 4: Random int.s & slopes		Model 5: Cross-level interaction	
Variance component	Variance	Coefficient estimate	Variance	Coefficient estimate	Variance	Coefficient estimate	Variance	Coefficient estimate	Variance	Coefficient estimate
Random effects										
Country intercept	0.104		0.061		0.054		0.052		0.049	
Income slope							0.008		0.007	
Residual	0.853		0.671		0.671		0.664		0.664	
Intercept-slope correlation							-0.72		-0.70	
Fixed effects										
Intercept		0.02		0.10 **		0.10 **		0.10 **		0.10 **
Income rank (1-10)				0.14 ***		0.14 ***		0.15 ***		0.15 ***
GDP per capita (log scale)						0.08 *		0.03		0.08 **
Interaction: income × GDP										-0.03 **
Health (ref: Good)										
—Very Good				0.19 ***		0.19 ***		0.19 ***		0.19 ***
—Fair				-0.24 ***		-0.24 ***		-0.24 ***		-0.24 ***
—Poor				-0.57 ***		-0.57 ***		-0.55 ***		-0.55 ***
Employment (ref: Full time)										
—Part time				-0.02 *		-0.02 *		-0.02 *		-0.02 *
—Self employed				-0.02 *		-0.02		-0.02 *		-0.02 *
—Retired				0.00		0.00		0.01		0.01
—Housewife				0.06 ***		0.06 ***		0.05 ***		0.05 ***
—Student				0.08 ***		0.08 ***		0.08 ***		0.08 ***
—Unemployed				-0.07 ***		-0.07 ***		-0.06 ***		-0.06 ***
—Other				-0.01		-0.01		-0.01		-0.02
Education (ref: Secondary)										
—Below primary				0.03 *		0.03 **		0.02		0.02
—Primary				0.01		0.01		0.01		0.01
—University				0.02 *		0.02 *		0.02 *		0.02 *

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Table 1 — *continued from previous page*

	Model 1: Variance component	Model 2: Random intercepts (1)	Model 3: Random intercepts (2)	Model 4: Random int.s & slopes	Model 5: Cross-level interaction
Social class (ref: Lower middle)					
—Upper		0.04 *	0.04 *	0.04 *	0.04 *
—Upper middle		0.03 ***	0.03 ***	0.03 **	0.03 **
—Working		-0.03 ***	-0.03 ***	-0.02 **	-0.02 **
—Lower		-0.13 ***	-0.13 ***	-0.10 ***	-0.10 ***
Personal autonomy (1-10)		0.24 ***	0.24 ***	0.24 ***	0.24 ***
Social trust (1-10)		0.08 ***	0.08 ***	0.08 ***	0.08 ***
Political confidence (ref: Not much)					
—Great deal		0.11 ***	0.11 ***	0.10 ***	0.10 ***
—Quite		0.05 ***	0.05 ***	0.05 ***	0.05 ***
—None		-0.06 ***	-0.06 ***	-0.05 ***	-0.05 ***
Sex (ref: Female)					
—Male		-0.05 ***	-0.05 ***	-0.05 ***	-0.05 ***
Living with partner (ref: Yes)					
—No		-0.12 ***	-0.12 ***	-0.12 ***	-0.12 ***
Age		-0.23 ***	-0.23 ***	-0.22 ***	-0.22 ***
Age-squared		0.25 ***	0.25 ***	0.25 ***	0.25 ***
Number of observations	78,772	78,772	78,772	78,772	78,772
Number of countries	58	58	58	58	58
χ^2 (difference in deviance)		18,941 ***	6.499 *	673.16 ***	7.331 **
		(df=27)	(df=1)	(df=2)	(df=1)

Notes: (1) Reported estimates are standardized
(2) Significance codes: ***$p < 0.001 <$ **$p < 0.010 <$ *$p < 0.050$
(3) Significance levels are derived from t-values and degrees of freedom based on Satterthwaite approximation

