Statistical Appendix for "The Distribution of World Happiness", John F. Helliwell, Haifang Huang and Shun Wang, Chapter 2, World Happiness Report Update 2016

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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 Jan 22, 2016 release of the Gallup World Poll (GWP), which covers the years from 2005 to 2015. 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.

- Inequality/distribution statistics of happiness scores by WP5-year (variables names *giniLadder* and more) from the GWP release. WP5 is GWP's coding of countries, including some sub-country territories such as Hong Kong. The statistics are named giniLadder, p95Ladder, p90Ladder, p75Ladder, p50Ladder, p25Ladder, p10Ladder, p05Ladder, maxLadder, minLadder, respectively the gini score, the various percentiles, the maximum and the minimum. They are all derived from the STATA command *ineqdec0* using observations in an individual country/territory in a given survey year with sample weights. According to Stephen P. Jenkins (May 2008, STATA Help), the command ineqdec0 "estimate[s] a range of inequality and related indices" using unit record or 'micro' level data, and that the calculations do not exclude observations whose value is equal to zero.

- Alternative measures of inequality in happiness scores by wp5-year (variable names *sdLadder* and *cvLadder*). These extra measures are sdLadder "Standard deviation of ladder by country-year" and cvLadder "Standard deviation/Mean of ladder by country-year".

- Gini of household income reported in the GWP (variable name *giniIncGallup*). The income variable, namely INC_001, 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 *giniIncWBavg*) from the World Development Indicators (Last Updated: 22-Dec-2015). 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* in the period 2000-2013. The average does not imply that a country has the gini index in all years in that period. In fact, most do not.

- The statistics of GDP per capita (variable name *gdp*) in purchasing power parity (PPP) at constant 2011 international dollar prices are from the December 22, 2015 release of the World Development Indicators (WDI). The GDP figures for Taiwan are from the Penn World Table 7.1. Syria, Angola and Argentina and a few others are missing the GDP numbers in the December 22, 2015 WDI but were present in earlier releases. We use the numbers from the earlier release, after adjusting their levels by a factor of 1.17 to take into account changes in the implied prices when switching from the PPP 2005 prices used in the earlier release to the PPP 2011 prices used in the latest release. The factor of 1.17 is the average ratio derived by dividing the US GDP per capita under the 2011 prices with their counterparts under the 2005 prices. The same 1.17 is used to adjust the Taiwanese numbers, which are originally PPP dollars at 2005 constant prices. For Somalia, we use the 2010 estimate of GDP per capita figure in the CIA World Factbook. New Zealand, Guyana and Yemen are missing the 2014 GDP in the WDI dataset. We compute the values with their 2013 base and OECD or World Bank forecasts of growth rates of real GDP, adjusted for population growth.

  - GPD per capita in 2015 are not yet available as of Dec 2015. We extend the GDP-per-capita time series from 2014 to 2015 using country-specific forecasts of real GDP growth in 2015 first from the OECD Economic Outlook No. 98 (Edition 2015/2) and then, if missing, forecasts from World Bank's Global Economic Prospects (Last Updated: 12/19/2014). The

GDP growth forecasts are adjusted for population growth with the subtraction of 2013-14 population growth as the projected 2013-14 growth. For another 12 countries that are missing figures of growth forecast, we compute their 2015 GDP per capita as the product of 2014 value and the 2013-2014 growth rate, essentially using the 2013-14 growth rates as if they were forecast of 2014 to 2015 growth rates.

- Healthy Life Expectancy (HLE). The time series of healthy life expectancy at birth are calculated by the authors based on data from the World Health Organization (WHO), the World Development Indicators (WDI), and statistics published in journal articles. The challenge is that the healthy life expectancy, unlike the simple life expectancy, is not widely available as time series. In the WHO's Global Health Observatory Data Repository, the statistics of healthy life expectancy are reported only for the years of 2000 and 2012. In our effort to derive the time series of healthy life expectancy for our sample period (2005 to 2015), we use WDI's non-health adjusted life expectancy, which is available as time series up to the year 2013, as the basis of our calculation. Using country-specific ratios of healthy life expectancy to total life expectancy in 2012, available from the WHO, we adjust the time series of total life expectancy to healthy life expectancy by simple multiplication, assuming that the ratio remains constant within each country over the sample period. Three countries/regions are missing due to the lack of health/total life expectancy ratio. One is Hong Kong. We calculate its ratio using relevant estimates 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). Another is Puerto Rico. We set its ratio to the U.S. ratio of 0.886. The third is Kosovo, we set its ratio to the world average 0.868. The estimated life expectancy for Taiwan and the Palestinian Territories are available 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. Once we have the data, we use intrapolation and extrapolation to fill in the missing values (when necessary) and to extend the period to 2015.

- 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?"

- Variables in the expanded data set: Confidence in national government from the GWP. The English wording of the question is "Do you have confidence in each of the following, or not? How about the national government? (WP139)".

- Variables in the expanded data set: "Most people can be trusted" from the GWP. The question's English wording is "Generally speaking, would you say that most people can be trusted or that you have to be careful in dealing with people?" This indicator has a limited coverage.

- Variables in the expanded data set: "Most people can be trusted" from the 6-wave World Value Surveys. The question's English wording is "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" The measure is defined as the percentage of respondents saying that most people can be trusted, excluding those who did not provide an answer.

- Variables in the expanded data set: Democratic and delivery quality measures of governance are based on Worldwide Governance Indicators (WGI) project (Kaufmann, Kraay and Mastruzzi). The original data have six dimensions:

Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption. The indicators are on a scale roughly with mean zero and a standard deviation of 1. We reduce the number of dimensions to two using the simple average of the first two measures as an indicator of democratic quality, and the simple average of the other four measures as an indicator of delivery quality, following Helliwell and Huang (2008).