

# Money Brings Empathy: The Emphasis of Community Happiness in Better-Developed Countries

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# 1 Introduction<sup>1</sup>

Does money buy happiness? When it comes to measuring individual well-being, the popular economic indicator Gross Domestic Product Per Capita (GDP per Capita) has been challenged by many development economists. Evidence presented by Deaton and Kahnemen (2010) has suggested that while high income buys personal satisfaction, it does not, buy happiness.<sup>2</sup> Other frontier research such as Rao's Job Market Paper (2013) has implied correlation between childhood personality traits and adulthood happiness.<sup>3</sup> Through field experiments, Rao has suggested that by incorporating diversity and dissolving the conventional social hierarchy in schools, children of different income backgrounds in rural India grew up kinder and happier.

Inspired by findings presented by Deaton and Kahnemen (2010), and Rao's JMP (2013), we wish to further analyze the correlation between happiness, income-relevant, and non-income relevant factors. Specifically, we postulate that individuals receive diminishing marginal returns from higher income. Once they reach a "steady-state" with sufficient wealth, money ceased to play an important role in obtaining happiness. Furthermore, we believe this individual model also works at a macro perspective. Using the 2016 - 2017 data from the World Happiness Report Appendix I, we hypothesize that in richer countries, increases in happiness is more likely to be associated with personality traits such as generosity, positive affect, etc. In poor countries, an increase in happiness is more likely to be impacted with GDP per Capita and GDP per Capita related factors such as government delivery quality and democracy.

The report proceeds as follows. In part 2 we provide the description of our data and some summary statistics. We carry out our empirical analysis in part 3. In part 4, we present our findings and conclude.

## 2 Data Description

We use the 2016 - 2017 data from the World Happiness Report Appendix I for our project. The report surveys domestic receptions of happiness in 156 countries across the world. Table I of this report compiles a list of variables and their descriptions used in our analysis. Table II - Table III present some summary statistics we performed to explore the dataset. On a scale of increasing happiness from 1- 10, the mean world happiness in 2016 is 5.4, and 5.49 in 2017 as listed in Table II. Table III lists the correlation between happiness and a set of covariates, the largest being log GDP per Capita. Nevertheless, the correlation of the difference of log GDP Per Capita and the difference of happiness between 2016 - 2017 are the lowest among all correlation coefficients of the difference. We first speculate that the change of log GDP per Capita only affects the happiness of the countries with low GDPs. To test if this assumption is true, we performed a Chi-Square significance test, reported in greater detail in the Appendix of this report.

Aligning with our hypothesis, we calculate the 25th percentile, 50th percentile, 75th percentile, and 99th percentile of the data and divide all the countries into four groups, assigning them with a variable "gdprank" varying from 1 to 4, in which "gdprank=1" means the countries that have log GDP per Capita between the lowest value and 25th percentile, "gdprank=2" means the countries that have log GDP per Capita between the 25th percentile and 50th percentile, "gdprank=3" means the countries that have log

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<sup>1</sup> The workload of this project was distributed to each group member as the following: the introduction and the external reference was done by Anna Sun. The summary statistics and data description was a collective work between Anna Sun (Table II) and Lexy Li (Figure I, Figure II, and Table III). Section 3.1 is a work of Seika Ryu and Lexy Li, who also plotted associated plots and tables for this section. Section 3.2 is a work of Anna Sun. Section 3.3 is a work done by Chelsea Zheng, and Section 3.4 is a work done by Jack Rasmusen. Lexy Li also contributed to the writing of the limitations of our project in the conclusion. Anna Sun and Lexy Li was also responsible for the organization of our report.

<sup>2</sup> Kahneman, Daniel, Angus Deaton. "High income improves evaluation of life but not emotional well-being" Proceedings of the National Academy of Sciences Sep 2010, 107 (38) 16489-16493; DOI:10.1073/pnas.1011492107

<sup>3</sup> Rao, Gautam. "Familiarity Does Not Breed Contempt: Diversity, Discrimination and Generosity in Delhi Schools." December 30, 2012. Accessed December 6, 2018.

GDP per Capita between the 50th percentile and 75th percentile and “gdprank=4” means the countries that have log GDP per Capita between the 75th percentile and the 99th percentile.

### 3 Empirical Analysis

#### Section 3.1: Role of Personal Traits

We group positive affect and negative affect as personal trait factors that possibly affect happiness, and we are quite interested to see whether Positive affect and Negative affect are strongly complementary. We also want to explore whether people in poor countries and people in rich countries focus on different aspects due to their different demands on life quality.

Figure III (a) shows that in the first three groups (GDP level ranked from 1 to 3), the change in positive affect has strong correlation with the change in happiness. In the last group that has the highest GDP level, however, change in positive affect leads to little change in happiness, meaning that less-developed countries has stronger positive correlation between change in Positive affect and change in happiness than better-developed countries. In Figure III (b), although there is a huge difference in the correlation between Negative affect difference and happiness difference in the four groups, we fail to find valid patterns. Therefore, we are unable to construct valid comparison between less-developed countries and better-developed countries on the relationship between the change in Negative affect and change in happiness.

Through calculation, the correlation between positive affect and negative affect is around -0.37 in 2016 and -0.4 in 2017. The correlation between these two factors is not very strong, but is considered complementary.

It is very clear that compared to the group that has the highest GDP level, the first three groups of countries have life ladder differences more related to the positive affect value differences between 2016 and 2017. Although it is unclear whether a certain type of affect (positive or negative) is related to the happiness of a certain group of people (from rich country or poor country), it is quite obvious that in those countries that do not have the highest GDP level, people’s personal feelings (mainly positive affect) play a more significant role in increasing their happiness (life ladder) level than in better-developed countries.

#### Section 3.2: Government Delivery Quality and Happiness

We hypothesize that the effectiveness of government is highly correlated with Log GDP per Capita. The effectiveness of government in richer countries is more likely higher than the effectiveness of government in poorer and less developed countries. Therefore, we believe that changes in Delivery correlate more with the increase of happiness in less developed countries than in more developed countries.

