

Sample Project 2 - Leadership

Have state leaders had an effect on the GDP and the Life Expectancy of their country during their rule?



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Introduction

I have chosen this subject as I have always had an interest in world politics, more specifically world leaders. I have always wondered whether how a leader's popularity is determined by the economic and health benefits the country has received during the leader's time in power. While researching potential for this project, I found out that Mao Zedong (Chairman on the Communist party between 1943-76) made many agricultural and social changes that led to an increase in the life expectancy of the Chinese people. After Mao's death, Hua Guofeng came to power, in his time in power, people's health did not increase but more so; economical factors such as industry. This little 'story' incited me to pick two factors that would represent health and economical growth; life expectancy and GDP.

For this project, I associated the 'leader' of a country as being the most powerful person. I limited myself to just portray the leader as being solely responsible for his/her country's GDP and life expectancy. I would like to find out if the 'type' of leader has a connection with the national wealth and the national health of their country. By 'type' I review the leader with questions such as; how long they were in power? Which political stance did they have? Did they rule as an absolute dictator, as a member of single-state party or as part of a democratic system? To measure the 'health' of a country I based this on the 'Life Expectancy' of the country. For the 'wealth', I used the GDP (Gross domestic product) of their country.

Dictators vs. Democracy

For this part of the investigation I would like to find out whether dictators or the democratic leaders were more successful in terms of GDP and life expectancy. I will use the data of the life expectancy, the GDP, the names of the leaders and their countries. I'll then filter the information for just the "dictators" and use the data in the "change in GDP" and represent this information as a box-whisker diagram. Similarly, I'll do the same for dictators but for the "change in life expectancy" column. Then, I'll filter out the information for just the "democracy" (i.e. – all the democratic leaders) and repeat the similar box-whisker diagrams from above. I expect that to see that there will be a broader range for both GDP and life expectancy for the democratic leaders than the dictators.

Shorter Rule vs. Longer Rule

In this section I'll find out whom of the shorter or the longer rulers were successful in terms of GDP and life expectancy increase. I'll do this by plotting a scatter graph with the years of the leaders in power over the GDP and another graph with the years of the leaders in power over their respective life here is that the longer rulers will have the advantage as things tend to increase slowly over time, no matter whether 'bad things' such as diseases epidemics or a sudden decrease in the country's economy happens.

Most Economically Successful Democratic Political Stance

In this part I will find out whether the left-wing politicians, the centralists or the right-wingers were more successful in terms of GDP. To do this, I'll put each political stance together (e.g. – centralists, centre-left, centre-right etc) and with the data of GDP, more specifically the "GDP change". Then, I'll use the 'changes' to put

everything onto one graph with box-whisker diagrams to compare all the different political positions to see which was the most successful in terms of GDP. I predict that the more right-wing the government, the higher the GDP.

The data for the 50 world leaders I collected is:

- Name of the leader
- Date of birth of leader
- Date of death of leader
- Age of leader when succeeded power
- Age of leader when withdrew from power
- Year when leader succeeded power
- Year when leader withdrew from power
- Country the leader ruled
- Number of years in power
- GDP when succeeded power
- GDP when leader withdrew from power
- Change in GDP
- Life expectancy when leader succeeded power
- Life expectancy when leader withdrew from power
- Change in life expectancy
- Whether ruled as a democracy or dictatorship
- The leader's party – the political belief it had (e.g. – left-wing). If the ruler did not have a party then = Nonpartisan.

The word 'leader' is a vague term, and so the definition of a 'leader' in this internal assessment is the person in a given country at a given time that had the most political power. The official title of the leader can often vary; chancellor, president, autocrat, prime minister, dictator, etc. The leader is simply the person who represents the country and who ultimately has the most political influence over his/her country.

Information

Data source

I collected data from online encyclopaedias such as <http://www.wolframalpha.com/> and www.wikipedia.org to find first of all, the world leaders I would base my investigation upon. Then, I used these websites to find basic information about each of the leaders such as when they were born, when they died (or if they are still alive – classed as N/A), whether they ruled as dictatorship or democratically and what political spectrum their party belonged to (if they were part of no party, they are considered as Nonpartisan). Based on the year the leader came into power and the year they left-office, I collected data on the average life expectancy and the GDP from the country they ruled in. Both of these sources of data came from the website www.gapminder.com.

