Getting a better understanding on Child Dependency Ratios across the world

Extra credit project. Principles of Urban Informatics.

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Abstract:

In this paper the Child Dependency Ratio will be plotted and analyzed in order to find longitudinal change and identify outliers. This work and future research in this field can draw policy change and a social understanding of periodicity and culture influence on population.

Introduction:

In the last decades many countries face a vast decrease in birth rates along with the rise of life expectancy. An equilibrium between young and old population is crucial in order to be able to keep a well functioning system and society. The Child Dependency Ratio (CDR) is used to measure the young population age as a share of the working population and is explained in image 1.1. According to the European Commission this ratio is expected to decrease dramatically in the next 40 years. This ratio is a predictor of the decency of old people on the younger generation will look like in the near future and therefore is a better measurement for policy making. [1] According to a research conducted by Colombia Public Health School in a generalization of ratios the least developed country is expected to have 80.8 ratio , 53.1 for the developing countries and 29.4 for the more developed countries.

$$Child\ Dependency\ ratio\ =\ \frac{population\ <15}{No\ of\ people\ aged\ 15\text{–}64}*100$$

Image 1.1

This research is an initial attempt to understand the cross national patterns and identify outliers in different time series. In this dataset, unlike many others the outliers are of subject of research for two main reasons. First, each time series is a country with a share of society and with its own autonomy to take policy decisions. The second reason for the importance of an outlier is that in the case of CDR's the outliers and especially the lower values indicates those observations might be in risk.

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[1] The ratio of a today's dependency are is the Age Dependency Ratio and the inverse of it is the Old Dependency Ratio that count the share of aged population (older than 64) out of the working population.

Data and Methodology:

   The data used for the analysis is collected and provided by the UN and consists CDR's for all countries between 1950 to 2015, with one data point for each five years. In addition, the UN has calculated ratios for the entire world and provided data for different demographics dividing the countries to more and less developed countries. If the change over time is stationary then there is no concern or policy to be made. But if we examine changes in these ratios over time and especially in the start and ending points it might suggest a pattern that requires policy changes.

   In the process of exploring the data the CDR was plotted in image 1.2 along the years for each country as an independent time series. And as the clutter makes it hard to draw any determinative conclusion it is apparent that some countries have change their behavior along the years and some remain stable.
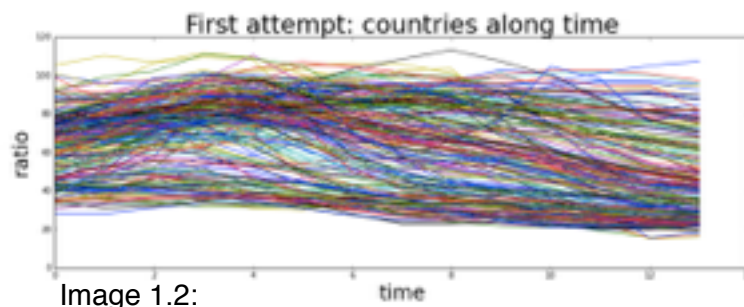

Image 1.2:

In order to better understand those time-series behaviors the data was manipulated to be reversed in shape to have each country as a point on the x axis as seen in image 1.3. The red and blue lines represent the ratios for 1950 and 2015 respectively. In the vast majority of countries the ratio has decreased alone this period. This plot gives us a perspective of the stationarity of the data. For countries which end up colliding or get similar values we can conclude they are stationary across time, meaning their ratio is pretty much stable alone the time. Note that as those are ratios we can not conclude anything about population and birth changes, we can only identify
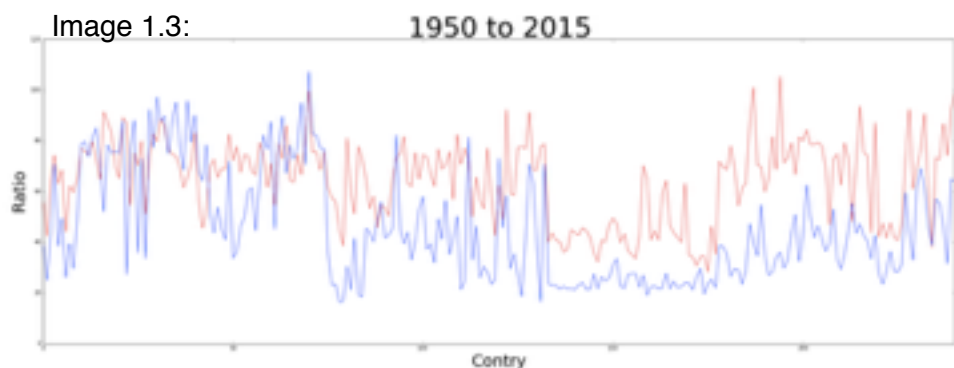

Image 1.3:

rather aged and young population are leaning to the same direction of growth.

