UTM

UNIVERSITI TEKNOLOGI MALAYSIA

SESSION 2020/2021 SEMESTER 2

COURSE:

SECI 2143-02 PROBABILITY & STATISTICAL DATA ANALYSIS

FACULTY:

FACULTY OF ENGINEERING

SCHOOL:

SCHOOL OF COMPUTING

TITLE:

PROJECT 2

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1.0 Introduction

Does happiness matter? Some claim it is vital, while some prefer to prioritize other things. Nonetheless, happiness leads to a broad range of benefits on performance, health, wellbeing, and more. For example, See and Yen (2018) study implies that happiness contributes significantly to health system efficiency. Additionally, happy individuals work better, producing a happier, healthier, and more productive society (Diener, E., & Tay, L., 2017). Since 2012, World Happiness Report consistently publishes the happiness index representing a nation's citizen collective happiness. The index is constructed based on various elements.

The data chosen is based on World Happiness Report 2019, which centered on community happiness participated by 156 countries. This study aims to test if there is any significant relationship between components including gross domestic product (GDP) per capita, social support, healthy life expectancy, freedom of choice, generosity, and perceptions of corruption to the happiness score. Hence, the data variables used are expected to deliver a valid result.

2.0 Dataset

Dataset URL : https://www.kaggle.com/unsdsn/world-happiness?select=2019.csv

Population : 195 countries

Sample: 156 countries

Data Description:

Variables	Type of Variable	Measurement Level	Description
Overall Rank	Quantitative	Nominal	Happiness ranking from 1 to 156
Country or region	Qualitative	Nominal	Name of the countries
Happiness Score	Quantitative	Ratio	Cumulative addition of six components
GDP per Capita	Quantitative	Ratio	A country's economic output
Social Support	Quantitative	Ratio	Assistance, social network, or resources, etc. from others
Healthy Life Expectancy	Quantitative	Ratio	Average life in good health
Freedom to make life choices	Quantitative	Ratio	Human’s right to decide
Generosity	Quantitative	Ratio	Willingness to offer help or support
Perceptions of corruption	Quantitative	Ratio	Index on perceived levels of public sector corruption

3.0 Data analysis

i. Hypothesis Testing (one-sample test)

Transparency International scores 180 countries ranging from 0 (highly corrupt) to 100 (very clean) in the Corruption Perceptions Index (CPI) 2019. While they consider scores below 50 to be failing, the average score is in fact 43. In this study, the variable **Perception of corruption** is tested to prove the connection between a country's overall rank in happiness.

Since the data used ranged from 0 to 0.5, the scale (0 to 100) is assumed to range between 0 to 1, where 0.43 is the population mean. From the data, it can be determined that a score of perception of corruption higher than 0.43 will result in a higher country happiness rank. A sample of only the top 10 countries will be taken from the data (see Appendix B). This is because the test presumes a high rank relates to high perception of corruption score. This is a right-tailed test.

Hypothesis statement:

$H_0: \mu = 0.43$

$H_1: \mu > 0.43$(high perception of corruption relates to high overall rank)

By using RStudio, we obtained the following result:

When $n = 10$, $df = 9$,and $\alpha = 0.05$,

Mean, $\bar{x} = 0.319$

Standard Deviation, $s = 0.088861$

$\therefore t = -3.95$

Critical value $= t_{0.05,9} = 1.833$

Result:

Fail to reject H_0, the t-score of -3.95 falls outside the rejection area since it is smaller than the critical value of 1.833. Thus, at a 0.05 significance level, there is no sufficient evidence to support the claim that when the perception of corruption is higher than 0.43, the higher the country's happiness ranks.

