# The Effects of Institutional and Social Trust on Life Satisfaction: a Multilevel Logit Analysis in 35 Countries

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May 2021

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## 1 Introduction

Generalised trust often included as proxy for social capital [1, 2] .The current study draws from this literature and defines social trust as interpersonal trust between fellow members of society: for example, family, neighbours and strangers within the community. Institutional trust is defined in this paper as the trust in the institutions (government, police, the courts). The aim of this study is to measure the effect of social and institutional trust on life satisfaction. Furthermore, the effect individual social trust on life satisfaction will be tested in the context of high or low social trust at the country level. That is, cross-level interactions will be examined.

Data from the most recent wave (Wave 7) of the World Values Survey is utilised and includes data collected between 2017 and 2019 in the following countries: Andorra, Argentina, Australia, Bangladesh, Bolivia, Brazil, Chile, China, Colombia, Cyprus, Germany, Ecuador, Greece, Hong Kong SAR, China, Indonesia, Iraq, Kazakhstan, Japan, Jordan, Republic of Korea, Lebanon, Mexico, Nigeria, Pakistan, Peru, Philippines, Puerto Rico, Romania, Russian Federation, Serbia, Thailand, Tunisia, Turkey, United States.

## 2 Literature Review

The effects of social trust and institutional trust on subjective well-being have mainly been studied in the context social capital. These studies have focused on data aggregated at the national or regional level [3, 4] as well at the individual level [5]. The following brief literature review discusses individual level studies of trust and life satisfaction, and some that combine individual and country level data using multilevel models.

There is robust evidence from previous studies showing trust has a large impact on life satisfaction. Generalised social trust (trust in most other people) has been shown to be associated with higher life satisfaction and lower probability of suicide in studies using WVS and ESS data [6, 7]. In the UK, Li [8] found that neighbourhood social trust increases life satisfaction. This study was cross-sectional using ordered logit on the British Household Panel Survey data (BHPS). Further studies [9] using World Values Survey data show that generalised trust increases life satisfaction. He also creates a social capital factor score (using responses to generalised trust, civic participation and perceptions of corruption) and shows these have a robust positive association to life satisfaction.

Elgar et al [10] use multilevel models to study the impact of aspects of social and in-

stitutional trust on life satisfaction as components of social capital. They use data on 69,725 adults in 50 countries that were collected in the 2005–2008 cycle of the World Values Survey. Multilevel beta regression was used to explore the associations between individual and contextual levels of the social capital factors. As in previous studies, they also found a positive relation between generalised social trust (measured from responses to "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?") and institutional trust (defined in the same way as in the current paper) and reported life satisfaction levels. The models accounted for associations between life satisfaction outcomes and country differences in GNI per capita.

Amati et al. [11] examines the role of friends and social trust on life satisfaction. The data comes from Aspects of Daily Life, the Italian National Statistical Institute's survey from 2012. Analysis showed that trusting others increases the probability of having high life satisfaction.

The current study combines aspects of the last two investigations mentioned. The most recent wave of the World Values Survey is used to test whether the results from these past studies also hold with new data. Multilevel logistic regression models were adopted with this purpose. In particular, this method was implemented to measure the interaction between country-level social trust and individual-level social trust, similar to Elgar et al's [10] investigation. Different control variables are explored, including GDP instead of GNI. Social trust and institutional trust have been operationalised as described in the introduction.

## 2.1 Data

The current study uses data from the 7th wave of the World Values Survey (WVS). Only data from 2017 to 2019 was used: data from 2020 and 2021 will have been affected by the COVID-19 pandemic and so was excluded from the study. In addition, GDP per capita data was taken from the World Bank World Development Indicators to control for country level economic effects. Values from 2018 were used for GDP. The investigation had initially included 36 countries but eliminated Taiwan as the GDP value was not available from the World Bank dataset.

The dependent variable in this study is life satisfaction. The survey question "How satisfied are you with your life?" from the WVS is used to measure life satisfaction on a 10-point answer scale, where 1 is least satisfied and 10 is most satisfied. This life satisfaction variable was recoded into high levels (response scores 6-10), and low levels (response scores 1-5) of life satisfaction.

The main influencing social demographic characteristics that have been studied our age, sex, marital status, ethnicity, education, employment status, income, and health [12]. Drawing from this, the current study controls for age, sex, marital status and employment status at the individual level.

Social trust is measured using seven items from the survey. Participants rated their trust in people including their neighbourhood, people they met for the first time and different nationalities (1=trust completely, 2=somewhat, 3=not very much, 4=no trust at all). Another item, "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" was measured on a dichotomous scale (1=most people can be trusted, 2=need to be very careful). Similarly, institutional trust was measured from three survey items indicating trust in the police, the courts and the government. A full list of the items used for each type of trust can be found in Appendix A.

