Democracy and Economic Prosperity:
Is a democratic country economically well off than an autocratic country?

Keshar Shahi
ks3984@nyu.edu

Instructors:
Defne Ezgi
Daniel Gellai

Statistics for Social and Behavioral Sciences
Spring 2016
New York University Abu Dhabi

Introduction:

My project will be assessing how a country's economy is affected by its political system. I will be taking GDP/Capita (inflation adjusted as of 2005$) of countries around the world and compare them with their Democracy index using various statistical measures with other few control variables. This will help me to generate a relationship between these variables and come up with a conclusion if a country's economic prosperity depends on its democracy or not.

Dependent Variable:

My dependent variable is GDP/Capita (inflation adjusted) of the year 2014. The inflation is adjusted to 2005 US dollar.

According to World Bank, GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. GDP per capita of a country is its GDP divided by the mid year population of the country.

GDP/Capita provides me how each country's income is spread over its population and hence reflects the country's economic status.

Identify Independent variable

For this project I will be using countries Democracy Index of 2014 (via Economist Intelligence Unit's) as an independent variable. This Democracy Index is an continuous ordinal qualitative variable. It is a summary measure of a country's democratic and free nature. EIU's evaluation of democracy are based on country's elections for competitiveness and openness, the nature of political participation in general, and the extent of checks on executive authority. For each year and country, the index is based on 60 indicators grouped in five different categories measuring voting rights, pluralism, civil liberties, political participation, and political culture from the range 0-10. Country with an absolute autocracy get a score of 0 and a country with absolute democracy gets 10.

Why is this important?

We have seen countries around the world changed their political system in last few decades. We associate political freedom with affirmative changes in the country which include infrastructures, business environment, access to education and health services. One of parameter that shows how well the country is doing is its Gross Domestic Product per Capita (GDP per capita). Examining a country's democracy level with its GDP/capita will allow to create a relationship between democracy and economy.

Theory and Causal Mechanism:

There has always been a debate about how politics and economy work in a country. Theoretically, a better governance system with democracy creates better opportunities a better economic development in a country than a autocratic government. Economists like Milton Friedman believes that democracy promotes economic liberation and is preferable for a long and sustained economic growth. Since economic development indicator GDP/Capita includes how much a country earns in a year, the earning can be varied with the government's political policies. Not all country have a similar policies as policies are highly influenced by the political system. But in the contrast, a strict government such as China has been successful in achieving high economic growth rate. And also a same case is with countries like Singapore and UAE.

Hypotheses:
My null hypotheses will be that democracy level of a country has nothing to do with its economics development.
H
Whereas, the alternative hypothesis will be that the democracy level actually affects the country's economic development.

Data Analysis:

Dataset:
The data set includes the countries 156 countries around the world which have data on my desired variables. Since the population of the world countries is around 195, the sample size is pretty large that can actually reflect the population.
Almost all countries with higher political freedom are included in the data set whereas a few countries such as North Korea and Cuba whose data are not available due to their strict political system. This could affect my result as I will have a greater sample from democratic countries.
The data for all variables are from the year 2104. I took GDP/Capita from the World Bank's 2014 data which is inflation adjusted to US Dollar 2005. Similarly, the Democracy Index is taken from Economist Intelligence Unit 2014

Operationalization
GDP per capita is a continuous quantitative variable that is measure in US Dollar of 2005. This is a good representation of economy of a country as this deals with both country's income and how much it can be shared. Since there was high difference in GDP per Capita between poorer and richer countries, I have taken LOG of GDP per Capita to reduce the effect of outliers (Check Robustness for detail).
Democracy Index, the independent variable, takes multiple parameters such as voting rights, pluralism, civil liberties, political participation, and political culture. They represent a better idea about how a country's political system is since these factors determines its democracy level. Democracy Index is a continuous ordinal qualitative variables from 0-10. Country with an absolute autocracy get a score of 0 and a country with absolute democracy gets 10.

Control variables

My control variables are:

1)Government's Expenditure in Health in terms of percentage of the country's GDP:
Health is one of the basic parameter that determines the productivity of labor force. When a labor force is healthy, the increase in productivity level leads to higher GDP. This control variable is measured in percentage, which mean its limit is from 0-100.

