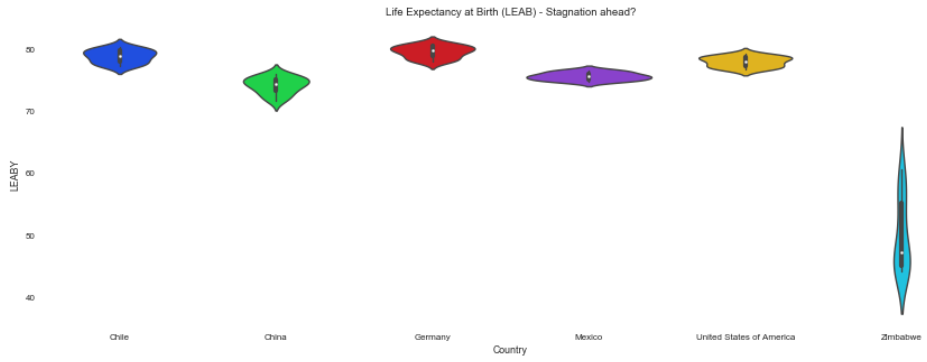
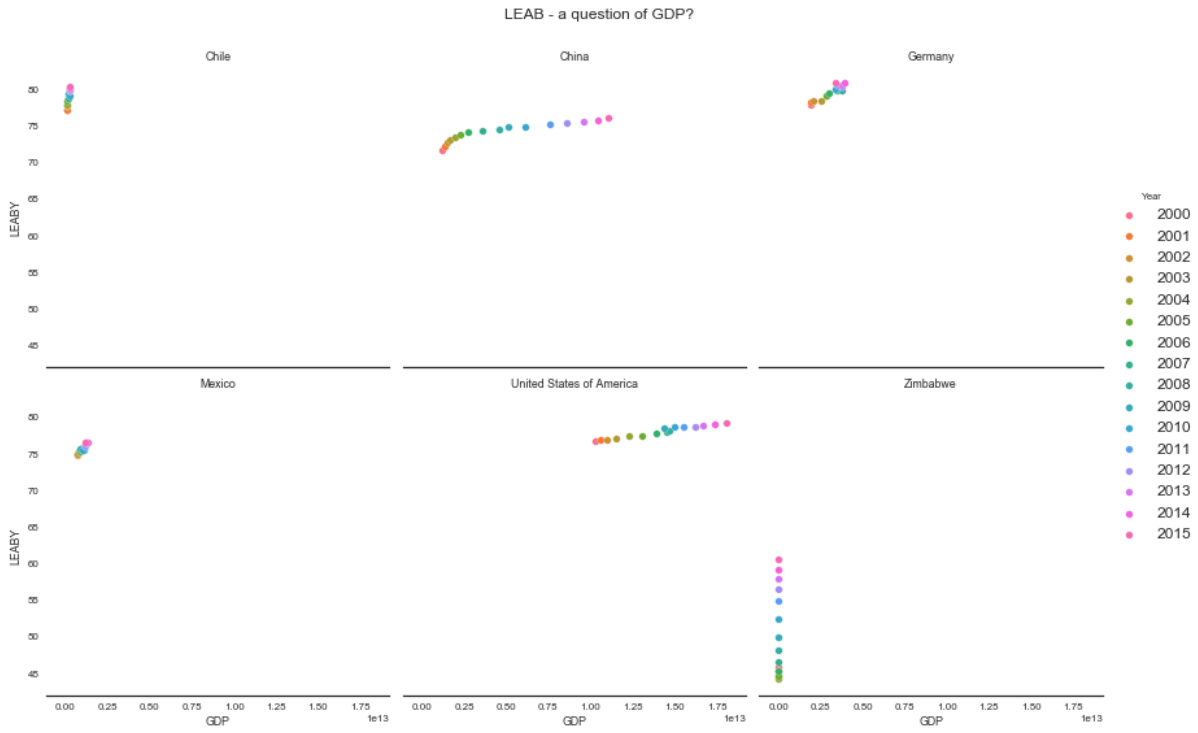
Life expectancy as a function of GDP? New evidence from the WHO

If I told you that Chile has a higher life expectancy than the US, would you believe me?
A recent study conducted by an analyst at the WHO, investigating six developed, emerging and developing countries over a timeframe of 15 years (2000-2015) has some elucidating things to say about the relationship between GDP (broadly the economic power of a country as measured by its total output in $US) and the life expectancy at birth (henceforth: LEABY) in that country. The good news is: life expectancy is positively impacted by stellar economics. Hence, contemporary political obsession with the increase of GDP seems to simultaneously enhance the lifespan of citizens by some amount. Perhaps even better, though, even countries that continued to be poor, in absolute terms, over the past two decades seem to have caught up somewhat in terms of life expectancy. Thus, increased lifespans in these countries may not be as much a result of increasing GDP, but rather a political paradigm shift to attribute more attention to the matter. Perhaps sobering is the fact that there is a satiation point in sight: even though countries like China or the US have ramped up their GDP by considerably more than, e.g., Zimbabwe, their increase in life expectancy over the studied time frame of 2 and 6 years, respectively, is miniscule compared to the jump of almost 15 years in added time for the average Zimbabwean. Life expectancy, thus, seems to be concavely positively related to GDP.