Generated data¹

Once all my data was collected, I decided to generate some data from the existing columns.

- “Age when started” column is the “Year started” take away “Date of birth”
- “Age when finished” is the (“Year finished” take away “Year started”) plus “Age when started”
- “Nos. of years in power” is the “Year finished” subtract the “Year started”
- “GDP change” is the “GDP finished” subtract “GDP started”
- “Life expectancy change” is the “Life expectancy finished” subtract “Life expectancy started”

Problems with data

I encountered several problems when trying to find data from specific points in time. Originally, I wanted to expand my question over several centuries going back as far as the 16th century. However, considering that the source of data I found for ‘GDP’ only went as far back as 1960, I would have to limit myself to leaders from the past 50 years. Also, some countries did not always have data for earlier years (around 1960-1980) which made my selection of leaders very narrow.

Limitations

The Gapminder website offers interesting information and is a valuable source as it was set up by physician and statistician Hans Rosling who aims to “[Unveil] the beauty of statistics for a fact based world view”².

However, although the data may be reliable, it cannot really prove that a leader had a significant effect on the country’s GDP and life expectancy. There are thousands of other factors that affect a country’s growth; culture, education, climate, debt, employability rate and crime are some of the many examples. Moreover, a country’s economical and health growth cannot be responsible to one leader, it’s also down to the ministers who are there to improve the country. Moreover, it is down to the people who choose how to eat or how to live, although this type of information is harder to

¹ See Appendix 1 for the table of information

² Rosling, Hans (08/12/10) – <http://www.gapminder.org/about-gapminder/our-mission/>

obtain. Data would have to be formulated in a subjective way, (i.e. – questionnaires on people's life habits).

Another problem I encountered was judging whether each leader was a dictator or a leader in a democratic environment, this was not always 100% clear. A dictator by definition is a "person granted absolute emergency power" that rules alone or with a single-state party. Generally, a dictatorship allows no party opposition and nobody else to participate in politics. Also, there are nuances between different types of dictatorships, such as a military dictatorship, a police state, constitutional dictatorship, elective dictatorship, theocracy etc.

If I were to re-do this investigation, I would take the time to obtain thousands of leaders from the entire world and use a database that has fewer gaps. I would also consider adding another factor such as some sort of 'rating' of each leader. Find a range of ratings from websites or magazines and finding the mean and the range of them. Another source of data could be to consider what other ministers might have done to improve the well-being of the citizens.

Mathematical processes

Dictators vs. Democracy

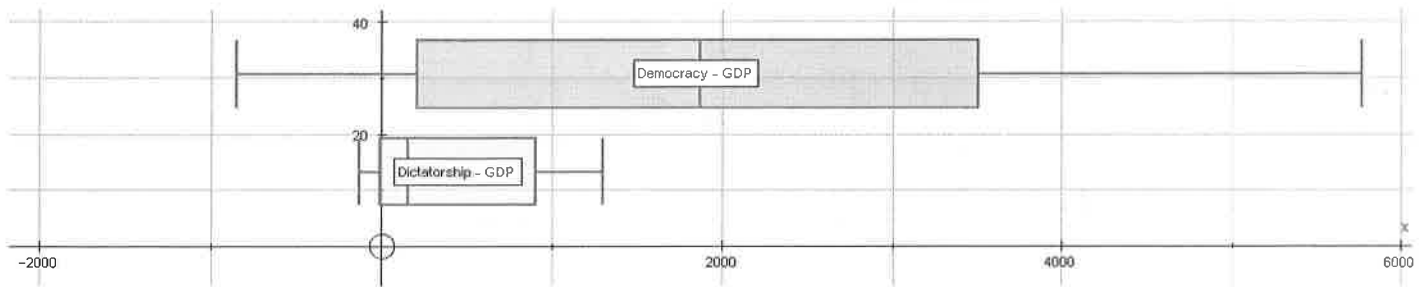
Results showing basic results for the GDP including Median, Range, Standard Deviation...

