Statistical Appendix 1 for Chapter 2 of World Happiness Report 2021

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1 Data Sources and Variable Definitions

- Happiness score or subjective well-being (variable name *ladder*): The survey measure of SWB is from the Feb 26, 2021 release of the Gallup World Poll (GWP) covering years from 2005 to 2020. Unless stated otherwise, it is the national average response to the question of life evaluations. The English wording of the question is "Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?" This measure is also referred to as *Cantril life ladder*, or just *life ladder* in our analysis.

- The statistics of GDP per capita (variable name *gdp*) in purchasing power parity (PPP) at constant 2017 international dollar prices are from the October 14, 2020 update of the World Development Indicators (WDI). The GDP figures for Taiwan, Syria, Palestine, Venezuela, Djibouti and Ymen are from the Penn World Table 9.1.

  - GDP per capita in 2020 are not yet available as of December 2020. We extend the GDP-per-capita time series from 2019 to 2020 using country-specific forecasts of real GDP growth in 2020 first from the OECD Economic Outlook No 108 (December 2020) and then, if missing, forecasts from World Bank's Global Economic Prospects (Last Updated: 06/08/2020). The GDP growth forecasts are adjusted for population growth with the subtraction of 2018-19 population growth as the projected 2019-20 growth.

- Healthy Life Expectancy (HLE). Healthy life expectancies at birth are based on the data extracted from the World Health Organization's (WHO) Global Health Observatory data repository (Last updated: 2020-09-28). The data at the source are available for the years 2000, 2005, 2010, 2015 and 2016. To match this report's sample period (2005-2020), interpolation and extrapolation are used.

- Social support (or having someone to count on in times of trouble) is the national average of the binary responses (either 0 or 1) to the GWP question "If you were in trouble, do you have relatives or friends you can count on to help you whenever you need them, or not?"

- Freedom to make life choices is the national average of responses to the GWP question "Are you satisfied or dissatisfied with your freedom to choose what you do with your life?"

- Generosity is the residual of regressing national average of response to the GWP question "Have you donated money to a charity in the past month?" on GDP per capita.

- Corruption Perception: The measure is the national average of the survey responses to two questions in the GWP: "Is corruption widespread throughout the government or not" and "Is corruption widespread within businesses or not?" The overall perception is just the average of the two 0-or-1 responses. In case the perception of government corruption is missing, we use the perception of business corruption as the overall perception. The corruption perception at the national level is just the average response of the overall perception at the individual level.

- Positive affect is defined as the average of three positive affect measures in GWP: happiness, laugh and enjoyment in the Gallup World Poll waves 3-7. These measures are the responses to the following three questions, respectively: "Did you experience the following feelings during A LOT OF THE DAY yesterday? How about Happiness?", "Did you smile or laugh a lot yesterday?", and "Did you experience the following feelings during A LOT OF THE DAY yesterday? How about Enjoyment?" Waves 3-7 cover years 2008 to 2012 and a small number of countries in 2013. For waves 1-2 and those from wave 8 on, positive affect is defined as the average of laugh and enjoyment only, due to the limited availability of happiness.

- Negative affect is defined as the average of three negative affect measures in GWP. They are worry, sadness and anger, respectively the responses to "Did you experience the following feelings during A LOT OF THE DAY yesterday? How about Worry?", "Did you experience the following feelings during A LOT OF THE DAY yesterday? How about Sadness?", and "Did you experience the following feelings during A LOT OF THE DAY yesterday? How about Anger?"

- Gini of household income reported in the Gallup World Poll (variable name *giniIncGallup*). The income variable is described in Gallup's "WORLDWIDE RESEARCH METHODOLOGY AND CODEBOOK" (Updated July 2015) as "Household Income International Dollars *[...]* To calculate income, respondents are asked to report their household income in local currency. Those respondents who have difficulty answering the question are presented a set of ranges in local

currency and are asked which group they fall into. Income variables are created by converting local currency to International Dollars (ID) using purchasing power parity (PPP) ratios." The gini measure is generated using STATA command *ineqdec0* by WP5-year with sample weights.

- GINI index from the World Bank (variable name *giniIncWB* and *giniIncW-Bavg*) from the World Development Indicators. The variable labeled at the source as "GINI index (World Bank estimate)", series code "SI.POV.GINI". According to the source, the data source is "World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments." The variable *giniIncWB* is an unbalanced panel of yearly index. The data availability is patchy at the yearly frequency. The variable *giniIncWBavg* is the average of *giniIncWB* starting from year 2000. The average does not imply that a country has the gini index in all years since then. In fact, most do not.

