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The Correlation Between Happiness and Inequality

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Abstract

This paper examines the link between income inequality and happiness, as measured by the World Database of Happiness. Data from 100 countries was analyzed in a cross-sectional study. Explanatory variables include Gross Domestic Product (GDP), percent of GDP spent on education, and the Gini index, a measure of income inequality. Policy recommendations, based on the ordinary least squares regression results, include increasing GDP and public spending on education as well as reducing inequality to increase satisfaction with life for individuals around the world. The conclusions from this study offer policy recommendations to improve happiness and thereby increase productivity and GDP.

Introduction

A person may spend his or her entire lifetime in the pursuit of happiness. One person may find happiness by having enough food for dinner, while another may search for happiness in expensive vacations or large homes. Some may hypothesize that people across different socio-economic classes and geographic regions look to vastly different things to find happiness. Is this true? Or do different people in different circumstances actually look to the same things for happiness? What leads to individual happiness throughout the world? And does this relate to income inequality among individuals within a nation?

Studying those characteristics of a country that lead to higher reported happiness levels is important because the study of economics seeks to maximize overall happiness, or utility. By studying what contributes to maximizing utility, leaders of countries can work toward improving the happiness of their citizens. In particular, this paper focuses on the relationship between income inequality and happiness. Does higher inequality result in lower happiness, on average, in a country? My research reveals that much of happiness can be explained through inequality, income, and education.

Literature Review

Many studies have researched the relationship between inequality and happiness. Graham and Pettinato (2001) sought to determine factors influencing happiness in a study of 17 Latin American countries. Their research focused on the relationship between happiness and demographic factors including “age, income, employment...marital status, and education” (p.

240). The findings reflected the importance of relative income instead of absolute income, which was described by Graham and Felton (2005).

Graham and Felton (2005) hypothesized that as inequality increases, happiness decreases. The study focused on wealth, which is one factor of inequality. Geographic location also impacted happiness in relation to average and relative wealth. In rural areas, both were correlated with happiness, whereas in larger and wealthier cities, individuals were concerned primarily with relative wealth.

Boroohah (2006) studied happiness in 80 countries around the world, including countries from every geographic region. This study found that good or improving health increased happiness by up to 15.3%. Education level and income showed a positive correlation. The same was true for people who put more emphasis on religion in their life versus people who did not view religion as important. Gender, belonging to a voluntary organization, being a student or homemaker, being married, and being in a middle or high income level instead of low income level were all factors positively correlated with happiness.

These studies suggested that trends in developing countries are not vastly different from trends in developed countries. They also used similar independent variables, including age, education level, inequality, and income. My research, then, focused on similar independent variables.

The data on happiness, although Graham and Pettinato (2001) claimed was sound due to the large numbers of individuals surveyed, was still subjective because every person views happiness differently. Happiness, like consumer preferences, is hard to measure quantitatively as every individual has different preferences, desires, dreams, and value systems. While according

to Graham and Pettinato the dataset is large enough to offset this difference, it is still something to be aware of while interpreting happiness research.

Model and Data Description

I collected data on 100 countries across the world, which I used to study the correlation between happiness and per capita GDP, percent of GDP spent on education, and the Gini index. Happiness was the dependent variable of the study and was measured using data from the World Database of Happiness, an index that measures the average reported happiness of citizens of a country based on survey data. The independent variables were gathered from the World Bank. Prevalence of undernourishment, a freedom measure, and regions of the world were also examined but were found to have no significant impact on happiness.

I used the following independent variables in my final model: log of per capita GDP (*lnpGDP*), public spending on education as percent of GDP (*educ*), and the Gini index (*Gini*). The Gini index is the Gini coefficient expressed as a percent and is based on a scale of 0 to 100, where 0% represents every person having the same amount of wealth and 100% represents one person holding all of the country's wealth. The model was as follows:

$$Happiness = \alpha + \beta_1 lnpGDP + \beta_2 educ - \beta_3 Gini + u$$

Happiness, also referred to as satisfaction with life, was an index that ranked each country on a scale from 1 to 10, with 10 being perfectly happy and 1 being as unhappy as possible. The World Database of Happiness gathered the average happiness index by distributing Likert scale surveys to residents in each country. The surveys were then used to assess the average national happiness per country. Survey questions ranged from topics in war, crime, educational opportunities, wealth, and more.