It means that the corruption perception index does not heavily influence the result of a country's happiness rank. For instance, in the dataset, Singapore and Rwanda rank 32 and 152 in happiness rank although its perception of corruption score is 0.453 and 0.411 respectively (see Appendix B). Similarly, Iceland is among the top 4 happiest countries but is slightly corrupted because its perception of corruption score is 0.118**.**

ii. Correlation test

This study uses the correlation test to analyze the strength of the linear relationship between two variables, namely **Happiness score** and **Freedom to make life choices**. We will use R Studio to apply the Pearson's Product Moment Correlation Coefficient technique. We will later determine the sample correlation coefficient, r since both the variables have the measurement level of ratio.

x = Happiness score

y = Freedom to make life choices

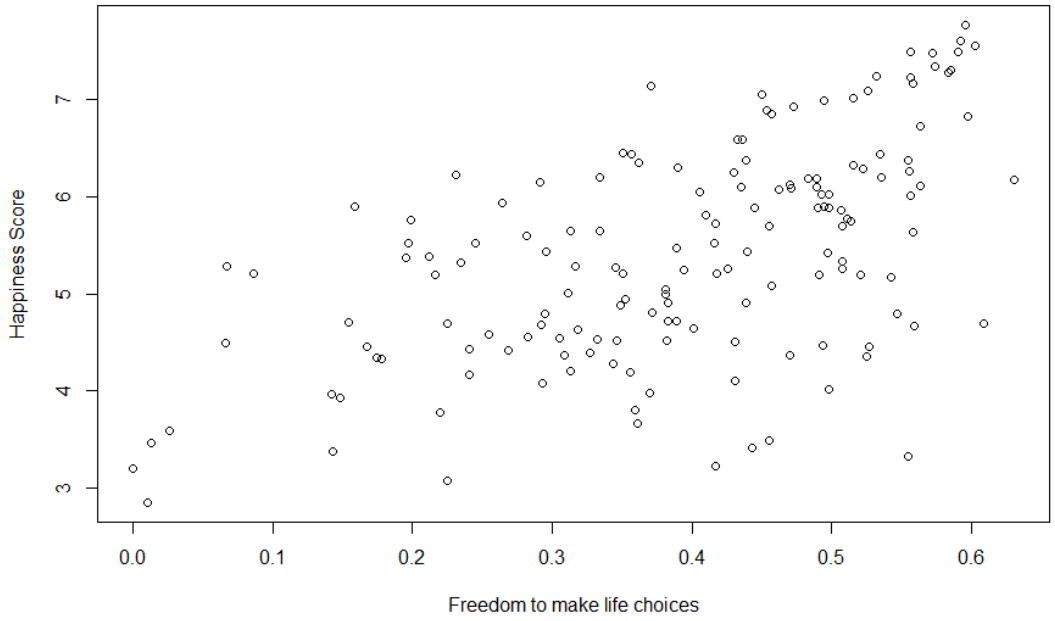

Figure 2: Scatter plot of Freedom to make life choices against Happiness Score

From the scatter plot above, we can observe a **positive correlation** relationship between the two variables, Happiness Score and Freedom to make life choices. This is because as the freedom of making life choices increases, the happiness score increases. Nonetheless, there are also several outliers on the bottom left part of the scatter plot graph.

1. Calculate the sample correlation coefficient, r, using Pearson's method by:

$$r = \frac{n\,\Sigma xy - \Sigma x\,\Sigma y}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$$

By using RStudio, we have successfully retrieved the sample correlation coefficient, which is r = 0.5667418. The sample correlation coefficient, r retrieved, indicates a moderately strong positive linear correlation between variable Freedom to make life choices (x) and Happiness score (y).

2. Significance test for Correlation

Hypothesis statement:

H_0: ρ $= 0$(no linear relationship)

H_1: ρ $\neq 0$(linear relationship does exist)

Calculate test statistics

$$t = \frac{r}{\sqrt{\frac{1-r^2}{n-2}}} = \frac{0.5667418}{\sqrt{\frac{1-(0.5667418)^2}{156-2}}} = 8.536375$$

Find critical value

When $\alpha = 0.05$, $df = 154$

From t-table, since this is a two-tailed test, there are two critical values:

Lower tail critical value $-t_{\alpha/2} = 0.025$, $df = 154 = -1.976$

Upper tail critical value $t_{\alpha/2} = 0.025$, $df = 154 = 1.976$

From RStudio, we also get p-value = 1.238e - 14

Result:

Hence, if test statistics > 1.976 or test statistics < -1.976, reject H_0. Otherwise, fail to reject H_0. From the calculation, the test statistic is $t = 8.5363$. Since $t = 8.5363 > 1.976$upper-tail critical value, **we reject** H_0. There is sufficient evidence to conclude that there is a linear relationship between Freedom to make life choices and Happiness score, at a 0.05 significance level.

iii. Regression test

In this analysis, we are using variables **social support** and **healthy life expectancy**. We will test whether the value of healthy life expectancy depends on the value of social support. The type of regression used is simple linear regression. The changes in health life expectancy are assumed to be caused by changes in social support.

x = social support (independent variable)

y = health life expectancy (dependent variable)

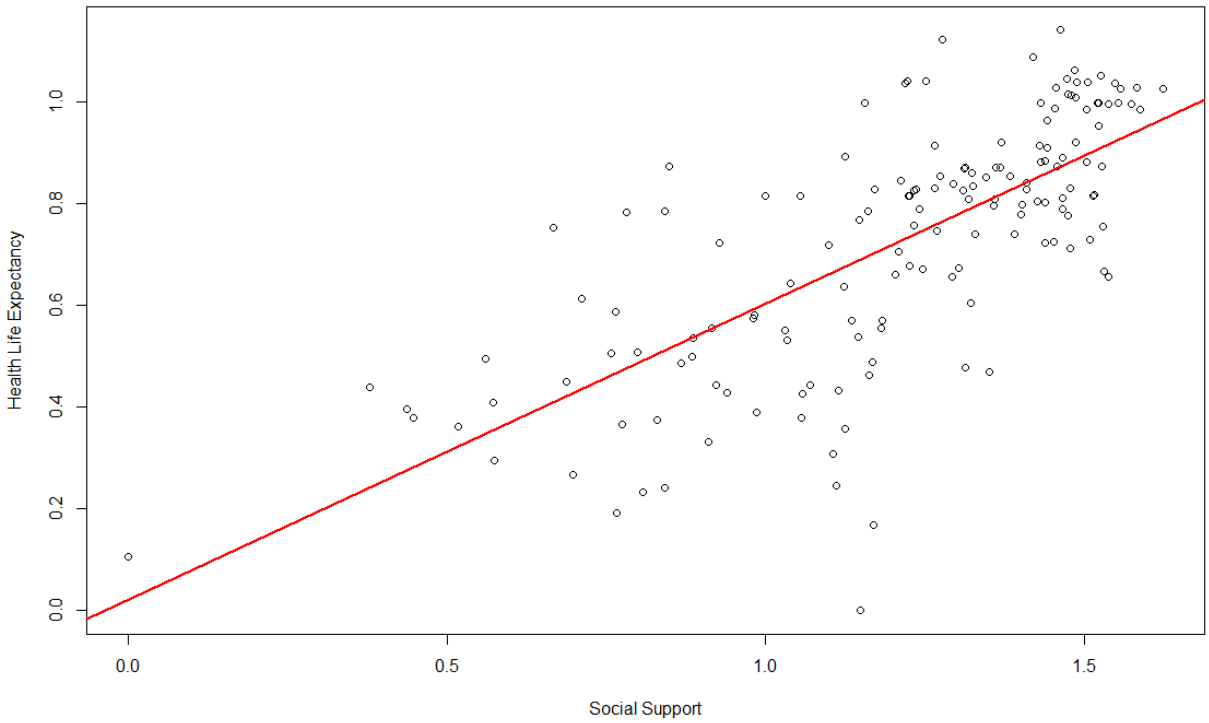

Figure 3: Scatter plot of healthy life expectancy against social support with the regression line

The estimated regression model is calculated by RStudio, where we obtain $\hat{y} = 0.022 + 0.582x$. From the equation, no healthy life had 0 social support, so $b_0 = 0.022$ indicates that for countries within the social support observed, 0.022 is the portion of the healthy life expectancy not explained by social support. Next, $b_1 = 0.582$ tells us that the average value of healthy life expectancy rises by 0.582 for each additional unit in social support. The scatter plot coefficient of determination, $R^2 = 0.517$. Since $0 < R^2 < 1$, this indicates a weaker linear relationship between social support and healthy life expectancy. There is some, but not all variation in healthy life expectancy explained by social support. Hence, 51.7% of the variation in healthy life expectancy is explained by variation in social support. From the graph, we can see a

significant standard error of an estimate, $s_{\varepsilon} = 0.169$, and standard deviation of regression slope, $s_{b_1} = 0.045$.