Figure IV shows the collinear relationship between explanatory variables log GDP per Capita and delivery quality. Log GDP per Capita and delivery quality seem to have a linear relationship according to Figure IV. When regressed, log GDP per Capita has a statistically significant coefficient of 0.43, further suggesting that an increase in GDP is highly correlated with an increase in Delivery Quality.

Under the assumption that there is a strong linear correlation between log GDP per Capita and delivery quality, we further postulate, in alliance with our main hypothesis, that since a change in GDP is associated with a change in delivery quality, happiness in less developed countries are more respondent to delivery.

Figure V illustrates the fitted linear relationship between delivery quality and happiness. Table IV displays the coefficients and the standard errors produced by the linear regression between delivery and happiness. Contrast to our hypothesis, the regression coefficient of countries in GDP per Capita group 3 and 4 ( $C_{rich}$ ) is larger than the regression coefficient of countries in GDP per Capita group 1 and 2 ( $C_{poor}$ ). We speculate that the approximate difference of approximately 0.034 is possibly attributed to the fact

that the linear relationship between the delivery quality and happiness of the poorer countries is itself weaker than that linear relationship of the richer countries. If we fit the model in a polynomial in the future, on the other hand, the relationship is perhaps stronger. Nevertheless, both coefficients are significant, and we carry out the following hypothesis testing using z-score test for differences:

$H_0$  : The difference between  $C_{rich}$  and  $C_{poor}$  is due to chance;  $C_{poor} - C_{rich} = 0$

$H_a$  : The difference between  $C_{rich}$  and  $C_{poor}$  is not due to chance; namely,  $C_{poor} - C_{rich} \neq 0$

Since the produced p-value is greater than 44 %, we fail to reject  $H_0$ . According to the data, the difference between  $C_{rich}$  and  $C_{poor}$  is most likely due to chance, and that an increase in delivery quality in rich countries would most likely have the same effect as an increase in the delivery quality of poor countries.

In greater details, we categorize the countries in GDP per Capita group 1 as extremely poor countries, and countries in GDP per Capita group 4 as the extremely rich countries given by their rank of log GDP per Capita. Figure VI shows a linear relationship between happiness and delivery quality for these two subgroups, which suggests for a linear regression fitting. Table V displays the coefficients with standard errors produced by the linear regression between delivery and happiness. Contrast to our initial hypothesis, we find that delivery quality has a significantly larger influence to the extremely rich countries than the extremely poor countries. We formulate the following hypothesis testing with the coefficient of countries in GDP per Capita group 1 ( $C_1$ ) and the coefficient of countries in GDP group 2 ( $C_4$ ):

$H_0$  : The difference between  $C_1$  and  $C_4$  is due to chance;  $C_1 - C_4 = 0$

$H_a$  : The difference between  $C_1$  and  $C_4$  is not due to chance; namely,  $C_1 - C_4 \neq 0$

With a p-value of 5.2%, we fail to reject our  $H_0$  in a two-sided z test for difference; however, in an one-sided z test, the data allows us to reject our  $H_0$ . Given the data supported by an one-sided z test, the difference between  $C_1$  and  $C_4$  is not random, and that delivery quality would have a higher impact on happiness in the extremely rich countries than in the extremely poor countries.

### Section 3.3: Democracy and Freedom

We hypothesize that with higher freedom of choices in society, the overall happiness of the country would be greater. Therefore, we infer that there is a positive correlation between the freedom of life choices and happiness ladder.

From Figure VII, it is clear that there is a general trend of positive association between the freedom to make life choices and happiness level. Therefore, we further hypothesize that for countries with high log GDP per Capita, with relative more wealth, they care more about their personal rights. We then infer that in countries of GDP per Capita rank 3 and rank 4, happiness are more positively correlated with personal freedom to make life choices. To the opposite, we infer that for countries with GDP per Capita rank 1 and 2, their happiness and personal freedom to make life choices would show a weaker correlation. Table V presents the correlation between happiness and freedom to make life choices based on their log GDP per Capita group.

Table VI presents the correlation between freedom to make choices and happiness for countries based on their log GDP per Capita rank group. For countries with GDP per Capita rank 1 and 2, the correlation between personal freedom to make life choices and happiness is relatively lower, especially for countries of GDP per Capita rank 1, showing only correlation about 0.28. For the groups with GDP per Capita rank 3 and 4, the correlation between personal freedom to make life choices and happiness is relatively stronger, especially for countries of GDP per Capita rank 3, which has a correlation 0.64. However, looking at each subgroup individually, it is clear that the correlation for countries of GDP per

Capita rank 2 is relatively similar to those of rank 3, with the rank 2 cohort showing even a higher level of correlation. As a result of the data, we can conclude that as a general trend, countries with higher GDP per Capita do evaluate their happiness based on freedom to make life choices more than countries with lower GDP per Capita. However, this trend is clearer and more accurate for the countries either at the top or at the bottom GDP per Capita rank groups. Countries with log GDP per Capita ranks in the middle do not necessarily follow this trend.

### **Section 3.4: Generosity and Social Support**

We hypothesize that when there is an encouraging amount of generosity present within a society, it will result in an increase in happiness. Additionally, we assume that with an increase in the amount of social support that each society gains, the happier people will be. From looking at the data at first glance, it is obvious to see a positive correlation between these factors. However, these assumptions could also be entirely based on a nation's wealth.

We first categorize our countries into two groups: one with 2016 data and the other with 2017. Those two groups are then sorted and ranked based upon the countries' GDPs. Table VIII compares the Log GDP per capita and the generosity of the nations whose gdprank is 3 and 4 from 2016 and 2017. It is evident from the graph that as the GDP of a wealthy country rises, then their citizens' are more generous as well. From these statistics, we are even more confident in our hypothesis. But, we also noticed from this graph that maybe money is the only reason that people are happy, compared to what our original hypothesis was at the beginning of our study.

Table IX compares countries with low GDP of 1's and 2's. to their generosity rates over the same two year period. Surprisingly, the table shows that although the GDP numbers fluctuate up and down, generosity numbers seem to have stayed the same. We can now make an inference that people of poorer nations seem to not care as much about their own personal gain when in comparison to giving back to others. When it comes to social support, the numbers are very close as well. Generosity and Social support so far have given us mixed signals on our original hypothesis.

