An Exploration Analyzing the Relationship Between GDP and Life Expectancy

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Introduction

The relationship between the Gross Domestic Product (GDP) and Life Expectancy has often been explored by various governments, the United Nations, and public institutions in order to understand the how a country's monetary production influences the welfare of its people. GDP (measured in USA dollars) allows workers to estimate a countries economy where a high GDP implies a higher monetary gain. The data that will be explored below was provided by the World Bank and has been parsed to analyze six countries Chile, China, Germany, Mexico, United States of America, Zimbabwe. The data below was taken from 2000 to 2015 in order to understand how the world has changed in the 21st century.

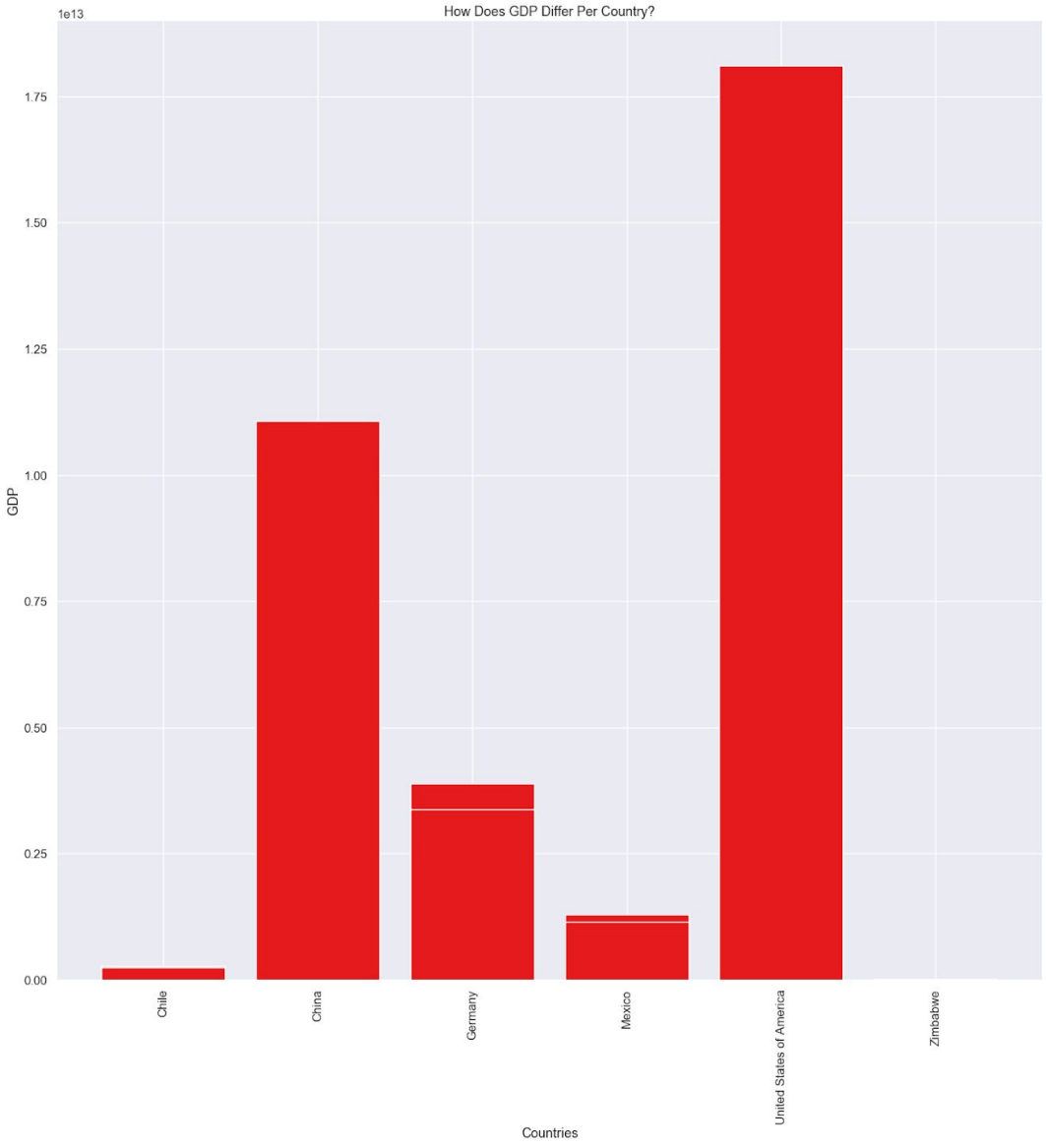

Figure 1. How Does GDP Differ Per Country?