The survey item responses were added up

and divided into high levels and low levels of social/institutional trust. The variables were created as such that 1 indicated high levels of trust and 0 indicated low levels of trust. National levels for social trust were also included by aggregating individual social trust measurement. A similar method was used by Elgar et al [10] to calculate a national mean for trust.

Figure 1 shows descriptive statistics of the explanatory variables used. A total of 47,610 observations were used. A full breakdown of the dataset including the number of cases per country can be found in Appendix B.

# 3 Methods

All of the data exploration and analyses were run using the programming language R. Before any statistical analysis could be performed, the data was checked for any missing values and these entries were removed. Age, age squared and GDP per capita values were scaled to SD units in order to build our models.

Two-level logit models were used for this investigation using the GLMER package. This was appropriate as the dependent variable is binary (individuals have either high satisfaction or low satisfaction) and controlling for country-level effects on life satisfaction was necessary. The multilevel model also allows for controlling for individual level variables. In the model the only coefficients allowed to vary randomly were the random intercepts. That is, levels of high or low life satisfaction were allowed to vary randomly across countries (random intercepts model).

The first model that was specified was a null random intercepts model: that is, a model with no predictors. Following models included added explanatory variables, starting first the control variables sex, age, age squared, marital status, employment status,

| | |
|---|---|
| Age | 43 (16) |
| Sex | |
| Female | 24,777 (52%) |
| Male | 22,833 (48%) |
| Marital Status | |
| Married | 31,154 (65%) |
| Not married | 16,456 (35%) |
| Employment Status | |
| Employed | 28,586 (60%) |
| Not employed | 19,024 (40%) |
| Social Trust | |
| High | 22,196 (47%) |
| Low | 25,414 (53%) |
| Institutional Trust | |
| High | 31,040 (65%) |
| Low | 16,570 (35%) |
| Life Satisfaction | |
| High | 36,797 (77%) |
| Low | 10,813 (23%) |
| Country Social Trust | |
| High | 17,188 (36%) |
| Low | 30,422 (64%) |
| [1] n (%); Mean (SD) | |

Figure 1: Summary statistics of explanatory variables.

**Model Results**

| | *Dependent variable:* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | high_ls | | | | | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| male | | 0.014 | 0.017 | 0.013 | -0.034 | -0.045* | -0.027 | -0.037 | -0.037 | -0.037 |
| | | (0.023) | (0.023) | (0.023) | (0.024) | (0.024) | (0.024) | (0.024) | (0.024) | (0.024) |
| age2_scaled | | | 0.081 | 0.382*** | 0.549*** | 0.529*** | 0.494*** | 0.482*** | 0.482*** | 0.477*** |
| | | | (0.063) | (0.067) | (0.072) | (0.072) | (0.072) | (0.072) | (0.072) | (0.072) |
| age_scaled | | | -0.140** | -0.474*** | -0.621*** | -0.605*** | -0.576*** | -0.566*** | -0.566*** | -0.563*** |
| | | | (0.063) | (0.068) | (0.071) | (0.072) | (0.072) | (0.072) | (0.072) | (0.072) |
| marital_status | | | | 0.358*** | 0.359*** | 0.357*** | 0.346*** | 0.346*** | 0.346*** | 0.344*** |
| | | | | (0.026) | (0.026) | (0.027) | (0.027) | (0.027) | (0.027) | (0.027) |
| employed | | | | | 0.192*** | 0.186*** | 0.200*** | 0.195*** | 0.195*** | 0.195*** |
| | | | | | (0.027) | (0.027) | (0.027) | (0.027) | (0.027) | (0.027) |
| soc_trust | | | | | | 0.316*** | | 0.260*** | 0.259*** | 0.175*** |
| | | | | | | (0.025) | | (0.025) | (0.025) | (0.031) |
| country_soct | | | | | | | | | | 0.045 |
| | | | | | | | | | | (0.316) |
| gdp_scaled | | | | | | | | | 0.175 | 0.127 |
| | | | | | | | | | (0.142) | (0.163) |
| soc_trust:country_soct | | | | | | | | | | 0.238*** |
| | | | | | | | | | | (0.051) |
| ins_trust | | | | | | | 0.496*** | 0.458*** | 0.457*** | 0.458*** |
| | | | | | | | (0.027) | (0.027) | (0.027) | (0.027) |
| Constant | 1.275*** | 1.268*** | 1.269*** | 1.045*** | 0.955*** | 0.824*** | 0.654*** | 0.570*** | 0.576*** | 0.548*** |
| | (0.128) | (0.128) | (0.130) | (0.132) | (0.132) | (0.132) | (0.136) | (0.136) | (0.133) | (0.172) |
| Observations | 47,610 | 47,610 | 47,610 | 47,610 | 47,610 | 47,610 | 47,610 | 47,610 | 47,610 | 47,610 |
| Log Likelihood | -23,630.120 | -23,629.940 | -23,616.530 | -23,525.460 | -23,499.660 | -23,416.960 | -23,328.310 | -23,273.900 | -23,273.150 | -23,262.390 |
| Akaike Inf. Crit. | 47,264.250 | 47,265.880 | 47,243.050 | 47,062.910 | 47,013.330 | 46,849.930 | 46,672.630 | 46,565.800 | 46,566.310 | 46,548.780 |
| Bayesian Inf. Crit. | 47,281.790 | 47,292.190 | 47,286.910 | 47,115.540 | 47,074.720 | 46,920.090 | 46,742.790 | 46,644.740 | 46,654.020 | 46,654.030 |
| *Note:* | | | | | | | | | | *p<0.1; **p<0.05; ***p<0.01 |

