A study on the relationship between economic growth and birth rate

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Jupyter Notebook available at:
https://github.com/acazzaro/DSE200XMini_Project/blob/master/Mini%20Project.ipynb

Dataset

In order to understand the relationship between economic growth and birth rate I used the World Development Indicators Dataset, where I filtered two key variables:

- Fertility rate, total (per woman)
- GDP per capita (current US$)

In addition, I excluded average data of geographic areas such as Europe or Asia and considered only data of specific countries like Australia or Angola in order to conduct a reasonable analysis. Moreover, in the second analysis, the latter variable has not been adjusted with the real purchasing power of 1983 since it is beyond the scope of this study.

Motivation

Rationally we could assume that a wealthy economy should be a key factor in fostering an increase in birth rates since a higher Gross Domestic Product (GDP) may result in higher incomes, which could help families raise more children. However, numerous economic studies state that economic growth and birth rate are inversely correlated (OECD, Federal Reserve Bank of St. Louis).

In this mini project the correlation between GDP per capita and birth rate (per woman) was analyzed on more than 200 countries. The goal was to confirm findings of previous studies. In particular, the data from two different years (2013 and 1983) were analyzed in order to understand whether the potential correlation has changed over time.

The insights of this analysis are essential to governments that aim to preserve birth rates and foster the growth of new generations. In fact, an inverse correlation between economic growth and birth rate should push governments to explore new ways to increase birth rate, which is a key factor in preserving a steady population.

Research Question(s)

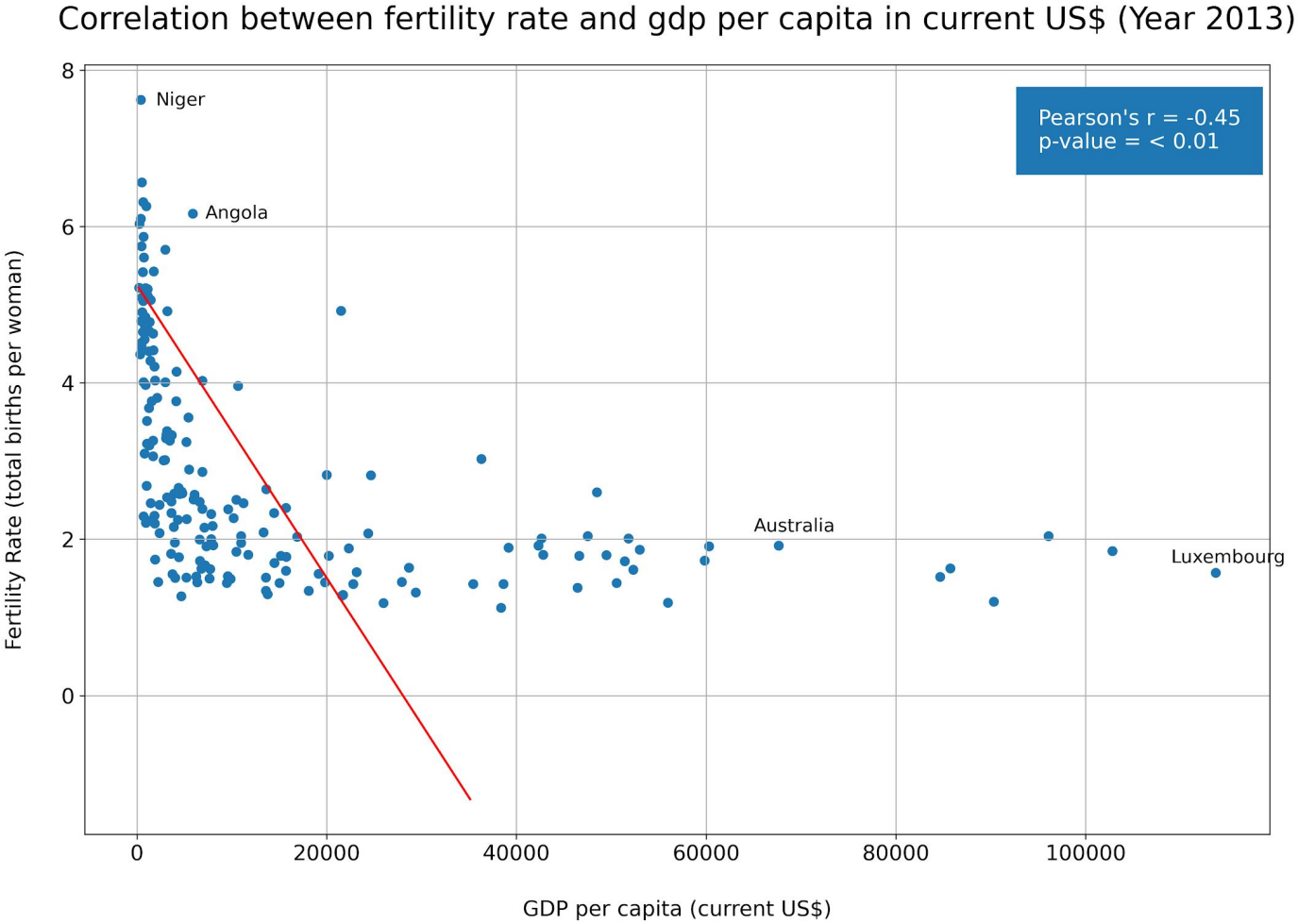
Does high GDP per capita inversely correlate with a high birth rate? Has this relationship changed in 30 years?

