

Statistical Appendix 3 for Chapter 2 of World Happiness Report 2020

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Contents

| | | |
|----------|--|-----------|
| 1 | Gallup World Poll | 3 |
| 1.1 | Defining measures of well-being inequality | 3 |
| 1.2 | Comparing inequality measures | 9 |
| 1.3 | Regression specification details | 12 |
| 1.4 | Full regression results and alternative specifications | 13 |
| 2 | European Social Survey | 22 |
| 2.1 | Modeling the social environment | 22 |
| 2.1.1 | Variable definitions and binary form cutoffs | 23 |
| 2.1.2 | Full regression results | 25 |
| 2.1.3 | Comparing the model fit of scale and binary determinants | 28 |
| 2.1.4 | Heterogeneity by gender | 31 |
| 2.2 | Well-being inequality | 34 |
| 2.2.1 | Descriptive statistics and figures | 34 |
| 2.2.2 | Comparing inequality measures | 39 |

List of Tables

| | | |
|----|---|----|
| 1 | Summary statistics: Well-being inequality in the GWP | 4 |
| 2 | Explanatory power of well-being inequality in a sparse specification comparable to Goff et al. (2018) Table 4, Column 4 | 10 |
| 3 | Explanatory power of well-being inequality in a rich specification comparable to <i>World Happiness Report 2020</i> Table 2.2 | 11 |
| 4 | Panel-level regressions from Table 2.1 plus well-being inequality . . . | 13 |
| 5 | Micro-level regressions comparable to Table 2.1 plus well-being inequality | 16 |
| 6 | Alternative regressions involving inequality in the micro-level GWP data | 19 |
| 7 | Full results for regression in <i>World Happiness Report 2020</i> Table 2.3 . | 25 |
| 8 | Binary vs scale ESS determinants | 28 |
| 9 | ESS results by gender | 31 |
| 10 | Summary statistics: Well-being inequality in the ESS | 34 |
| 11 | Explanatory power of well-being inequality in a sparse specification comparable to Goff et al. (2018) Table 4, Column 4 | 40 |
| 12 | Explanatory power of well-being inequality in a rich specification from <i>World Happiness Report 2020</i> Chapter 2, Table 2.3 | 40 |
| 13 | Alternative regressions with inequality in the micro-level ESS data . . | 41 |

List of Figures

| | | |
|---|---|----|
| 1 | Frequency of country-year percentiles at limits of response scale (0 or 10) (GWP) | 5 |
| 2 | Country-year average life evaluation, by standard deviation (GWP) . | 6 |
| 3 | Country-year average life evaluation, by P80/P20 ratio of reported values (GWP) | 7 |
| 4 | Country-year average life evaluation, by P80/P20 ratio of predicted values (GWP) | 8 |
| 5 | Frequency of country-year percentiles at limits of response scale (0 or 10) (ESS) | 35 |
| 6 | Country-year average life evaluation, by standard deviation (ESS) . . | 36 |
| 7 | Country-year average life evaluation, by P80/P20 ratio of reported values (ESS) | 37 |
| 8 | Country-year average life evaluation, by P80/P20 ratio of predicted values (ESS) | 38 |

1 Gallup World Poll

1.1 Defining measures of well-being inequality

The *World Happiness Report 2016 Update* introduced into these reports the analysis of well-being inequality as measured by the standard deviation of life evaluations. Since then, research on well-being inequality has suggested that the standard deviation may not be the best-suited statistic for describing dispersion in the distribution of life evaluations. Goff et al. (2018) estimate that up to one third of the correlation between the standard deviation and average of life evaluations may be a mechanical effect driven by the censored nature of life evaluation scales. Ratios of percentiles have been suggested as a more representative measure (Nichols & Reinhart, 2019). This Appendix provides preliminary evidence on the suitability of a range of percentile ratio measures. Within each country-year combination in the Gallup World Poll from 2005 through 2018, we calculate the following statistics:

- **Standard deviation** This previous benchmark measure tends to be largest for country-years in which the average life evaluation is near the center of the reporting scale, and smaller when the average life evaluation is very high (or very low), because extremely happy (and extremely unhappy) people cannot report life evaluations higher than 10 (or lower than 0). This mechanical relationship may bias estimates of the relationship between well-being and inequality.
- **Adjusted percentile ratios** We consider 4 percentile ratios representing well-being inequality within a given country-year: the 95th percentile life evaluation divided by the 5th percentile life evaluation, the 90th by the 10th, the 80th by the 20th, and the 75th by the 25th. Since each percentile is the actual self-reported life evaluation for some individual, both numerator and denominator can potentially take any value in the reporting scale, i.e. any value from 0 to 10. To avoid dividing by 0, we adjust the denominator value to 1 in any country-year in which the low percentile value is 1.¹
- **Ratio of top & bottom quintile means** We also consider the ratio of the mean life evaluation in the top quintile to the mean life evaluation in the bottom quintile. This avoids the dividing by 0 problem except in rare cases, which we adjust as described for the ratios of percentiles. Nichols & Reinhart (2019) offer an alternative approach to this problem, putting an upper bound of 11 on the same ratio, which we do not test here.

Next, we create a version of the model in Table 2.1 suitable for individual-level regressions, and use it to predict individual-level life evaluations. Using these fitted values, we then recalculate the above measures of inequality. This approach offers two important advantages over the use of reported life evaluations. First, since the distribution of fitted values is continuous rather than being limited to whole numbers,

¹See the orange columns in [Figure 1](#) for the number of times we need to make this adjustment for each of the ratios we analyze.

Table 1: Summary statistics: Well-being inequality in the GWP

| | (1) | | | (2) | | |
|--------------------------------------|-----------------|-------|--------|---------------|-------|-------|
| | Reported values | | | Fitted values | | |
| | Mean | Min | Max | Mean | Min | Max |
| Standard deviation | 2.011 | 0.863 | 3.719 | 0.538 | 0.292 | 1.014 |
| P95/P05 ratio | 5.417 | 1.500 | 10.000 | 1.394 | 1.166 | 2.232 |
| P90/P10 ratio | 3.531 | 1.286 | 10.000 | 1.289 | 1.121 | 1.931 |
| P80/P20 ratio | 2.050 | 1.143 | 10.000 | 1.178 | 1.073 | 1.588 |
| P75/P25 ratio | 1.728 | 1.000 | 8.000 | 1.140 | 1.053 | 1.443 |
| Ratio of top & bottom quintile means | 3.862 | 1.377 | 42.715 | 1.325 | 1.178 | 1.966 |
| Country-year observations | 1,516 | | | 1,516 | | |
| Number of countries | 157 | | | 157 | | |

Note: Values calculated at the country-year level.

we eliminate both problems that stem from the censored nature of the life evaluation scale.² Second, inequality measures generated from the predicted value distribution are comparable across predicted counterfactual distributions such as those discussed in the social environment section of Chapter 2. These fitted-value inequality measures thus allow us to quantify the change in inequality under the counterfactuals.

Table 1 reports the means of our 6 measures of inequality in both the reported and predicted distributions of life evaluations. The table also reports the minimum and maximum values taken by each measure in order to convey the range of values across the 157 countries and 14 years in our panel of countries.³

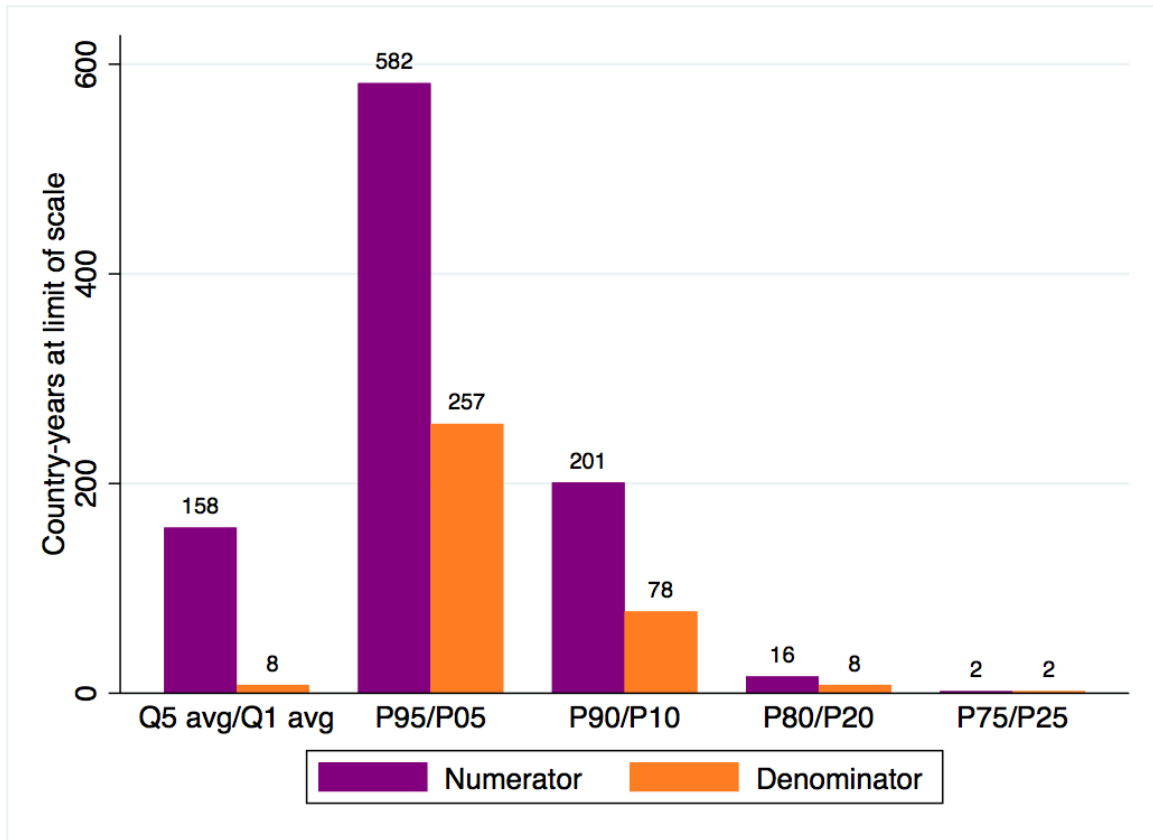
Figure 1 indicates, for each ratio we analyze, the number of country-years in which either the numerator or the denominator takes the most extreme value on the reporting scale. For example, the first pair of columns indicates that the mean top-quintile respondent reports a life evaluation of 10 in 158 country-years, and the mean bottom-quintile respondent reports a life evaluation of 0 in 8 country-years. A large number of such observations suggests that using the inequality statistic in question may bias our estimate of the relationship between well-being and inequality. The figure thus provides preliminary evidence that the quintile ratio, the P95/P05 ratio, and the P90/P10 ratios may be problematic, while our concern is substantially lessened in the cases of the P80/P20 and the P75/P25 ratios.

