Impact of GDP Per Capita on the Quality of Life Within a Country

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1 Introduction

GDP Per Capita is a widely used economic indicator in terms of comparing economic performance. This value can be derived simply by dividing Gross Domestic Product, or GDP, which tells us the total monetary value of all goods and services produced within a country, by the population of that same country. This tells us the average amount of output produced per person. The appeal of GDP Per Capita lies in its ability to simplify complex economic data into one simple number. Using GDP Per Capita allows comparisons of different countries over different time periods. GDP Per Capita is commonly used to infer and analyze whether or not a country has a good standard of living relative to other countries. For instance, wealthy countries such as the United States of America have a significantly higher GDP Per Capita than developing nations which generally indicates more wealth, productivity, and as a result, better societal outcomes and standard of living.

However, while GDP Per Capita undoubtedly has its uses, it is equally important to explore any potential limitations. If we plan to assume that GDP Per Capita plays a large role in determining well being, we need to examine this idea to ensure that this is truly an effective way of determining quality of life.

This study aims to address the following research questions:

1. How strongly does GDP Per Capita correlate with healthcare, education, and the distribution of income?

2. What are the key reasons that GDP Per Capita is not a perfect measure of the economic well being of a country's citizens? In other words, what are the shortcomings of GDP Per Capita?

2 Literature Review

Measuring the economic well being of people within a country is far from a simple process. Many factors come together to determine how well off citizens are. International Monetary Fund (2018) discussed their creation of a "Well Being Index". This well being index combines factors such as consumption, leisure, and life expectancy while simultaneously adjusting for inequality. Theoretically, this should offer a clearer picture of overall welfare over a lifetime across countries.

The study used this model to analyze 151 countries all around the world, and it showed a "close relation between our calculation of per capita welfare... and per capita income or GDP". However, the trend did show that poorer countries tend to have lower welfare than income, while richer countries have higher welfare than income.

Based on this study, the main takeaway is that we can not disregard GDP Per Capita. According to International Monetary Fund (2018) it is an imperfect metric, but GDP Per Capita does capture many of the main components of well being. Policies that make production more efficient and generate income will tend to increase welfare.

To expand on the idea that GDP Per Capita is an imperfect but useful metric, Business Council of Alberta (2020) advocated that higher output generally associates with higher incomes within households. This also means families can spend their money on things that they value as they lack financial stress. They can send children to college, or even take a vacation in some cases. On a more institutional level, countries with governments with greater GDP Per Capita values also tend to have a greater capacity to provide services like high quality public schooling, health care, and social aid programs. Aggregately, these factors that stem from a strong GDP Per Capita insinuate that GDP Per Capita does have an effect on welfare.

On the other hand, it would be far too extreme to use GDP Per Capita as an "all encompassing measure of prosperity" according to Business Council of Alberta (2020). It is far more reliable to use a more comprehensive view in which a surplus of factors are taken into account. GDP Per Capita does not take into account factors such as true economic opportunity, environmental factors, and health of a given community or country. Due to this, simply assuming that GDP Per Capita is a perfect representative of well being can be sonsidered malpractice.

Business Council of Alberta (2020) expand even further on this idea. A high GDP Per Capita does not mean that the average or typical person makes said amount. For example, imagine a 10-person

economy that produces a GDP of $1 million USD. GDP Per Capita would show that all 10 people in the economy have six figure salaries when in reality, it is reasonable that one person could be making $900,000 while the other nine people are making approximately $11,000. This is a major flaw of GDP Per Capita.

According to Stiglitz (2019), GDP was created in the Great Depression to measure economic output, but it was never intended to measure societal well being. In addition, its creator, Simon Kuznets, warned against the over-reliance on GDP due to its inabaility to measure negative impacts such as pollution, for example. GDP measures activity within the many markets within a country, but does not consider any well-being indicators, or take factors such as health or education into play making it a less than ideal inidcator to determine well-being.

My study contributes to this greater body of work in determining the significance of GDP Per Capita and the significance it has on the well being of those within a country. For my study, I will consider not only the literateure discussed above, but also work with and analyze data on my own to expand on these ideas.