Table IX compares countries with their GDP per capita rank that are 3 and 4. The data contrasts their generosity in relation to their happiness. It is evident that they have a very strong positive association. We can concur that there are many reasons to a person's happiness and that we cannot pinpoint an exact reason why. Table VII has a correlation of about .60, Table IX has a correlation of about .05, and the last table had a correlation of .71. In conclusion, there is not enough convincing evidence in the data sets that will compel us to stick by our hypothesis.

## **4 Conclusion**

In our original hypothesis, we speculate that happiness of richer countries are more responsive to social and personality factors such as generosity and freedom, whereas the happiness of poorer countries are more responsive to income related variables such as GDP per Capita. However, we find this hypothesis not consistent throughout our empirical analysis.

According to the result we have reached in Section 3.1, positive affect plays a more important role in happiness in less-developed countries. Although different from our hypothesis, this result remains significant since it inspires us that in less-developed countries, people narrow their criteria of happiness down to personal feelings; whereas in highly advanced countries, people tend to look at the bigger picture and personal feelings matter less in their way defining happiness.

Based on the analysis we performed in Section 3.2, we find that contrast to our hypothesis, happiness is more responsive to changes in government delivery quality in countries with higher log GDP

per Capita. In particular, in countries with the highest log GDP per Capita rank in our study, the coefficient of the impact of delivery quality on happiness is the largest. These contradictory results we find are possibly explained by the fact that citizens of the richer countries, given a more politically engaging and democratic atmosphere, may thus care more about the delivery quality of their government than citizens of poorer countries, where the political climate is less democratic. Consequently, higher delivery quality would incur greater happiness where it matters more. This speculation, nevertheless, requires future testing.

With the test of correlation between personal freedom to choose and happiness we examine in Section 3.3, we see a trend of positive association between freedom and happiness. While looking at the correlations based on GDP ranks, we find that countries with the highest log GDP per Capita rank and countries with the lowest log GDP per Capita rank follow our initial prediction that wealthier countries care more about freedom as factor for happiness. However, countries placed in the middle two groups of log GDP per Capita rank are not very consistent with the trend, which may need further examination to determine the factors causing the inconsistency.

In section 3.4, we analyze the associations between generosity, social support, and a nation's wealth. In Table VII, there is a positive association between generosity and nations with high GDP ranks per capita. In table IX, the data shows that the association between generosity and a poor country has a very weak association, with generosity barely fluctuating on the graph. Finally, Table X has a very strong association between the quality of a person's happiness and generosity. We believe that the results were too random from most data sets to confidently answer our hypothesis. Also, there are many different factors to a human's level of happiness that we did not take account for during our analysis. Overall, the data was too extreme on both spectrums of what we studied to come to a confident conclusion to our hypothesis.

With all that being said, there are still a few limitations in our research that we cannot neglect. First, since the data we use come from a survey, we are unable to avoid the wording bias, response bias, and selection bias originated from the survey itself, which affects the effectiveness of our study. Second, the omitting of the missing values is likely to cause inconsistent comparisons when we try to compare the factors that are not in the same section. To keep as many valid data as possible, we omit the countries that have incomplete data every time we explore a new factor, which results in different number of countries being used in different sections. Third, we are unable to clearly differentiate the correlation of two variables and the correlation of the changes in two variable between 2016 and 2017. It is believed that happiness is affected by multiple variables at the same time and slight change in one variable is hard to be instantly reflected on the change of happiness. We choose to explore both the correlation and the correlation of difference when we are analyzing the relationship between GDP and happiness. As for other factors, we either only focus on the correlation because we lack the data of a particular year or we only focus on the correlation of difference because we believe that the rest factors only play a minor role in setting the basic level of happiness.

## Work Cited

Kahneman, Daniel, Angus Deaton. "High income improves evaluation of life but not emotional well-being" *Proceedings of the National Academy of Sciences* Sep 2010, 107 (38) 16489-16493; DOI:10.1073/pnas.1011492107

Rao, Gautam. "Familiarity Does Not Breed Contempt: Diversity, Discrimination and Generosity in Delhi Schools." December 30, 2012. Accessed December 6, 2018.

Appendix I: Chi-Square Test For Whether the Change in GDP Affects “Life Ladder Difference”  
Differently in Four Groups of Countries that Have Different GDP Level

This section provides the the detailed Chi-Square test mentioned in the data description section of our analysis.

$H_0$  : The correlations between GDP difference and Life Ladder difference is the same in the four groups.

$H_a$  : The correlations between GDP difference and Life Ladder difference is not the same in the four groups, and the correlation coefficients decrease from group 1 to group 4.

Chi-square Test Result:

$$1-pchisq(1.66, 3)=0.646$$

We therefore fail to reject the null hypothesis.

It turns out that after prescribing the basic level of Life Ladder for each country, the change in GDP plays a very small role in changing the established life ladder value. Given this solid evidence, we are confident to use GDP as a precondition to explore the effect of other factors on the life ladder in the groups of countries that have different GDP levels.

Appendix Table I: Chi-Square Test Result

	gdprank=1(lowest Log GDP per Capita level)	gdprank=2	gdprank=3	gdprank=4 (highest Log GDP per Capita level)
Cor	0.55	0.14	0.22	0.15
Cor of diff(observed)	-0.052	-0.01	0.158	-0.03
expected	0.0165	0.0165	0.0165	0.0165
chi-square	0.28	0.04	1.21	0.13



Table I: Description of the Variables (with Variable Names)

**1. Dependent Variable**

Happiness Level:

Well-being of citizens in a country isomorphic to ladder level in the survey. On a scale from 0 - 10, 0 indicates being least happy and 10 indicates being the happiest.

**2. Independent Variables**

Delivery Quality:

Variable measuring the effectiveness of a government through the average of four indicators: government effectiveness, regulatory quality, rule of law, and the control of corruption. Measured in 2016 only.

Freedom to Make Decisions:

Variable measured based on the response of people to the question of whether they are satisfied with their freedom to make choices for their life or not. The data recorded is the national average for each country.