The inference about the slope is using t-test:

Hypothesis statement, $H_0: \beta_1 = 0$(no linear relationship)

$H_1: \beta_1 \neq 0$(linear relationship does exist)

When $\alpha = 0.05$, $df = n - 2 = 156 - 2 = 154$

From t-table, since this is a two-tailed test, there are two critical values:

Lower tail critical value $-t_{\alpha/2} = 0.025$, $df = 154 = -1.976$

Upper tail critical value $t_{\alpha/2} = 0.025$, $df = 154 = 1.976$

From RStudio, we also get p-value = 2.2e - 16.

Hence, we reject H_0 if test statistics, t > 1.976 or t < -1.976. By using RStudio, we get test statistics, $t = 12.838$. Since $t = 12.838 > 1.976$ of upper-tail critical value, we reject H_0. There is sufficient evidence that social support affects health life expectancy.

iv. Chi-Square test of independence

In this test, we need to divide the countries based on their continents to test if a relationship exists between countries' continents and country income groups. The country income group is from The World Data Bank (The World Bank Group, 2021). The Chi-square test determines whether there is evidence of a relationship between them at the significance level of 0.05. The hypothesis statement is shown below:

H_0: No relationship between countries' continents and income groups.
H_1: Countries' continents and income groups are dependent and relationships exist.

Find the critical value,x^2 using RStudio is $x^2 = 24.996$with a degree of freedom (6-1)(4-3) = 15 and $\alpha = 0.05$. The result of the two-way contingency table, which includes both the observed and expected counts, is shown below:

Countries' Continents	Income Group								Total
	High Income		Upper Middle Income		Lower Middle Income		Low Income		
	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	
Africa	1	14.712	5	11.538	19	11.538	20	7.212	45
Asia	13	15.038	14	11.795	15	11.795	4	7.372	46
Europe	29	13.077	9	10.256	2	10.256	0	6.410	40
North America	4	4.250	5	3.333	3	3.333	1	2.083	13
South America	2	3.269	7	2.564	1	2.564	0	1.603	10
Oceania	2	0.654	0	0.513	0	0.513	0	0.321	2
Total	51	51	40	40	40	40	25	25	156

By using Rstudio, we get the test statistic $x^2 = 95.975$with $p - value = 7.519$. Therefore, since the test statistic value > the critical value,$x^2 = 95.975 > 24.996$. This shows that the test statistic falls within the critical region. Thus, the null hypothesis, H_0 is rejected at $\alpha = 0.05$. There is sufficient evidence to conclude that there is a relationship between the countries' continent and income group.

4.0 Conclusion

Though there has been much debate on the subject, the rankings of national happiness do correlate with various quality of life factors. It is clear that GDP per capita, social support, healthy life expectancy, freedom, generosity, and the absence of corruption contributes to a happy nation. This is made evident by the results obtained from testing the hypothesis, correlation, regression, and chi-square test of independence.

While conducting the study, we found that choosing the correct variables and determining the calculation process is challenging. Nevertheless, the process enables us to learn to conduct inferential statistical data analysis. One of the research findings deduces that the higher the corruption perception does not necessarily equate to a higher rank in happiness. It gives an unexpected result even though less corrupt nations are usually linked to happy people. However, this applies to a small number of countries because the perception of corruption does contribute to some extent.

Apart from this, a positive correlation between happiness score and freedom to make life choices can also be observed. Furthermore, there is also sufficient evidence to confirm the claim that social support does affect health life expectancy. Last but not least, the chi-square test of independence is also conducted to determine if there is a statistically significant relationship between country income groups and countries' continents. The test concludes that there is a connection between the countries' continents and income groups. It can also be interpreted that the country's income group is based on the countries' continents.