Figures 2 to 4 plot the relationship between country-year average life evaluations and the three measures of inequality on which we focus: standard deviation, the P80/P20 ratio of reported values, and the P80/P20 ratio of predicted values. A comparison of **Figures 3 and 4** shows the how the use of the predicted rather than

²First, since life evaluations are not in principle bound by the limits of the response scale, the standard deviation of fitted values is not mechanically correlated with average well-being. In practice, the distribution of the fitted values fits within the usual response scale, as show in Figure 2.5, Panel D. Second, no individual will be predicted to have a life evaluation of exactly zero, so the denominator adjustment is unnecessary.

³We include observations from an additional 8 countries in our micro-level regressions.

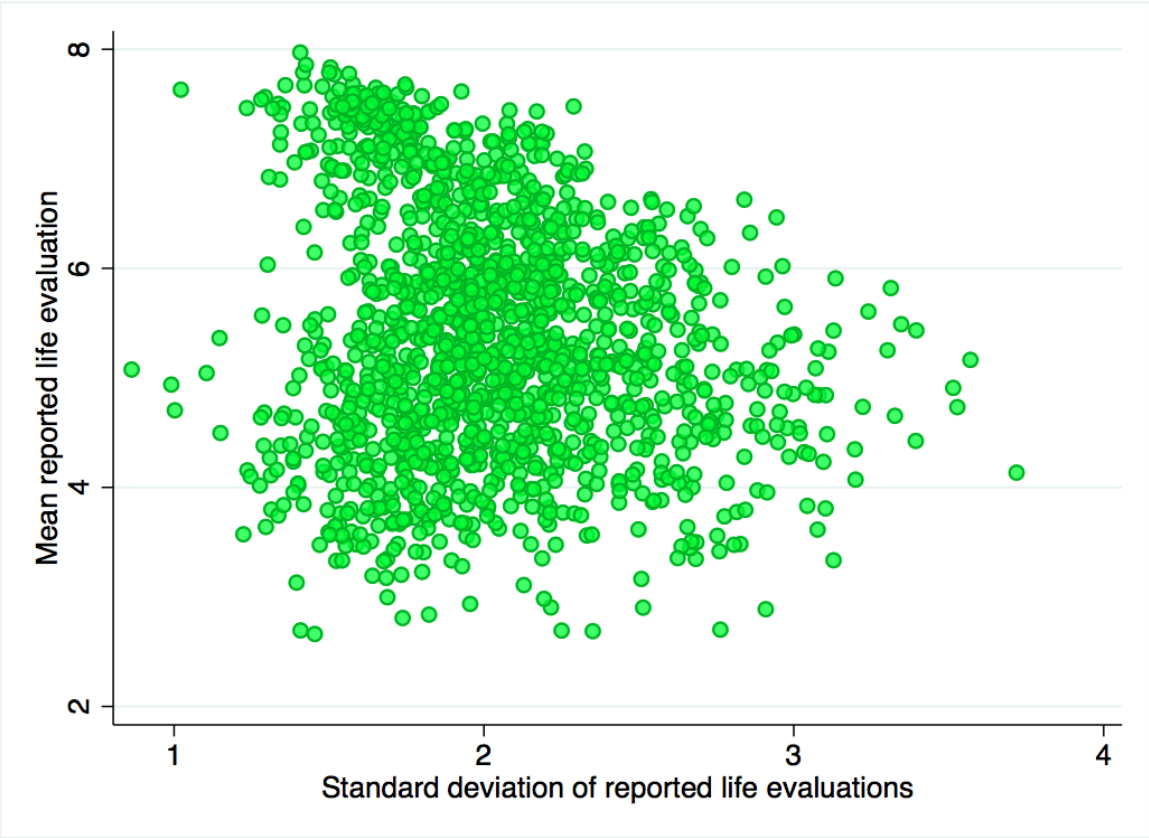
Figure 1: Frequency of country-year percentiles at limits of response scale (0 or 10) (GWP)



Notes: Q5 and Q1 refer to the top and bottom quintiles, respectively. Counts drawn from the 1,516 country-years in [Table 1](#).

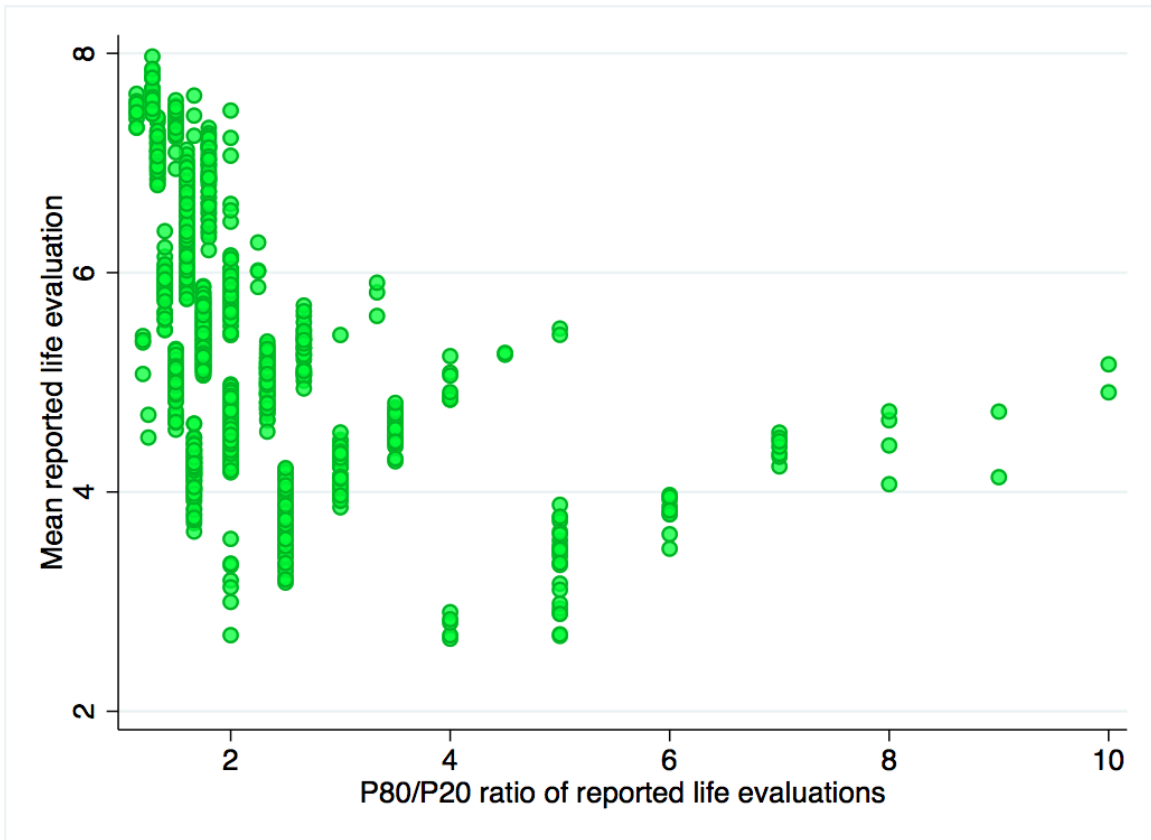
reported values generates a more continuous distribution of inequality across country-years.

Figure 2: Country-year average life evaluation, by standard deviation (GWP)



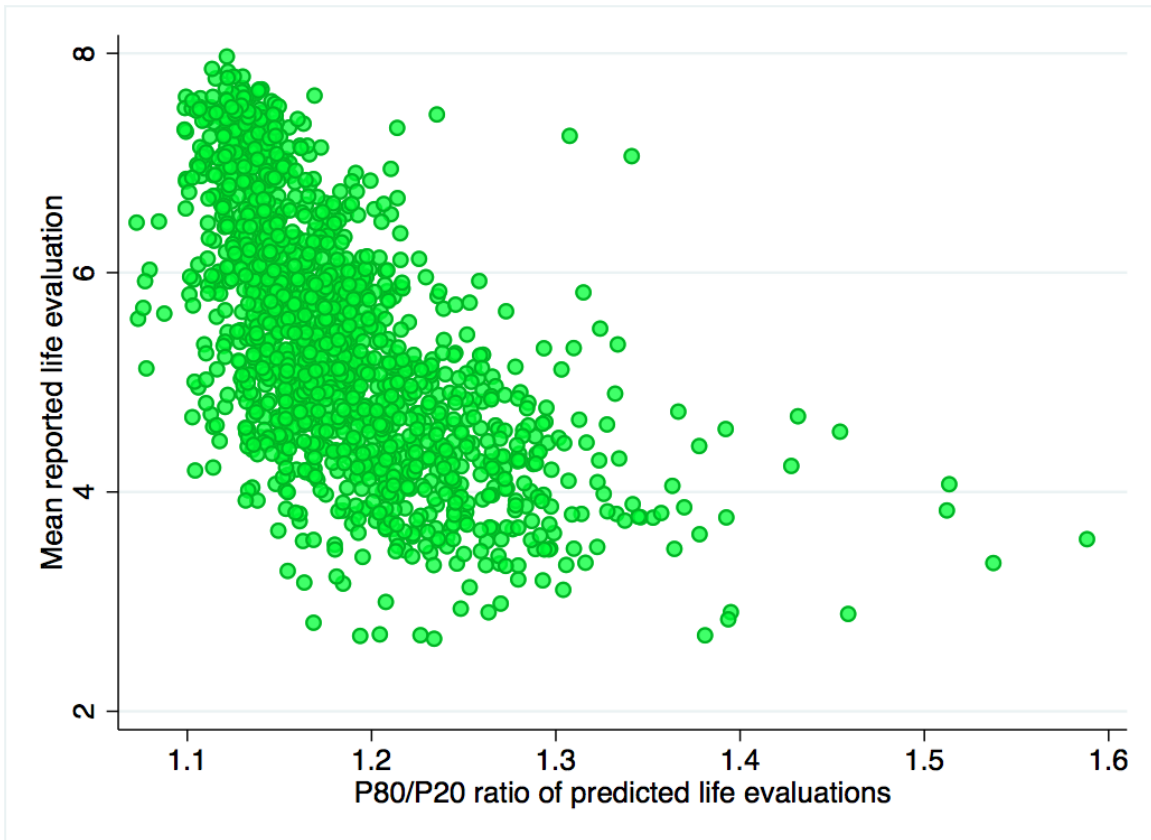
Note: Values calculated at the country-year level, with 1,516 country-year observations.

Figure 3: Country-year average life evaluation, by P80/P20 ratio of reported values (GWP)



Note: Values calculated at the country-year level, with 1,516 country-year observations.

Figure 4: Country-year average life evaluation, by P80/P20 ratio of predicted values (GWP)



Note: Values calculated at the country-year level, with 1,516 country-year observations.

1.2 Comparing inequality measures

Tables 2 and 3 report 3 measures of the explanatory power of each inequality measure in a sparse and a rich model, respectively. In each table, Panel (a) reports results in the individual-level micro data, and Panel (b) reports results at the country-panel level used in Chapter 2, Table 2.1.

Table 2 results are taken from regressions on a relatively sparse set of independent variables comparable to the analysis of the Gallup World Poll undertaken in Goff et al. (2018). Table 3, in contrast, uses the model underlying Table 2.1 (and, in the micro-data case, the individual-level analogue model that we use to generate predicted values).