Generosity: Generosity is the residual of regressing the national average of GWP responses to the question “Have you donated money to a charity in the past month?” on GDP per capita.

Log GDP per Capita:

Variable measured in both 2016 and 2017 as a reflection of individual output and income in each country. Converted from actual value to a logarithmic value to better reflect the approximate exponential growth of GDP per Capita in reality. In this case, an increase of log GDP per Capita by 1 indicates an increase of the dependent variable by a percentage of the coefficient value.

Positive Affect:

Variable measured based on the response of people to the question of whether they laughed or experienced enjoyment the day before they took the survey. The data is defined as the average of two positive affect measures in GWP: laugh and enjoyment.

Negative Affect:

Variable measured based on the response of people to the question of whether they experienced worry, sadness, and anger the day before they took the survey. The data is defined as the average of the three negative affect measures.

Social Support: Social support is the national average of the binary responses (either 0 or 1) to the Gallup World Poll (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?”

Table II: Summary Statistics of Happiness and a Set of Explanatory Variables by Year

<b>Summary Statistics</b>	<b>year: 2016 (N = 142)</b>	<b>year: 2017 (N = 141)</b>
<b>Distribution of the Happiness Ladder</b>		
25 Percentile Happiness	4.52	4.63
50 Percentile Happiness	5.4	5.49
75 Percentile Happiness	6.13	6.27
99 Percentile Happiness	7.58	7.59
Mean Happiness	5.4	5.49
<b>Distribution of Log GDP</b>		
25 Percentile GDP	8.34	8.55
50 Percentile GDP	9.27	9.34
75 Percentile GDP	10.24	10.31
99 Percentile GDP	11.24	11.25
Mean GDP	9.27	9.34
<b>Distribution of Life Expectancy</b>		
25 Percentile Life Expectancy	57.49	57.98
50 Percentile Life Expectancy	64.96	65.13
75 Percentile Life Expectancy	68.87	69.05
99 Percentile Life Expectancy	75.47	75.61
Mean Life Expectancy	63.15	63.4
<b>Distribution of Freedom</b>		
20 Percentile Freedom Index	0.69	0.71
50 Percentile Freedom Index	0.77	0.81
75 Percentile Freedom Index	0.86	0.88
99 Percentile Freedom Index	0.96	0.96
Mean Freedom Index	0.76	0.78

Table III: The Correlation with “Life Ladder”

<b>Factor</b>	<b>Correlation of the factor and “Life Ladder” in 2016</b>	<b>Correlation of the difference in the factor and the difference in “Life Ladder” between 2016 and 2017</b>
GDP	0.80	0.028
Positive affect	0.5156	0.31
Negative affect	-0.46	-0.095
Corruption	-0.40	-0.26
Freedom	0.52	0.18
Social support	0.74	0.099
Healthy life expectancy	0.779	0.125
Generosity	0.12	0.23

Table IV: The Relationship Between Delivery Quality and Happiness, Countries in GDP Rank 1 and 2 & Countries in GDP Rank 3 and 4

	Estimated	Standard Error
Delivery Quality (Group GDP Rank = 1 & 2)	0.593	0.21
Delivery Quality (Group GDP Rank = 3 & 4)	0.63	0.08

Table V: The Relationship Between Delivery Quality and Happiness, Countries in GDP Rank 1 & Countries in GDP Rank 4

	Estimated	Standard Error
Delivery Quality (Group GDP Rank = 1)	0.2886615	0.2355368
Delivery Quality (Group GDP Rank = 4)	0.7368715	0.1431541

Table VI: The Correlation Table between Freedom to Make Choices and Happiness of Different GDP Ranks

<b>GDP Rank Group</b>	<b>Correlation of Freedom to Make Life Choices and Happiness</b>
1	0.28
2	0.46
3	0.35
4	0.65