The tests conducted have proven that all of these elements are responsible for ranking a country's happiness. Thus, it is not a coincidence that countries like Finland, Denmark, and Norway were among the happiest countries in the world in the 2019 report since all the components have a significant relationship with each other. Hence, the data presented in the World Happiness Report 2019 are verified to be accurate and valid.

5.0 References

Diener, E., & Tay, L. (2017). A scientific review of the remarkable benefits of happiness for successful and healthy living. Happiness: Transforming the development landscape, 90-117.

See, K. F., & Yen, S. H. (2018). Does happiness matter to health system efficiency? A performance analysis. Health economics review, 8(1), 1-10.

The World Bank Group. (2019, November 27). *World Development Indicators*. The World Data Sustainable Development Solutions Network. *World Happiness Report*. Bank.World Development Indicators

Transparency International. (2019) Corruption Perceptions Index. Report 2019, 4. https://images.transparencycdn.org/images/CPI2020_Report_EN_0802-WEB-1_2021-02-08-103053.pdf

- Video presentation link: https://youtu.be/D3LyNxtO_Wk
- E-portfolio link:
    - Nurarissa Dayana: e-portfolio
    - Sakinah Al'izzah: e-portfolio

6.0 Appendix A

Diagram 1: World Happiness Report 2019 Dataset

Overall rank	Country or region	Score	GDP per capita	Social support	Healthy life expectancy	Freedom to make life choices	Generosity	Perceptions of corruption
1	Finland	7.769	1.34	1.587	0.986	0.596	0.153	0.393
2	Denmark	7.6	1.383	1.573	0.996	0.592	0.252	0.41
3	Norway	7.554	1.488	1.582	1.028	0.603	0.271	0.341
4	Iceland	7.494	1.38	1.624	1.026	0.591	0.354	0.118
5	Netherlands	7.488	1.396	1.522	0.999	0.557	0.322	0.298
6	Switzerland	7.48	1.452	1.526	1.052	0.572	0.263	0.343
7	Sweden	7.343	1.387	1.487	1.009	0.574	0.267	0.373
8	New Zealand	7.307	1.303	1.557	1.026	0.585	0.33	0.38
9	Canada	7.278	1.365	1.505	1.039	0.584	0.285	0.308
10	Austria	7.246	1.376	1.475	1.016	0.532	0.244	0.226
11	Australia	7.228	1.372	1.548	1.036	0.557	0.332	0.29
12	Costa Rica	7.167	1.034	1.441	0.963	0.558	0.144	0.093
13	Israel	7.139	1.276	1.455	1.029	0.371	0.261	0.082
14	Luxembourg	7.09	1.609	1.479	1.012	0.526	0.194	0.316
15	United Kingdom	7.054	1.333	1.538	0.996	0.45	0.348	0.278
16	Ireland	7.021	1.499	1.553	0.999	0.516	0.298	0.31
17	Germany	6.985	1.373	1.454	0.987	0.495	0.261	0.265
18	Belgium	6.923	1.356	1.504	0.986	0.473	0.16	0.21
19	United States	6.892	1.433	1.457	0.874	0.454	0.28	0.128
20	Czech Republic	6.852	1.269	1.487	0.92	0.457	0.046	0.036
21	United Arab Emirates	6.825	1.503	1.31	0.825	0.598	0.262	0.182
22	Malta	6.726	1.3	1.52	0.999	0.564	0.375	0.151
23	Mexico	6.595	1.07	1.323	0.861	0.433	0.074	0.073