Table 2: Explanatory power of well-being inequality in a sparse specification comparable to Goff et al. (2018) Table 4, Column 4

(a) Micro data

| | (1) | | | (2) | | |
|-------------------------|-----------------|---------------|--------|---------------|---------------|--------|
| | Reported values | | | Fitted values | | |
| | Std beta | <i>t</i> stat | Adj R2 | Std beta | <i>t</i> stat | Adj R2 |
| Standard deviation | -0.016 | -1.884 | 0.220 | -0.042 | -6.830 | 0.220 |
| P95/P05 ratio | -0.066 | -10.396 | 0.221 | -0.050 | -7.229 | 0.220 |
| P90/P10 ratio | -0.066 | -8.112 | 0.221 | -0.052 | -7.118 | 0.220 |
| P80/P20 ratio | -0.053 | -5.235 | 0.221 | -0.058 | -8.026 | 0.221 |
| P75/P25 ratio | -0.060 | -5.994 | 0.221 | -0.051 | -6.949 | 0.220 |
| Top/bottom quint means | -0.056 | -7.429 | 0.222 | -0.051 | -7.335 | 0.213 |
| Individual observations | 1,968,596 | | | 1,968,596 | | |
| Number of countries | 165 | | | 165 | | |

(b) Country panel

| | (1) | | | (2) | | |
|---------------------------|-----------------|---------------|--------|---------------|---------------|--------|
| | Reported values | | | Fitted values | | |
| | Std beta | <i>t</i> stat | Adj R2 | Std beta | <i>t</i> stat | Adj R2 |
| Standard deviation | -0.028 | -1.453 | 0.896 | -0.089 | -6.430 | 0.900 |
| P95/P05 ratio | -0.139 | -9.676 | 0.904 | -0.103 | -6.755 | 0.900 |
| P90/P10 ratio | -0.133 | -7.252 | 0.904 | -0.107 | -6.624 | 0.900 |
| P80/P20 ratio | -0.105 | -4.398 | 0.902 | -0.119 | -7.466 | 0.901 |
| P75/P25 ratio | -0.124 | -5.524 | 0.904 | -0.104 | -6.404 | 0.899 |
| Top/bottom quint means | -0.117 | -6.923 | 0.910 | -0.108 | -6.817 | 0.896 |
| Country-year observations | 1,516 | | | 1,516 | | |
| Number of countries | 157 | | | 157 | | |

Notes: The explanatory power of each listed measure of inequality is estimated in a separate regression. Each regression includes log GDP per capita, the Gini coefficient of income, and country fixed effects. Micro-level regressions also control for gender, age, age squared, and marital status. We report *t*-statistics corrected for clustering at the country-year level.

Table 3: Explanatory power of well-being inequality in a rich specification comparable to *World Happiness Report 2020* Table 2.2

(a) Micro data

| | (1) | | | (2) | | |
|-------------------------|-----------------|---------------|--------|---------------|---------------|--------|
| | Reported values | | | Fitted values | | |
| | Std beta | <i>t</i> stat | Adj R2 | Std beta | <i>t</i> stat | Adj R2 |
| Standard deviation | 0.024 | 2.003 | 0.252 | -0.021 | -2.292 | 0.252 |
| P95/P05 ratio | -0.045 | -4.848 | 0.253 | -0.010 | -0.974 | 0.252 |
| P90/P10 ratio | -0.046 | -3.573 | 0.253 | -0.012 | -1.351 | 0.252 |
| P80/P20 ratio | -0.032 | -2.275 | 0.253 | -0.016 | -1.918 | 0.252 |
| P75/P25 ratio | -0.040 | -2.786 | 0.253 | -0.010 | -1.069 | 0.252 |
| Top/bottom quint means | -0.037 | -2.956 | 0.254 | -0.010 | -1.089 | 0.246 |
| Individual observations | 1,968,596 | | | 1,968,596 | | |
| Number of countries | 165 | | | 165 | | |

(b) Country panel

| | (1) | | | (2) | | |
|---------------------------|-----------------|---------------|--------|---------------|---------------|--------|
| | Reported values | | | Fitted values | | |
| | Std beta | <i>t</i> stat | Adj R2 | Std beta | <i>t</i> stat | Adj R2 |
| Standard deviation | 0.014 | 0.449 | 0.746 | -0.045 | -1.234 | 0.747 |
| P95/P05 ratio | -0.170 | -5.555 | 0.764 | -0.046 | -1.327 | 0.747 |
| P90/P10 ratio | -0.177 | -6.438 | 0.767 | -0.065 | -1.823 | 0.747 |
| P80/P20 ratio | -0.136 | -3.575 | 0.759 | -0.073 | -2.192 | 0.748 |
| P75/P25 ratio | -0.133 | -3.572 | 0.759 | -0.063 | -1.999 | 0.747 |
| Top/bottom quint means | -0.145 | -3.826 | 0.769 | -0.060 | -1.645 | 0.743 |
| Country-year observations | 1,516 | | | 1,516 | | |
| Number of countries | 157 | | | 157 | | |

Notes: The explanatory power of each listed measure of inequality is estimated in a separate regression. Each regression includes income, social support, health, freedom, generosity, perceived corruption, and year fixed effects. Micro-level regressions also include country fixed effects. See Chapter 2, Technical Box 1 for definitions of these variables in the country panel setting. In the micro-level regressions, income is household income; health is whether the respondent experienced health problems in the last year; generosity is whether the respondent has donated money to charity in the last month; social support and freedom are the individual-level observations of the variables described in Technical Box 1. We report *t*-statistics corrected for clustering at the country level.

Tables 2 and 3 suggest the following interpretation. First, although the standardized betas and *t*-statistics vary across measures, there is very little variation in the overall model fit as reflected in the adjusted R-squared. However, standard deviation is clearly the weakest predictor of life evaluations among all our candidate inequality measures. Next, we note that the P95/P05, P90/P10, and quintile mean ratios appear to have very strong and precisely estimated correlations with well-being. However, we are suspicious of the strength of these correlations, since these are exactly the

measures where we are most concerned about bias due to censoring effects, as suggested by [Figure 1](#). The two remaining measures have similar levels of explanatory power, but with P80/P20 appearing to be a marginally better fit for the models of fitted values. In [subsubsection 2.2.2](#), we show that P80/P20 is a substantially better predictor than P75/P25 of reported life evaluations in the European Social Survey. For these reason, we use P80/P20 as our primary measure of inequality, and when evaluating counterfactual distributions, we use this ratio as calculated from predicted values.

1.3 Regression specification details

This section explains the regression specifications used to generate predicted life evaluations and to calculate the explanatory power statistics reported in [section 1.2](#). We use two baseline specifications. The first is consistent across all the country panel estimates. The second is used for predicting life evaluations and in all micro-level estimates made using the GWP. It is designed to be analogous to the first, but suited for individual-level estimation.

The specification used in the country panel regresses country-year average life evaluations from the Cantril ladder question (0-10) on that country-year’s log of GDP per capita, average level of social support, healthy life expectancy at birth, average perception of freedom to make life choices, a measure of generosity, average perceptions of corruption, and well-being inequality, plus year fixed effects. This is exactly the same as the model estimated in *World Happiness Report 2019* Chapter 2, Table 2.1, column (1), with the addition of the well-being inequality measure. For details on the exact definitions and calculation of these variables, see Chapter 2, Technical Box 1, and Statistical Appendix 1. This regression appears in the main text of Chapter 2 in Table 2.2, columns (1) and (2). [Table 4](#) reports the full results of these regressions as well as the regressions involving affect from columns (2)-(4) of Table 2.1.

The specification used to generate predicted life evaluations and to make micro-data estimates is a regression of individual life evaluations on the log of household income, individually reported social support, health, freedom, generosity, and corruption perceptions, and country-year-level well-being inequality, plus country and year fixed effects. Country fixed effects are included to improve the predicted value distribution and to make the results more comparable to those in Goff et al. (2018). At the individual level, generosity is an indicator of whether the respondent reports having donated to charity in the last month, and health is an indicator of whether the respondent reports having experienced health problems in the last year. The social support, freedom, and corruption questions are the individual-level responses to the questions explained in Statistical Appendix 1. This regression appears in the main text of Chapter 2 in Table 2.2, columns (3) and (4). [Table 5](#) reports the full results of this regression as well as the regressions involving affect from columns (2)-(4) of Table 2.1.

1.4 Full regression results and alternative specifications

Table 4: Panel-level regressions from Table 2.1 plus well-being inequality

(a) Inequality measured as: standard deviation of reported ladder scores

| | (1) | (2) | (3) | (4) |
|---------------------------------------|---------------------|---------------------|----------------------|---------------------|
| | Ladder | Positive affect | Negative affect | Ladder |
| Log GDP per capita | 0.321 (0.065)*** | -0.012 (0.009) | 0.011 (0.008) | 0.346 (0.064)*** |
| Social support | 2.279 (0.378)*** | 0.257 (0.049)*** | -0.251 (0.044)*** | 1.730 (0.392)*** |
| Healthy life expectancy at birth | 0.034 (0.010)*** | 0.001 (0.001) | 0.001 (0.001) | 0.030 (0.010)*** |
| Freedom to make life choices | 1.141 (0.320)*** | 0.342 (0.040)*** | -0.124 (0.045)*** | 0.408 (0.308) |
| Generosity | 0.614 (0.280)** | 0.149 (0.031)*** | 0.030 (0.028) | 0.290 (0.273) |
| Perceptions of corruption | -0.581 (0.291)** | 0.006 (0.029) | 0.021 (0.025) | -0.592 (0.286)** |
| Positive affect | | | | 2.174 (0.400)*** |
| Negative affect | | | | 0.033 (0.502) |
| Standard deviation of reported ladder | 0.040 (0.089) | 0.024 (0.012)* | 0.090 (0.010)*** | -0.016 (0.100) |
| Number of observations | 1,516 | 1,513 | 1,515 | 1,512 |
| Number of countries | 157 | 157 | 157 | 157 |
| Adjusted R-squared | 0.746 | 0.498 | 0.405 | 0.767 |

Notes: See Chapter 2, Technical Box 1 for details on the independent variables.

Regressions include year fixed effects. Standard errors clustered by country. * $p < .1$,

** $p < .05$, *** $p < .01$.

Table 4: Panel-level regressions from Table 2.1 plus well-being inequality (cont.)