Figure 2: Multilevel logit regression of life satisfaction.

GDP. Later models included social trust and institutional trust separately as explanatory variables, and then together in the same model. Finally cross-level interactions were tested using individual level social trust and country-level social trust (aggregated). The flexibility of multilevel modelling allows for the exploration of this sort of effect. The aim was to test the effect of contextual social trust (country-level) on the impact of individual-level social trust on life satisfaction outcomes.

The different models were compared using the AIC statistic. The final model gives the lowest AIC estimate and includes the cross-level interaction term (see Figure 2). The code that was written for the analysis is included in Appendix C.

# 4 Results

The results for the estimates of the log odds of each of the models can be found in Figure 2.

Males were 1.04 times more likely than women to have high life satisfaction, although this effect was not statistically significant. This is an interesting as most studies report that women tend to report higher levels of subjective wellbeing than men [13], although few studies exist where there is no

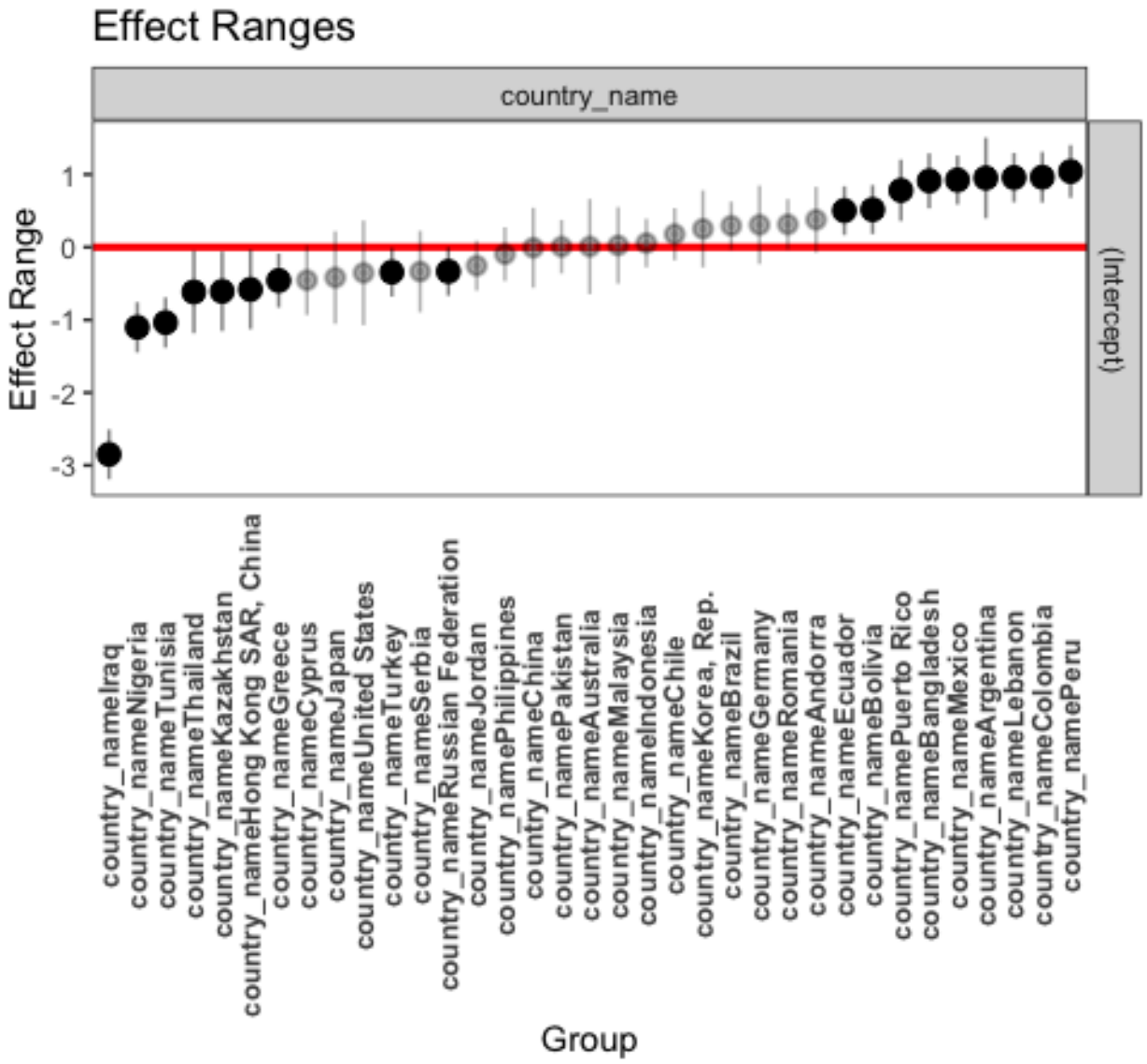


Figure 3: Life satisfaction ranking by country.

sex differences [14]. On the other hand, the coefficients of age and age squared are statistically significant and attest the existence of the U-shaped relationship between age and life satisfaction that is commonly reported in other investigations [15]. That is, life satisfaction is higher in early and late stages of life, and dips around middle-aged people.

Being married increases the probability of high life satisfaction by 41 percent compared to those that are not married. This confirms results found by previous studies that also show a positive relationship between these two variables [6]. Employment also has a positive effect on life satisfaction: being employed increases the probability of high life satisfaction by 21 percent compared to those that are unemployed. GDP per capita increased the probability of life satisfaction by 14 percent, however this result was statistically insignificant. This is consistent with the Easterlin Paradox, which states over time the relationship between happiness and income is very weak [16].

People that had high levels of institutional trust were 1.58 times more likely to have high life satisfaction compared to those that reported low levels of institutional trust. High levels of social trust also had an impact on life satisfaction but to lesser extent: high social trust made it 1.19 more likely to have high life satisfaction than those who reported low social trust.