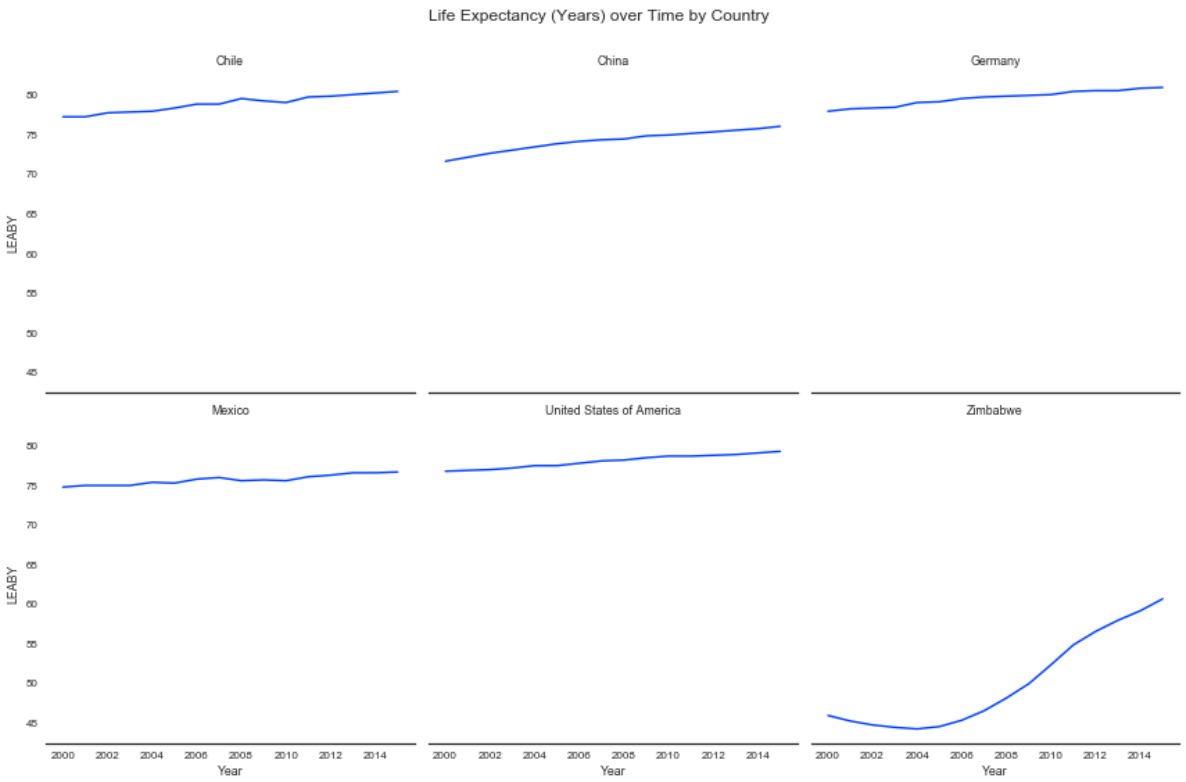
Graph 1: Life expectancy at birth

As this violin graph shows, Zimbabwe life expectancy has fluctuated the most over the studied time frame, from between 46 and 61 years. Other, more developed countries have not had a steady life expectancy, but at over 70+ years already in 2000, there was not so much headroom for change anymore. Interestingly, Mexico, despite a strong economic growth trajectory and some catch-up potential to other countries, has kept more or less steady: high homicide rates are one likely cause (*Financial Times*). What this violin graph does not show is that there is a clear pattern in the data: life expectancy has increased in every observed country over time. Thus, there is not just fluctuation in life expectancy, but rather, this is in a structured and progressive fashion towards higher life expectancy.