(b) Inequality measured as: P80/P20 ratio of reported ladder scores

| | (1) | (2) | (3) | (4) |
|----------------------------------|----------------------|---------------------|----------------------|----------------------|
| | Ladder | Positive affect | Negative affect | Ladder |
| Log GDP per capita | 0.308 (0.062)*** | -0.013 (0.010) | 0.011 (0.008) | 0.329 (0.060)*** |
| Social support | 1.968 (0.392)*** | 0.233 (0.049)*** | -0.252 (0.044)*** | 1.621 (0.390)*** |
| Healthy life expectancy at birth | 0.030 (0.009)*** | 0.001 (0.001) | 0.002 (0.001)* | 0.026 (0.009)*** |
| Freedom to make life choices | 1.116 (0.303)*** | 0.347 (0.040)*** | -0.095 (0.044)** | 0.430 (0.298) |
| Generosity | 0.610 (0.276)** | 0.145 (0.030)*** | 0.014 (0.028) | 0.287 (0.267) |
| Perceptions of corruption | -0.530 (0.280)* | 0.023 (0.027) | 0.075 (0.024)*** | -0.623 (0.270)** |
| Positive affect | | | | 2.167 (0.385)*** |
| Negative affect | | | | 0.627 (0.453) |
| P80/P20 ratio of reported ladder | -0.169 (0.047)*** | -0.006 (0.004) | 0.031 (0.005)*** | -0.176 (0.050)*** |
| Number of observations | 1,516 | 1,513 | 1,515 | 1,512 |
| Number of countries | 157 | 157 | 157 | 157 |
| Adjusted R-squared | 0.759 | 0.494 | 0.350 | 0.780 |

Notes: Column (1) is the same regression reported in Chapter 2, Table 2.2, column (1). See Chapter 2, Technical Box 1 for details on the independent variables. Regressions include year fixed effects. Standard errors clustered by country. *p<.1, **p<.05, ***p<.01.

Table 4: Panel-level regressions from Table 2.1 plus well-being inequality (cont.)

(c) Inequality measured as: P80/P20 ratio of predicted ladder scores

| | (1) | (2) | (3) | (4) |
|-----------------------------------|---------------------|---------------------|----------------------|---------------------|
| | Ladder | Positive affect | Negative affect | Ladder |
| Log GDP per capita | 0.306 (0.063)*** | -0.013 (0.010) | 0.010 (0.009) | 0.333 (0.062)*** |
| Social support | 1.887 (0.451)*** | 0.237 (0.055)*** | -0.282 (0.060)*** | 1.380 (0.424)*** |
| Healthy life expectancy at birth | 0.034 (0.009)*** | 0.002 (0.001) | 0.001 (0.001) | 0.030 (0.009)*** |
| Freedom to make life choices | 1.112 (0.325)*** | 0.348 (0.041)*** | -0.099 (0.047)** | 0.370 (0.309) |
| Generosity | 0.575 (0.273)** | 0.145 (0.030)*** | 0.016 (0.030) | 0.262 (0.270) |
| Perceptions of corruption | -0.560 (0.282)** | 0.022 (0.027) | 0.079 (0.025)*** | -0.606 (0.276)** |
| Positive affect | | | | 2.159 (0.394)*** |
| Negative affect | | | | 0.027 (0.434) |
| P80/P20 ratio of predicted ladder | -1.487 (0.678)** | -0.020 (0.087) | 0.087 (0.096) | -1.455 (0.630)** |
| Number of observations | 1,516 | 1,513 | 1,515 | 1,512 |
| Number of countries | 157 | 157 | 157 | 157 |
| Adjusted R-squared | 0.748 | 0.492 | 0.272 | 0.769 |

Notes: Column (1) is the same regression reported in Chapter 2, Table 2.2, column (2). See Chapter 2, Technical Box 1 for details on the independent variables. Regressions include year fixed effects. Standard errors clustered by country. *p<.1, **p<.05, ***p<.01.

Table 5: Micro-level regressions comparable to Table 2.1 plus well-being inequality

(a) Inequality measured as: standard deviation of predicted ladder scores

| | (1) | (2) | (3) | (4) |
|---------------------------------------|----------------------|----------------------|----------------------|----------------------|
| | Ladder | Positive affect | Negative affect | Ladder |
| Log of household income | 0.178 (0.011)*** | 0.013 (0.001)*** | -0.012 (0.001)*** | 0.155 (0.010)*** |
| Missing income | 1.444 (0.137)*** | 0.086 (0.018)*** | -0.107 (0.011)*** | 1.307 (0.131)*** |
| Social support | 0.610 (0.029)*** | 0.096 (0.006)*** | -0.074 (0.004)*** | 0.579 (0.027)*** |
| Health problems in last year | -0.570 (0.027)*** | -0.106 (0.004)*** | 0.114 (0.002)*** | -0.395 (0.021)*** |
| Freedom to make life choices | 0.353 (0.021)*** | 0.082 (0.005)*** | -0.063 (0.003)*** | 0.278 (0.022)*** |
| Donated in last month | 0.255 (0.014)*** | 0.048 (0.003)*** | 0.002 (0.002) | 0.235 (0.012)*** |
| Perceptions of corruption | -0.235 (0.021)*** | -0.015 (0.004)*** | 0.044 (0.003)*** | -0.172 (0.017)*** |
| Positive affect | | | | 0.729 (0.023)*** |
| Negative affect | | | | -0.732 (0.028)*** |
| Standard deviation of reported ladder | 0.148 (0.074)** | 0.029 (0.008)*** | 0.072 (0.008)*** | 0.202 (0.071)*** |
| Number of observations | 1,968,596 | 1,804,361 | 1,848,521 | 1,781,974 |
| Number of countries | 165 | 164 | 165 | 164 |
| Adjusted R-squared | 0.252 | 0.117 | 0.103 | 0.285 |

Notes: Regressions include year and country fixed effects. Standard errors clustered by country. *p<.1, **p<.05, ***p<.01.

Table 5: Micro-level regressions comparable to Table 2.1 plus well-being inequality (cont.)

(b) Inequality measured as: P80/P20 ratio of reported ladder scores

| | (1) | (2) | (3) | (4) |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|
| | Ladder | Positive affect | Negative affect | Ladder |
| Log of household income | 0.172 (0.010)*** | 0.012 (0.001)*** | -0.012 (0.001)*** | 0.149 (0.010)*** |
| Missing income | 1.429 (0.147)*** | 0.086 (0.018)*** | -0.107 (0.011)*** | 1.293 (0.140)*** |
| Social support | 0.605 (0.030)*** | 0.096 (0.006)*** | -0.075 (0.004)*** | 0.573 (0.028)*** |
| Health problems in last year | -0.567 (0.027)*** | -0.106 (0.004)*** | 0.114 (0.002)*** | -0.392 (0.021)*** |
| Freedom to make life choices | 0.352 (0.021)*** | 0.082 (0.005)*** | -0.063 (0.003)*** | 0.278 (0.021)*** |
| Donated in last month | 0.258 (0.014)*** | 0.048 (0.003)*** | 0.003 (0.002) | 0.239 (0.013)*** |
| Perceptions of corruption | -0.239 (0.021)*** | -0.015 (0.004)*** | 0.043 (0.003)*** | -0.176 (0.017)*** |
| Positive affect | | | | 0.737 (0.023)*** |
| Negative affect | | | | -0.717 (0.030)*** |
| P80/P20 ratio of reported ladder | -0.086 (0.038)** | 0.005 (0.003)* | 0.019 (0.003)*** | -0.065 (0.035)* |
| Number of observations | 1,968,596 | 1,804,361 | 1,848,521 | 1,781,974 |
| Number of countries | 165 | 164 | 165 | 164 |
| Adjusted R-squared | 0.253 | 0.117 | 0.102 | 0.285 |

Notes: Column (1) is the same regression reported in Chapter 2, Table 2.2, column (3). Regressions include year and country fixed effects. Standard errors clustered by country. *p<.1, **p<.05, ***p<.01.

Table 5: Micro-level regressions comparable to Table 2.1 plus well-being inequality (cont.)

(c) Inequality measured as: P80/P20 ratio of predicted ladder scores

| | (1) | (2) | (3) | (4) |
|-----------------------------------|----------------------|----------------------|----------------------|----------------------|
| | Ladder | Positive affect | Negative affect | Ladder |
| Log of household income | 0.172 (0.011)*** | 0.013 (0.001)*** | -0.013 (0.001)*** | 0.152 (0.010)*** |
| Missing income | 1.386 (0.142)*** | 0.097 (0.017)*** | -0.101 (0.014)*** | 1.312 (0.136)*** |
| Social support | 0.610 (0.029)*** | 0.096 (0.006)*** | -0.076 (0.004)*** | 0.576 (0.028)*** |
| Health problems in last year | -0.567 (0.027)*** | -0.106 (0.004)*** | 0.114 (0.002)*** | -0.393 (0.021)*** |
| Freedom to make life choices | 0.354 (0.021)*** | 0.082 (0.005)*** | -0.063 (0.003)*** | 0.278 (0.022)*** |
| Donated in last month | 0.259 (0.014)*** | 0.048 (0.003)*** | 0.003 (0.002) | 0.237 (0.012)*** |
| Perceptions of corruption | -0.235 (0.021)*** | -0.015 (0.004)*** | 0.043 (0.003)*** | -0.175 (0.017)*** |
| Positive affect | | | | 0.734 (0.023)*** |
| Negative affect | | | | -0.722 (0.030)*** |
| P80/P20 ratio of predicted ladder | -0.675 (0.352)* | 0.148 (0.060)** | 0.118 (0.048)** | 0.141 (0.346) |
| Number of observations | 1,968,596 | 1,804,361 | 1,848,521 | 1,781,974 |
| Number of countries | 165 | 164 | 165 | 164 |
| Adjusted R-squared | 0.252 | 0.117 | 0.101 | 0.285 |

Notes: Column (1) is the same regression reported in Chapter 2, Table 2.2, column (4). Regressions include year and country fixed effects. Standard errors clustered by country. *p<.1, **p<.05, ***p<.01.

Table 6: Alternative regressions involving inequality in the micro-level GWP data

(a) Inequality measured as: standard deviation of reported ladder scores

| | Dependent variable: Cantril ladder (0-10) | | | |
|---------------------------------------|---|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| Standard deviation of reported ladder | -0.093 (0.082) | 0.105 (0.080) | 0.134 (0.074)* | 0.151 (0.080)* |
| Log GDP per capita | 0.938 (0.225)*** | | | |
| Log household income | | 0.202 (0.011)*** | 0.176 (0.010)*** | 0.175 (0.010)*** |
| giniIncWB | -1.551 (1.130) | -3.653 (1.178)*** | | -3.447 (1.114)*** |
| Social support | | | 0.570 (0.027)*** | 0.586 (0.030)*** |
| Ill health | | | -0.484 (0.024)*** | -0.491 (0.025)*** |
| Freedom to make life choices | | | 0.357 (0.020)*** | 0.350 (0.022)*** |
| Donated in last month | | | 0.282 (0.014)*** | 0.286 (0.015)*** |
| Perceptions of corruption | | | -0.227 (0.020)*** | -0.225 (0.021)*** |
| Year fixed effects | | X | X | X |
| Number of observations | 1,666,233 | 1,671,202 | 1,937,453 | 1,671,202 |
| Number of countries | 144 | 144 | 165 | 144 |
| Adjusted R-squared | 0.219 | 0.234 | 0.259 | 0.263 |

Notes: Each specification includes country fixed effects and controls for age, age squared, and marital status; a dummy for missing income observations is included when household income is used. Standard errors are clustered at the country level. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 6: Alternative specifications with inequality in the micro-level GWP data (cont.)