Raw Data	Raw Data
Number in sample, n: 11	Number in sample, n: 39
Mean, x: 359.937	Mean, x: 2025.39
Standard Deviation, x: 461.493	Standard Deviation, x: 1851.02
Range, x: 1432	Range, x: 6616.8
Lower Quartile: -16.1041	Lower Quartile: 206.364
Median: 148.201	Median: 1869.45
Upper Quartile: 902.143	Upper Quartile: 3497.37
Semi I.Q. Range: 459.124	Semi I.Q. Range: 1645.5

Dictatorship

Democracy

Finding out whether dictators or the democratic leaders were more successful in terms of GDP and life expectancy



Here, I wanted to find out whether dictators or the democratic leaders were 'better' for the GDP of their country. The results for the ranges of the box-whisker diagrams are significantly different. The range of the dictators is far smaller (1432) than the democratic leaders (6616.8). An explanation to this could be that dictatorships are more consistent, they have a more reliable economy and therefore a higher GDP.

This can be backed up with an extremist type of political government such as communism. Communism works on the principal that everyone is equal, and ensures that everyone is fed. So, despite there being a small variety of types of products in a communist shopping centre, there will, in theory always be a constant supply. This is different to a democratic form of government such as capitalism, capitalism allows there to be many types of baked beans in the supermarket, but a constant supply cannot be guaranteed. Capitalism works through competition and food-shortages are not rare, although arguably, there have been food shortages with communist states such as the Ukrainian famine of 1932-3.

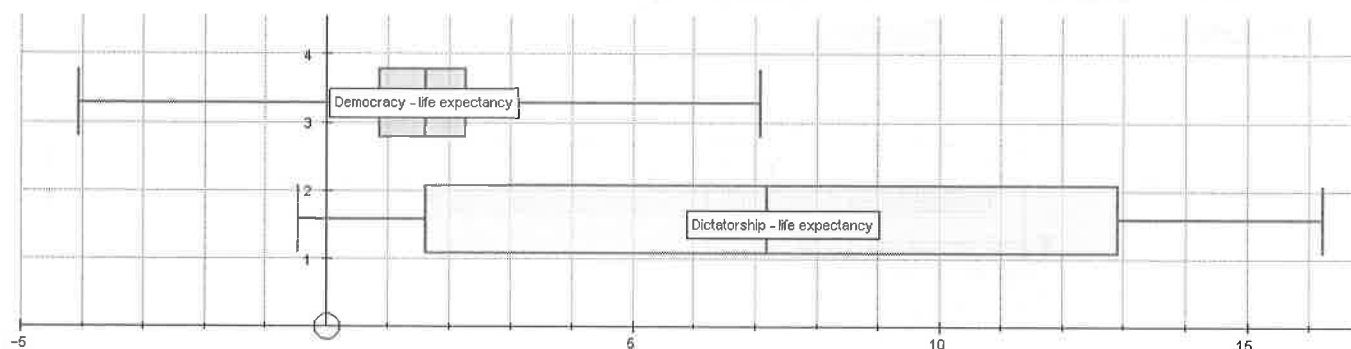
However, the democratic leaders have a far smaller lower quartile. This could be that the one leader at the bottom of the "Democracy GDP" (lower quartile) of the box-whisker had a catastrophic economic downfall. This could be due to many reasons;

the most obvious explanation being that the country experienced a devastating economic recession.

Results showing basic results for the Life Expectancy including Median, Range, Standard Deviation...

Raw Data	Raw Data
Number in sample, n: 39	Number in sample, n: 11
Mean, x: 1.66754	Mean, x: 6.61673
Standard Deviation, x: 2.04955	Standard Deviation, x: 5.5695
Range, x: 11.151	Range, x: 16.682
Lower Quartile: 0.849	Lower Quartile: 1.602
Median: 1.607	Median: 7.175
Upper Quartile: 2.272	Upper Quartile: 12.888
Semi I.Q. Range: 0.7115	Semi I.Q. Range: 5.643