2) Internet Access per 100 person:
One of the most important factor that determines any economy's' well being is the technology that is available to its market, consumer, and labor force. This control variables measures how many people have access to internet. It is a continuous quantitative variable with a possible score from 0 to 100. This provides us the estimation about the technological status of the economy too. Better the technology, more affirmative its impact on the country's GDP.

Summary statistics

Variable	Mean	SD	Min	Max	Sample Size
Democracy Index	5.630897	2.156734	1.49	9.93	156
Log_GDP/Capita	3.580449	.6815041	2.18384	4.91868	156
Health Expenditure	6.750371	2.594472	1.4753	17.14075	156
Internet Access	44.09103	29.80842	1.14	98.16	156

Scatterplot with best-fit line:
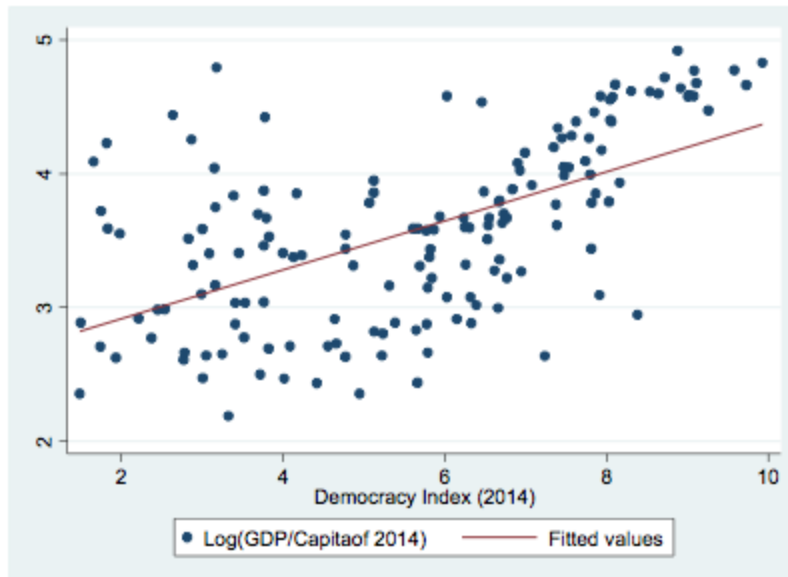
The scatterplot shows that there is a linear and a positive relationship between log of GDP/Capita and Democracy Index. This means an Increase in democracy Index leads to an increase in log of GDP/Capita.
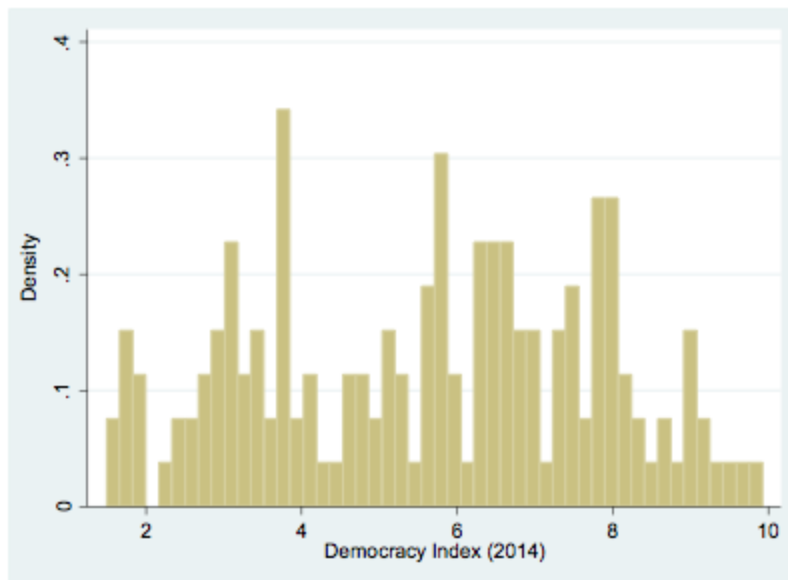
Regression analysis

Log_GDP/Capita	Bivariate	Health Expenditure	Internet Access	All Control
Democracy Index	.1835706 *** (.0207256)	.1760313 *** (.0237598)	.0350774 ** (.0157241)	.0437333** (.016718)
Health Expenditure per GDP	----	.0112381 * (.0198055)	----	-.0173687 (.0122405)
Internet Access per 100 persons	----	----	.0182334*** (.0011377)	.018373*** (.0011491)
	b_0=2.546782 n=156 R^2=0.3375	b_0= 2.508161 n=1056 R^2=0.3395	b_0= 2.579002 n=156 R^2=0.7527	b_0=2.639043 n=156 R^2=0.7547