(b) Inequality measured as: P80/P20 ratio of reported ladder scores

| | Dependent variable: Cantril ladder (0-10) | | | |
|----------------------------------|---|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| P80/P20 ratio of reported ladder | -0.137 (0.040)*** | -0.098 (0.040)** | -0.090 (0.038)** | -0.082 (0.039)** |
| Log GDP per capita | 0.954 (0.203)*** | | | |
| Log household income | | 0.196 (0.011)*** | 0.170 (0.010)*** | 0.169 (0.010)*** |
| giniIncWB | -1.333 (1.078) | -3.227 (1.215)*** | | -3.067 (1.167)*** |
| Social support | | | 0.565 (0.028)*** | 0.580 (0.030)*** |
| Ill health | | | -0.479 (0.024)*** | -0.486 (0.025)*** |
| Freedom to make life choices | | | 0.356 (0.020)*** | 0.349 (0.022)*** |
| Donated in last month | | | 0.285 (0.014)*** | 0.290 (0.015)*** |
| Perceptions of corruption | | | -0.230 (0.020)*** | -0.229 (0.021)*** |
| Year fixed effects | | X | X | X |
| Number of observations | 1,666,233 | 1,671,202 | 1,937,453 | 1,671,202 |
| Number of countries | 144 | 144 | 165 | 144 |
| Adjusted R-squared | 0.221 | 0.234 | 0.260 | 0.264 |

Notes: Each specification includes country fixed effects and controls for age, age squared, and marital status; a dummy for missing income observations is included when household income is used. Standard errors are clustered at the country level. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 6: Alternative specifications with inequality in the micro-level GWP data (cont.)

(c) Inequality measured as: P80/P20 ratio of predicted ladder scores

| | Dependent variable: Cantril ladder (0-10) | | | |
|-----------------------------------|---|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| P80/P20 ratio of predicted ladder | -2.397 (0.406)*** | -0.253 (0.391) | -0.794 (0.355)** | -0.787 (0.387)** |
| Log GDP per capita | 1.028 (0.218)*** | | | |
| Log household income | | 0.199 (0.011)*** | 0.171 (0.010)*** | 0.169 (0.010)*** |
| giniIncWB | -1.754 (1.095) | -3.599 (1.209)*** | | -3.352 (1.170)*** |
| Social support | | | 0.571 (0.027)*** | 0.586 (0.030)*** |
| Ill health | | | -0.479 (0.024)*** | -0.486 (0.025)*** |
| Freedom to make life choices | | | 0.359 (0.020)*** | 0.352 (0.022)*** |
| Donated in last month | | | 0.286 (0.014)*** | 0.290 (0.015)*** |
| Perceptions of corruption | | | -0.227 (0.020)*** | -0.225 (0.021)*** |
| Year fixed effects | | X | X | X |
| Number of observations | 1,666,233 | 1,671,202 | 1,937,453 | 1,671,202 |
| Number of countries | 144 | 144 | 165 | 144 |
| Adjusted R-squared | 0.220 | 0.233 | 0.259 | 0.263 |

Notes: Each specification includes country fixed effects and controls for age, age squared, and marital status; a dummy for missing income observations is included when household income is used. Standard errors are clustered at the country level. * $p < .1$, ** $p < .05$, *** $p < .01$.

2 European Social Survey

2.1 Modeling the social environment

The European Social Survey asks a wider variety of questions about respondents' personal social connections, trust in others, and trust in institutions than does the Gallup World Poll. Hence, our use of the ESS permits a much more detailed regression specification underlying our analysis of the social environment in Chapter 2.

The ESS asks two general life evaluation questions in every cycle, both answered on a 0 to 10 scale. The first is, "Taking all things together, how happy would you say you are?" The second is, "All things considered, how satisfied are you with your life as a whole nowadays?" The life evaluation measure we use for the ESS is the average of each individual's response to these two questions. We focus on micro-level analysis of the ESS. The full regression specification, the results that underlie the discussion related to Chapter 2, Table 2.3, and means for each independent variable reported in [Table 7](#).

Many of the questions we use elicit responses on a scale with several steps, much like life evaluation scales. These responses convey more information than binary variables, and thus yield a better-fitting model of life evaluations. However, for some applications, it is more useful to convert a scaled response to a binary response (either 0 or 1).

For an example of this, consider the interaction of discrimination and social trust. The variable representing whether an individual experiences discrimination is always binary in the ESS, but social trust is reported on a 0-10 scale. An increase of one unit in this interaction term is not an intuitive object. We thus define social trust to be high if it is greater than or equal to 7, and low otherwise. Then, we calculate the interaction term as the interaction of discrimination and binary social trust. Now, allowing variation in discrimination and social trust while holding other factors constant, a one-unit increase in this interaction term represents a shift from low social trust to high social trust among individuals who experience discrimination.

We were interested to know how much the response scales increase the fit of the life evaluation regressions. To examine this, we estimate two additional models. First, we re-estimate the model with every explanatory variable converted to binary form, and second with every variable in its original form, even in the interaction terms. As shown in [Table 8](#), the binary specification, which has an adjusted R-squared of 0.306, is a poorer fit than the scale specification, which has an adjusted R-squared of 0.351.

Our preferred specification (the one reported in [Table 7](#)) uses binary trust measures in the interaction terms, and full-scale responses for all other cases. This model has an adjusted R-squared of 0.349. It thus preserves almost all of the improved fit from the use of the full scale responses.

[Table 9](#) reports full results for our preferred specification estimated separately by gender, as discussed in Chapter 2, footnote 35.

2.1.1 Variable definitions and binary form cutoffs

Below we list the independent variables in our regression, their definitions, and the cutoffs used to generate their binary form.

- Social trust is the response 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? Please tell me on a score of 0 to 10, where 0 means you can’t be too careful and 10 means that most people can be trusted.” We use the 0-10 scale to estimate the main effect of social trust. For interactions, we use a binary form that takes a value of 1 for individuals reporting 7 or higher, and 0 otherwise. We selected this cutoff so that about a third of the population would fall into the high category, which is approximately consistent with surveys that elicit a binary trust response.
- System trust is the average of responses to 3 questions on trust in the respondent’s country’s parliament, legal system, and politicians. The question is worded, “Please tell me on a score of 0-10 how much you personally trust each of the institutions I read out. 0 means you do not trust an institution at all, and 10 means you have complete trust.” The main effect estimate uses the full 0-10 scale. Interactions use a binary form with high system trust defined as 5.5 or higher, which again places about a third of the population in the high category.
- Trust in police is elicited in the same manner as trust in other institutions, but we treat it as distinct from other institutional elements in order to test its particular interaction with being afraid after dark. The main effect estimate uses the full 0-10 scale, and interactions use a binary form with high trust in police defined as 7 or higher.
- Afraid after dark is the response to the question, “How safe do you, or would you, feel walking alone in this area after dark?” Responses are (1) Very safe, (2) Safe, (3) Unsafe, and (4) Very unsafe. In the completely binary model, respondents are considered afraid if their response is 3 or 4.
- Discrimination is the binary response to the question, “Would you describe yourself as being a member of a group that is discriminated against in this country?”
- Health is the response to the question, “How is your health in general?” Responses are (1) Very good, (2) Good, (3) Fair, (4) Bad, (5) Very bad. Since higher responses indicate worse health, we label this variable “Ill health.” In the completely binary model, respondents are considered in ill health if their response is 3 or higher.
- Unemployed is a binary variable that takes a value of 1 if the respondent indicates that they have been “unemployed and actively looking for a job” during the last 7 days.

- Social meetings is the response to the question, “How often do you meet socially with friends, relatives, or work colleagues?” Responses are (1) Never, (2) Less than once a month, (3) Once a month, (4) Several times a month, (5) Once a week, (6) Several times a week, and (7) Every day. In the completely binary model, respondents are considered to have frequent social meetings if their response is 5 or higher.
- Intimate friend is the binary response to the question, “Do you have anyone with whom you can discuss intimate and personal matters?” Some years report a variant of this question that asks how many such friends a respondent has. These years are collapsed to the binary form for consistency. About 1% of respondents in the years 2002-2010 have no recorded response to this question. We assign them a value of 0 for Intimate friend and create a binary indicator that their response was missing.
- Sep., div., wid. is a binary indicator that the respondent is separated, divorced, or widowed.
- For the years 2002-2006, incomes are reported in nominal income bins. From 2008 on, incomes are reported by decile. We use income category fixed effects to control for the relationship of income and life evaluation. Low income is the linear combination of the bottom two deciles for the years 2008-2018. Similarly, high income is the linear combination of the top two deciles for the years 2008-2018. Interaction terms involving low income and high income are calculated using a binary variable indicating whether the respondent falls in the bottom two and top two deciles, respectively.

2.1.2 Full regression results

Table 7: Full results for regression in *World Happiness Report 2020* Table 2.3

| | (1) | (2) |
|-------------------------------------|-----------------------------|-------|
| | Regression on | |
| | life evaluation (0-10) Mean | |
| Social trust | 0.057 (0.004)*** | 5.024 |
| System trust | 0.065 (0.009)*** | 4.359 |
| Trust in police | 0.070 (0.005)*** | 5.957 |
| Afraid after dark | -0.163 (0.012)*** | 2.002 |
| Afraid after dark x social trust | 0.038 (0.011)*** | 0.578 |
| Afraid after dark x system trust | 0.047 (0.009)*** | 0.615 |
| Afraid after dark x trust in police | 0.032 (0.008)*** | 0.931 |
| Discrimination | -0.495 (0.039)*** | 0.071 |
| Discrimination x social trust | 0.159 (0.031)*** | 0.018 |
| Discrimination x system trust | 0.061 (0.048) | 0.017 |

Notes: Regressions continue on the next page. Each specification includes country and year fixed effects and controls for age, age squared, income category, and marital status. Standard errors clustered at the country level. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 7: Full results for regression in *World Happiness Report 2020* Table 2.3 (cont.)

| | (1) | (2) |
|---------------------------------|-----------------------------|-------|
| | Regression on | |
| | life evaluation (0-10) Mean | |
| Ill health | -0.595 (0.015)*** | 2.170 |
| Ill health x social trust | 0.094 (0.010)*** | 0.640 |
| Ill health x system trust | 0.108 (0.013)*** | 0.671 |
| Unemployed | -0.748 (0.032)*** | 0.046 |
| Unemployed x social trust | 0.056 (0.045) | 0.010 |
| Unemployed x system trust | 0.165 (0.045)*** | 0.010 |
| Social meetings | 0.158 (0.007)*** | 4.916 |
| Social meetings x social trust | -0.026 (0.006)*** | 1.645 |
| Social meetings x system trust | -0.053 (0.009)*** | 1.714 |
| Intimate friend | 0.538 (0.029)*** | 0.922 |
| Missing obs for intimate friend | 0.296 (0.066)*** | 0.005 |
| Intimate friend x social trust | -0.068 (0.034)* | 0.305 |
| Intimate friend x system trust | -0.098 (0.045)** | 0.317 |

Notes: Regressions are continued from the previous page and continue on the next. Each specification includes country and year fixed effects and controls for age, age squared, income category, and marital status. Standard errors clustered at the country level.

*p<.1, **p<.05, ***p<.01.