Figure (1) shows the stark differences in GDP among different counties. While the United States of America has a GDP of $1.8 \bullet 10^{13}$, Zimbabwe's GDP is not even noticeable on the graph.

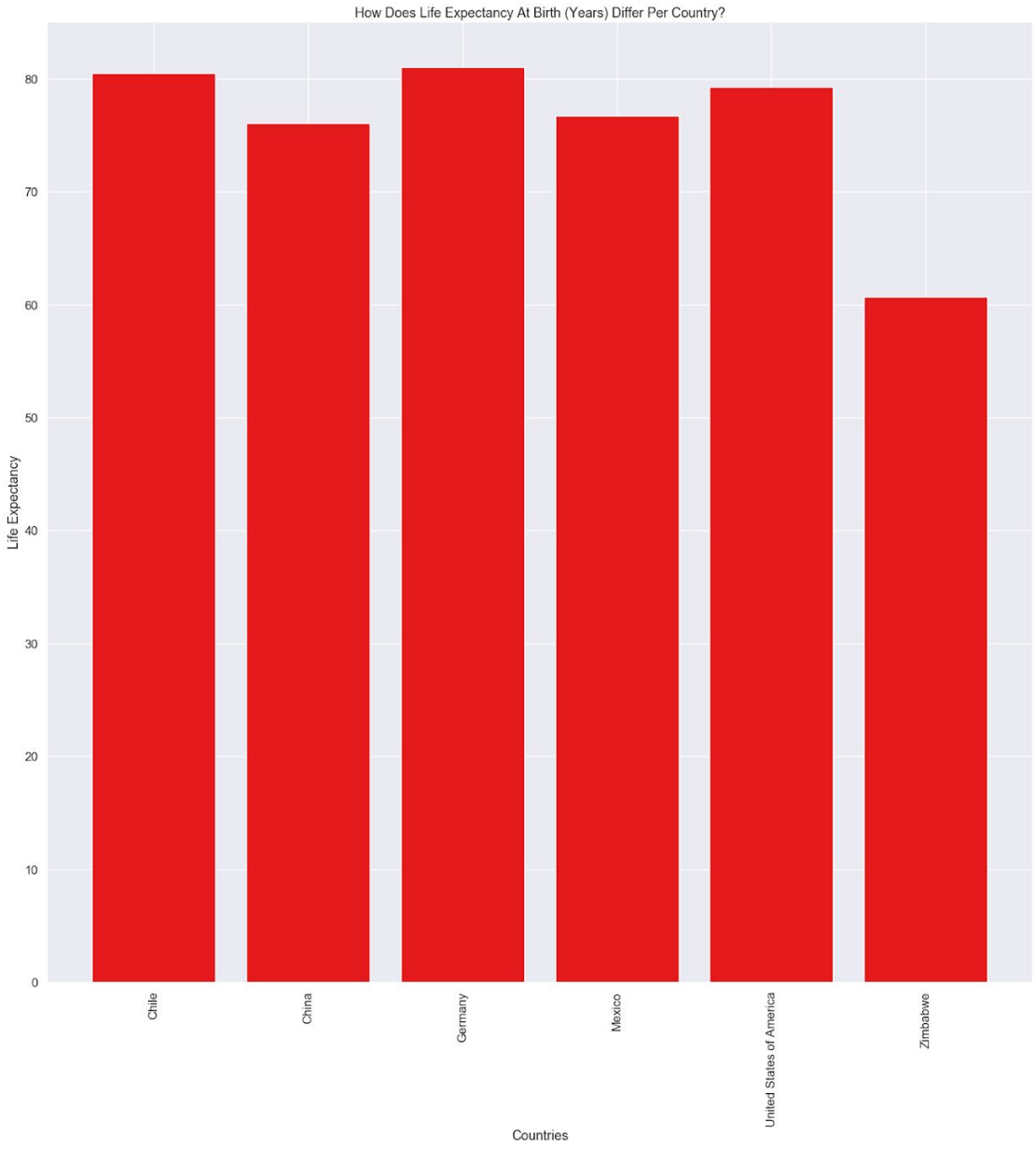

Figure 2. How Does Life Expectancy At Birth (Years) Differ Per Country?