Aggregated social trust (at country-level) did not have a statistically significant effect on life satisfaction. However, when interaction terms were included, individual level social trust was positively related with life satisfaction more strongly in countries with high aggregated social trust (odds ratio of 1.27) . This positive effect is similar to previous findings [10].

Figure 3 shows us the residuals of the final model. It displays the ranking of countries with highest satisfaction (using the predictor variables as control variables). Iraq ranks significantly lower than the rest of the countries. Seven out of the nine Latin American countries in the sample rank amongst the top ten for life satisfaction. The results are consistent with other studies that find Latin American countries to score higher levels of subjective wellbeing [17].

# 5 Conclusions

The results largely confirm studies from previous waves of the WVS and other similar studies on life satisfaction. Strengths of the study include the use of multilevel modelling where there is clear grouping between countries, as well as the large sample size per country.

A weakness of the study is the aggregation of individual level data to create a variable at the country level: this is largely due to limitations in the data. An improvement would be to find a country level index to measure trust.

Another limitation in the study is it does not consider variation over time: including panel data would be a significant improvement to the study: using data from previous waves could show patterns over time. Panel data models also include techniques that can address heterogeneities across individuals from different countries. The effect of GDP could be better measured by including panel data. Oishi and Kesebir [18] find that economic growth has a positive effect on life satisfaction when social trust is high: this effect could be accounted for in a future study.

# References


[1] Robert D. Putnam. *Bowling alone: The collapse and revival of American community*. Simon and schuster, 2000.

[2] Woolcock Szreter S. "Health by association? Social capital, social theory, and the political economy of public health". In: *International Journal of Epidemiology* 33.4 (July 2004), pp. 650–667. ISSN: 1464-3685. DOI: 10.1093/ije/dyh013. URL: https://academic.oup.com/ije/article-lookup/doi/10.1093/ije/dyh013.

[3] Christian Kroll. *Social capital and the happiness of nations: The importance of trust and networks for life satisfaction in a cross-national perspective*. Peter Lang Publishing, 2008.

[4] Sibylle Puntscher et al. "The Impact of Social Capital on Subjective Well-Being: A Regional Perspective". In: *Journal of Happiness Studies* 16.5 (Oct. 2015), pp. 1231–1246. ISSN: 1389-4978. DOI: 10.1007/s10902-014-9555-y. URL: http://link.springer.com/10.1007/s10902-014-9555-y.