Figure I: The Difference of Life Ladder between 2016 and 2017

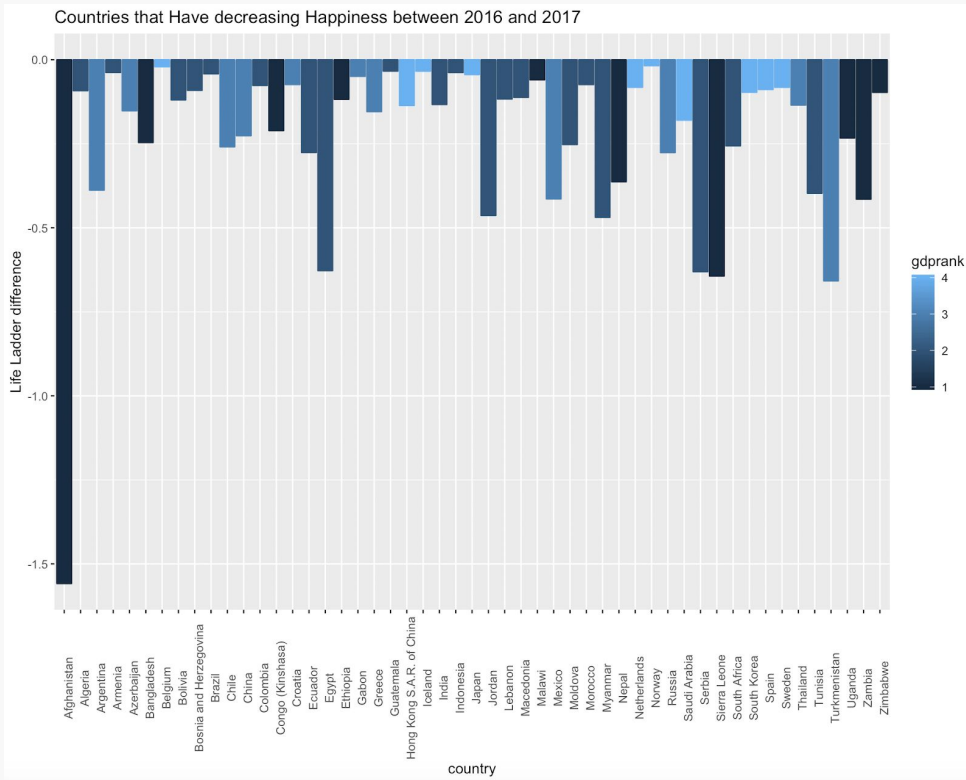
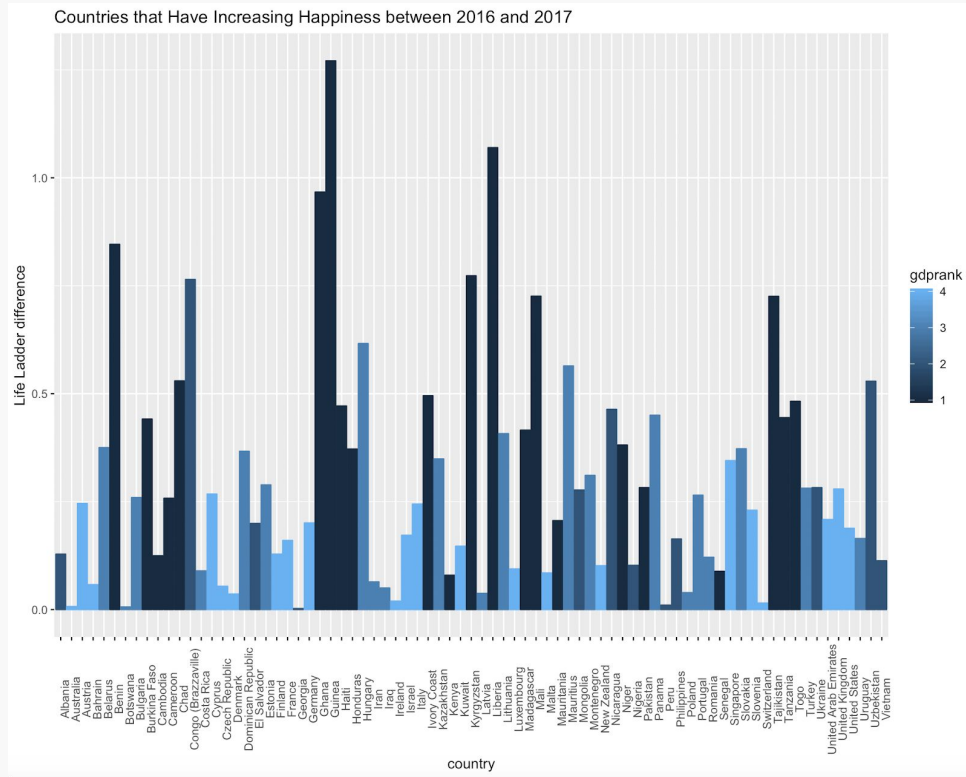


Figure II: The distribution of the Country Group with certain GDP level

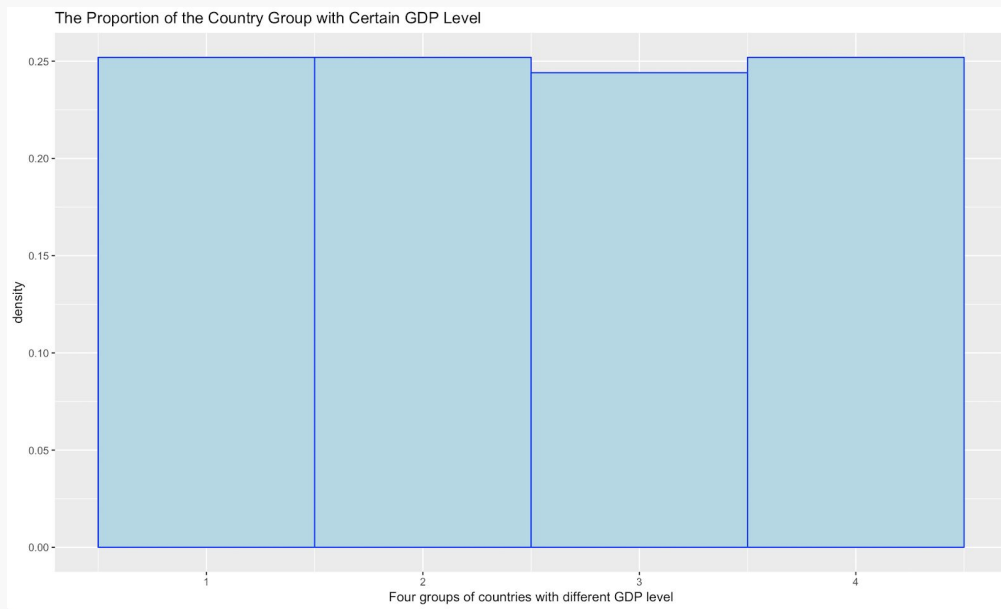




Figure III: Relationship Between Change in Affects and Happiness Difference

Figure III (a): Relationship Between Change in Positive Affect and Happiness Difference

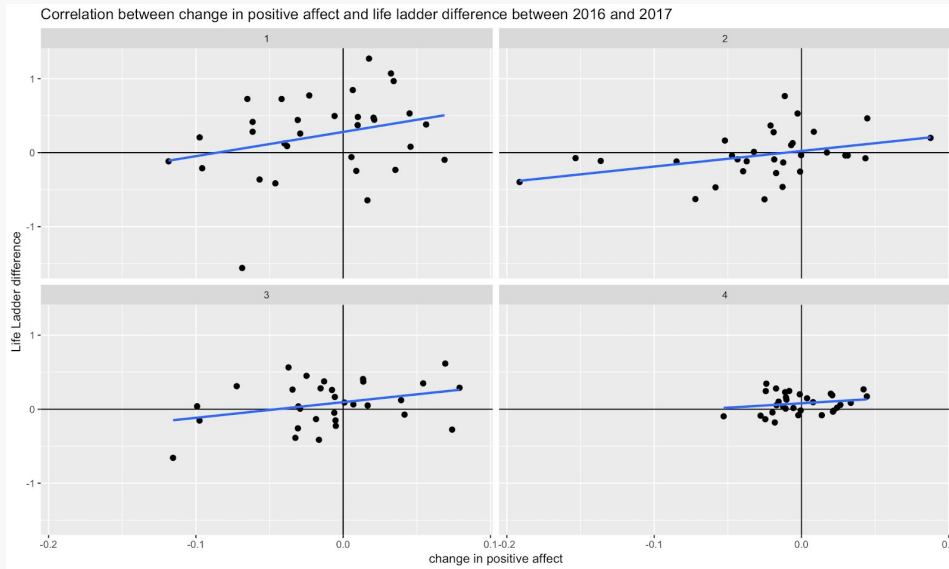


Figure III (b): Relationship Between Change in Negative Affect and Happiness Difference