Figure 2 shows that the life expectancy at birth of each country is not on such of a wide spectrum. It is noted though that the country with the smallest GDP which is Zimbabwe also has the lowest Life Expectancy Rate. This might imply that there is a relationship between Life Expectancy and GDP yet the United States of America does not have the highest Life

Expectancy despite having the highest GDP. The average life expectancy of each country is as follows:

- Chile: 81
- China: 76
- Germany: 81
- Mexico: 77
- USA: 79
- Zimbabwe: 61

In order to first explore the distribution of each country, a violin plot will be explored.

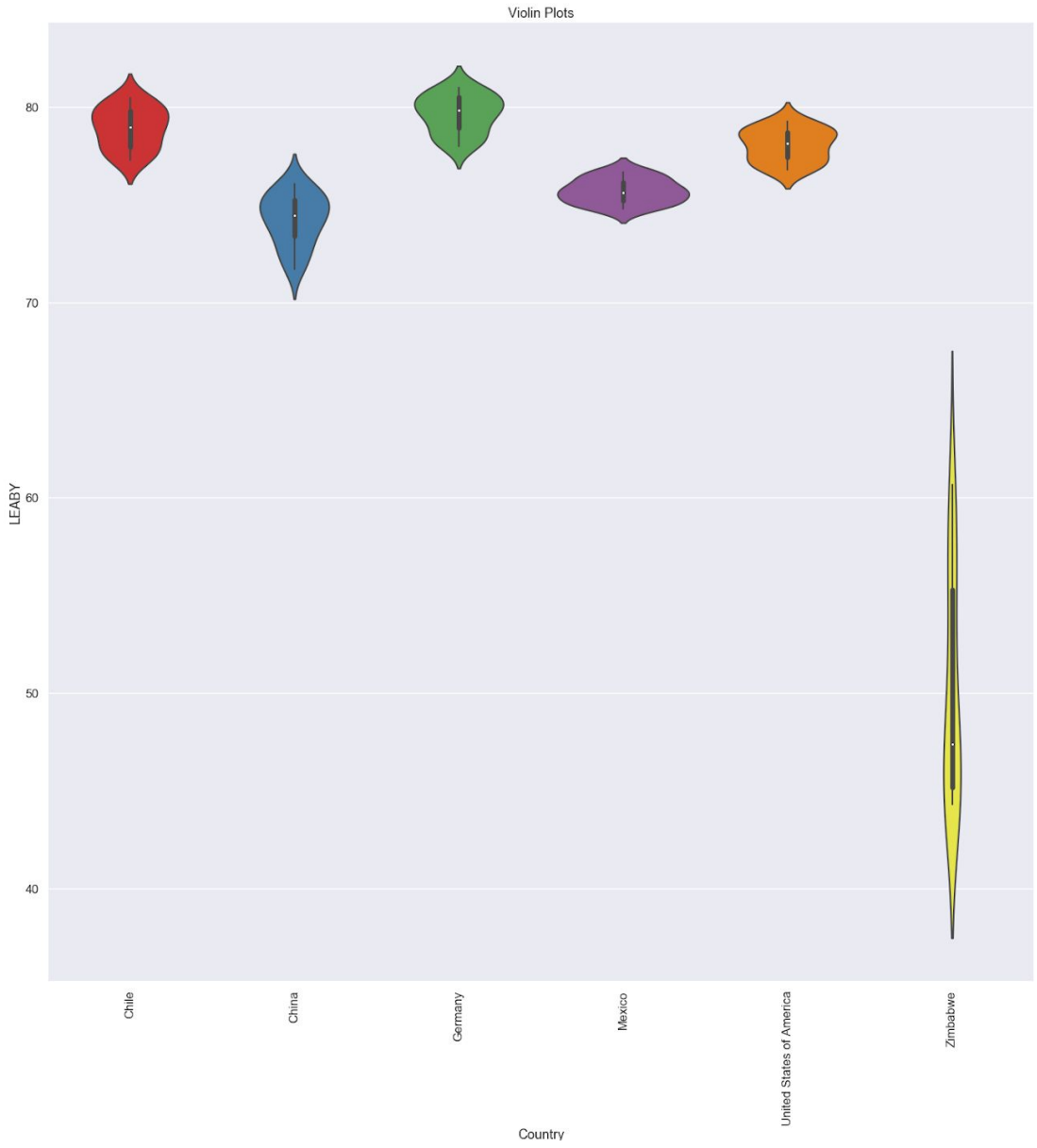

Figure 3. Violin Plot of Data

The Violin Plot allows us to explore various aspects of the data. The white dot shows us the median of the data indicating that