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of using mixed-effect models. Next, the introduction of individual-level variables in Model 2—relative income and a list of controls—reduces country-level as well as individual-level random effects. Thereby, the variation of SWB across countries is partly due to the differences represented by the control variables. Continuing the examination of random effects with income-related variation, first, the introduction of GDP per capita in Model 3 results in a further decrease in the country-level variance. Second, allowing random slopes for relative income in Model 4 brings a slight decrease in the variance of intercepts, but the total country-level random effects are approximately at the same level as Model 2: 0.060 and 0.061 respectively. In other words, the increase in the random effects due to varying slopes is more or less equivalent to the decrease which was brought by the introduction of GDP per capita as a fixed effect. Finally, the fact that cross-level interaction term reduces this level back to 0.056 testifies to the visible, albeit small, association between random slopes and national averages.

As for the fixed effects, the results for individual-level variables largely conform to the findings of existing studies: with the exception of education, variables representing health, employment, social class, personal autonomy, social trust, trust in political institutions, and demographics are all significant determinants of SWB, and the coefficients retain their significance in further model specifications. Regarding the main independent variable of interest, relative income displays a strong relationship with SWB as one standard deviation change in income rank is associated with approximately 0.15 standard deviation change in life satisfaction. However, when compared with other individual-level variables, income is not necessarily the most important one.

For example, to compare it with the variables measured at the same scale, although the coefficient of income is larger than that of social trust (0.08), it is considerably smaller than that of personal autonomy (0.24). Among categorical variables, subjective health displays a straightforward pattern; the worse one's health gets, the larger are the SWB losses (0.19, 0.24 and 0.33 from very good to poor). Each change in the ladder is larger than what is accounted for by one standard deviation of relative income. For employment, not seeking work (housewives and students) has a positive impact and being unable to find work (unemployed) has a negative impact of similar magnitudes as compared to being in full employment, and this level is half as much as what one standard deviation of relative income brings. The change associated with each category of social class is even smaller, except for the lowest class whose difference from lower middle is comparable to one standard deviation of relative income. The effect of the confidence in political institutions is quite monotone with approximately 0.06 standard deviation for each category. Regarding demographics, the difference between biological sexes is 0.05, while living with a partner has an effect comparable with one standard deviation of relative income. Finally, the negative coefficient of age and the positive

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coefficient of age-squared with almost equal magnitudes reaffirms its U-shaped relationship with life satisfaction.

The triangular relationship among life satisfaction, income rank and GDP per capita implies interesting patterns. First, when GDP per capita is added alone, it yields a significant coefficient; although this finding is not compatible with a strict interpretation of the Easterlin paradox, it is expected and unsurprising in cross-sectional analysis. Yet it should be remarked that the coefficient of GDP per capita is considerably smaller than that of income rank (0.08 and 0.14 respectively), suggesting that within-country income differentials are more important than cross-national ones. Second, when the slopes of income rank are allowed vary, the impact of GDP per capita is reduced to insignificant levels (0.03); this can be interpreted as the random effect of varying slopes and the fixed effect of average income corresponding more or less to the same cross-country variation. Furthermore, the large and negative correlation between random slopes and intercepts shows that relative income regression lines are flatter when they are positioned at vertically higher levels.

The cross-level interaction term is intended to test if a similar pattern can be observed for GDP per capita as well, and the significant and negative coefficient confirms that relative income curves get slightly flatter at higher levels of average income. It should also be remarked that the main term for GDP per capita reverts back to its original level: once the mediated effect of average income is accounted for, a significant direct effect can still be observed. Therefore, overall, the data confirm all posited associations between income and SWB: relative income has an autonomous direct (fixed) effect, and average income is still relevant partly because it also has a direct effect, and partly because it shapes the country-specific relationships between relative income and SWB.

7 Discussion

While the full model displays the expected properties, it remains to discuss how well the empirical results at each stage of model specification conform to the theoretical reasoning. First, it is argued that average income could have a direct effect on SWB, thus it would partially determine the vertical differences among relative income curves. This corresponds to the addition of GDP per capita as a fixed effect by Model 3 to explain some part of the random intercepts of Model 2. This reasoning is valid insofar as the intercepts are positively correlated to the respective values of GDP per capita, since a positive effect of the latter on SWB is expected. While this is confirmed by the significant coefficient of GDP per capita in Model 3, Figure 2 enables the examination of the distribution of countries in further detail.