Dictatorship Democracy



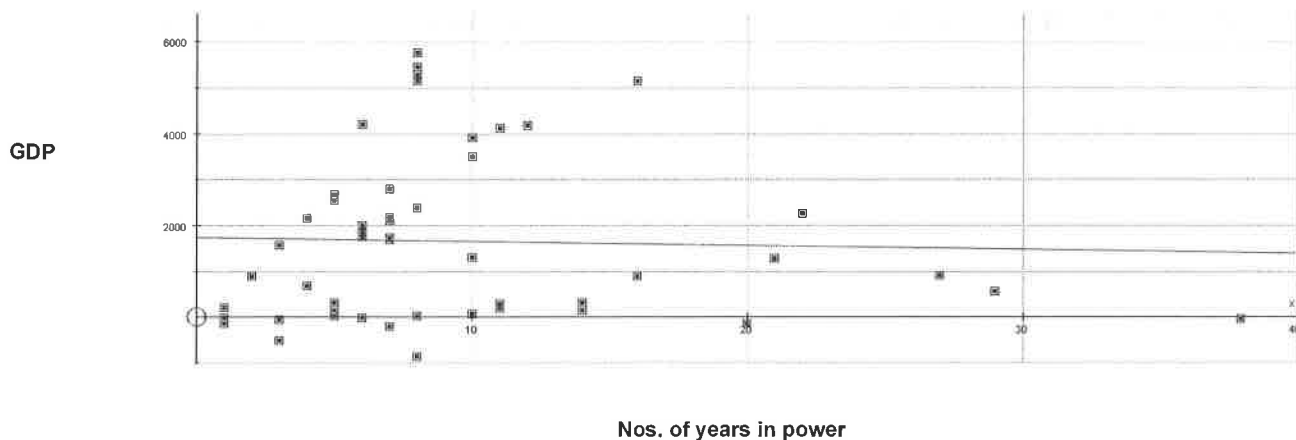
Here, similar to *Results for GDP* I wanted to find out whether dictators or the democratic leaders were 'better' for the Life Expectancy of their country. The result here is interesting because, contrary to my hypothesis (that democratic would have a higher life expectancy); it is in fact the very opposite. Democratic life expectancies have a significant smaller mean, range, lower quartile, median, and upper quartile than the dictatorship life expectancy. This seeks many interesting questions, first of all, why could this be?

The validity of this data is questionable here; the dictators in my database only account for about a third of all the leaders. Therefore, the level between democratic leaders and dictators is different, putting into question how seriously we could take this. The ultimate question here is: Ultimately, do dictatorships have a better impact on Life Expectancy than democracies?

Shorter Rule vs. Longer Rule

GDP over "Nos. of years in power"

Finding out who of the shorter or the longer rulers were successful in terms of GDP and life expectancy increase?



Results for the GDP over "Nos. of years in power" including Mean, Standard Deviation, Correlation coefficient, x-on-y regression line...

Number of points, n: 50
Mean, x: 9.54
Mean, y: 2.756
Standard Deviation, x: 7.365
Standard Deviation, y: 3.782
Correlation Coeff, r: 0.8905
Spearman's Ranking Coeff: 0.8103
y-on-x Regression Line: $y=0.4573x-1.606$
x-on-y Regression Line: $x=1.734y+4.76$