3 Data And Methodology

3.1 Data Utilized

To effectively compare GDP per capita (GDPPC) with well-being and evaluate its potential impact, it was essential to identify indicators of well-being. I selected education, health, and income equality as key dimensions for this analysis. To represent these dimensions, I utilized literacy rates as a representation for education, life expectancy at birth for health, and the GINI Index for income equality. These indicators were analyzed as dependent variables in relation to GDPPC as the independent variable to assess whether meaningful correlations exist between economic performance and societal well-being.

There were two main reasons as to why I chose these specific variables rather than others:

- They are very strong in representing the well-being factors (ie. education, health, and income equality) that I am researching.
- Data was difficult to find for many variables, even including these to a lesser degree.

3.2   Data Dictionary

- GDP Per Capita (GDPPC) is measured in USD.
- Life Expectancy (lifeexpec) is measured in years.
- GINI Index (gini) is measured in percentage.
- Adult Literacy Rate (litrate) is measured in percentage.

3.3   Data Source

All of the data discussed in this report was collected from the World Bank. This ensures the data is reliable and consistent as a source for economic statistics. The datasets I collected from the World Bank provided me with great insight to help with my research.

3.4   Key Information

I did not delete missing data from the data sets. This is because it is reasonable to believe that certain countries (maybe poor countries) are more likely to be missing data than rich countries. This is relevant to this study, so I left all missing data.

In addition, the data utilized covers from 2010-2023. I dropped older values to create a more modern approach and analysis.

3.5   Data Analysis

3.5.1   Is GDP Per Capita correlated with life expectancy?

First, I ran a simple regression with GDP Per Capita as the independant variable, and life expectancy as the dependant variable. The equation was represented by an R-squared value of .3660, a coefficient of 0002022, and a standard error of 00000524. The R-squared value suggests that 36.6% of the variation in life expectancy is explained by GDP Per Capita. A correlation coefficient of .0002022 means that for every 1 unit increase in GDP Per Capita, life expectancy goes up .0002022. This may sound small, but considering GDPPC is measured in large units (dollars). The standard error tells us the precision of the coefficient estimate. The lower the better, so a standard error of .00000524 is a strong value.

However, using the log of GDP Per Capita proved to be a much stronger method. This allowed me to normalize and linearize my data, and it fit much better.

Table 1: Log GDP Per Capita and Life Expectancy

R-Squared	Coefficient	Std Err
.663	4.51	.061

As we can see, the R-squared is significantly higher, and shows a somewhat strong correlation. This also showed an increase in correlation due to scaling differences between using GDP Per Capita and the log of GDP Per Capita and a standard error of .538.

In order to further analyze this data, I created a visual comparing the log of GDP Per Capita and Life Expectancy.
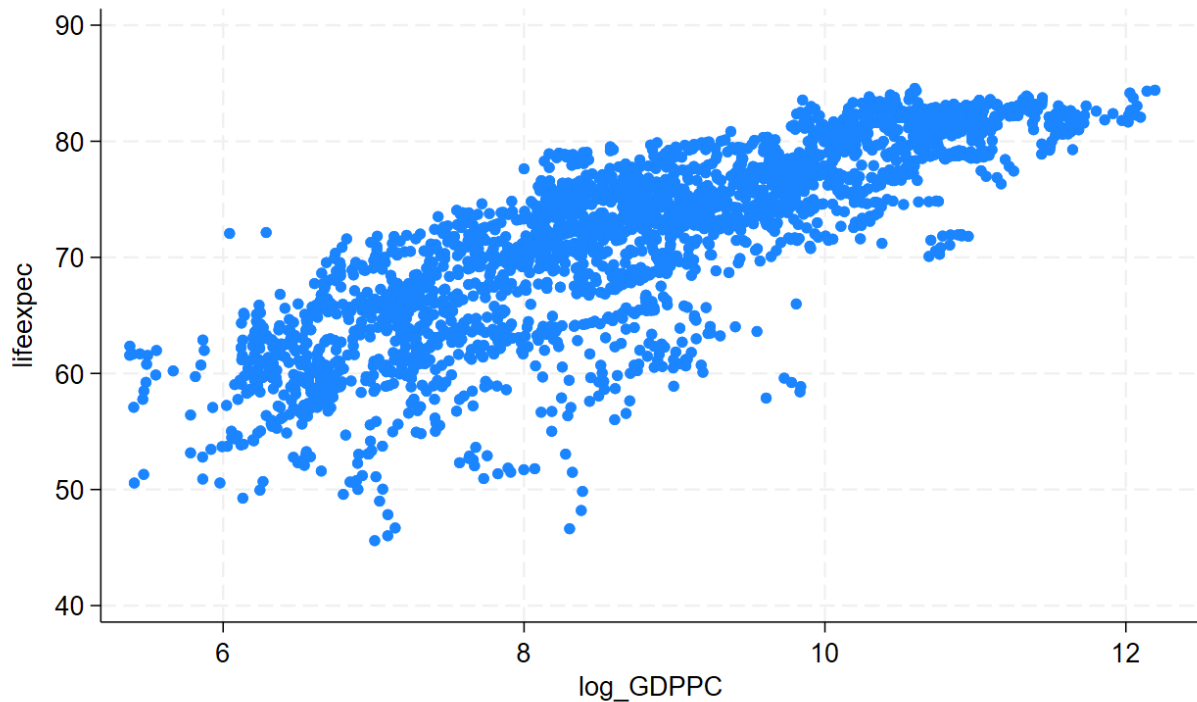
Correlation Between Life Expectancy and GDP Per Capita