The data in Table 1 show the predicted sign of each variable; the summary statistics including mean, standard error, and standard deviation; and an explanation of the variable.

The mean log per capita GDP was \$7,236, with a standard deviation of \$10,632. This was a large standard deviation and was the main reason for logging per capita GDP in this regression. By logging per capita GDP, the variance was more compact, and it was easier to comprehend regardless of the country being studied. The level-log relationship between happiness and *lnpGDP* allowed for purchasing power differences among countries as *lnpGDP* was a percentage as opposed to a dollar amount. The log of per capita GDP, therefore, also made it easier to compare across countries.

The mean percentage of GDP spent on education was 4.5%, with a standard deviation of 1.6%. The GDP of countries varies greatly, so 4.5% of GDP in the United States is much larger in monetary terms than 4.5% of GDP in Bulgaria. Therefore, for ease of comprehension for the countries, a percentage of GDP spent on education was used instead of dollars spent on education.

The average Gini index was 39.7%, with a standard deviation of 8.3%. These numbers were fairly high, showing there was significant income inequality, on average, in the countries studied. *Gini* measures the income inequality in a given country. I hypothesized that as income inequality increases, happiness decreases, indicating that *Gini* should be negatively correlated with happiness.

Table 1
Summary Statistics

Variable	Predicted sign	Summary statistics	Explanation
<i>InpGDP</i>	+	Mean: 7,235.570 Standard error: 1,063.224 Standard dev: 10,632.239	Log per capita GDP <i>World Bank</i>
<i>educ</i>	+	Mean: 4,450.0 Standard error: 0.164 Standard dev: 1.641	Public spending on education (% GDP) <i>World Bank</i>
<i>Gini</i>	-	Mean: 39.720 Standard error: 0.832 Standard dev: 8.324	Gini index (Gini coefficient as %) <i>World Bank</i>
<i>happiness</i>	Dependent	Mean: 5.946 Standard error: 0.114 Standard dev: 1.137	Satisfaction with life <i>World Database of Happiness</i>

I found a positive correlation of .11 between happiness and the log of per capita GDP, *InpGDP*. As per capita GDP increased, happiness increased. This makes sense because as income, or per capita GDP, increases, a person becomes more able to purchase necessities and luxury goods, which makes people happier.

Public spending on education as percent of GDP (*educ*) was also positively related to happiness. I hypothesized that people who are more educated are happier because education opens opportunities to higher paying jobs, increased knowledge and understanding, and many other benefits that are believed to increase satisfaction of life.

Prevalence of undernourishment, an economic freedom index measure, and regions of the world were also included in the original model. These variables were not included in the final regression model due to multicollinearity problems and lack of statistical significance. The three independent variables used in the final model (*InpGDP*, *educ*, and *Gini*) offered the strongest regression. These three variables likely included many of the same characteristics or trends that undernourishment, freedom, and regions were attempting to explain. For instance, a country with high income inequality was likely to have had a high percentage of undernourishment and a low freedom index. It would also tend to be focused in a region that had high income inequality on

average. Therefore, the Gini index had already accounted for undernourishment, freedom, and regions. Similar trends occurred with *LnpGDP* and *educ* as well. *LnpGDP*, *educ*, and *Gini* provided the strongest and most inclusive model from the models attempted for this regression.

The correlation coefficients are shown in Table 2. The signs of the correlation coefficients were as expected, with per capita GDP and percent of GDP spent on education being positively correlated and the Gini index being negatively correlated with both. None of the correlation coefficients were abnormally high, so there was no concern about multicollinearity between the independent variables.