x-on-y Regression Line: $x=-0.0001459y+9.782$

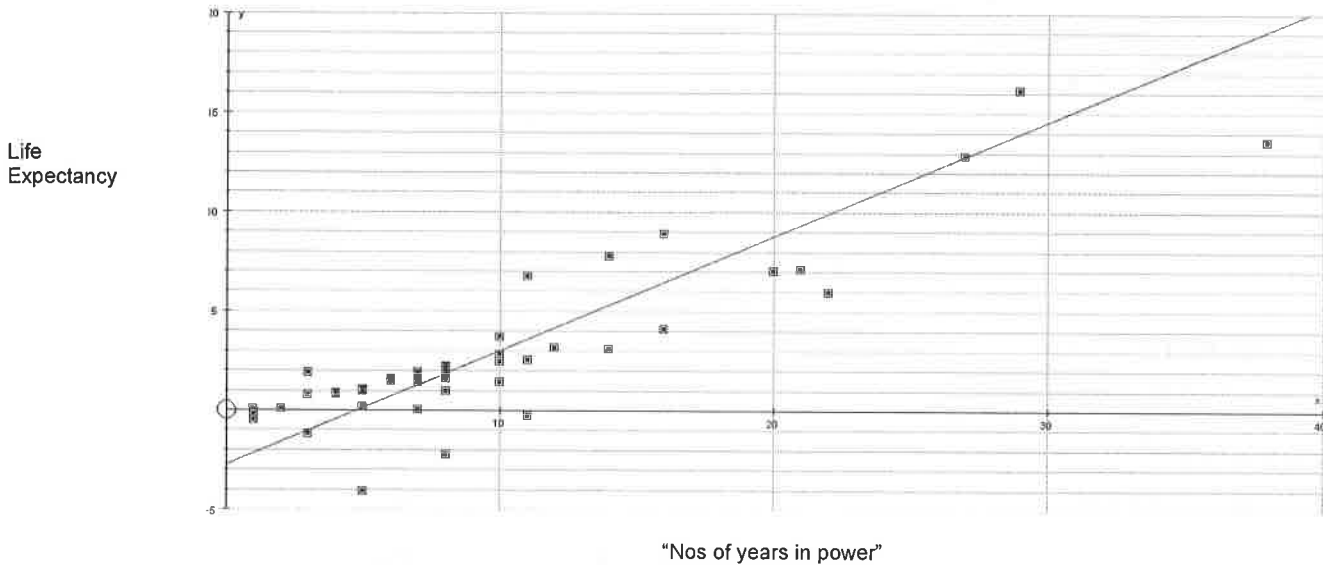
y-on-x Regression Line: $y=-8.593x+1741$

I wanted to see if shorter term rulers were economically more successful than longer-term leaders. The graph above shows that GDP over the "Nos. of years in power" has no correlation at all, with a Correlation Coefficient of -0.03 (almost being zero

with no correlation at all). My results signify there is no correlation between how long a leader is in power to the improvement in GDP. The standard deviation (x: 7.365) (y: 1788) are both very far from their according means (x: 9.54) (y: 1659). This suggests that data is too dispersed to have any significance.

The in-existent correlation I obtained could be due to the simple fact that the years a leader spends in power DOES NOT affect the GDP; however, I'm suspicious of this. I believe the contrary; I'm sure this question could have some correlation, although to prove this would require more data and about other factors. Individual economic policies could be considered and their effect on more specific parts of the economy sectors such as the industrial sector, agricultural sector, private sector, public sector etc. Other factors such as unemployment rate could also be taken into consideration.

Life expectancy over "Nos of years in power"



I wanted to find out whether there is a correlation between life expectancy and the number of years a leader stays in power.