Germany has the highest median while Zimbabwe has the lowest. The gray lines indicate the 95% confidence interval while the general shape of the data represents how the probability of a life expectancy varies. What is apparent about this graph is the stark location of Zimbabwe in comparison to other countries and the long distribution. This implies that there there was a lot of change in its life expectancy in the 21st century. China also has a longer confidence interval which could also imply large change in the 21st century while Mexico might not have changed as much. In order to explore how the data has changed, Figure 4 will explore the relationship between the life expectancy versus GDP.

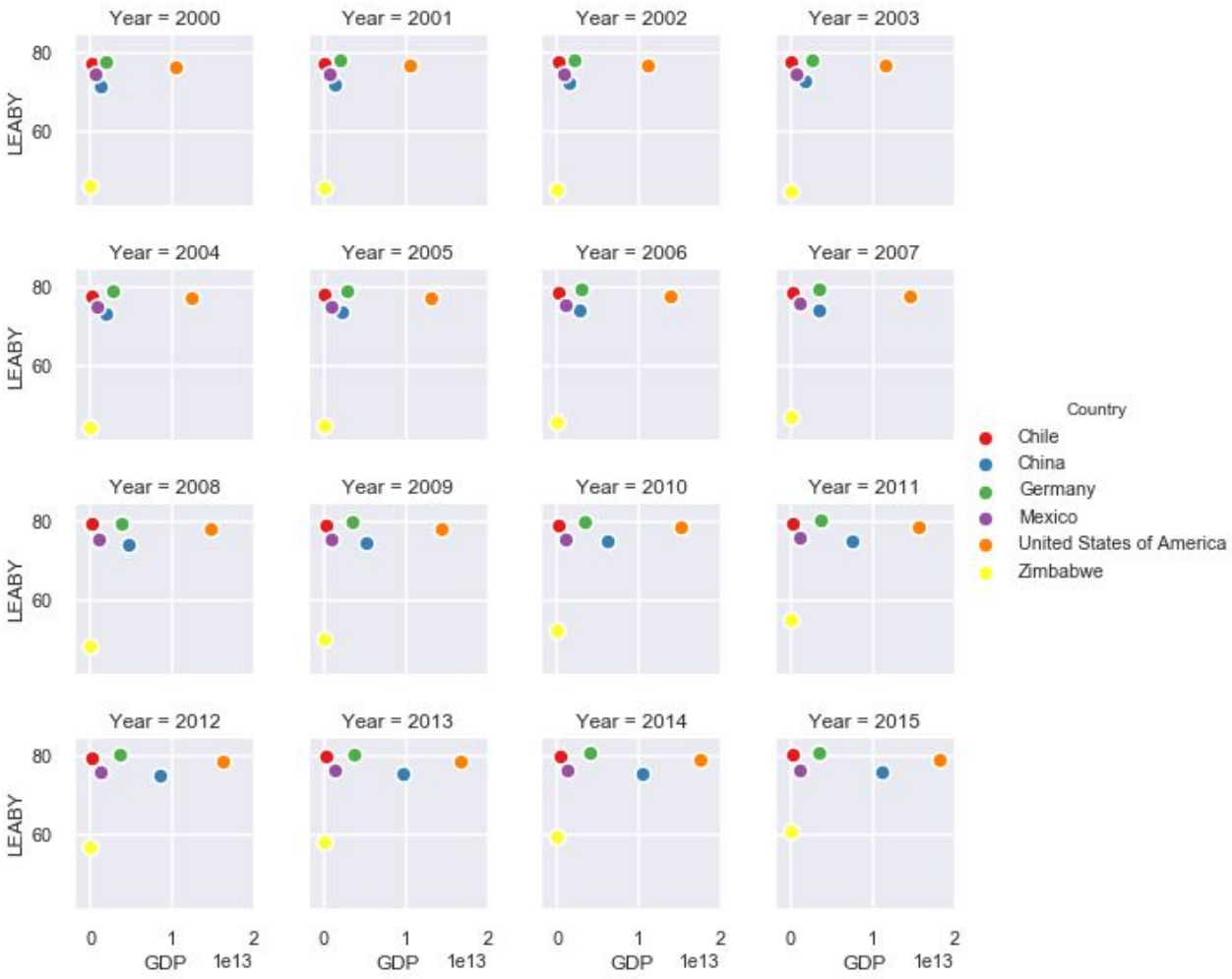

Figure 4. facet grid of scatter graphs mapping GDP as a function of Life Expectancy by country