Findings 1 (Correlation in 2013)

As shown in figure A, a strong inverse correlation was found between GDP per capita and birth rate with Pearson's r at -0.45 and p-value < 0.01. The scatter plot shows crowding on the left side of the chart, meaning that most countries have a GDP lower than 20.000$ per person. Among those countries, many of them have a high birth rate with Niger at the top of the list.

On the medium to right side of the image, instead, we can see how countries with a relative high GDP per capita like Australia or Luxembourg have a low birth rate.

Figure 1

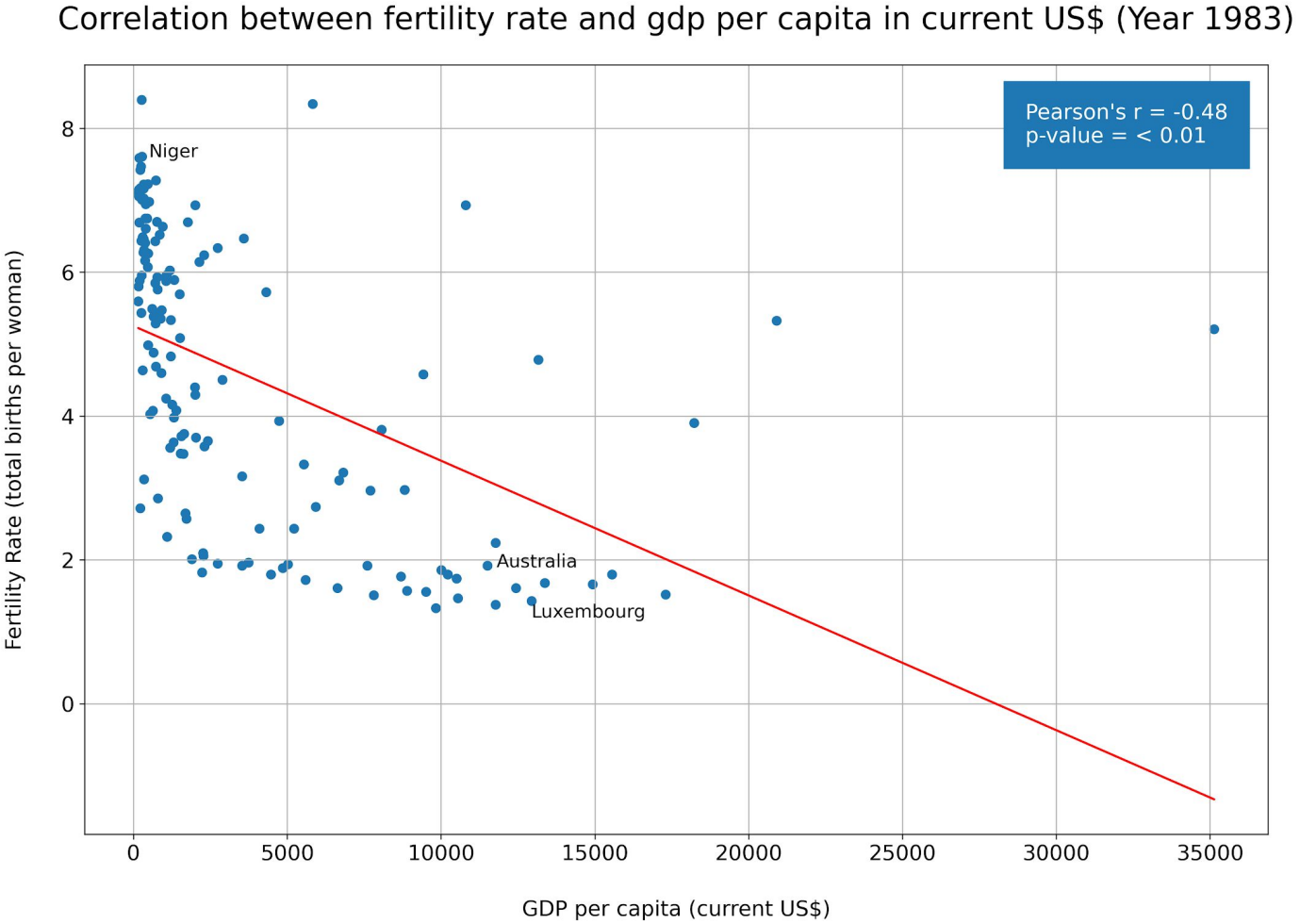

Correlation between fertility rate and gdp per capita in current US$ (Year 2013)
Pearson's r = -0.45
p-value = < 0.01
Niger
Angola
Australia
Luxembourg
Fertility Rate (total births per woman)
GDP per capita (current US$)
8
6
4
2
0
0
20000
40000
60000
80000
100000

Findings 2 (Correlation in 1983)

Figure 2 shows that an evident strong inverse correlation was already present in 1983. Even though the GDP per capita was much lower, the distribution is almost identical to the one in 2013. Indeed, by comparing the three countries mentioned before (Niger, Australia and Luxembourg) we can see how their place in the chart has not changed significantly.

By comparing figure 1 and figure 2, it can be concluded that the relationship between GDP per capita and birth rate per woman has not changed over time. In addition, despite a constant GDP growth, developed countries have not faced changes in birth rate.

Figure 2


Correlation between fertility rate and gdp per capita in current US$ (Year 1983)
Pearson's r = -0.48
p-value = < 0.01
Niger
Australia
Luxembourg
Fertility Rate (total births per woman)
GDP per capita (current US$)
8
6
4
2
0
0
5000
10000
15000
20000
25000
30000
35000

Conclusion

Overall, the analysis has shown a strong inverse correlation between GDP per capita and birth rate, meaning that economic growth is not a key factor in fostering birth rates. Indeed, despite a low GDP per capita, many developing countries, kept a high birth rate over time.

In addition, the analysis confirms the findings of previous studies and this should be a good starting point for governments to deepen the analysis on this topic. Further studies are warranted to explore the relationship between GDP and working hours in order to understand whether low birth rates are due to a lack of leisure time and elevated stress levels.

References

- Federal Reserve Bank of St. Louis. “The Link between Fertility and Income”. Online. Accessible from: https://www.stlouisfed.org/on-the-economy/2016/december/link-fertility-income
- OECD Family Database. “SF.2.1. Fertility Rates”. Online. Accessible from: https://www.oecd.org/els/family/SF_2_1_Fertility_rates.pdf
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