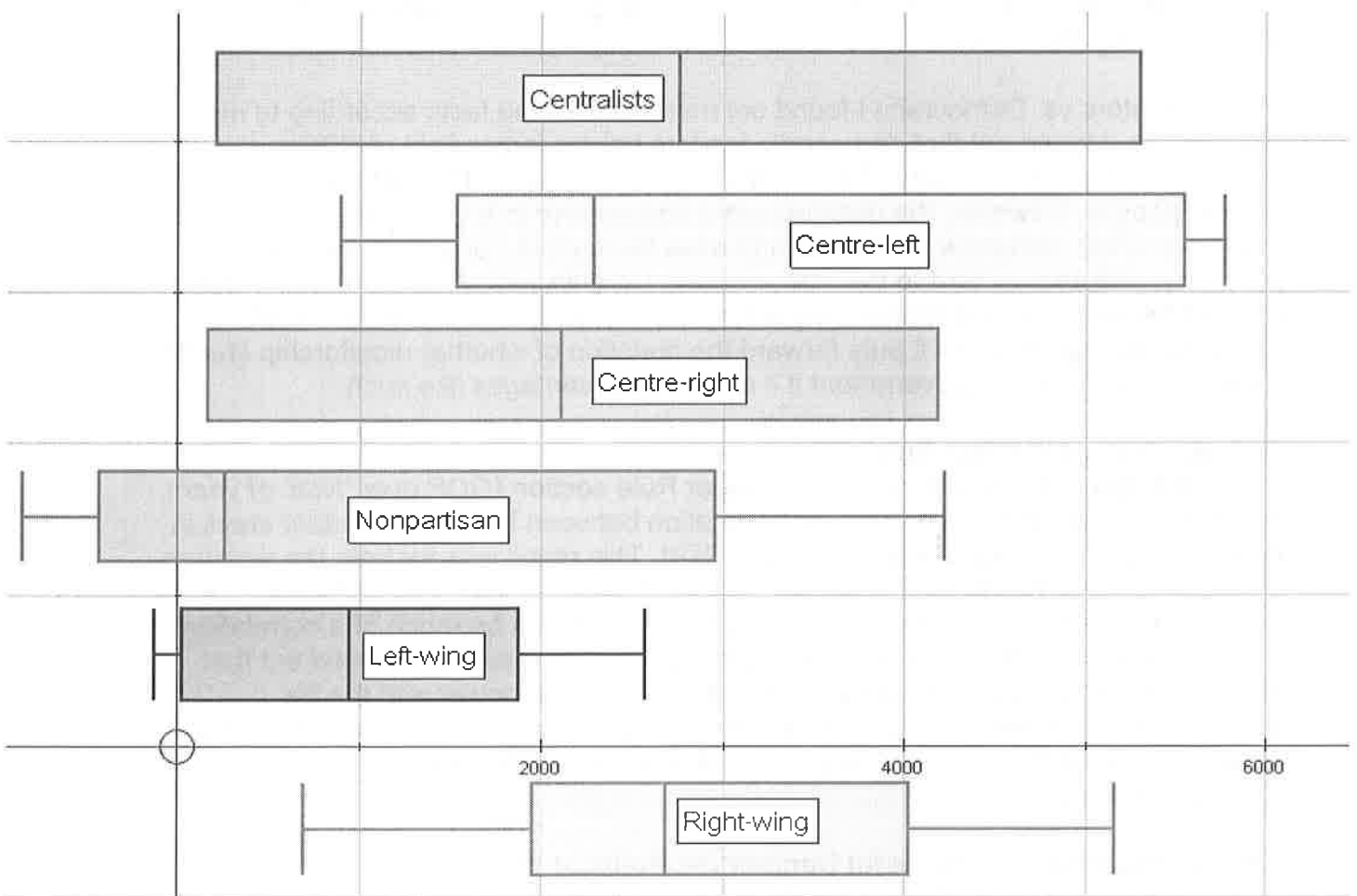
The correlation coefficient suggests that there is a strong positive linear correlation between the two sets of data (correlation coefficient: 0.8905). One of the reasons for the positive correlation is that the leaders from my data might have promoted worthy social benefits / social reforms.

Social benefits that would eventually positively affect the life expectancy of the country, if it is not in the leaders' time in power, the benefits might be seen later. However, I doubt it is this simplistic, do the leaders actually make a difference considering that life expectancy in the world is an exponential curve. In other words, the life expectancy in the world is increasing. Despite diseases such as AIDS which has led the life expectancy to shoot down in some Southern African countries. The life expectancy is on an exponential increase; moreover, the progressing world of science now allows humans to have organ transplants and to grow certain tissues. This must contribute to the life expectancy in more economically developed countries.

Most Economically Successful Democratic Political Stance

Finding out whether the left-wing politicians, the centralists, the non-partisans or the right-wingers were more successful in terms of GDP

GDP for all the political stances



The most economically successful type of political position here is the centre-left whose upper quartile slightly surpasses the centralists and right-wing leaders. Contrary to my hypotheses; the right-wing is NOT the most economically successful. My rationale for this being simply that right-wing politics tends to revolve more around capitalism, individualism and competition systems.

However, there is some evidence to support my original hypothesis (that right-wing leaders are more economically developed than the left-wing leaders). There is however, insufficient data to have enough of each 'political position'.

For example there was only example of 'centre to centre-left' which I decided not to include. It would be interesting to have a very big statistic board to draw conclusions about which political position or political ideology was more successful.

Conclusions

Dictators vs. Democracy

Throughout out this investigation I found out several things relating to my question "Have state leaders had an effect on the GDP and the Life Expectancy of their country during their rule?"