Table 7: Full results for regression in *World Happiness Report 2020* Table 2.3 (cont.)

| | (1) | (2) |
|---------------------------------|------------------------|---------|
| | Regression on | |
| | life evaluation (0-10) | |
| | | Mean |
| Sep., div., wid. | -0.507 (0.025)*** | 0.147 |
| Sep., div., wid. x social trust | 0.122 (0.024)*** | 0.045 |
| Sep., div., wid. x system trust | 0.075 (0.022)*** | 0.044 |
| Low income | -0.478 0.033 | 0.098 |
| Low income x social trust | 0.040 (0.029) | 0.031 |
| Low income x system trust | 0.185 (0.031)*** | 0.034 |
| High income | 0.333 0.035 | 0.091 |
| High income x social trust | -0.057 (0.022)** | 0.052 |
| High income x system trust | -0.096 (0.022)*** | 0.054 |
| Constant | 6.132 (0.095)*** | |
| Number of observations | 376,246 | 414,769 |
| Number of countries | 35 | |
| Adjusted R-squared | 0.349 | |

Notes: Regressions are continued from the previous page. Each specification includes country and year fixed effects and controls for age, age squared, income category, and marital status. Standard errors clustered at the country level. * $p < .1$, ** $p < .05$, *** $p < .01$.

2.1.3 Comparing the model fit of scale and binary determinants

Table 8: Binary vs scale ESS determinants

| | Regression on | | | |
|--|------------------------|----------------------|--------|--------|
| | life evaluation (0-10) | | Mean | |
| | (1) | (2) | (3) | (4) |
| | Binary | Scale | Binary | Scale |
| Social trust | 0.498*** (0.033) | 0.034** (0.012) | 0.317 | 4.983 |
| System trust | 0.352*** (0.052) | 0.043* (0.021) | 0.365 | 4.336 |
| Trust in police | 0.369*** (0.019) | 0.070*** (0.007) | 0.494 | 5.937 |
| Afraid after dark | -0.384*** (0.023) | -0.226*** (0.022) | 0.232 | 2.012 |
| Afraid after dark x social trust | 0.104*** (0.024) | 0.006 (0.003) | 0.047 | 9.644 |
| Afraid after dark x system trust | 0.095*** (0.018) | 0.011** (0.003) | 0.062 | 8.386 |
| Afraid after dark x trust in police | 0.108*** (0.023) | 0.005 (0.002) | 0.092 | 11.630 |
| Discrimination | -0.612*** (0.046) | -0.668*** (0.059) | 0.072 | 0.072 |
| Discrimination x social trust | 0.187*** (0.027) | 0.043*** (0.008) | 0.018 | 0.325 |
| Discrimination x system trust | 0.079 (0.045) | 0.010 (0.014) | 0.020 | 0.264 |

Notes: Regression results continue on next page. Each specification includes country and year fixed effects and controls for age, age squared, and income category. Standard errors clustered by country. *p<.1, **p<.05, ***p<.01.

Table 8: Binary vs scale ESS determinants (cont).

| | Regression on | | | |
|---|------------------------|----------------------|--------|--------|
| | life evaluation (0-10) | | Mean | |
| | (1) | (2) | (3) | (4) |
| | Binary | Scale | Binary | Scale |
| Ill-health | -1.313*** (0.036) | -0.743*** (0.023) | 0.080 | 2.190 |
| Ill-health x social trust | 0.136*** (0.032) | 0.019*** (0.002) | 0.017 | 10.534 |
| Ill-health x system trust | 0.008 (0.042) | 0.028*** (0.004) | 0.023 | 9.114 |
| Unemployment | -0.802*** (0.037) | -0.890*** (0.056) | 0.046 | 0.046 |
| Unemployment x social trust | 0.051 (0.050) | 0.008 (0.009) | 0.010 | 0.202 |
| Unemployment x system trust | 0.147*** (0.039) | 0.042*** (0.008) | 0.012 | 0.166 |
| Social meetings | 0.431*** (0.023) | 0.198*** (0.014) | 0.615 | 4.904 |
| Social meetings x social trust | -0.111*** (0.019) | -0.003* (0.001) | 0.214 | 24.932 |
| Social meetings x system trust | -0.137*** (0.026) | -0.012*** (0.002) | 0.239 | 21.49 |
| Have intimate friends | 0.670*** (0.032) | 0.587*** (0.055) | 0.916 | 0.916 |
| (Missing response on intimate friends) | 0.316*** (0.062) | 0.280*** (0.067) | 0.007 | 0.007 |
| Intimate friends x social trust | -0.103** (0.035) | -0.012 (0.007) | 0.299 | 4.644 |
| Intimate friends x suystem trust | -0.085 (0.053) | -0.013 (0.012) | 0.340 | 4.038 |

Notes: Regressions are continued from previous page and continue on next page. Each specification includes country and year fixed effects and controls for age, age squared, and income category. Standard errors clustered by country. *p<.1, **p<.05, ***p<.01.

Table 8: Binary vs scale ESS determinants (cont).

| | Regression on | | | |
|--|------------------------|----------------------|---------|---------|
| | life evaluation (0-10) | | Mean | |
| | (1) | (2) | (3) | (4) |
| | Binary | Scale | Binary | Scale |
| Sep., div., wid. | -0.523*** (0.025) | -0.658*** (0.036) | 0.152 | 0.152 |
| Sep., div., wid. x social trust | 0.165*** (0.028) | 0.025*** (0.006) | 0.045 | 0.721 |
| Sep., div., wid. x system trust | 0.071** (0.022) | 0.023*** (0.006) | 0.052 | 0.613 |
| Bottom quintile income | -0.588*** 0.033 | -0.486*** 0.032 | 0.133 | 0.133 |
| Bottom quintile income x social trust | 0.094** (0.032) | 0.099*** (0.026) | 0.032 | 0.580 |
| Bottom quintile income x system trust | 0.191*** (0.035) | 0.172*** (0.031) | 0.041 | 0.498 |
| Top quintile income | 0.429*** 0.041 | 0.314*** 0.036 | 0.109 | 0.109 |
| Top quintile income x social trust | -0.084*** (0.021) | 0.009 (0.026) | 0.049 | 0.629 |
| Top quintile income x system trust | -0.114*** (0.026) | -0.101*** (0.024) | 0.052 | 0.566 |
| Number of observations | 395,590 | 376,246 | 395,590 | 376,246 |
| Number of countries | 35 | 35 | | |
| Adjusted R-squared | 0.306 | 0.351 | | |

Notes: Regressions continued from previous page. Each specification includes country and year fixed effects and controls for age, age squared, and income category. Standard errors clustered by country. * $p < .1$, ** $p < .05$, *** $p < .01$.

2.1.4 Heterogeneity by gender

Table 9: ESS results by gender

| | Regression on | | | |
|-------------------------------------|------------------------|----------------------|-------|--------|
| | life evaluation (0-10) | | Mean | |
| | (1) | (2) | (3) | (4) |
| | Male | Female | Male | Female |
| Social trust | 0.055*** (0.005) | 0.059*** (0.005) | 5.036 | 4.935 |
| System trust | 0.063*** (0.009) | 0.067*** (0.009) | 4.375 | 4.299 |
| Trust in police | 0.068*** (0.005) | 0.072*** (0.006) | 5.882 | 5.990 |
| Afraid after dark | -0.222*** (0.015) | -0.126*** (0.013) | 1.814 | 2.195 |
| Afraid after dark x social trust | 0.051*** (0.013) | 0.036* (0.014) | 0.531 | 0.618 |
| Afraid after dark x system trust | 0.071*** (0.015) | 0.036** (0.010) | 0.619 | 0.744 |
| Afraid after dark x trust in police | 0.040*** (0.009) | 0.026** (0.009) | 0.835 | 1.046 |
| Discrimination | -0.513*** (0.042) | -0.472*** (0.043) | 0.073 | 0.071 |
| Discrimination x social trust | 0.206*** (0.045) | 0.113** (0.037) | 0.018 | 0.019 |
| Discrimination x system trust | 0.031 (0.056) | 0.084 (0.056) | 0.019 | 0.021 |
| Ill health | -0.577*** (0.017) | -0.608*** (0.015) | 2.119 | 2.255 |
| Ill health x social trust | 0.081*** (0.012) | 0.103*** (0.014) | 0.637 | 0.641 |
| Ill health x system trust | 0.100*** (0.017) | 0.110*** (0.015) | 0.732 | 0.770 |

Notes: Regression results continue on next page. Each specification includes country and year fixed effects and controls for age, age squared, and income category. Standard errors clustered by country. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 9: ESS results by gender (cont).

| | Regression on | | | |
|---------------------------------|------------------------|----------------------|-------|--------|
| | life evaluation (0-10) | | Mean | |
| | (1) | (2) | (3) | (4) |
| | Male | Female | Male | Female |
| Unemployed | -0.837*** (0.037) | -0.636*** (0.039) | 0.052 | 0.041 |
| Unemployed x social trust | 0.064 (0.062) | 0.043 (0.059) | 0.012 | 0.009 |
| Unemployed x system trust | 0.180** (0.061) | 0.151* (0.067) | 0.013 | 0.010 |
| Social meetings | 0.139*** (0.009) | 0.176*** (0.007) | 4.962 | 4.851 |
| Social meetings x social trust | -0.019** (0.006) | -0.033*** (0.008) | 1.673 | 1.581 |
| Social meetings x system trust | -0.051*** (0.010) | -0.056*** (0.010) | 1.893 | 1.816 |
| Have intimate friend | 0.554*** (0.034) | 0.519*** (0.033) | 0.909 | 0.923 |
| Intimate friend x social trust | -0.069 (0.036) | -0.075 (0.048) | 0.304 | 0.295 |
| Intimate friend x system trust | -0.116* (0.046) | -0.084 (0.055) | 0.343 | 0.337 |
| Sep., div., wid. | -0.483*** (0.030) | -0.518*** (0.029) | 0.095 | 0.204 |
| Sep., div., wid. x social trust | 0.091 (0.046) | 0.144*** (0.028) | 0.030 | 0.060 |
| Sep., div., wid. x system trust | 0.060 (0.036) | 0.093*** (0.024) | 0.033 | 0.070 |

Notes: Regressions continued from previous page and continue on next page. Each specification includes country and year fixed effects and controls for age, age squared, and income category. Standard errors clustered by country. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table 9: ESS results by gender (cont).

| | Regression on | | | |
|----------------------------|------------------------|----------------------|---------|---------|
| | life evaluation (0-10) | | Mean | |
| | (1) | (2) | (3) | (4) |
| | Male | Female | Male | Female |
| Low income | -0.518 0.046 | -0.439 0.034 | 0.095 | 0.131 |
| Low income x social trust | 0.025 (0.037) | 0.049 (0.035) | 0.027 | 0.036 |
| Low income x system trust | 0.231*** (0.055) | 0.148*** (0.026) | 0.034 | 0.048 |
| High income | 0.325 0.037 | 0.331 0.039 | 0.094 | 0.071 |
| High income x social trust | -0.079** (0.027) | -0.033 (0.026) | 0.056 | 0.042 |
| High income x system trust | -0.089** (0.030) | -0.103*** (0.023) | 0.061 | 0.044 |
| Number of observations | 177,794 | 198,492 | 177,794 | 198,492 |
| Number of countries | 35 | 35 | | |
| Adjusted R-squared | 0.345 | 0.355 | | |

Notes: Regressions continued from previous page. Each specification includes country and year fixed effects and controls for age, age squared, and income category. Standard errors clustered by country. * $p < .1$, ** $p < .05$, *** $p < .01$.