- Institutional trust: The first principal component of the following five measures: confidence in the national government, confidence in the judicial system and courts, confidence in the honesty of elections, confidence in the local police force, and perceived corruption in business. This principal component is then used to create a binary measure of high institutional trust using the 75th percentile in the global distribution as the cutoff point; this way a country whose population tends to have a low level of institutional trust in the global distribution will have a low average institutional trust at the national level. This measure is not available for all countries since not all surveys in all countries ask all of the questions that are used to derive the principal component.

2 Coverage, Summary Statistics and Regression Tables

WP5 is GWP's coding of countries including some sub-country territories such as Hong Kong. Not all the countries and territories appear in all the years. Our analysis does not cover all of the country/territories that have valid happiness scores.

The 2018-2020 ranking of happiness scores includes 149 countries/territories; only two third of them (95 to be precise) have survey information in 2020. The remaining countries' ranking are based on surveys in 2018 and 2019. The chapter also report average happiness scores from the 2017-2019 period; as we noted in the text, the scores are slightly different from those reported in WHR 2020 because of the late arrival of data for 15 countries; their 2019 survey data were not released to the WHR team for analysis until after the publication of WHR 2020. The late arrival causes only minor changes.

To appear in regression analysis that uses data from outside the GWP survey, a wp5-year pair needs to have the necessary external information (GDP, healthy life expectancy, etc). The regression analysis thus does not necessarily cover all of the coun-

tries/territories in the GWP. Nor does it necessarily cover all the countries/territories that are ranked by their happiness scores in this report. The underlying principle is that we always use the largest available sample. For different kind of analysis/ranking, the largest available samples can be different.

Regions: Some of the analysis includes dummy indicator for regions, namely Western Europe, Central and Eastern Europe, Commonwealth of Independent States, Southeast Asia, South Asia, East Asia, Latin America and Caribbean, North America and ANZ, Middle East and North Africa, and Sub-Saharan Africa. A later set of tables list individual countries by their region grouping.

3 Imputed Missing Values in Our Exercise of Explaining Ladder Scores with Six Factors

We do not make use of any imputed missing values in our rankings of happiness and its supporting factors. The only place where we make use of imputation is when we try to decompose a country's average ladder score into components explained by six hypothesized underlying determinants (GDP per person, healthy life expectancy, social support, perceived freedom to make life choice, generosity and perception of corruption). A small number of countries have missing values in one or more of these factors. The most prominent is about the perception of corruption in businesses and governments. In several countries, the relevant questions were not asked in the Gallup World Poll. For these countries we impute the missing values using the "control of corruption" indicator from the Worldwide Governance Indicators (WGI) project. Specifically, the imputed value is calculated as the predicted value using estimates from a model that regresses Gallup World Poll's perception of corruption on WGI's control of corruption. In all, less than 10 countries, listed in a later table, have the measure of corruption perception imputed in this way. In a few cases, countries are missing one or more of the happiness factors in the most recent years, but the information is available in earlier years; for example they may have GDP statistics in 2017 but not in the period from 2018 to 2020. In this case we use the information from the last available year. There is a limit of 3 years for how far back we go in search of those missing values. A few territories/countries do not have data on healthy life expectancy in the World Health Organization's (WHO) Global Health Observatory data repository. For Hong Kong, we calculate the health life-to-life expectancy ratio using estimates reported in "Healthy life expectancy in Hong Kong Special Administrative Region of China," by C.K. Law, & P.S.F. Yip, published at the *Bulletin of the World Health Organization*, 2003, 81 (1). The same ratio information for Swaziland in the period 2005-2010 can be found in "Healthy life expectancy for 187 countries, 1990 - 2010: a systematic analysis for the Global Burden Disease Study 2010," by Joshua A Salomon et al, *The Lancet*, Volume 380, Issue 9859. We then multiply the ratios for Hong Kong and Swaziland, respectively, with their life expectancy time series in the WDI to get the health life expectancy up to 2017. The time series is then extrapolated to the end of our sample period. The Lancet

article also provides information for Taiwan and the Palestinian Territories. But the WDI does not provide life expectancy data for these two regions. For these two, we use their 2010 healthy life expectancy. For Kosovo, we adjust its time series of life expectancy (available in the World Development Indicators) to a time series of health life expectancy by assuming that its health life-to-life expectancy ratio equals to the world average. Northern Cyprus is missing GDP per capita, Healthy, life expectancy, as well as the measure of Generosity; we use the statistics of Cyprus instead. We note again we do not use any of the imputed values to generate country rankings. We use them only for our decomposition exercises, and the ranking of countries do not depend on those exercises.