In the Dictators vs. Democracy I found out many interesting facts according to my data. Firstly, I found out that democratic leaders have a larger field of GDP's, meaning that one leader could have had a negative effect on the country's economy or the opposite. However, the dictators were somewhere in between the two extremes which somehow shows them to have been more consistent with their economy. The second part to this sub question (*Results for Life Expectancy*) I found out that the dictators had a better impact for a country's life expectancy. This is a really interesting result, as it puts forward the question of whether dictatorship should be an accepted form of government if it can have advantages like such.

Shorter Rule vs. Longer Rule

In the first part of the Shorter Rule vs. Longer Rule section (*GDP over "Nos. of years in power"*) I found out that there is no correlation between how long a leader stays in power and the improvement/regression in GDP. This result was for both the dictators and the democratic leaders. I was interesting if finding out if there would be a correlation, although I already thought that there would not be much of a correlation. For the *Life expectancy over "Nos of years in power"* sub-question I found out that there is a near to perfect correlation between the years in power and the life expectancy. The main factor that determines this is that although life expectancy is changes according to each country, world health is increasing and therefore life expectancy is increasing.

Most Economically Successful Democratic Political Stance

In this section I found out that political position does not have so much affect on the *GDP*. Each individual box-whisker has a really large range, although the medians do give us some indication of how successful they were. The "Nonpartisan" box-whisker diagram was the lowest and the "right-wing" box-whisker being the highest. An explanation to this could be that the nonpartisan leaders were maybe less organised as nonpartisan means that they have no official party. Although they may work with other people, it might be that there political status is sometimes unclear or apolitical. With this argument, it could be that non-partisans have difficulties in running a stable economy and therefore their country has a lower GDP.

Validity

The 'GDP' was quite unreliable in several instances. The data only ends for the year 2008 which means that the leaders that either finished in 2009 or are still incumbent were simply marked as having finished in 2008. This being not entirely correct, for example Zine El Abidine Ben Ali (leader of Tunisia – resigned 2009) and Hosni Mubarak (leader of Egypt – still incumbent) Anders Fogh Rasmussen (leader of Denmark – still incumbent).

All the GDP data (Gross Domestic Product) was measured in constant 2000 US\$. The inflation was taken into account but not the differences in the cost of living between countries have been taken into account. This data and the life expectancy come from the World Bank World Development Indicators.

Another point of the validity of the data is the time of leaders in power, it is not always perfect. Leaders who ran through twice or even three times there is a period where nobody is in office. Therefore, it is not entirely accurate.

References

Rosling, Hans (08/12/10) – <http://www.gapminder.org/about-gapminder/our-mission/>

Appendices

See attached database

Possible Marks for Sample Project - State Leadership

Name	Project 3	Project	Old Criteria		New Criteria
Strand	Name	Mark	Justification		Justification
1	Introduction	2	Clear title. Introduction on page 3 and 4 gives clear description of task and plan.	2/2	As before
2	Information / measurement	3	Candidate has collected data for 50 world leaders that is suitable for the investigation. Candidate has included a number of numerical and categorical fields and has generated fields to measure 'change' in GDP and life expectancy. The database is sufficient in quality and quantity and structured appropriately for use.	3/3	This is really a hybrid. This can be seen as primary data collected from secondary sources and sampling is not appropriate here.
3	Mathematical analysis	2	Although the candidate has made use of correlation coefficient, there is not attempt to calculate this manually and so I have judged that this does not count as an attempt to use a sophisticate process. Candidate is awarded 2 for using simple processes that are 'mostly' correct.	3/5	This becomes a 3 because mostly correct and relevant simple processes.
4	Interpretation of Results	2	Candidate has, for example, correctly interpreted the correlation coefficient for the scatter graphs. There are other examples of correct interpretations, but not enough to be considered comprehensive discussion.	2/3	Plural
5	Validity	1	On page 5 the candidate discusses problems with data and limitations.	1/1	Comfortable sufficient detail to cover this
6	Structure and communication	3	Project follows a logical order and correct notation (although not much is used. The project reads well despite its limited mathematical content (limiting student to a mark of 2 for 'C')	3/3	
7	Commitment	2	Student worked well with an area of interest despite struggling with the mathematics in general.	1/2	Project could be considered too simple to need too much terminology and notation
Total	Score	15			

Your criteria

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