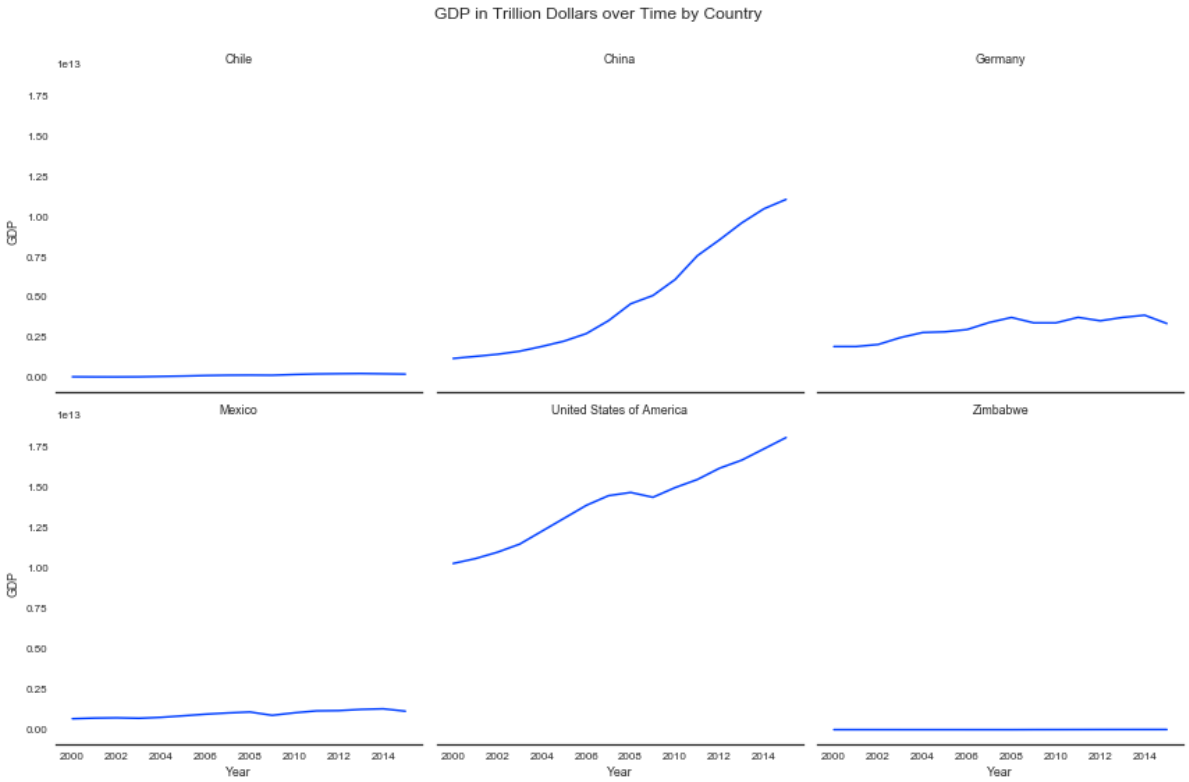


Graph 2: Does GDP increase LEABY?

Within country analysis can reduce some of the noisy statistics and look at whether GDP within a country is correlated with that country's LEABY. There seems to be a correlation. The higher the GDP within a country is, the higher the life expectancy will be in that country, ceteris paribus. Yet, this function is concave, that is: a small change in GDP has a higher effect on life expectancy at lower levels of initial GDP than for already highly developed countries. It could be an interesting mind-game to try to layer Zimbabwe's graph over that of China. From this, one can readily deduce the concave form of the function.



Graph 3: LEABY over time



Graph 4: GDP over time

Germany, China and USA were the clear economic winners of the 15 years studied. That's maybe why they faired better in increasing their life expectancy then, e.g., Mexico.
Chile, on the other hand, exhibits a pattern that is hard to be explained by GDP alone. It's economy slumbers behind that- both in terms of relative growth and absolute size- the developed countries previously mentioned. Yet, it boasts the highest life expectancy in the sample. Probably, **cultural factors**- like lower alcohol consumption, higher penetration rate of vegetarianism and the like- play a role in giving Chile a top spot, which is a consistent pattern (only Germany has overtaken it over the course of the studied period).
Zimbabwe has increased its GDP over time phenomenally. Yet, it is unclear through which channels this works. Decreasing homicide rates and lower conflict potential are both cause and symptom of an increasing GDP. Yet, they also directly increase life expectancy. Hence, a thorough channel investigation has to be conducted to disentangle these effects and see by how much GDP increases are directly causal to increase life expectancy, and by how much they influence other factors which then influence life expectancy. This is important because alternative policies could be considered which may be more efficient in increasing life expectancy, by targeting directly the factor which are otherwise only indirectly driven by GDP increases.

Limitations to the data and conclusion

Correlation is not causation- as was previously mentioned, it stands to be investigated through which channels GDP increases work on life expectancy, or whether GDP increases may altogether just be a symptom and byproduct of factors that increase life expectancy directly (then, there is just correlation). The most revealing analysis would be to see by how much a $ of GDP per capita increases that country's life expectancy. Data on GDP per capita, especially adjusted for purchasing power, may have been more insightful to scale the data. China increased its GDP, but a $1 increase in China's (population ~1b+) GDP means less for an individual citizen than a $1 increase in Germany (population ~80m). Data on other controlling variables (e.g., government spending on healthcare) could sharpen the analysis further. Lastly, it may be mentioned that in some countries, like Zimbabwe, record keeping and functioning bureaucracy is still as much developing as is their economy, so some of the data may be subject to recording errors and thus be imprecise.

Nonetheless, the preliminary analysis has shown that there seems to be a positive relationship between GDP and life expectancy, with the 'returns' diminishing as the economy grows in absolute size.