Interpretation and conclusion

Bivariate:
The slope of the regression line (regression coefficient) of Democracy and Log_GDP/Capita is 0.1835706. With 99% confidence level, this can be interpreted as every one unit change in Democracy Index will change the Log_GDP/Capita by 0.1835706 units in the same direction, rejecting the null hypothesis.
The height of this regression line is 2.546782, which means that a country with an absolute zero score of democracy Index will still have Log_GDP/Capita of 2.546782.
The the R^2 (coefficient of determination) between Democracy Index and Log_GDP/Capita is 0.3375. Only 33.75% of the the total variation is explained by the model. There is a weaker correlation.

Multivariate:
When observing all all control, the regression coefficient is 0.0437333 between Democracy and Log_GDP/Capita. This means every one unit change in Democracy Index will change the Log_GDP/Capita by 0.0437333 units in the same direction with 95% confidence interval. At 95% CI, we can reject the null hypothesis again.
Whereas, The height of this regression line is 2.639043, which means that a country with an absolute zero score of democracy Index will still have Log_GDP/Capita of 2.639043.
The the R^2 (coefficient of determination) between Democracy Index and Log_GDP/Capita, with all control variables, is 0.7547. 75.47% of the the total variation is explained by the model. There is a strong correlation.

In both calculations, bivariate and multivariate, it can be conclude that there is a positive relationship between level of democracy and it economic prosperity. The more liberal a country is, the more potential it has to be economically well off.

Robustness checks:

Outliers:

Country name	Log_GDP/Capita	Democracy Index	Outlier
Bahrain	4.25283	2.87	.039454
DRC	3.72013	1.75	.0338237
Equatorial Guinea	4.08891	1.66	.0740382
Kuwait	4.42378	3.78	.0257965
Malta	2.9429	8.39	.037105
Qatar	4.79357	3.18	.0678083
Saudi Arabia	4.22974	1.82	.0823118
United Arab Emirates	4.43883	2.64	.0625091

Here are the list of ten countries which are considered outliers in my data set. Among these ten countries, only one of them, Malta has a higher Democracy Index with a lower Log_GDP/Capita. In other cases, the countries are economically well off but have less democracy. These nine countries can affect my result as they will show that the less democracy has positive impact on the economy.

GDP per capita before taking log:

Before taking log of GDP per capita, there were many outliers like shown in the boxplot below. The outliers can significantly change the representation of data as it has done in the following by making it negatively skewed.
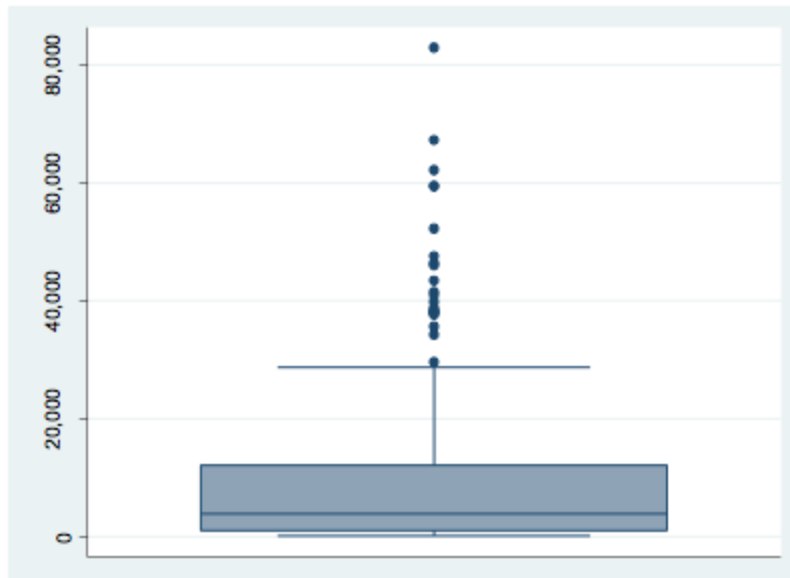
GDP per capita after taking log is a better representation of my data as it disallow outliers to affect my results. This is a better representation with less outliers that could affect the result of my test.