Figure 4 explores the relationship between GDP and Life Expectancy. The figure indicates that there is a positive correlation between the two. The country that moves the most along the X axis over the year is China. This could be because of its increasingly growing economy. Based on its industrialization changes, China has not had CO_2 emissions imposed on its industry and

so it has been allowed to rapidly expand. This has allowed many of its industries to focus on growth rather than conservation of its environment. It is also noted that China has focused on increasing its education standards which could create many white collar jobs. The country that has changed the most along the Y axis over the years is Zimbabwe. This could be because of increasing aid in creating simple yet effective technologies that greatly increase life expectancy, especially at birth. Attention has been paid to vaccines, proper nutritious diets, and clean water. Sources: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4759485/
https://www.gapminder.org/answers/how-does-income-relate-to-life-expectancy/

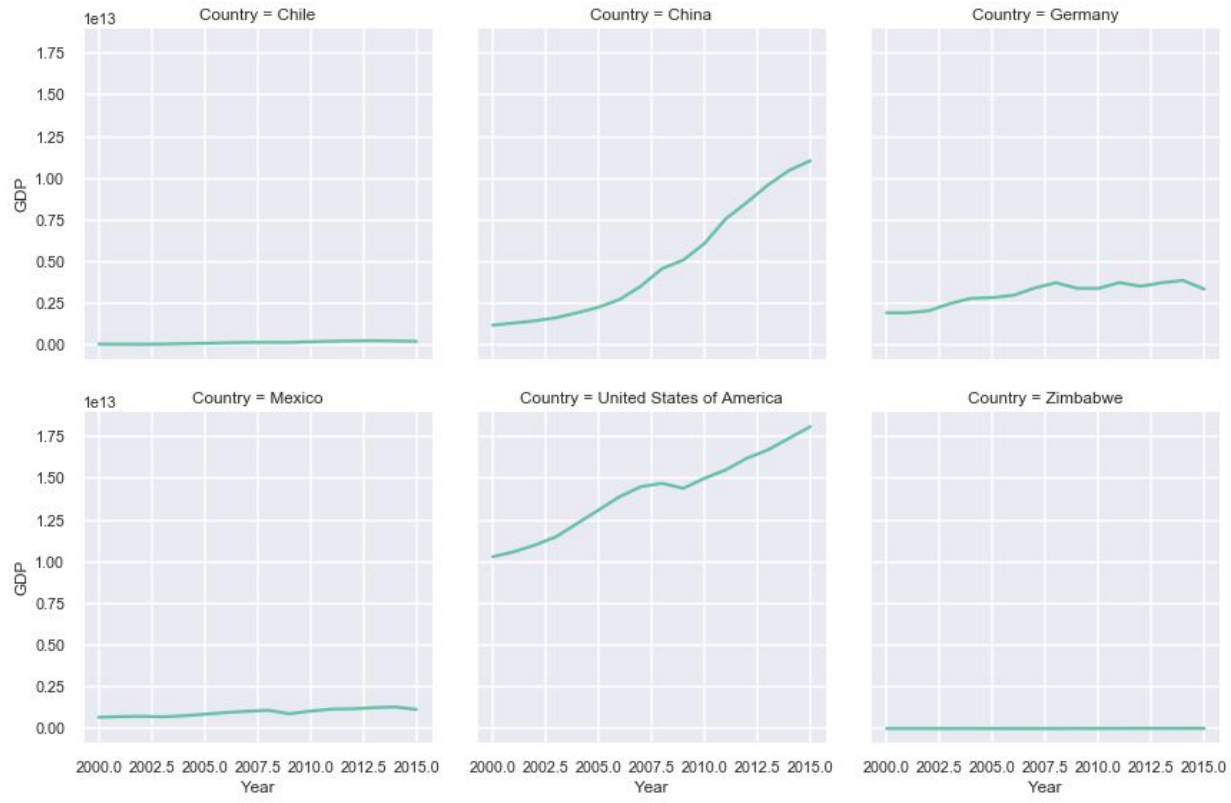

Figure 5. GDP Over Time

Figure 5 shows how GDP has changed over time. It is amazing to see how China has had a huge GDP increase compared to many other countries. Chile and Zimbabwe have barely increased in GDP over the 21st century. This graph shows how generally wealthy countries have overwhelmingly benefitted from a growing and dynamic world while smaller and lower GDP countries have not been able to tap into this world growth. It is safe to say that for every country but Zimbabwe, GDP has increased over time.

