A visual representation of past and projected GDP of USA, China, and India: three biggest economies in the world

Project objective

In this project, I compared past (1990-2015) and projected (2016-2050) total and per capita GDP of three major economies in the world; USA, China, and India. I tracked how these economies performed in terms of GDP for 26 years (1990-2015), and how they are projected to perform in the next 35 years (2016-2050). The GDP data used here is calculated in terms of Purchasing Power Parity (PPP). Purchasing power of a currency refers to the quantity of the currency needed to purchase a given unit of a good or service. A Big Mac hamburger costs only $1.62 in India, but costs $5.06 in USA. If I oversimplify this, an Indian GDP of 1.62 trillion USD is equal to an US GDP of 5.06 trillion USD, although PPP calculations are much complicated than this. I used D3.js (a JavaScript library) and Dimple.js (a D3.js-based library) for preparation of this visualization.

Data source

I collated the GDP data from different sources. The past total GDP[1] and per capita GDP[2] for the period of 1990-2015 is from World Bank. The projected total GDP[3] and per capita GDP[4] for the period of 2016-22 is from IMF (International Monetary Fund). The GDP for the year 2050 is projected by PricewaterhouseCoopers (PwC)[5].

Design

I graphed total GDP and per capita GDP over the period of 1990 to 2050 using D3.js and Dimple.js (code in 'visualization_code.html' file). I used line chart, as this chart type is best suited to visualize such time series data.

Initially, I plotted both total and per capita GDP on the same graph. On this graph, lines seemed to be cluttered. Second, since we do not have to compare total GDP of a country to per capita GDP of that country, there is no point in having both of these components on one graph. Therefore, I separated total GDP from per capita GDP by filtering the data, graphed them, and

rendered the graphs through clickable buttons. This made the comparison lot easier, and pattern in the data stood out.

I overlaid a scatter plot on the line graph. While lines show the trends clearly, the points on scatter plots are useful for interactivity. With these points, it is easy to see data for a particular year and country as hover-over tooltip.

Patterns/findings of visualization

The total GDP of China took over the GDP of USA in 2014. From the graph, it looks like India will overtake USA around 2035. However, it is not an accurate conclusion, as there is no projection data available between 2022 and 2050. It is just a straight line connecting 2022 and 2050 data points, and it is less likely that GDP growth follows such a perfect linear pattern. However, it is clear that in 2050, the total GDP of India will be much higher than that of USA as per PwC projections.

While China and India, as nations, are much richer than USA in 2050, an average Indian and Chinese will still be poorer than an average American. In fact, from graph we can notice widening disparity between American and Indian/Chinese per capita income.

These trends could be of major consequences. Because global power equation will be altered as these countries are vying for supremacy. However, from an Indian or Chinese perspective, they will still be struggling, and may not have comparable standard of living.

It should be noted that we have to be extremely cautious in making any conclusions based on these GDP projections. It is difficult to predict how economy will behave even in next week, let alone how it will behave in the next 35 years.

References:

1. http://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD
2. http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD
3. https://en.wikipedia.org/wiki/List_of_countries_by_past_and_projected_GDP_(PPP)#IMF_estimates_between_2010_and_2019

4. https://en.wikipedia.org/wiki/List_of_countries_by_past_and_projected_GDP_(PPP)_per_capita#IMF_estimates_between_2010_and_2019
5. https://www.pwc.com/gx/en/issues/the-economy/assets/world-in-2050-february-2015.pdf