[5] Paul Dolan, Tessa Peasgood, and Mathew White. "Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being". In: *Journal of Economic Psychology* 29.1 (Feb. 2008), pp. 94–122. ISSN: 01674870. DOI: 10.1016/j.joep.2007.09.001. URL: https://linkinghub.elsevier.com/retrieve/pii/S0167487007000694.

[6] John F Helliwell. "How's life? Combining individual and national variables to explain subjective well-being". In: *Economic Modelling* 20.2 (Mar. 2003), pp. 331–360. ISSN: 02649993. DOI: 10.1016/S0264-9993(02)00057-3. URL: https://linkinghub.elsevier.com/retrieve/pii/S0264999302000573.

[7] John F. Helliwell and Robert D. Putnam. "The social context of well–being". In: *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences* 359.1449 (Sept. 2004). Ed. by F. A. Huppert, N. Baylis, and B. Keverne, pp. 1435–1446. ISSN: 0962-8436. DOI: 10.1098/rstb.2004.1522. URL: https://royalsocietypublishing.org/doi/10.1098/rstb.2004.1522.

[8] Y. Li. "Social Capital and Social Trust in Britain". In: *European Sociological Review* 21.2 (Apr. 2005), pp. 109–123. ISSN: 0266-7215. DOI: 10.1093/esr/jci007. URL: https://academic.oup.com/esr/article-lookup/doi/10.1093/esr/jci007.

[9] Christian Bjørnskov. "The multiple facets of social capital". In: *European Journal of Political Economy* 22.1 (Mar. 2006), pp. 22–40. ISSN: 01762680. DOI: 10.1016/j.ejpoleco.2005.05.006. URL: https://linkinghub.elsevier.com/retrieve/pii/S0176268005000509.

[10] Frank J. Elgar et al. "Social capital, health and life satisfaction in 50 countries". In: *Health Place* 17.5 (Sept. 2011), pp. 1044–1053. ISSN: 13538292. DOI: 10.1016/j.healthplace.2011.06.010. URL: https://linkinghub.elsevier.com/retrieve/pii/S1353829211001146.

[11] Viviana Amati et al. "Social relations and life satisfaction: the role of friends". In: *Genus* 74.1 (Dec. 2018), p. 7. ISSN: 2035-5556. DOI: 10.1186/s41118-018-0032-z. URL: https://genus.springeropen.com/articles/10.1186/s41118-018-0032-z.

[12] Bruno S. Frey and Alois Stutzer. *Happiness and economics: How the economy and institutions affect human well-being*. 2010.

[13] Alberto Alesina, Rafael Di Tella, and Robert MacCulloch. "Inequality and happiness: are Europeans and Americans different?" In: *Journal of Public Economics* 88.9-10 (Aug. 2004), pp. 2009–2042. ISSN: 00472727. DOI: 10.1016/j.jpubeco.2003.07.006. URL: https://linkinghub.elsevier.com/retrieve/pii/S0047272703000756.

[14] Vincent V. Louis and Shanyang Zhao. "Effects of Family Structure, Family SES, and Adulthood Experiences on Life Satisfaction". In: *Journal of Family Issues* 23.8 (Nov. 2002), pp. 986–1005. ISSN: 0192-513X. DOI: 10.1177/019251302237300. URL: http://journals.sagepub.com/doi/10.1177/019251302237300.

[15] Edsel L. Beja. "The U-shaped relationship between happiness and age: evidence using world values survey data".

In: *Quality Quantity* 52.4 (July 2018), pp. 1817–1829. ISSN: 0033-5177. DOI: 10.1007/s11135-017-0570-z. URL: http://link.springer.com/10.1007/s11135-017-0570-z.

[16] R Easterlin. "Does Economic Growth Improve the Human Lot? Some Empirical Evidence". In: *Nations and Households in Economic Growth* (1974).

[17] Pablo Beytía. "The Singularity of Latin American Patterns of Happiness". In: *Handbook of Happiness Research in Latin America*. Dordrecht: Springer Netherlands, 2016, pp. 17–29. DOI: 10.1007/978-94-017-7203-7_2. URL: http://link.springer.com/10.1007/978-94-017-7203-7_2.

[18] Shigehiro Oishi and Selin Kesebir. "Income Inequality Explains Why Economic Growth Does Not Always Translate to an Increase in Happiness". In: *Psychological Science* 26.10 (Oct. 2015), pp. 1630–1638. ISSN: 0956-7976. DOI: 10.1177/0956797615596713. URL: http://journals.sagepub.com/doi/10.1177/0956797615596713.