2.2 Well-being inequality

In this section we report results from our analysis of well-being inequality in the ESS. The tables and figures reported here are parallel to those reported for the Gallup World Poll in [sections 1.1](#) and [1.2](#).

2.2.1 Descriptive statistics and figures

[Table 10](#) reports the means and ranges of our 6 measures of inequality in both the distribution of reported life evaluations and the distribution of life evaluations predicted by the model specified in [Table 7](#).

[Figure 5](#) indicates, for each inequality ratio, the number of country-years in which either the numerator or the denominator takes the most extreme value on the reporting scale. Much like [Figure 1](#), the analogous figure for the GWP, we observe that censoring at the top end of the reporting scale appears to be a serious problem in the P95/P05 and P90/P10 cases, while seeing little reason for concern in the P80/P20 and P75/P25 cases.

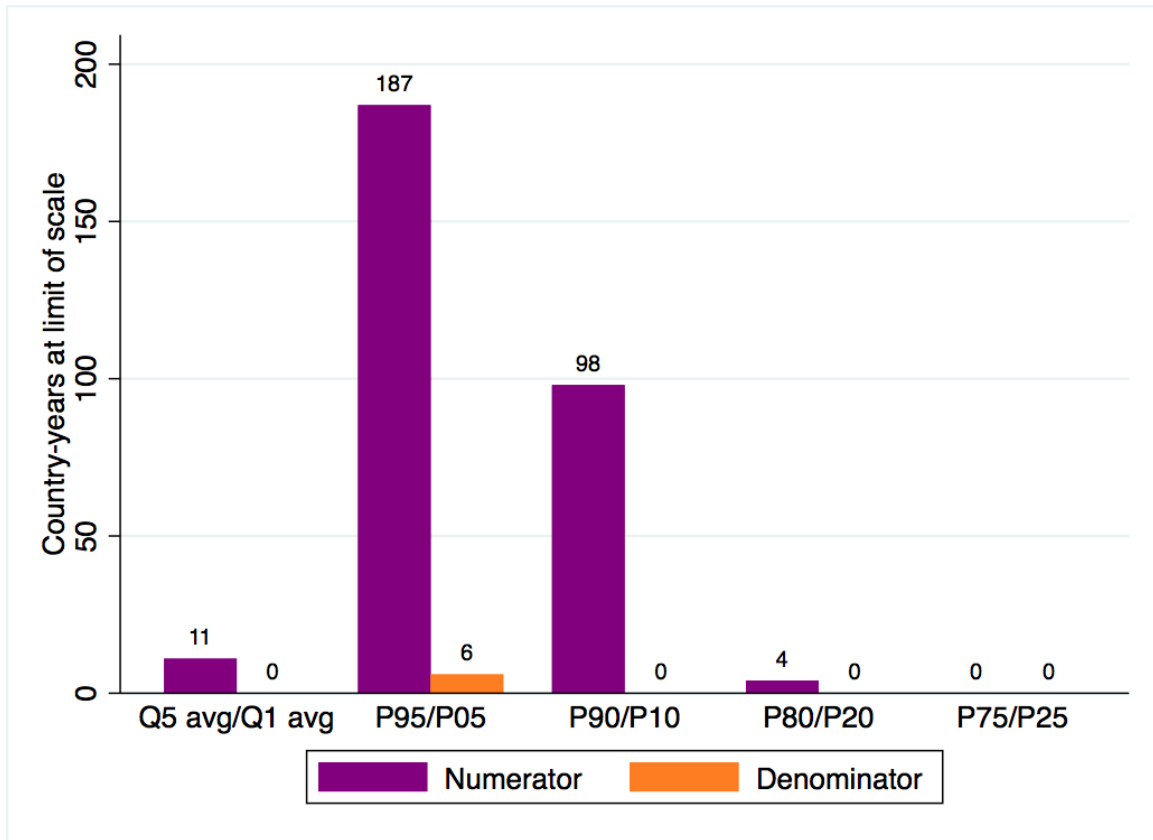
[Figures 6 to 8](#) plot the relationship between country-year average life evaluations and, respectively, standard deviation, P80/P20 for reported life evaluations, and P80/P20 for predicted life evaluations.

Table 10: Summary statistics: Well-being inequality in the ESS

| | (1) | | | (2) | | |
|--------------------------------------|-----------------|-------|--------|---------------|-------|-------|
| | Reported values | | | Fitted values | | |
| | Mean | Min | Max | Mean | Min | Max |
| Standard deviation | 1.805 | 1.171 | 2.777 | 0.879 | 0.627 | 1.274 |
| P95/P05 ratio | 4.017 | 1.667 | 20.000 | 1.555 | 1.275 | 2.547 |
| P90/P10 ratio | 2.463 | 1.357 | 10.000 | 1.391 | 1.196 | 1.873 |
| P80/P20 ratio | 1.623 | 1.188 | 3.250 | 1.231 | 1.126 | 1.475 |
| P75/P25 ratio | 1.455 | 1.125 | 2.600 | 1.179 | 1.095 | 1.364 |
| Ratio of top & bottom quintile means | 2.276 | 1.489 | 6.086 | 1.442 | 1.235 | 1.987 |
| Country-year observations | 217 | | | 217 | | |
| Number of countries | 35 | | | 35 | | |

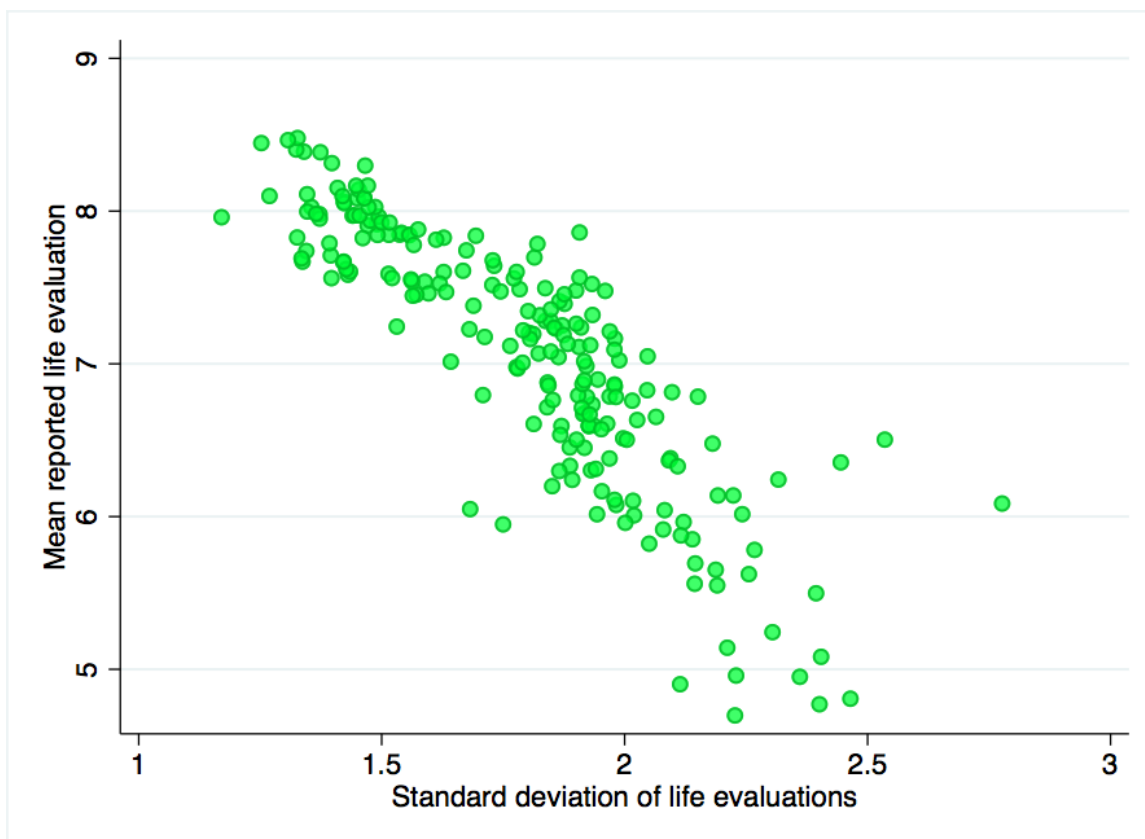
Notes: Table reports the mean, minimum, and maximum within-country-year measures of inequality in the European Social Survey pooled sample of 35 countries between 2002 and 2018.

Figure 5: Frequency of country-year percentiles at limits of response scale (0 or 10) (ESS)



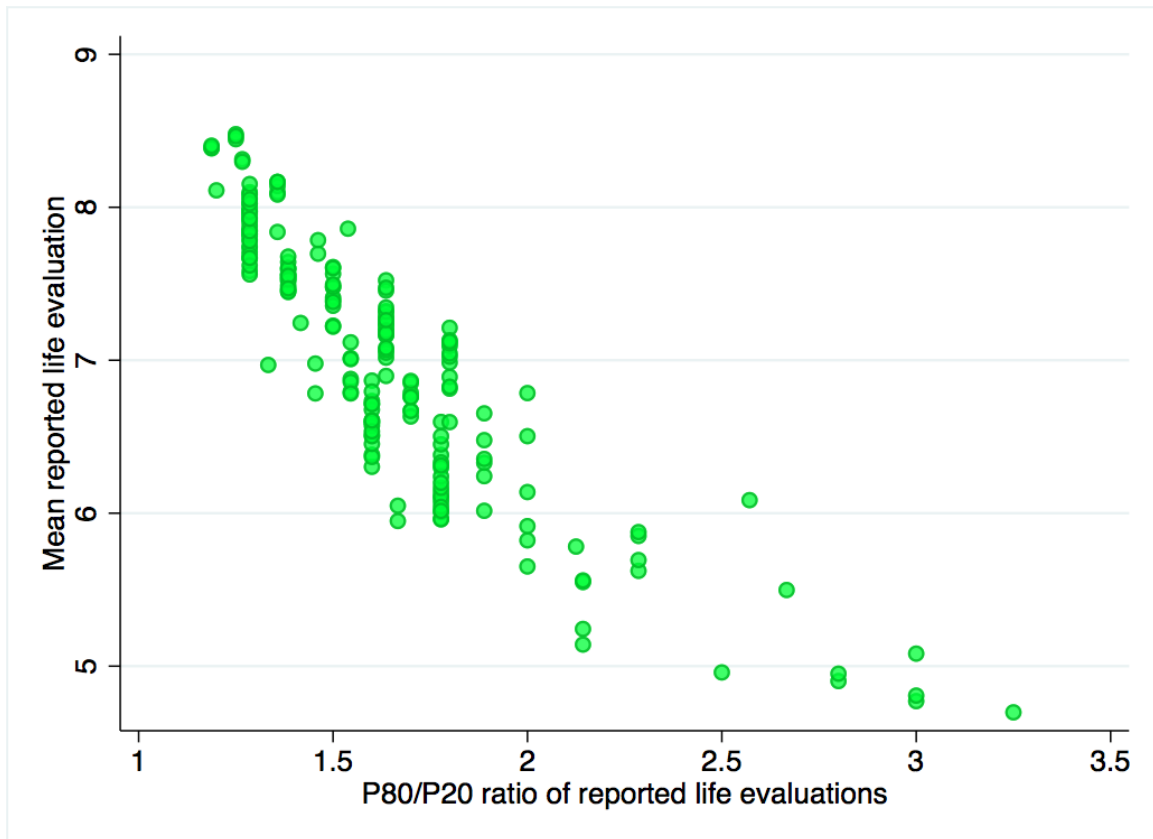
Notes: Q5 and Q1 refer to the top and bottom quintiles, respectively. Counts drawn from the 217 country-years in [Table 10](#).