as we can see in this scatterplot, there is a clear correlation between the log of GDP Per Capita and Life Expectancy. The correlation is positive as the regression analysis assumed it would be. We can now visualize this clear positive trend between life expectancy and GDPPC.

I also wanted to focus on one year particularly, as I can see the individual data points much more clearly, and it may be more telling as each country only gets one plotted point. I decided to use the

same data, but only for the year 2020. In this regression, the R-squared value increased to .7170, and a coefficient of 4.324 was a slight decrease. No change is drastic, and this is generally in line with the entire scope with every year since 2010 included.

Table 2: Log GDP Per Capita and Life Expectancy in 2020.

R-Squared	Coefficient	Std. Err
.717	4.507	.195

Additionally, here is a scatter plot to visualize things.
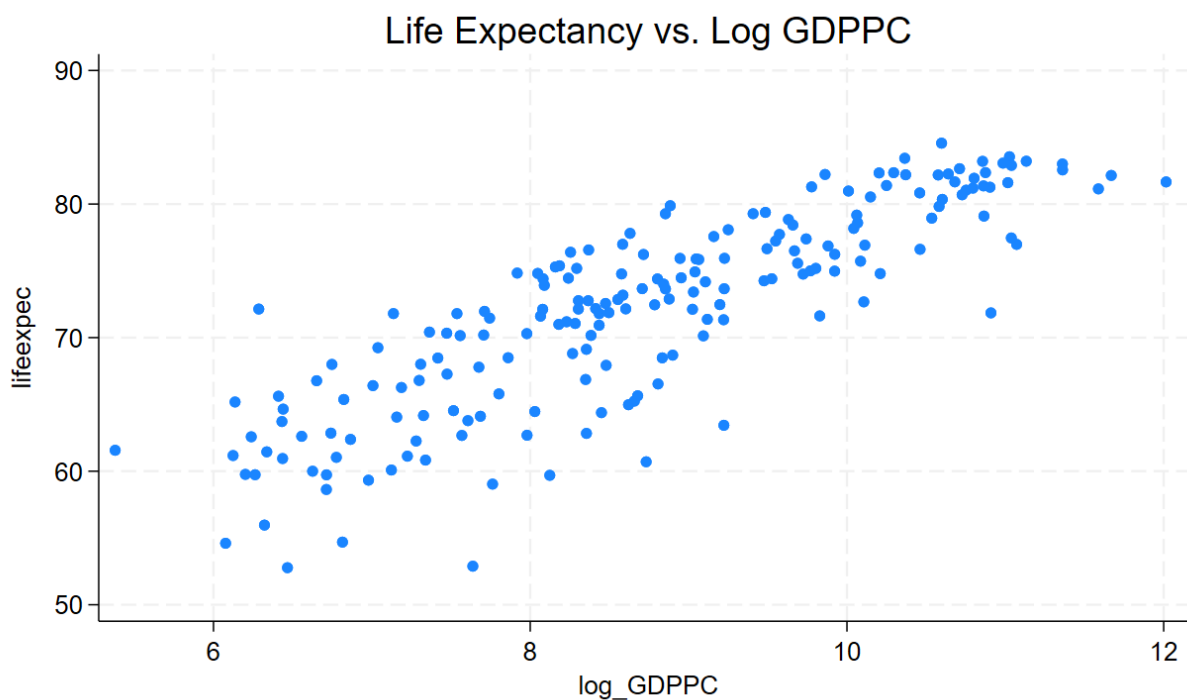
Correlation Between Life Expectancy and GDP Per Capita 2020

Here, we can see the same upward trend as the previous scatterplot involving all of the data simply focused on only the year 2020. As a whole, we can see evidence that supports a pretty strong correlation and I believe we can accurately say that GDP Per Capita may have an influence on life expectancy.