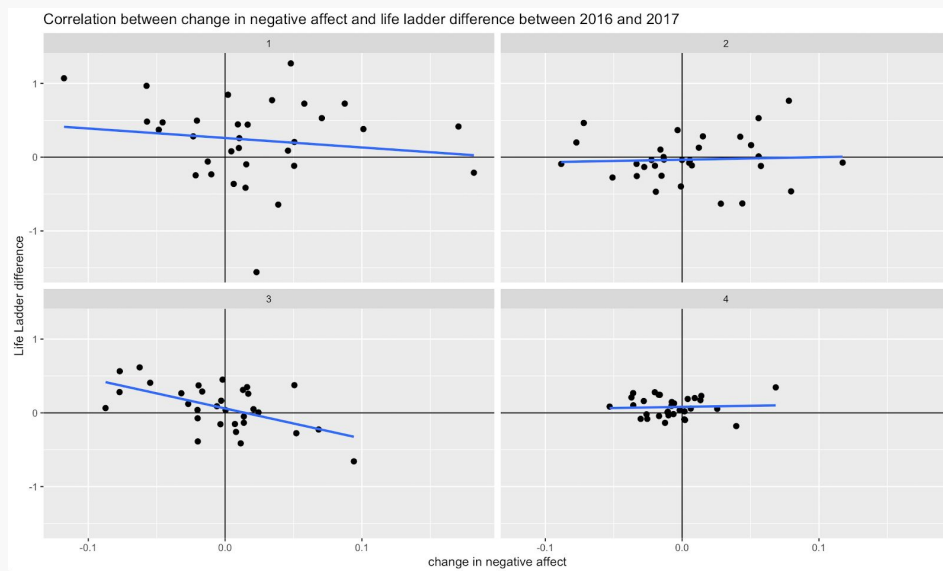


Figure IV: Relationship Between Log GDP per Capita and Delivery Quality

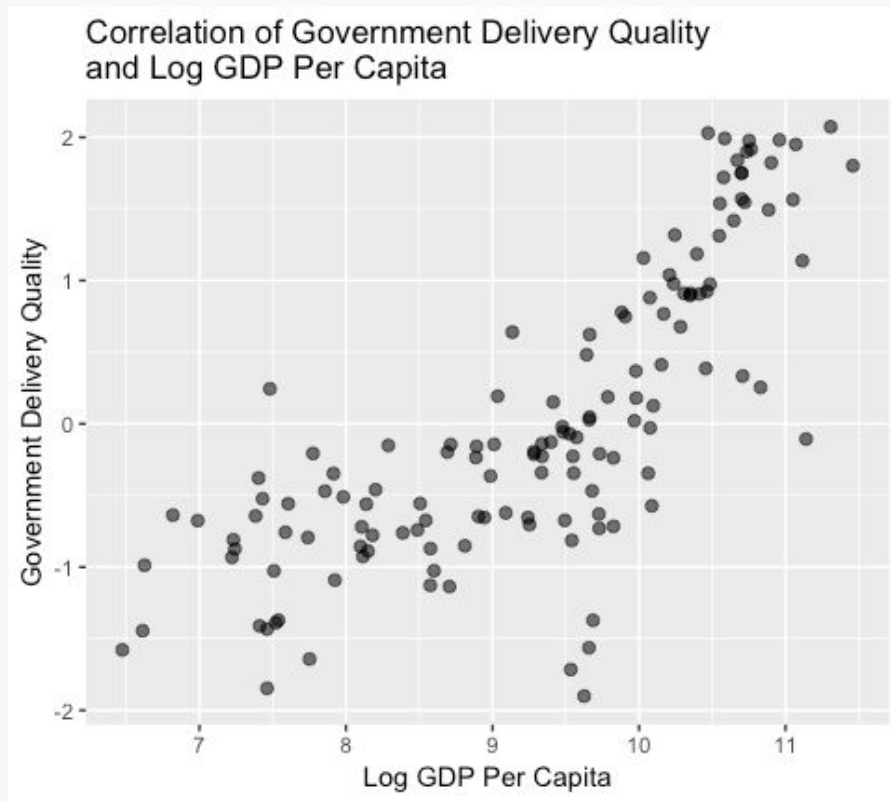


Figure V: Relationship Between Delivery Quality and Happiness Level for Countries Given Their GDP Percentile