24	France	6.592	1.324	1.472	1.045	0.436	0.111	0.183
25	Taiwan	6.446	1.368	1.43	0.914	0.351	0.242	0.097
26	Chile	6.444	1.159	1.369	0.92	0.357	0.187	0.056
27	Guatemala	6.436	0.8	1.269	0.746	0.535	0.175	0.078
28	Saudi Arabia	6.375	1.403	1.357	0.795	0.439	0.08	0.132
29	Qatar	6.374	1.684	1.313	0.871	0.555	0.22	0.167
30	Spain	6.354	1.286	1.484	1.062	0.362	0.153	0.079
31	Panama	6.321	1.149	1.442	0.91	0.516	0.109	0.054
32	Brazil	6.3	1.004	1.439	0.802	0.39	0.099	0.086
33	Uruguay	6.293	1.124	1.465	0.891	0.523	0.127	0.15
34	Singapore	6.262	1.572	1.463	1.141	0.556	0.271	0.453
35	El Salvador	6.253	0.794	1.242	0.789	0.43	0.093	0.074
36	Italy	6.223	1.294	1.488	1.039	0.231	0.158	0.03
37	Bahrain	6.199	1.362	1.368	0.871	0.536	0.255	0.11
38	Slovakia	6.198	1.246	1.504	0.881	0.334	0.121	0.014
39	Trinidad & Tobago	6.192	1.231	1.477	0.713	0.489	0.185	0.016
40	Poland	6.182	1.206	1.438	0.884	0.483	0.117	0.05
41	Uzbekistan	6.174	0.745	1.529	0.756	0.631	0.322	0.24
42	Lithuania	6.149	1.238	1.515	0.818	0.291	0.043	0.042
43	Colombia	6.125	0.985	1.41	0.841	0.47	0.099	0.034
44	Slovenia	6.118	1.258	1.523	0.953	0.564	0.144	0.057
45	Nicaragua	6.105	0.694	1.325	0.835	0.435	0.2	0.127
46	Kosovo	6.1	0.882	1.232	0.758	0.489	0.262	0.006
47	Argentina	6.086	1.092	1.432	0.881	0.471	0.066	0.05
48	Romania	6.07	1.162	1.232	0.825	0.462	0.083	0.005
49	Cyprus	6.046	1.263	1.223	1.042	0.406	0.19	0.041
50	Ecuador	6.028	0.912	1.312	0.868	0.498	0.126	0.087
51	Kuwait	6.021	1.5	1.319	0.808	0.493	0.142	0.097
52	Thailand	6.008	1.05	1.409	0.828	0.557	0.359	0.028
53	Latvia	5.94	1.187	1.465	0.812	0.264	0.075	0.064
54	South Korea	5.895	1.301	1.219	1.036	0.159	0.175	0.056
55	Estonia	5.893	1.237	1.528	0.874	0.495	0.103	0.161
56	Jamaica	5.89	0.831	1.478	0.831	0.49	0.107	0.028
57	Mauritius	5.888	1.12	1.402	0.798	0.498	0.215	0.06
58	Japan	5.886	1.327	1.419	1.088	0.445	0.069	0.14
59	Honduras	5.86	0.642	1.236	0.828	0.507	0.246	0.078
60	Kazakhstan	5.809	1.173	1.508	0.729	0.41	0.146	0.096
61	Bolivia	5.779	0.776	1.209	0.706	0.511	0.137	0.064
62	Hungary	5.758	1.201	1.41	0.828	0.199	0.081	0.02
63	Paraguay	5.743	0.855	1.475	0.777	0.514	0.184	0.08
64	Northern Cyprus	5.718	1.263	1.252	1.042	0.417	0.191	0.162
65	Peru	5.697	0.96	1.274	0.854	0.455	0.083	0.027
66	Portugal	5.693	1.221	1.431	0.999	0.508	0.047	0.025
67	Pakistan	5.653	0.677	0.886	0.535	0.313	0.22	0.098
68	Russia	5.648	1.183	1.452	0.726	0.334	0.082	0.031
69	Philippines	5.631	0.807	1.293	0.657	0.558	0.117	0.107
70	Serbia	5.603	1.004	1.383	0.854	0.282	0.137	0.089
71	Moldova	5.529	0.685	1.328	0.739	0.245	0.181	0
72	Libya	5.525	1.044	1.303	0.673	0.416	0.133	0.152
73	Montenegro	5.523	1.051	1.361	0.871	0.197	0.142	0.08
74	Tajikistan	5.467	0.493	1.098	0.718	0.389	0.23	0.144
75	Croatia	5.432	1.155	1.266	0.914	0.296	0.119	0.022