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Figure 2: Random intercepts and GDP per capita
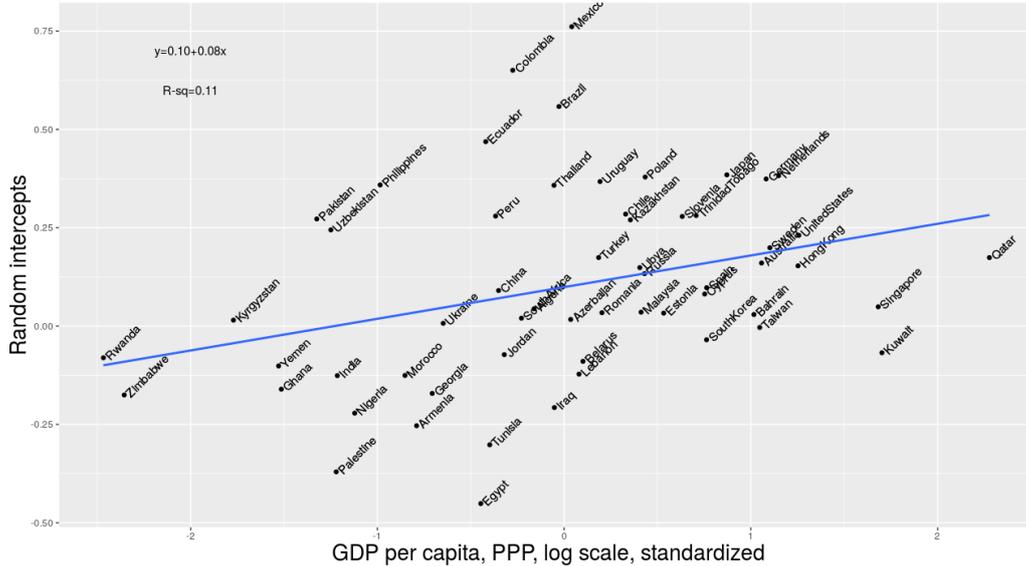
The linear fit as presented in this figure yields a standardized coefficient of 0.33 (not reported in the figure); one standard deviation change in GDP per capita accounts for one-third standard deviation change in the intercepts. However, there are several cases which clearly display large residuals. Above the regression line, four Latin American countries have unusually large intercepts: Mexico, Colombia, Brazil, Ecuador. This observation confirms several studies which have already found that the SWB levels reported in Latin American countries tend to be higher than what is predicted by global models. Meanwhile, Peru and Chile are closer to the predicted values, and there is no clear pattern within this group. Below the regression line, five Middle-Eastern countries have relatively large negative residuals: Egypt, Palestine, Tunisia, Iraq and Kuwait. However, given smaller residuals of other countries which are similar to them in terms of geographic, social and economic characteristics, a regional or cultural pattern cannot be readily inferred. Yet ongoing civil conflicts and political instability are among possible explanations for unusually lower levels of SWB. Overall, average income explains only part of the international differences in SWB, and the remaining variation is likely to result from unobserved national or regional characteristics.

Second, it is argued that average income could have a mediated effect on SWB, thus it would partially determine the slope of relative income curves. This corresponds to the addition of the cross-level interaction term by Model 5 to explain part of the random intercepts of Model 4. This reasoning is valid insofar as the slopes are negatively correlated to the respective values of GDP per capita, since the latter is conceptualized in terms of diminishing returns. While this is con-

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firmed by the significant coefficient of the interaction term in Model 5, Figure 3 can be used for further examination of how countries are distributed.