# A Appendix A

## LIFE SATISFACTION

**All things considered, how satisfied are you with your life as a whole these days?**

1. Completely dissatisfied
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9
10. Completely satisfied

## SOCIAL TRUST

**Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?** 1=most people can be trusted, 2=need to be very careful

**Tell me for each whether you trust people from each of these groups completely, somewhat, not very much or not at all (1=trust completely, 2=trust somewhat, 3=do no trust very much, 4=do not trust at all):**

- Your neighbourhood
- People you know personally
- People you met for the first time
- People of another religion
- People of another nationality

## INSTITUTIONAL TRUST

**How much confidence do you have in the following organisations (1=a great deal, 2=quite a lot, 3=not very much, 4=none at all)?**

- The police
- The courts
- The government

# B Appendix B

| Characteristic | N = 47,610[1] |
|---|---|
| Country | |
| Andorra | 957 (2.0%) |
| Argentina | 741 (1.6%) |
| Australia | 1,633 (3.4%) |
| Bangladesh | 1,114 (2.3%) |
| Bolivia | 1,863 (3.9%) |
| Brazil | 1,337 (2.8%) |
| Chile | 770 (1.6%) |
| China | 2,733 (5.7%) |
| Colombia | 1,520 (3.2%) |
| Cyprus | 823 (1.7%) |
| Ecuador | 1,131 (2.4%) |
| Germany | 1,224 (2.6%) |
| Greece | 1,077 (2.3%) |
| Hong Kong SAR, China | 1,964 (4.1%) |
| Indonesia | 3,112 (6.5%) |
| Iraq | 989 (2.1%) |
| Japan | 628 (1.3%) |
| Jordan | 1,018 (2.1%) |
| Kazakhstan | 952 (2.0%) |
| Korea, Rep. | 1,245 (2.6%) |
| Lebanon | 1,169 (2.5%) |
| Malaysia | 1,312 (2.8%) |
| Mexico | 1,605 (3.4%) |
| Nigeria | 1,187 (2.5%) |
| Pakistan | 1,739 (3.7%) |
| Peru | 1,316 (2.8%) |
| Philippines | 1,196 (2.5%) |
| Puerto Rico | 1,049 (2.2%) |
| Romania | 894 (1.9%) |
| Russian Federation | 1,417 (3.0%) |
| Serbia | 899 (1.9%) |
| Thailand | 1,242 (2.6%) |
| Tunisia | 1,074 (2.3%) |
| Turkey | 2,198 (4.6%) |
| United States | 2,482 (5.2%) |
| Age | 43 (16) |
| Sex | |
| Female | 24,777 (52%) |
| Male | 22,833 (48%) |
| Marital Status | |
| Married | 31,154 (65%) |
| Not married | 16,456 (35%) |
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| Social Trust | |
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| High | 36,797 (77%) |
| Low | 10,813 (23%) |
| Country Social Trust | |
| High | 17,188 (36%) |
| Low | 30,422 (64%) |

[1] n (%); Mean (SD)