3.5.2 Is GDP Per Capita Correlated with Adult Literacy Rates?

Again, I ran a regression. This time, using GDP Per Capita as the independent variable, and Adult Literacy Rates as the dependent variable. My findings were quite interesting. When using the basic GDP Per Capita variable, there was a very low R squared value of .1329, and a small positive coefficient of .0004085. This would suggest that GDP Per Capita has very little to do with adult literacy rates in different countries.

Once again, when going back to using the log of GDP Per Capita, I saw drastically different results.

Table 3: Log GDP Per Capita and Adult Literacy Rates

R- Squared	Coefficient	Std. Err
.493	9.925	.448

We see an increase in R squared, now showing just about a moderate level of explanation of literacy levels within countries, as well as a coefficient of 9.925 which shows a much higher level of explanatory power. Standard error sits right around .448 as we see.

To further analyze this data, I created another visual.

Literacy Rates vs. Log GDP Per Capita
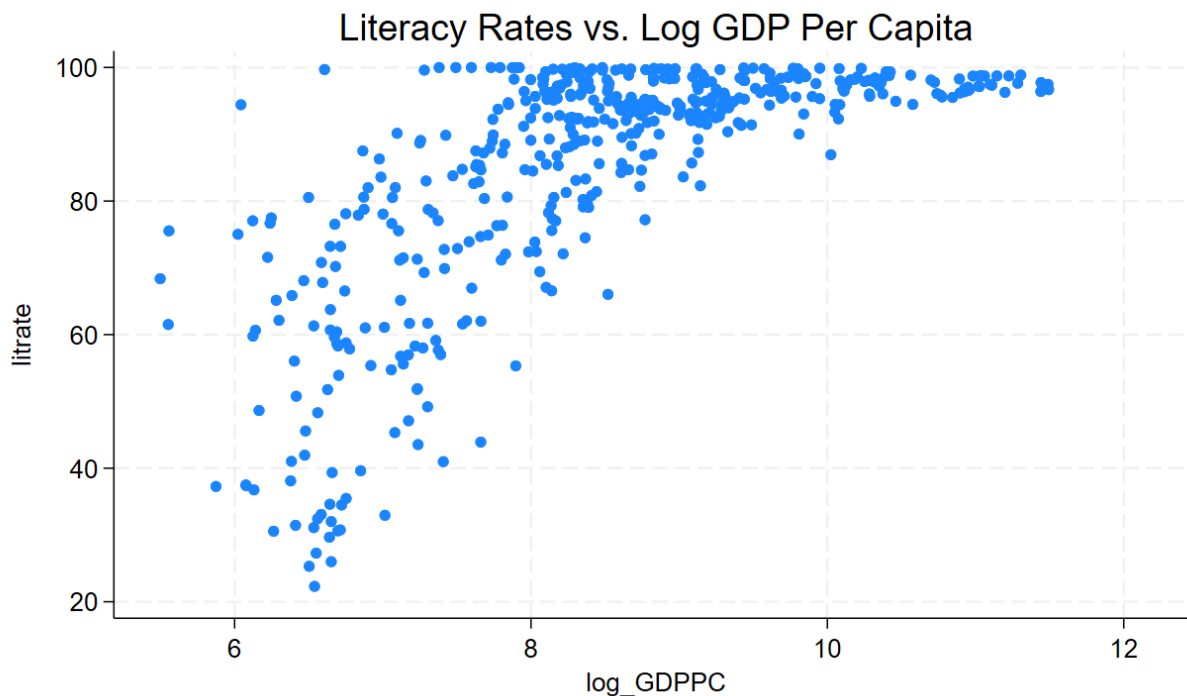
Correlation Between Literacy Rates and GDP Per Capita

You can see a slightly correlated upward sloping trend of data points. This portrays the moderate correlation that was previously discussed.