Figure V(a) - Countries with Log GDP per Capita Below 50 Percentile

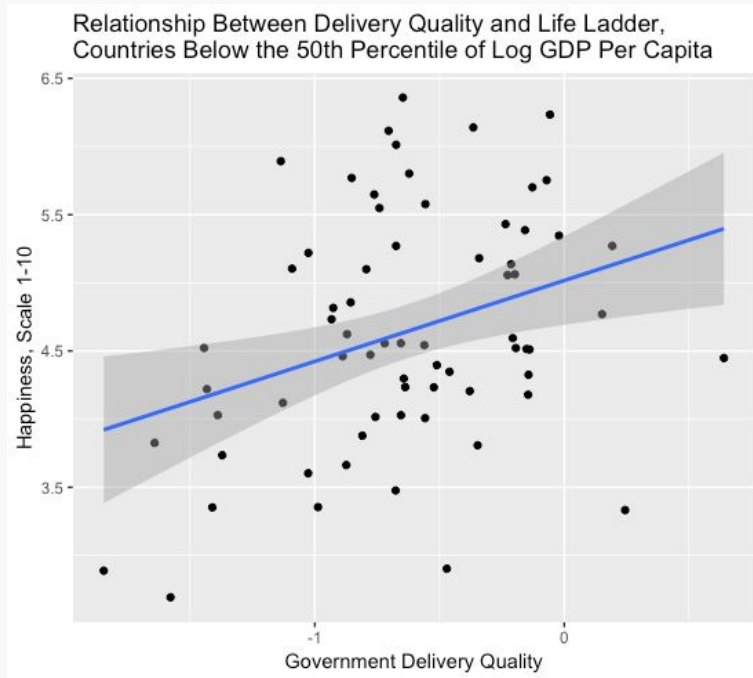


Figure V(b) - Countries with Log GDP per Capita Above 50 Percentile

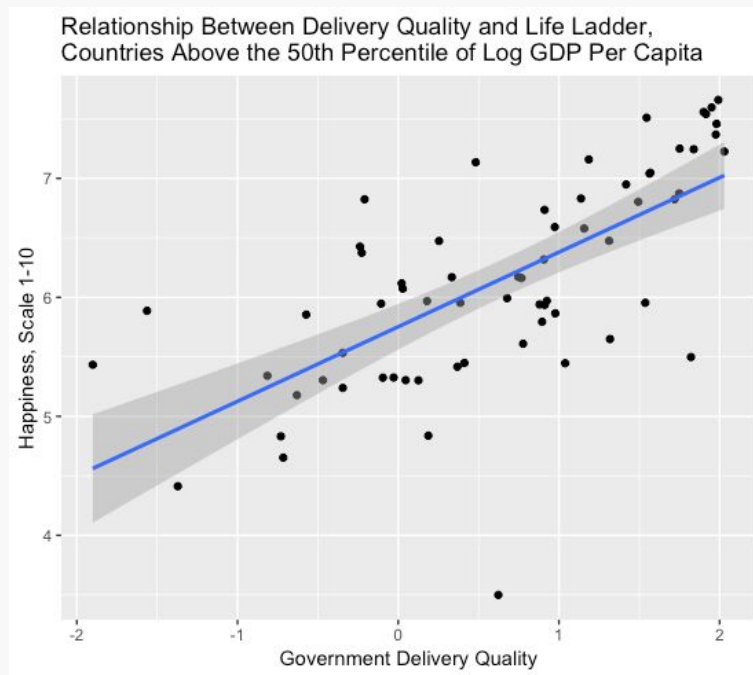


Figure VI: Relationship Between Delivery Quality and Happiness Level for Countries Given Their GDP Percentile