76	Hong Kong	5.43	1.438	1.277	1.122	0.44	0.258	0.287
77	Dominican Republic	5.425	1.015	1.401	0.779	0.497	0.113	0.101
78	Bosnia and Herzegovina	5.386	0.945	1.212	0.845	0.212	0.263	0.006
79	Turkey	5.373	1.183	1.36	0.808	0.195	0.083	0.106
80	Malaysia	5.339	1.221	1.171	0.828	0.508	0.26	0.024
81	Belarus	5.323	1.067	1.465	0.789	0.235	0.094	0.142
82	Greece	5.287	1.181	1.156	0.999	0.067	0	0.034
83	Mongolia	5.285	0.948	1.531	0.667	0.317	0.235	0.038
84	North Macedonia	5.274	0.983	1.294	0.838	0.345	0.185	0.034
85	Nigeria	5.265	0.696	1.111	0.245	0.426	0.215	0.041
86	Kyrgyzstan	5.261	0.551	1.438	0.723	0.508	0.3	0.023
87	Turkmenistan	5.247	1.052	1.538	0.657	0.394	0.244	0.028
88	Algeria	5.211	1.002	1.16	0.785	0.086	0.073	0.114
89	Morocco	5.208	0.801	0.782	0.782	0.418	0.036	0.076
90	Azerbaijan	5.208	1.043	1.147	0.769	0.351	0.035	0.182
91	Lebanon	5.197	0.987	1.224	0.815	0.216	0.166	0.027
92	Indonesia	5.192	0.931	1.203	0.66	0.491	0.498	0.028
93	China	5.191	1.029	1.125	0.893	0.521	0.058	0.1
94	Vietnam	5.175	0.741	1.346	0.851	0.543	0.147	0.073
95	Bhutan	5.082	0.813	1.321	0.604	0.457	0.37	0.167
96	Cameroon	5.044	0.549	0.91	0.331	0.381	0.187	0.037
97	Bulgaria	5.011	1.092	1.513	0.815	0.311	0.081	0.004
98	Ghana	4.996	0.611	0.868	0.486	0.381	0.245	0.04
99	Ivory Coast	4.944	0.569	0.808	0.232	0.352	0.154	0.09
100	Nepal	4.913	0.446	1.226	0.677	0.439	0.285	0.089
101	Jordan	4.906	0.837	1.225	0.815	0.383	0.11	0.13
102	Benin	4.883	0.393	0.437	0.397	0.349	0.175	0.082
103	Congo (Brazzaville)	4.812	0.673	0.799	0.508	0.372	0.105	0.093
104	Gabon	4.799	1.057	1.183	0.571	0.295	0.043	0.055
105	Laos	4.796	0.764	1.03	0.551	0.547	0.266	0.164
106	South Africa	4.722	0.96	1.351	0.469	0.389	0.13	0.055
107	Albania	4.719	0.947	0.848	0.874	0.383	0.178	0.027
108	Venezuela	4.707	0.96	1.427	0.805	0.154	0.064	0.047
109	Cambodia	4.7	0.574	1.122	0.637	0.609	0.232	0.062
110	Palestinian Territories	4.696	0.657	1.247	0.672	0.225	0.103	0.066
111	Senegal	4.681	0.45	1.134	0.571	0.292	0.153	0.072
112	Somalia	4.668	0	0.698	0.268	0.559	0.243	0.27
113	Namibia	4.639	0.879	1.313	0.477	0.401	0.07	0.056
114	Niger	4.628	0.138	0.774	0.366	0.318	0.188	0.102
115	Burkina Faso	4.587	0.331	1.056	0.38	0.255	0.177	0.113
116	Armenia	4.559	0.85	1.055	0.815	0.283	0.095	0.064
117	Iran	4.548	1.1	0.842	0.785	0.305	0.27	0.125
118	Guinea	4.534	0.38	0.829	0.375	0.332	0.207	0.086
119	Georgia	4.519	0.886	0.666	0.752	0.346	0.043	0.164
120	Gambia	4.516	0.308	0.939	0.428	0.382	0.269	0.167
121	Kenya	4.509	0.512	0.983	0.581	0.431	0.372	0.053
122	Mauritania	4.49	0.57	1.167	0.489	0.066	0.106	0.088