Next, I will repeat the same actions for the year of 2020. Again, as a way to highlight one year of data from each country and see how similarly this regression and scatterplot behaves.

Table 4: Log GDP Per Capita and Adult Literacy Rates in 2020

R-Squared	Coefficient	Std Err
.505	9.762	1.794

Based on these values, I would expect the scatterplot to look very similar to the one we just looked at, maintaining a moderate correlation between GDP Per Capita and Adult Literacy Rates. To verify, I created the plot.

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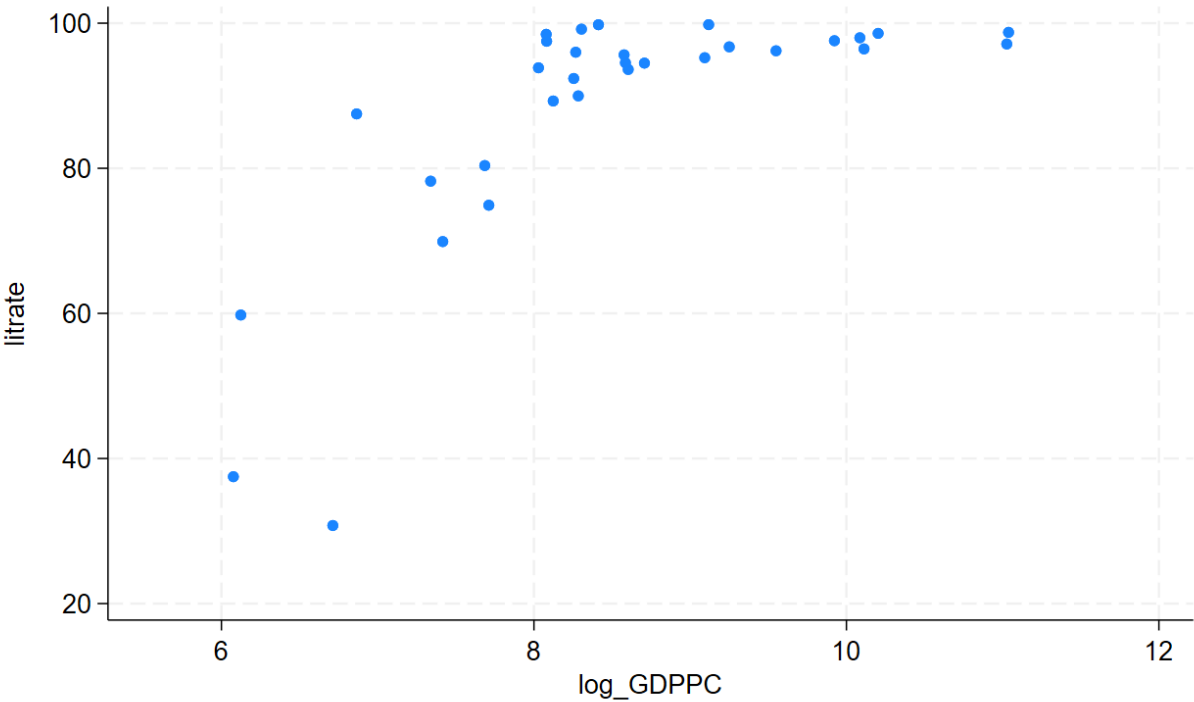
Literacy Rates vs. GDP Per Capita in different Countries in 2020

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We can see a very similar pattern. In both graphs, there are upward sloping scattered values in lower GDP countries, and a large grouping between 8 and 10 log GDPPC near 100% literacy rates at the top of the graph. As a whole, I believe we can confidently say there is approximately a moderate correlation between GDPPC and literacy rates.

3.5.3 Is GDP Per Capita Correlated With Income Distribution (GINI)?

Again, I ran a regression. While using the GDP Per Capita as the independent variable and the GINI index values as the dependent variable, my results were not very telling. The R-Squared value was only .1213, the coefficient was actually -.0001, and the standard deviation was 0.00000954.

However, similarly to the previous two variables, I was looking for a stark increase in correlation when adjusting the regression to the log of GDP Per Capita. Here are my findings.