Table 2
Correlation Coefficients Table

	<i>LnpGDP</i>	<i>educ</i>	<i>Gini</i>
<i>LnpGDP</i>	1		
<i>educ</i>	0.381	1.000	
<i>Gini</i>	-0.467	-0.263	1

The highest correlation was between per capita GDP and the Gini index, with a correlation coefficient of -0.47. This was noticeable but not concerning. Both per capita GDP and Gini index were included in this regression because they differ in information provided. Per capita GDP represented the GDP spread out per person, which can be misleading in countries where, for example, the top 10% of the population earns 50% of the income, which is the case in many Latin American countries. Gini index measured the income inequality, thus measuring these unequal distributions of income within a society. Therefore, both were included in the regression.

Regression Analysis

The adjusted R^2 of my regression was .635, indicating that 63.5% of the variation of happiness was explained with variations in log per capita GDP, percent of GDP spent on public education, and the Gini index. The Ramsey RESET test had p -values greater than .10, so the model was correctly specified at the 90% confidence level. There were no signs of heteroskedasticity in the model. The Breusch-Pagan test revealed a p -value of .89, indicating the model was homoskedastic. The Jarque-Bera test was also run, and the results signified that the errors were normally distributed. Given these tests, the ordinary least squares regression approach was appropriate.

Table 3 contains the estimated coefficient, standard error, t -ratio, and p -value of each of the variables including the constant in the regression. I reported statistical significance based on a 90% confidence level ($\alpha = 0.1$).

Table 3
Regression Table

Variable	Estimated coefficient	Standard error	t -ratio	p -value	Alpha
<i>InpGDP</i>	0.551	0.046	11.950	0.000	0.100
<i>educ</i>	0.087	0.046	1.913	0.059	0.100
<i>Gini</i>	0.030	0.009	3.393	0.001	0.100
<i>Constant</i>	0.113	0.585	0.194	0.847	0.100

All three of the variables included in the model were statistically significant independently, so no F -test was necessary to test for joint significance.

Conclusions

My regression demonstrated that, with 90% confidence, happiness indeed decreased as inequality increased. Per capita GDP, public spending on education as percent of GDP, and the Gini index were all determined to be correlated with happiness. These determinants of happiness

could be useful in policy recommendations and in promoting long-term economic growth. Policymakers can look to per capita GDP, percent of GDP spent on education, and income inequality (as measured by the Gini index) when attempting to increase the satisfaction of citizens in their countries. However, these three variables should not be used exclusively when making policy recommendations as 36.5% of the variation in happiness measures was not determined from this regression. Policy makers could also look at corruption, unemployment, fertility rates, wars, and conflict as other possible determinants of average national happiness.

Increasing happiness is important because doing so can lead to long-term economic growth. An interesting effect based on the relationships between the independent and dependent variables in this regression could lead to long-term economic growth in a nation by increasing national GDP. The macroeconomic production model below demonstrates that long-term economic growth is a function of productivity, capital, and labor.

$$Y = AK^{1/3}L^{2/3}$$

Where: Y = GDP, A = productivity, K = capital, and L = labor

An increase in happiness would likely result in an increase in worker productivity. Based on the production model, as productivity increases, GDP increases as well, thus leading to long-term economic growth. An increase in GDP also implies per capita GDP would rise, holding population constant, which my regression has shown to be associated with increased happiness.

Education can also improve productivity. Increasing the percentage of GDP spent on education is expected to increase productivity, which increases GDP and promotes long-term economic growth. Thus, another recommendation for policymakers would be to focus on improving education. Increasing the percent of GDP spent on education is administratively fairly easy, and would have positive effects on happiness, productivity, GDP, and per capita GDP.

Another way to increase happiness is to establish a redistributive income taxation policy. This would decrease the Gini index by decreasing income inequality and would, therefore, increase happiness due to the negative correlation between Gini and happiness. This is not necessarily preferable because reducing inequality is not guaranteed to promote long-term economic growth and may have no impact on GDP. However, there are other benefits associated with redistributive income tax policies in terms of both equity and fairness.

In conclusion, this regression analysis suggests that per capita GDP, percent of GDP spent on education, and income inequality are correlated with satisfaction with life. Happiness affects GDP and long-term economic growth through the productivity variable. Policymakers can use these models to increase the happiness within their respective nations and to also increase GDP.

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