123	Mozambique	4.466	0.204	0.986	0.39	0.494	0.197	0.138
124	Tunisia	4.461	0.921	1	0.815	0.167	0.059	0.055
125	Bangladesh	4.456	0.562	0.928	0.723	0.527	0.166	0.143
126	Iraq	4.437	1.043	0.98	0.574	0.241	0.148	0.089
127	Congo (Kinshasa)	4.418	0.094	1.125	0.357	0.269	0.212	0.053
128	Mali	4.39	0.385	1.105	0.308	0.327	0.153	0.052
129	Sierra Leone	4.374	0.268	0.841	0.242	0.309	0.252	0.045
130	Sri Lanka	4.366	0.949	1.265	0.831	0.47	0.244	0.047
131	Myanmar	4.36	0.71	1.181	0.555	0.525	0.566	0.172
132	Chad	4.35	0.35	0.766	0.192	0.174	0.198	0.078
133	Ukraine	4.332	0.82	1.39	0.739	0.178	0.187	0.01
134	Ethiopia	4.286	0.336	1.033	0.532	0.344	0.209	0.1
135	Swaziland	4.212	0.811	1.149	0	0.313	0.074	0.135
136	Uganda	4.189	0.332	1.069	0.443	0.356	0.252	0.06
137	Egypt	4.166	0.913	1.039	0.644	0.241	0.076	0.067
138	Zambia	4.107	0.578	1.058	0.426	0.431	0.247	0.087
139	Togo	4.085	0.275	0.572	0.41	0.293	0.177	0.085
140	India	4.015	0.755	0.765	0.588	0.498	0.2	0.085
141	Liberia	3.975	0.073	0.922	0.443	0.37	0.233	0.033
142	Comoros	3.973	0.274	0.757	0.505	0.142	0.275	0.078
143	Madagascar	3.933	0.274	0.916	0.555	0.148	0.169	0.041
144	Lesotho	3.802	0.489	1.169	0.168	0.359	0.107	0.093
145	Burundi	3.775	0.046	0.447	0.38	0.22	0.176	0.18
146	Zimbabwe	3.663	0.366	1.114	0.433	0.361	0.151	0.089
147	Haiti	3.597	0.323	0.688	0.449	0.026	0.419	0.11
148	Botswana	3.488	1.041	1.145	0.538	0.455	0.025	0.1
149	Syria	3.462	0.619	0.378	0.44	0.013	0.331	0.141
150	Malawi	3.41	0.191	0.56	0.495	0.443	0.218	0.089
151	Yemen	3.38	0.287	1.163	0.463	0.143	0.108	0.077
152	Rwanda	3.334	0.359	0.711	0.614	0.555	0.217	0.411
153	Tanzania	3.231	0.476	0.885	0.499	0.417	0.276	0.147
154	Afghanistan	3.203	0.35	0.517	0.361	0	0.158	0.025
155	Central African Republic	3.083	0.026	0	0.105	0.225	0.235	0.035
156	South Sudan	2.853	0.306	0.575	0.295	0.01	0.202	0.091

7.0 Appendix B

Table 1: Top 10 Countries Sample

Overall rank	Country or region	Perceptions of corruption
1	Finland	0.393
2	Denmark	0.41
3	Norway	0.341
4	Iceland	0.118
5	Netherlands	0.298
6	Switzerland	0.343
7	Sweden	0.373
8	New Zealand	0.38
9	Canada	0.308
10	Austria	0.226

Table 2: Top 10 Countries with Low Corruption

Overall rank	Country or region	Perceptions of corruption
34	Singapore	0.453
152	Rwanda	0.411
2	Denmark	0.41
1	Finland	0.393
8	New Zealand	0.38
7	Sweden	0.373
6	Switzerland	0.343
3	Norway	0.341
14	Luxembourg	0.316
16	Ireland	0.31

Table 3: Iceland in Ranked 4 with Low Score of Perception in Corruption

Overall rank	Country or region	Perceptions of corruption
1	Finland	0.393
2	Denmark	0.41
3	Norway	0.341
4	Iceland	0.118
5	Netherlands	0.298