Table 5: Log GDP Per Capita GINI Index

R-Squared	Coefficient	Std Err
.104	-1.823	.171

This data shows a very low R-squared value of .1213 and a negative coefficient of -.0001108, which actually shows the dependent variable of GINI has a very slight propensity to decrease as GDP Per Capita increases. When using the log of GDPPC, this portrays a worse fit, as the R-squared value drops, and the coefficient goes even more negative as it decreases to -1.822545.

I created a visualization to show this trend, or lack there of.

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GINI Index vs. Log GDPPC
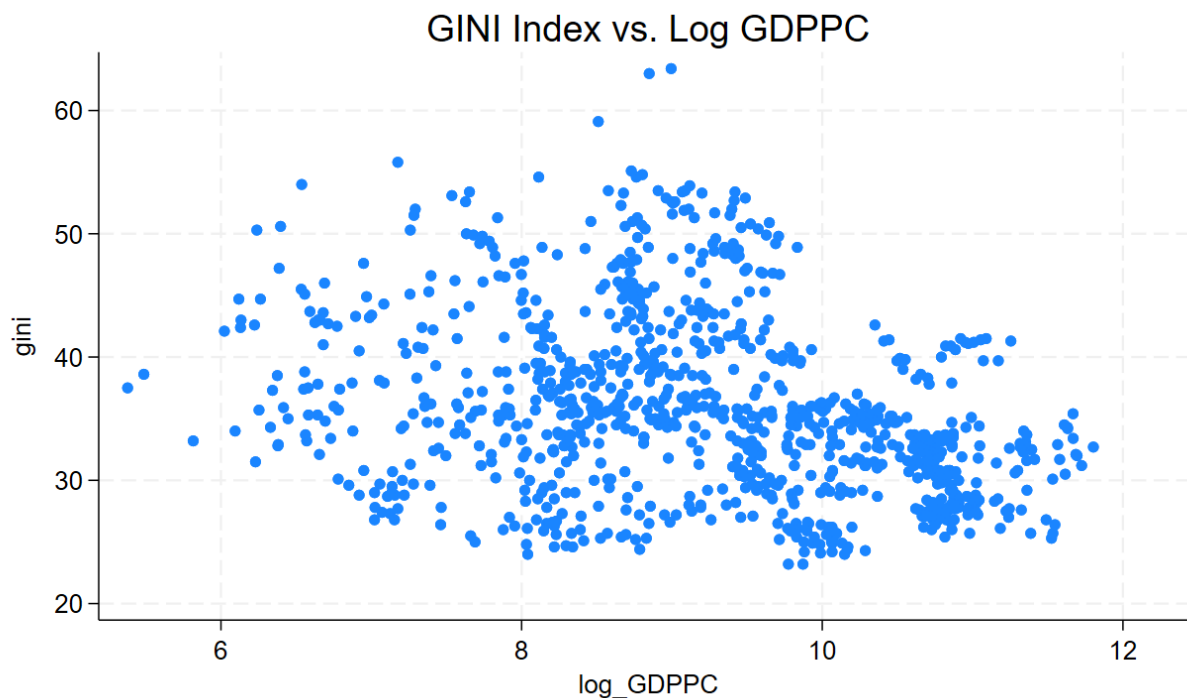
Income Distribution (GINI) vs. GDP Per Capita