Figure VI (a) - Countries with Log GDP per Capita Below 25 Percentile

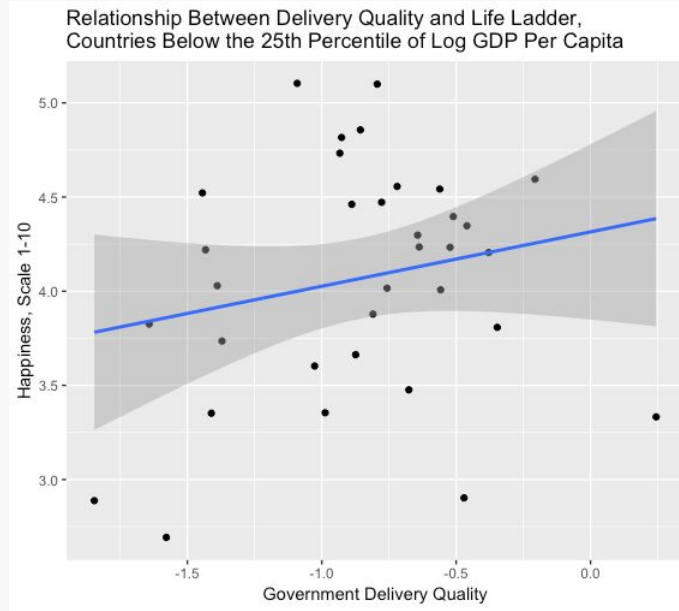


Figure VI (b) - Countries with Log GDP per Capita Between 75 and 99 Percentile



Figure VII: The Correlation between Freedom of Choice and Happiness

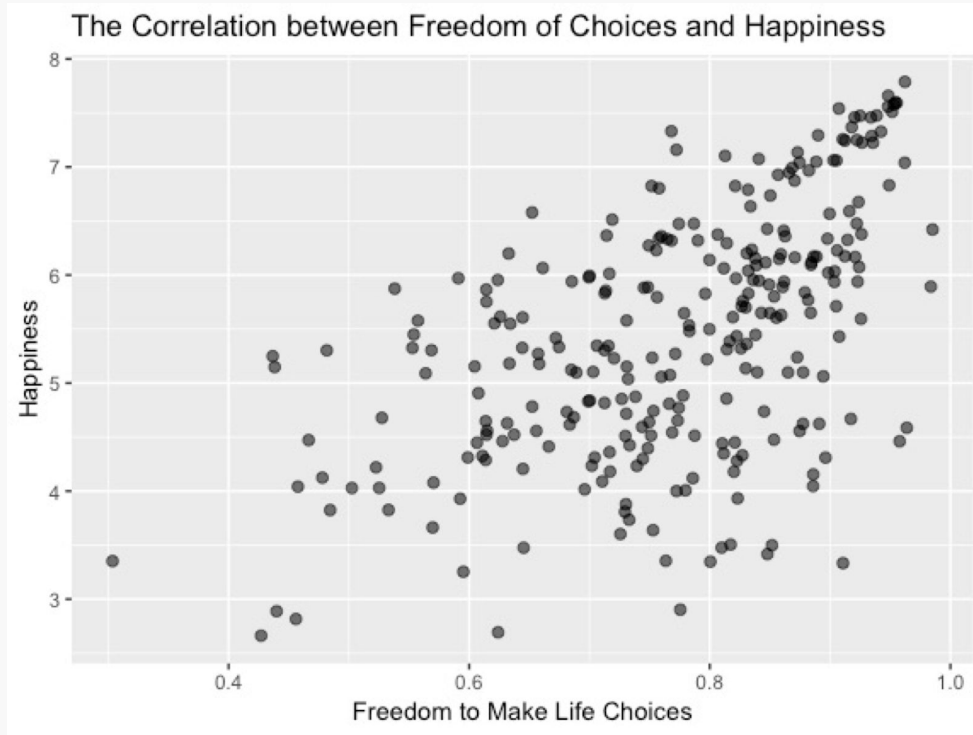


Figure VIII: Correlation between wealthy nations and generosity from 2016-2017

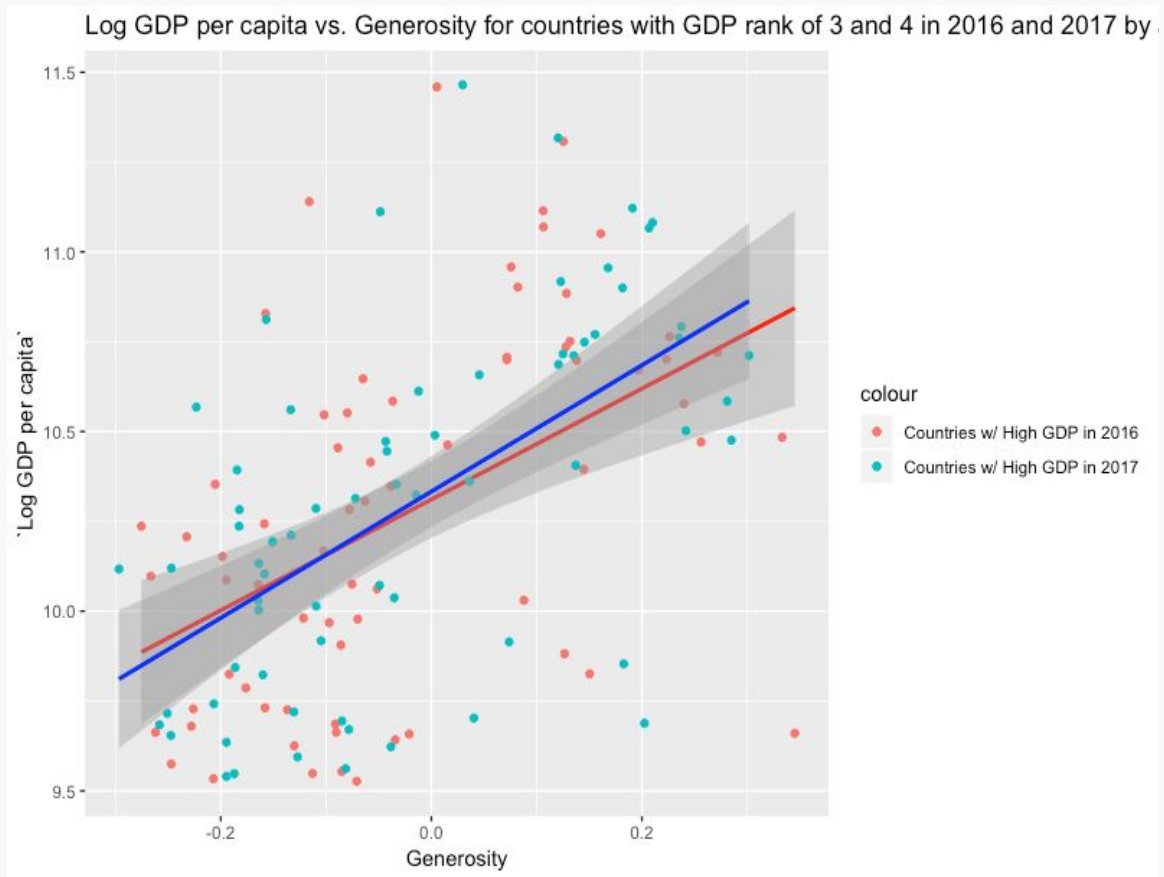


Figure IX: Correlation between nations with low GDP per capita and generosity from 2016-2017

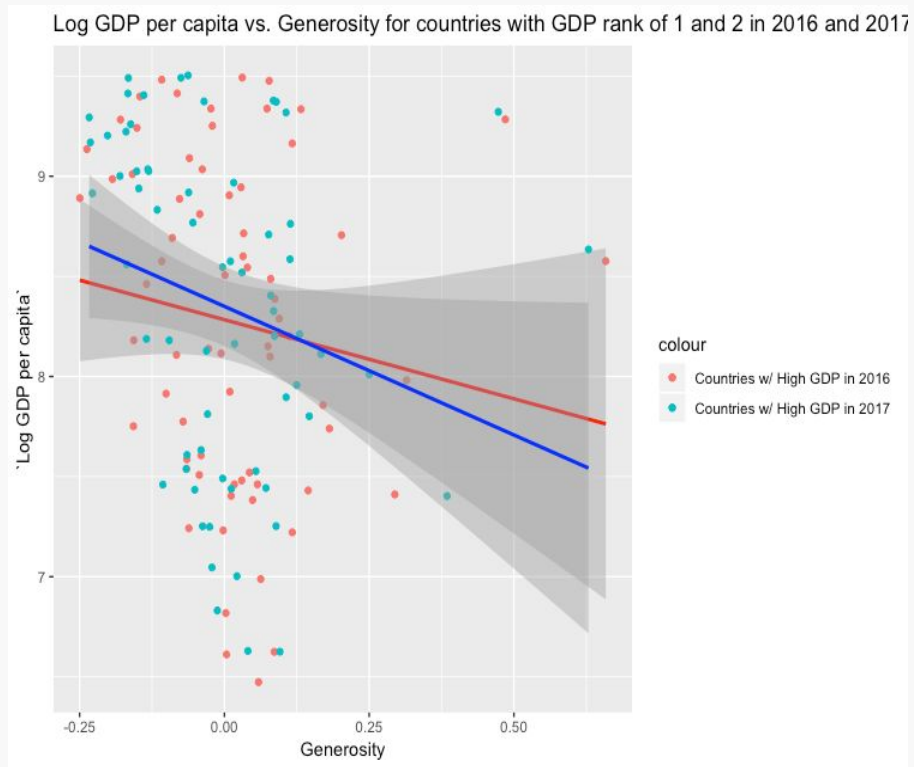


Figure X: Comparing generosity with the happiness of wealthy nations of 3 and 4 GDP per capita wealth from 2016-2017