# C Appendix C

```
library("tidyverse")
library("ggplot2")
library("readxl")
library("dplyr")
library("tidyr")
library("ggfortify")
library("DT")
library("reshape2")
library("knitr")
library("lubridate")
library("gtsummary")

# Load Wave 7 data
wave7 <- read_csv("WVS_Cross-
    National_Wave_7_csv_v1_6_2.
    csv")

# Select only countries
    surveyed in 2018
data<- wave7 %>%
   filter(wave7$A_YEAR == 2018 |
              wave7$A_YEAR == 2017
                  |
              wave7$A_YEAR ==
                 2019)

# Select variables I need
myset <- c("B_COUNTRY", "B_
    COUNTRY_ALPHA", "Q262", "Q260
    ","Q273", "Q279", "Q49",
              "Q58","Q59","Q60","
                 Q61","Q62","Q63",
              "Q57",
              "Q69", "Q70", "Q71")

# Subset data
mydata <- data[myset]
# Select only complete rows (
    without NAs)
data_complete <- mydata[
    complete.cases(mydata), ]

data_complete$soc1 <- if_else(
    data_complete$Q58 <= 2  , 1,
```

```
    0)
data_complete$soc2 <- if_else(
    data_complete$Q59 <= 2 , 1,
    0)
data_complete$soc3 <- if_else(
    data_complete$Q60 <= 2 , 1,
    0)
data_complete$soc4 <- if_else(
    data_complete$Q61 <= 2 , 1,
    0)
data_complete$soc5 <- if_else(
    data_complete$Q62 <= 2 , 1,
    0)
data_complete$soc6 <- if_else(
    data_complete$Q63 <= 2 , 1,
    0)
data_complete$socgen <- if_else
    (data_complete$Q57 == 1 , 1,
    0)

data_complete$Q57

# Create high trust/low trust
    indices
data_complete$soctrust <- if_
    else((rowSums(data_complete[
    , c("soc1","soc2","soc3","
    soc4","soc5","soc6","socgen")
    ]))>=4, 1,0)
data_complete$instrust <- if_
    else((rowSums(data_complete[
    , c("Q69","Q70","Q71")])-2)
    <=6, 1,0)

# Subset final dataset
final <- dplyr::select(data_
    complete,
                           -c("Q57"
                              ,"Q58"
                              ,"Q59"
                              ,"Q60"
                              ,"Q61"
                              ,"Q62"
                              ,"Q63"
                              ,"Q57"
                              ,"Q69"
```

```
                                ,"Q70"
                                ,"Q71"
                                ,
                                "soc1
                                   ","
                                   soc2
                                   ","
                                   soc3
                                   ","
                                   soc4
                                   ","
                                   soc5
                                   ","
                                   soc6
                                   ","
                                   socgen
                                   "))

# The number of individuals per
    country
description <- final %>%
  group_by(B_country) %>%
  summarise(n())

# Rename the columns of my
   dataset
column_names <- c("country_code
   ", "country", "age", "male",
   "marital_status", "employed",
                  "life_
                     satisfaction
                     ", "soc_
                     trust","ins
                     _trust")

colnames(final) <- column_names

description <- final %>%
  group_by(country_code)  %>%
  summarise(n())

# Life satisfaction split
   between high and low values
final$high_ls <- if_else(final$
   life_satisfaction >= 6 ,
                        1, 0)
```

```
# Employed == 1, else 0
final$employed = if_else((final
    $employed == 1 |final$
    employed == 2 | final$
    employed == 3),
                              1, 0)

# Male == 1, Female == 0
final$male = if_else(final$male
     == 1, 1,0)

# Married/livingwith someone
final$marital_status <- if_else
    (final$marital_status <= 2 ,
                                    1,

                                       0)


# Add age squared
final$age2 <- final$age^2


# Did not find GDP for Taiwan
    so remove from dataset
final <- final %>%
   filter(final$country_code!=
      158)

#Import GDP values from WORLD
    BANK (World Development
    Indicators)
gdp_all <- read_csv("gdp1.csv")
length(gdp_all$`2018 [YR2018]`)
n<-dim(gdp_all)[1]
gdp<-gdp_all[1:(n-5),]

# Arrange in alphabetical order
gdp <- gdp[order(gdp$`Country
    Name`),]
final <- final[order(final$
    country),]

# Select only 2018 values
gdp_final <- gdp[c("Country
```

```
   Name","2018 [YR2018]")]
# Add country code
gdp_final$country_code <-
   description$country_code
# Rename cols
colnames(gdp_final) <- c("
   country_name", "gdp", "
   country_code")

# Merge with final dataset
final <- left_join(final,gdp_
   final)

# Agg trust
agg_trust <-aggregate(final[, c
   ("ins_trust", "soc_trust")],
                      list(
                         final$
                         country
                         _code),
                      mean)
agg_trust$country_inst <- if_
   else(agg_trust$ins_trust >=
   0.5   , 1, 0)
agg_trust$country_soct <- if_
   else(agg_trust$soc_trust >=
   0.5   , 1, 0)
agg_trust_final <- agg_trust[c(
   "Group.1", "country_inst", "
   country_soct")]
colnames(agg_trust_final) <- c(
   "country_code", "country_inst
   ", "country_soct")
final <- left_join(final,agg_
   trust_final)

# Summary stats
col_select <- c("country_name",
    "age", "male",
                "marital_status
                   ", "employed"
                   , "soc_trust"
                   ,
                "ins_trust", "
                   high_ls", "
                   country_soct"
```

```
                    )
summary_stats_cols <- c("
   Country", "Age", "Sex",
                            "
                               Marital

                               Status
                               ", "
                               Employment

                               Status
                               ",
                            "Social

                               Trust
                               ", "
                               Institutional

                               Trust
                               ", "
                               Life
                               Satisfaction
                               ",
                            "
                               Country

                               Social

                               Trust
                               ")

summary_stats <- final[col_
   select]
colnames(summary_stats) <-
   summary_stats_cols
summary_stats$Sex <- if_else(
   summary_stats$Sex ==1, "Male"
   , "Female")
summary_stats$`Marital Status`
   <- if_else(summary_stats$`
   Marital Status` ==1,
                                                  "
                                                     Married
                                                     "
                                                     ,
```

```
                                                    "
                                                    Not