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As we can see, the data is all over the place, and ther seems to be no true trend. Though, you can see an ever so slight downward movement of GINI as GDPPC increases which matches what we saw in our regression analysis. With that said, we can not say there is any true correlation.
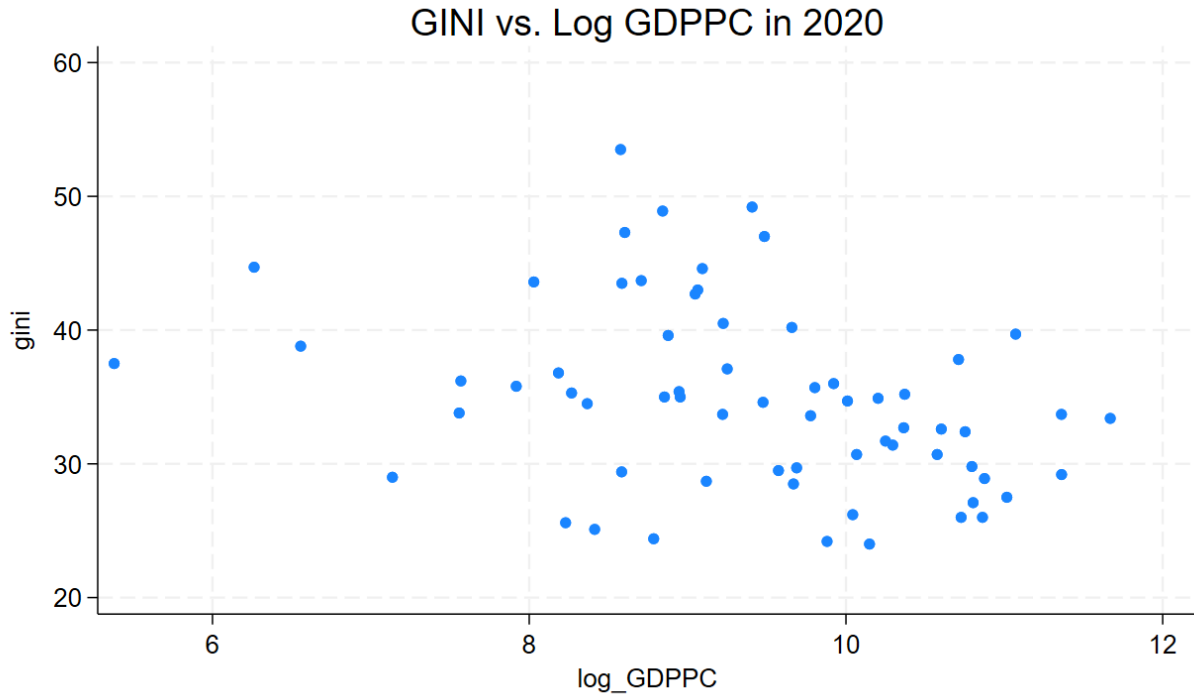
I also analyzed the data in the year 2020.

Table 6: Log GDP Per Capita GINI Index in 2020

R-Squared	Coefficient	Std Err
.118	-1.853	.638

The same trends we looked at over the range of multiple years remains true in the year of 2020. To visualize this, I created another scatter plot.

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GINI vs. Log GDPPC in 2020

Income Distribution (GINI) vs. GDPPC in 2020

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As predicted, we still see an unorganized jumble of data points. However, we can still see an extremely slight downward trend. Overall it seems that GDP Per Capita has very little effect on income distributions as a whole.

4   Conclusion

This study shows the level of relation between GDP Per Capita and well being indicators such as life expectancy, adult literacy rates, and the GINI Index to determine whether GDP Per Capita serves as a reliable reliable metric for assessing a countries economic and social health. While GDP Per Capita can be considered a useful indicator, it is not perfect, as was expressed during the literature review. These findings underscore not only the positives, but also the limitations of using GDP Per Capita as a comprehensive measure ofsocietal well being.

4.1 Key Findings

Life expectancy: A strong positive correlation was identified between GDP Per Capita (log transformed) and life expectancy. This suggests that as output per capita increases, the health of those within a nation does as well.

Literacy Rates: We saw a moderate correlation between GDP Per Capita (log transformed) and literacy rates. This demonstrates that countries with higher output per capita usually have higher educational outcomes as well, however, not to the same extent as health outcomes as seen with life expectancy which indiates that other factors may play a large role in education levels of a country's constituents.

Income Distribution (GINI): The analysis showed a very minimal level of relation between GDP Per Capita (log transformed) and income equality. The R squared values were extremely low, and the scatterplots backed this up as it was very difficult to find any real trend. GDP Per Capita is likely not a good indictaor in terms of its relation to income equality.

4.2 Implications

As was stated during the literature review, it seems that GDP Per Capita remains important, but can not be considered an indicator that tells the entire story. Other factors must be considered outside of GDP Per Capita if the objective is to determine the well being of the citizens of a country.

GDP Per Capita struggles to capture aspects such as income distribution, environmental issues, and non-market factors such as labor disparities and community well being which limits its overall scope.

GDP Per Capita should be used as a useful starting point when discussing societal well being, but using it as the sole indicator would be reductive. In order to capture the full picture, researchers and policymakers need to adopt a much more holistic approach, and implement a diverse collection of metrics to paint a genuine picture human welfare. This will allow for more informed decisions to address the nuanced nature of societal progress.

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