Finally, an overview of the data demonstrates each year as a time series when the color scale indicates the shift in time with light yellow for 1950 and dark red for 2015. The results of the 10 lower and higher countries for each year are appearing in this project notebook. In image

1.5 the countries that appeared in the 10 lowest ratios across the years. The bar scale in image 1.5 is counting the amount of times each country appears in this ranking.
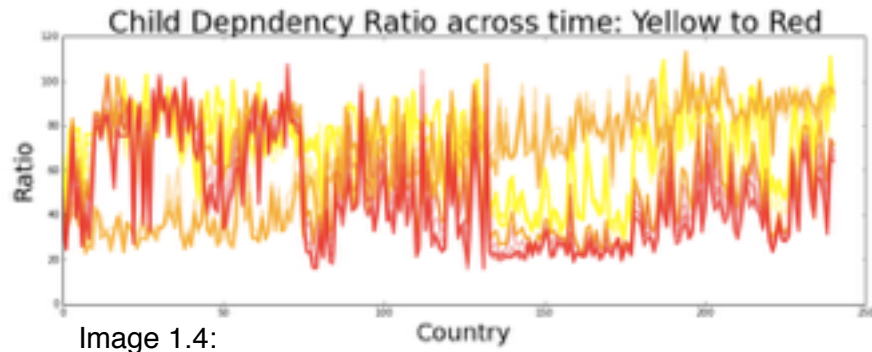

Image 1.4:

Results and discussion:

In the analysis made for Child Dependency Ratios across the world and over time there are interesting insights to analyze. First, most countries are leaning toward decreasing the ratio and becoming more and more in risk of providing pensions for the near future elderly. An interesting pattern was identified by measuring the lowest results over time: west european countries dominated it for the first decades but the tipping point around the 2000's brought new players to this ranking. Among them we find Russia just after the collapse of the communism, Asian countries (Japan, China, HK) with the rise of the middle class and the one child policy and finally Qatar and the United Arab Emirates and the gas monopoly peak.

To sum it up, in the case of low ratio a government has only limited amount of tools it can use to influence the birth ratio in case of a

Image
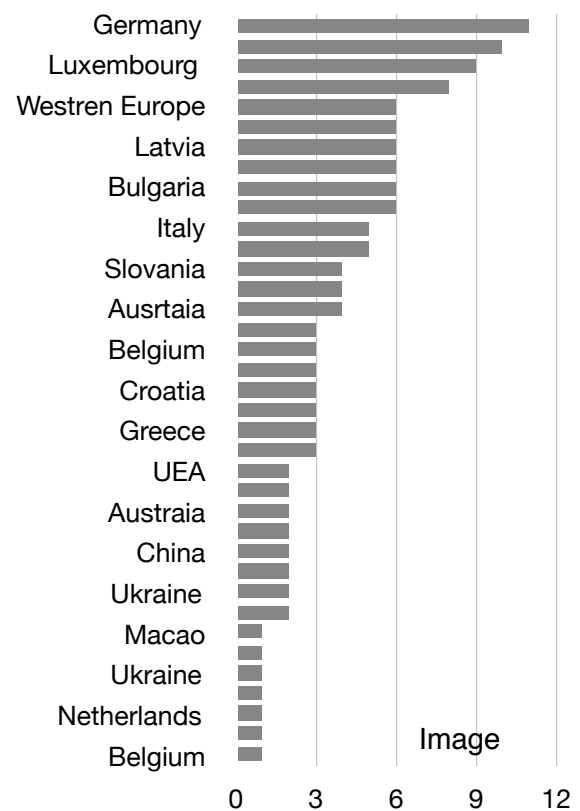
disproportionate amount of aged population. China, is one of the only examples where a simple legislation can improve this ratio with the amendment of its one child policy lately. Nonetheless, with those results countries such as Japan and Germany can offer an extended child support systems to encourage birth or at least plan their taxation and budgets to ensure pensions will be available for the future. Future work can measure the geographical patterns and explain deeply the relationships between the countries by clustering them.

Resources:

Banister, Judith, Bloom, David E and Rosenberg, Larry, Population Aging and Economic Growth in China, Harvard Program On the Global Demography of Aging, March 2010

Measure total population structure and size, visited Dec 13: http://www.columbia.edu/itc/hs/pubhealth/modules/demography/populationRatio.html

UN data ,visited Dec 13: http://data.un.org/Data.aspx?d=PopDiv&f=variableID%3A42

Price D, Bisdee D, Daly T, Livsey L, Higgs P. Financial planning for social care in later life: the 'shadow' of fourth age dependency. *Ageing & Society* [serial online]. March 2014;34(3):388-410 23p. Available from: CINAHL Plus, Ipswich, MA. Accessed November 25, 2015.