                                                    married
                                                    "
                                                    )

summary_stats$`Employment
    Status` <- if_else(summary_
    stats$`Employment Status`
    ==1,
                                                    "
                                                        Employed
                                                        "
                                                        ,

                                                        "
                                                        Not

                                                        employed
                                                        "
                                                        )

summary_stats$`Social Trust` <-
     if_else(summary_stats$`
    Social Trust` ==1,
                                                "
                                                    High
                                                    "
                                                    ,

                                                    "
                                                    Low
                                                    "
                                                    )

summary_stats$`Institutional
    Trust` <- if_else(summary_
    stats$`Institutional Trust`
    ==1,
                                                "
                                                    High
                                                    "
                                                    ,

                                                    "
```

```
                                                    Low
                                                    "
                                                    )

summary_stats$`Country Social
    Trust` <- if_else(summary_
    stats$`Country Social Trust`
    ==1,
                                                "
                                                    High
                                                    "
                                                    ,
                                                    "
                                                    Low
                                                    "
                                                    )

summary_stats$`Life
    Satisfaction` <- if_else(
    summary_stats$`Life
    Satisfaction` ==1,
                                                "
                                                    High
                                                    "
                                                    ,
                                                    "
                                                    Low
                                                    "
                                                    )



testsummary <- summary_stats
   %>%
   tbl_summary(
     #by = country_code,
     statistic = list(all_
        continuous() ~ "{mean} ({
        sd})",
                         all_
                            categorical
                            () ~ "{n
                            } ({p
                            }%)"),
```

```
    #digits = all_continuous()
        ~ 2,
    #label = grade ~ "Tumor
        Grade",
    #missing_text = "(Missing)"
  )


# Load lmer library
library(lme4)
library(lmer)
# Null model
nullmodel <- glmer(high_ls ~ 1+
    (1 | country_name),
                   data=final,
                   family =
                      binomial(
                      link="logit
                      "))

# adding level 1 predictors

m1 <- glmer(high_ls ~ male+ (1
   | country_name),
                    data=final,
                    family =
                       binomial(
                       link="
                       logit"))

# adding age
final$age_scaled <- scale(final
   $age)
final$age2_scaled <- scale(
   final$age2)

m2 <- glmer(high_ls ~ male+
   age2_scaled+age_scaled+ (1 |
   country_name),
             data=final,
             family = binomial(
                link="logit"))

# marital status
m3 <- glmer(high_ls ~ male+
   age2_scaled+age_scaled+
```

```
                marital_status
                   +(1 | country_
                   name),
                data=final,
                family = binomial(
                   link="logit"))

# employment status

m4 <- glmer(high_ls ~ male+
    age2_scaled+age_scaled+
                marital_status +
                   +employed +(1 |
                    country_name),
                data=final,
                family = binomial(
                   link="logit"))

# soc trust

m5 <- glmer(high_ls ~ male+
    age2_scaled+age_scaled+
                marital_status +
                   +employed +
                soc_trust+(1 |
                   country_name),
                data=final,
                family = binomial(
                   link="logit"))

# ins_trust
m6 <- glmer(high_ls ~ male+
    age2_scaled+age_scaled+
                marital_status +
                   +employed +
                ins_trust+(1 |
                   country_name),
                data=final,
                family = binomial(
                   link="logit"))

# both trusts

m7 <- glmer(high_ls ~ male+
    age2_scaled+age_scaled+
                marital_status +
```

```
                    +employed +
                  ins_trust+soc_
                     trust+(1 |
                     country_name),
                data=final,
                family = binomial(
                   link="logit"))

# gdp
final$gdp_scaled <- scale(final
   $gdp)

m8 <- glmer(high_ls ~ male+
   age2_scaled+age_scaled+
                  marital_status +
                     +employed +
                  ins_trust+soc_
                     trust+
                    +gdp_scaled+(1 |
                     country_name),
                data=final,
                family = binomial(
                   link="logit"))

# with interaction term
m9 <- glmer(high_ls ~ male+
   age2_scaled+age_scaled+
                  marital_status +
                     +employed +
                  ins_trust+soc_
                     trust*country_
                     soct+
                    +gdp_scaled+ (1 |
                      country_name),
                data=final,
                family = binomial(
                   link="logit"))

# AIC(nullmodel, m1, m2,m3,m4,
   m5,m6,m7,m8,m9)

# plot country rank
library(merTools)
reEX <- REsim(m9)
plotREsim(reEX,oddsRatio =
   FALSE, labs=TRUE)
```

```
#### table of models
library(stargazer)

library(gtsummary)
library(tidyverse)
remotes::install_github("
    rstudio/gt")

stargazer(nullmodel, m1,m2,m3,
    m4,m5,m6,m7, m8, m9,
            title = 'Model
                Results',
            type = 'html',
            out = '
                allmodelssummary.
                html')


# finding the log odds
tab <- c(fixef(m9))
# odds ratios
exp(tab)
```