Figure 6: Country-year average life evaluation, by standard deviation (ESS)



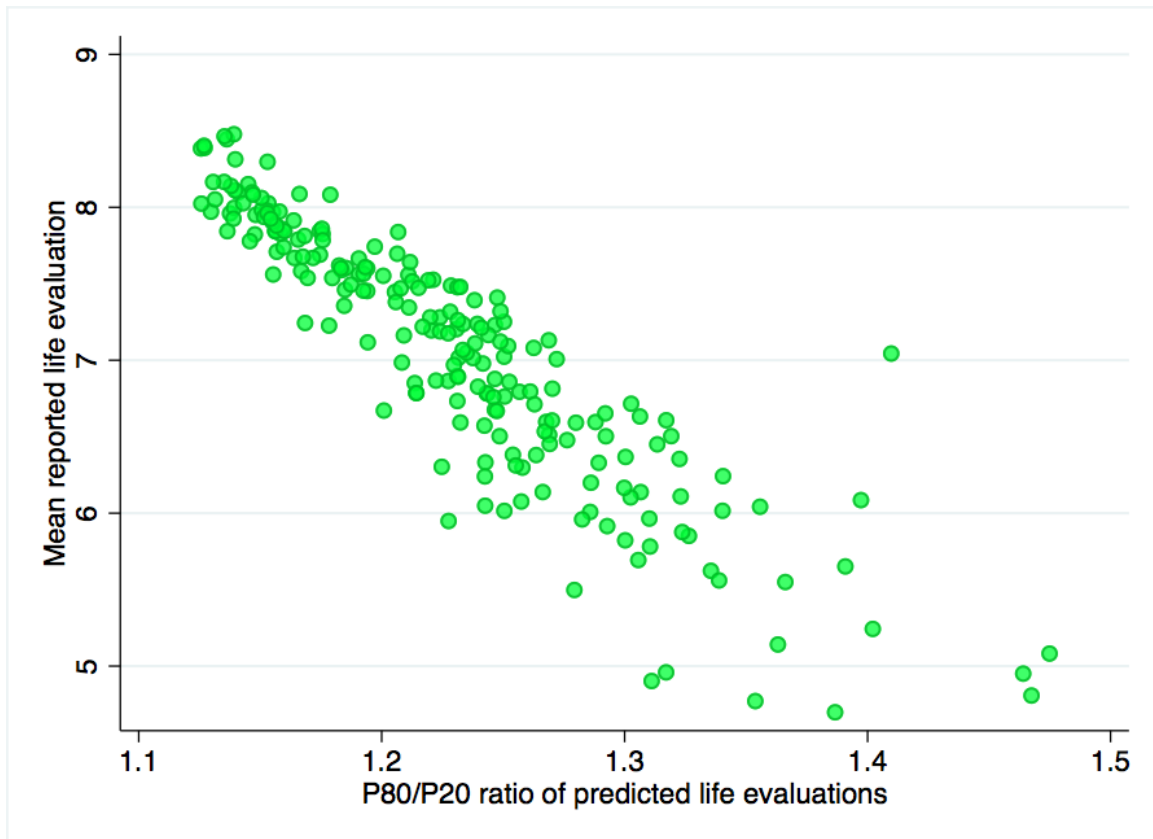
Note: Values calculated at the country-year level, with 217 country-year observations.

Figure 7: Country-year average life evaluation, by P80/P20 ratio of reported values (ESS)



Note: Values calculated at the country-year level, with 217 country-year observations.

Figure 8: Country-year average life evaluation, by P80/P20 ratio of predicted values (ESS)



Note: Values calculated at the country-year level, with 217 country-year observations.

2.2.2 Comparing inequality measures

Tables 11 and 12 report 3 measures of the explanatory power of each inequality measure in a sparse model and in the model from Table 7, respectively.

As with the analogous GWP results reported in Tables 2 and 3, we observe little variation in overall model fit as reflected in the adjusted R-squared. But in the ESS case, the P80/P20 ratio performs substantially better than the P75/P25 ratio as a predictor of reported life evaluations. This pattern does not hold in the case of the fitted value models.

In Table 2.2.2 we reports results from select alternative specifications exploiting an additional variable related to preference for inequality that is available in the ESS.

- Thinks inequality too high is the response to the question, "Please say to what extent you agree or disagree with the following statement. The government should take measures to reduce differences in income levels." Responses are (1) Agree strongly, (2) Agree, (3) Neither agree nor disagree, (4) Disagree, and (5) Disagree strongly.

The specifications in columns (1), (3), and (5) are quite similar to the specifications underlying Table 11, additionally controlling for income category. Columns (2), (4), and (6) add the variable just described, plus its interactions with both well-being inequality and income inequality. Well-being inequality on its own retains a strong negative correlation with average life evaluations, but also has an additional, significant negative correlation with life evaluations particular to those who believe that government should reduce inequality. Interestingly, controlling for this effect, income inequality appears to have little predictive power over the life evaluations of those who believe government should reduce inequality. This is consistent with our general finding that income inequality has little predictive power that is not absorbed by well-being inequality.

Table 11: Explanatory power of well-being inequality in a sparse specification comparable to Goff et al. (2018) Table 4, Column 4

| | (1) | | | (2) | | |
|-------------------------|-----------------|--------|--------|---------------|--------|--------|
| | Reported values | | | Fitted values | | |
| | Std beta | t stat | Adj R2 | Std beta | t stat | Adj R2 |
| Standard deviation | -0.172 | -6.317 | 0.188 | -0.033 | -1.851 | 0.187 |
| P95/P05 ratio | -0.047 | -2.483 | 0.187 | -0.028 | -1.252 | 0.187 |
| P90/P10 ratio | -0.145 | -4.739 | 0.188 | -0.059 | -2.068 | 0.187 |
| P80/P20 ratio | -0.150 | -6.888 | 0.190 | -0.060 | -2.030 | 0.187 |
| P75/P25 ratio | -0.128 | -5.833 | 0.188 | -0.080 | -2.724 | 0.187 |
| Top/bottom quint means | -0.198 | -4.642 | 0.189 | -0.063 | -2.141 | 0.187 |
| Individual observations | 406,222 | | | 406,222 | | |
| Number of county-years | 215 | | | 215 | | |

Notes: The explanatory power of each inequality measure is estimated in a separate regression. Each regression includes log GDP per capita, the Gini coefficient of income, country fixed effects, and controls for gender, age, age squared, and marital status. We report t -statistics corrected for clustering at the country-year level.

Table 12: Explanatory power of well-being inequality in a rich specification from *World Happiness Report 2020* Chapter 2, Table 2.3

| | (1) | | | (2) | | |
|-------------------------|-----------------|--------|--------|---------------|--------|--------|
| | Reported values | | | Fitted values | | |
| | Std beta | t stat | Adj R2 | Std beta | t stat | Adj R2 |
| Standard deviation | -0.101 | -4.232 | 0.350 | -0.021 | -1.145 | 0.350 |
| P95/P05 ratio | -0.024 | -1.510 | 0.350 | 0.007 | 0.313 | 0.349 |
| P90/P10 ratio | -0.117 | -4.870 | 0.351 | -0.007 | -0.278 | 0.349 |
| P80/P20 ratio | -0.129 | -7.158 | 0.352 | -0.011 | -0.397 | 0.349 |
| P75/P25 ratio | -0.093 | -5.431 | 0.350 | -0.030 | -1.114 | 0.350 |
| Top/bottom quint means | -0.132 | -4.794 | 0.351 | -0.010 | -0.366 | 0.349 |
| Individual observations | 376,246 | | | 376,246 | | |
| Number of country-years | 217 | | | 217 | | |

Notes: The explanatory power of each inequality measure is estimated in a separate regression. For the full regression specification, see [Table 7](#). We report t -statistics corrected for clustering at the country-year level.

Table 13: Alternative regressions with inequality in the micro-level ESS data

| | Dependent variable: Life evaluation (0-10) | | | | | |
|---|--|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Standard deviation of life evaluations | | -0.947 (0.279)*** | -0.671 (0.291)** | | | |
| P80/P20 ratio of reported life evaluations | | | -0.753 (0.185)*** | -0.591 (0.169)*** | | |
| P80/P20 ratio of predicted life evaluations | | | | | -0.471 (1.226) | 0.798 (1.360) |
| Log GDP per capita | -0.000 (0.258) | 0.023 (0.263) | 0.179 (0.243) | 0.170 (0.242) | 0.580 (0.262)** | 0.604 (0.275)** |
| Gini coefficient of income | -0.411 (1.310) | -1.003 (1.262) | -0.615 (1.139) | -0.908 (1.114) | -0.357 (1.363) | -0.701 (1.291) |
| Thinks inequality too high | | 0.181 (0.100)* | | 0.085 (0.102) | | 1.143 (0.182)*** |
| Thinks inequality too high x inequality of life evaluations | | | | | -0.190 (0.042)*** | -1.112 (0.192)*** |
| Thinks inequality too high x Gini coefficient of income | | 0.553 (0.442) | | 0.283 (0.414) | | 0.290 (0.372) |
| Constant | 10.002 (2.856)*** | 9.615 (2.950)*** | 7.770 (2.650)*** | 7.860 (2.649)*** | 2.627 (3.639) | 1.073 (3.958) |
| Number of observations | 406,222 | 398,647 | 406,222 | 398,647 | 406,222 | 398,647 |
| Number of countries | 34 | 34 | 34 | 34 | 34 | 34 |
| Adjusted R-squared | 0.199 | 0.206 | 0.201 | 0.207 | 0.198 | 0.205 |

Notes: Regressions include country and year fixed effects and controls for gender, age, age squared, income category, and marital status. Standard errors clustered at the country level. *p<.1, **p<.05, ***p<.01.

References

- Goff, L., Helliwell, J. F., & Mayraz, G. (2018). Inequality of Subjective Well-Being as a Comprehensive Measure of Inequality. *Economic Inquiry*, 56(4), 2177–2194.
- Nichols, S. & Reinhart, R. (2019). Well-being inequality may tell us more about life than income. Technical report.