Figure 3: Random slopes and GDP per capita
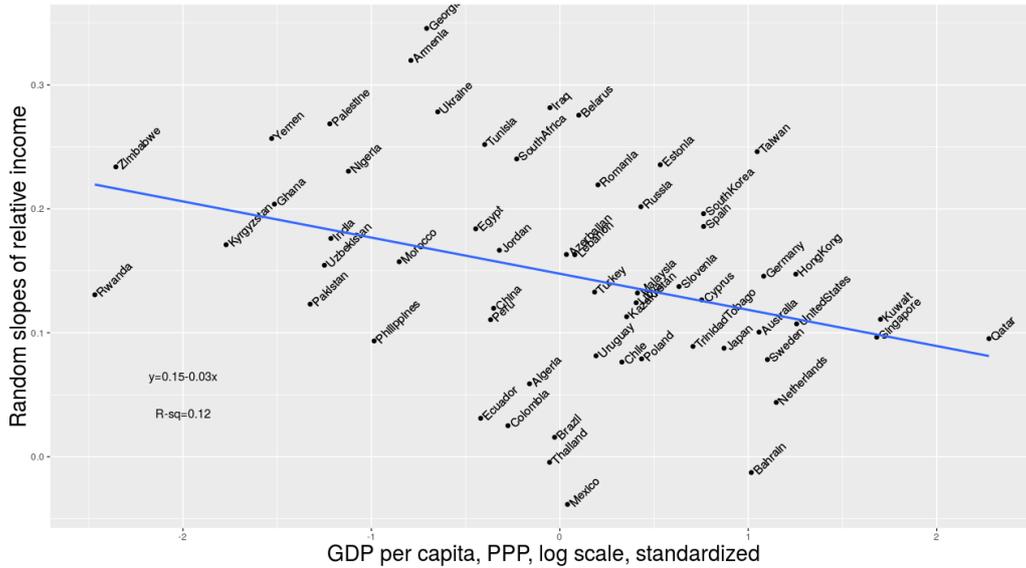
The standardized coefficient of this linear fit is -0.34 (not reported in the figure); similarly to above, one standard deviation change in GDP per capita accounts for approximately one-third standard deviation change in the slopes in the opposite direction. Again similarly, there are country groups which display large residuals. The same four Latin American countries are grouped together in this plot as well, sharing the common feature of having flat relative income curves. When this is considered together with their distinctively high intercepts, they constitute the cases which embody the relationship between high levels of SWB and low inequality in SWB which is probably reflected in flat curves. On the other side, four ex-Soviet countries can be taken as a group of steep relative income curves: Georgia, Armenia, Ukraine and Belarus. Since there are other ex-Soviet countries in the sample with a closer conformity to the general pattern, it is difficult to decide the extent to which the shared historical context is responsible for this similarity. Yet it should be reiterated that unobserved national or regional characteristics can be taken as the reason for this degree of dispersion.

Finally, considering random slopes and intercepts together, Figure 4 displays a plot comparable to Figure 1 which embodies an idealized form of the main argument. In this plot, countries are horizontally positioned according to their real GDP per capita values, and vertically positioned according to their random intercepts and GDP per capita values in log scale multiplied by the coefficient from Model 5. The blue line represents the log-linear fit, and each black line

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segment takes random slopes from respective countries.