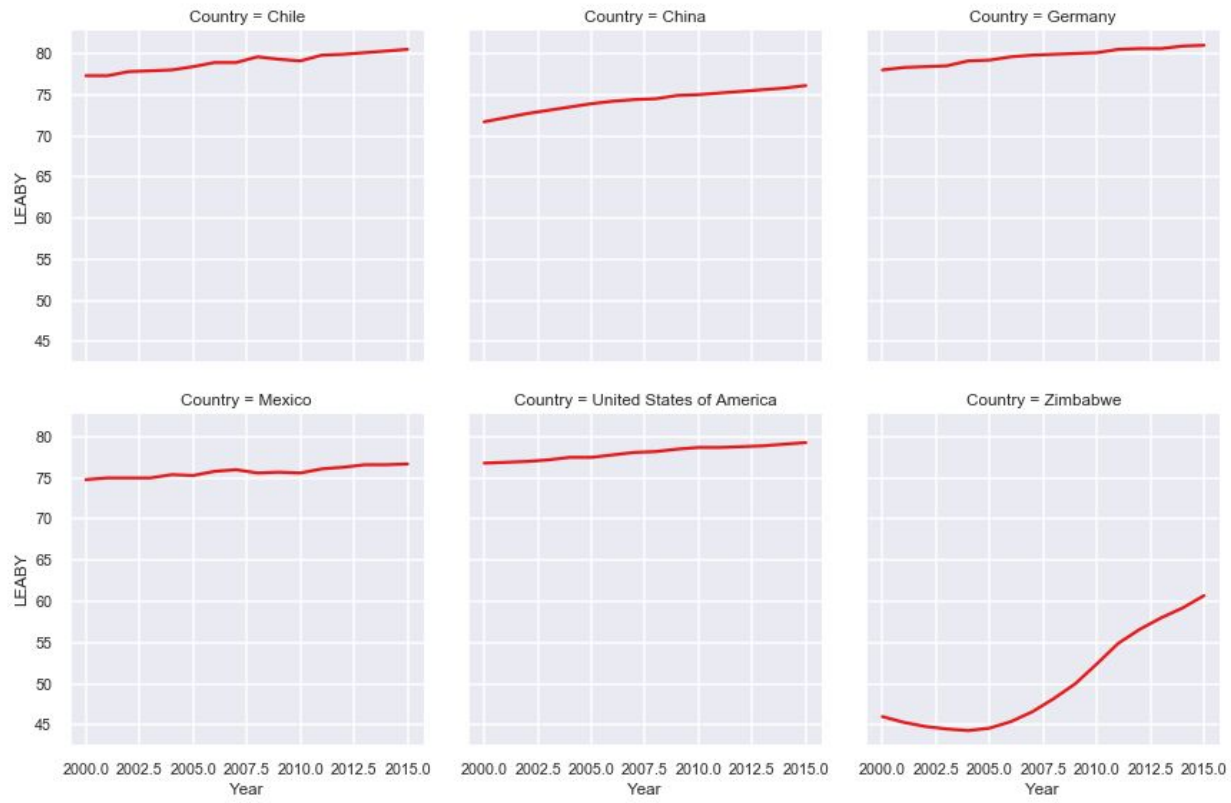

Figure 6. Life Expectancy Over Time.

Figure 6 shows how the life expectancy of the countries have overall increased in the 21st century. It would be interested to analyze what happened in Zimbabwe in the early 21st century because of its low Life Expectancy. This could be due to war or natural disasters. The highest increase in life expectancy can be explored by the slope of each graph, indicating that Zimbabwe has been increasing the most after 2005. It is also interesting to note how the United States has the lowest rate of increasing life expectancy. This could be due to its lack of universal health care system.

While this data is very helpful, it would be great to see how other countries with a smaller GDP change with life expectancy over time. This was because Zimbabwe was so different from all the other countries presented in this data that it was hard to make conclusions on whether the large growth rate in life expectancy was really due to an increase in GDP. It would have also been great to see how education rates, childbirth rates, and power usage (energy) also changed between each of the countries. This would have been neat to see, especially in China because of its huge industrialization.