Figure 4: GDP per capita with Random intercepts and slopes
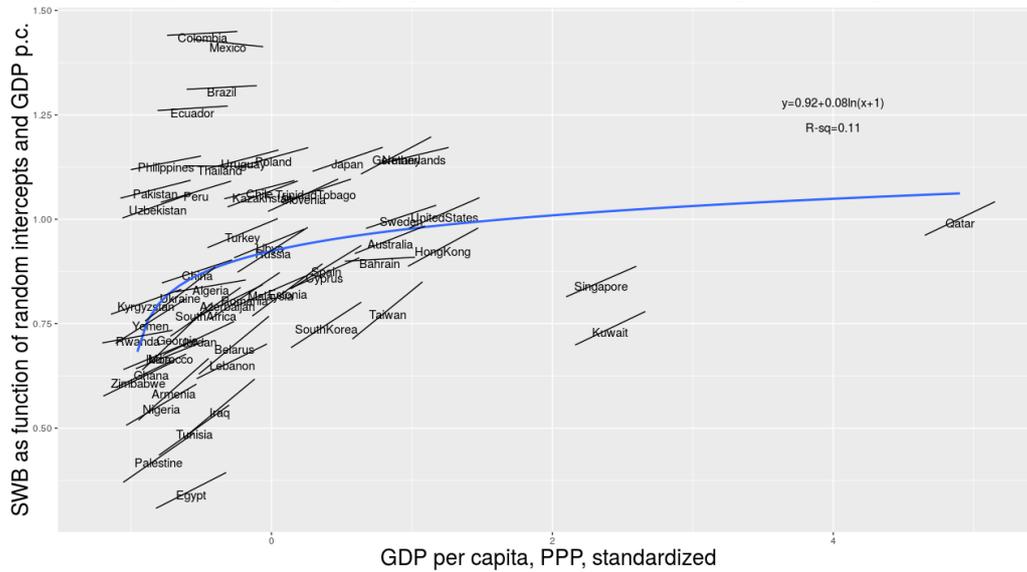
The comparison with the idealized form of the argument naturally reveals visible discrepancies. First, the vertical differences among countries at similar levels of economic development are still quite large. This observation suggests that the logarithm of GDP per capita accounts for only a small portion of direct country effects, and the rest constitutes random intercepts. Thus it marks the first point of compromise for the main debate in the literature: the relationship between average income and average SWB is relatively weak, yet to a certain degree it exists. Second, in a considerable number of cases, the country-specific slopes do not reflect the slope of the log-linear curve. This observation points to the limitation of taking the inverse relationship between GDP per capita and slopes of relative income as the mediated effect of the former. Thus it also marks the second point of compromise: relative income curves tend to flatten as GDP per capita increases, but it is also true that there is a fixed component in their slopes and that cross-national differences in these slopes are not fully accounted for by GDP per capita.

8   Conclusion

To summarize, this paper offered a compromise between two accounts, one which accepts the main premises of the Easterlin paradox and one which refuses them. It has argued that while there is a limited direct effect of average income, this also shapes the relationship between relative income and SWB although relativity has

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a fixed and autonomous component. Analysing the latest wave of WVS with a mixed-effect model, the results confirm this argument. However, further examinations of direct and mediated effects reveal that there is a considerable amount of cross-national variation that GDP per capita cannot explain. This is especially true for middle-income economies, but despite this variation, the link between the level of SWB and the slope of relative income curve seems to hold. Thus, one of the main implications of this finding is that providing overall higher SWB is usually analogous to closing the gap between low and high levels of SWB, and higher average income can partially serve this purpose.

Furthermore, when the countries which returned unusually high or low statistics are discussed, these can be reasonably linked to certain geographic, cultural and historical commonalities. Thereby, some national characteristics, including both economic and non-economic factors, may account for the remaining variation. Several implications for future research follow from this conclusion. For economic characteristics, a relevant country-level indicator is inequality, being a key feature of income distribution, and there is a long tradition on its relationship with SWB (e.g. Morawetz et al., 1977 as an early study), but the findings are even more inconclusive, varying between negative, insignificant and positive effects (see Schneider, 2016 for a recent review). The possibilities that its effect may have the form of an inverted U-shaped curve (Senik, 2004; Wang, Pan and Luo, 2014), and that it may be mediated by a variety of factors (Alesina, Di Tella and MacCulloch, 2004; Senik, 2005), make income inequality a particularly challenging variable to include in standard models. But these also mean that conditional effects of inequality can make useful contributions to models such as the one analysed in this paper.

As for non-economic variables, political factors can potentially contribute to the explanation of SWB. Earlier studies, such as those conducted by Helliwell and Huang (2008), Inglehart et al. (2008) and Radcliff (2001) confirm the relevance of democracy, good governance and social tolerance for SWB, and the list can be extended to many other political factors. However, with limited number of countries in the world and due to general limitations of data availability, it will not be possible to test extensive models. Additionally, as the comparability of political factors across countries is usually problematic, ways to analyse cross-national differences in well-being at sub-national levels of analysis should also be considered.

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