The Impact of Democracy on Key Economic Indicators

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RESEARCH QUESTIONS

In the last few years some researchers and journalists have started to worry about democratic backsliding, i.e. the slow decline of democracy , around the world (The Economist, 2021). A large meta analysis has not found any impact on economic growth, however it has found a positive impact on economic freedom, human capital, and (lower) inflation (Doucouliagos and Ulubaşoğlu, 2008).

Many important key economic indicators have not been extensively studied, therefore I want to research the following question: *"What is the impact of democracy on the economy?"*.

To answer this question we first need to find a way to measure a democracy. Thus the next question is: *"Does a reliable measurement of democracy exist?"*. A country is not either democratic or not, e.g. a country where you can vote, but have no freedom is speech is not fully democratic nor autocratic. There are multiple sources that claim to measure democracy, if they are reliable they should give countries a similar "democracy score". Thus to determine the reliability we ask the question: *"How are the democracy scores correlated?"*.

The core of this paper is about the impact of democracy on the economy. An important indicator of the economy is GDP (Gross Domestic Product) per capita. Thus another research question is: *"Is there a relation between GDP per capita or GDP growth and democracy?"*. This relation could change over time, therefore I ask the follow up research question: *"Does this relation change over time?"*.

Another important economic indicators are the unemployment rate and the labor force participation rate (i.e. the percentage of the population that has, or is looking, for a job). Thus we get the following research question: *"Is there a relation between the unemployment rate or labor force participation rate and the democracy of a country? And does this change over time?"*.

Most governments spend more then they get in revenue. If they over-borrow, they could get into trouble. Then they might have to stop spending or start paying a much higher rate. It is measured as the ratio between debt and GDP, and it has a significant effect on the economy. Therefore the next research question is: *"What is the relation between the debt to GDP ratio and democracy? Does it change over time?"*.

The last important economic indicator I look at is inflation (the average increase in prices per year). A high inflation rate (as can currently be seen in Turkey) is bad for the economy, since everything becomes much more expensive. Thus the last research question is: *"What is the relation between inflation and democracy?"*.

DATA SOURCES

Democracy

Democracy is not something that can be easily measured. Indices that claim to measure democracy and freedom do exist. I chose to implement the three of the most well known democracy indices.

- *V-Dem (Varieties of Democracy)*. The annual V-Dem report rates democracies by multiple experts on 483 indicators. This report is written by the V-Dem Institute, which is supported by the University of Gothenburg. Their (large) data set can be downloaded from their website (https://v-dem.net). I used the most updated version at the time (V11.1 at 20 January 2022).

- *The Economist Democracy Index*. The Democracy Index is also an annual report, it is compiled by the Economist Intelligence Unit. They let country experts rate every country on 60 questions. The latest report can be downloaded from their website (https://www.eiu.com/n/campaigns/democracy-index-2020/). A public Github repository has all the data in a CSV file (https://github.com/xmarquez/democracyData), I used the latest version available at the time (20 January 2022).

- *Freedom in the World*. The Freedom in the World report by Freedom House rates countries on a 1.0 (best) to 7.0 (worst) scale, this is detmined by local research, consultants, and government reports. Their annual report is privately funded and a data set containing all their data can be downloaded from their website (https://freedomhouse.org/report/freedom-world). I used the latest version of their country and territory ratings data set available at the time (20 January 2022).

Economic

Economic data easier to measure and generally more accepted. I have used data from the following sources.

- *The World Bank*. The World Bank is a financial institution that provides funding for developing countries. They have an enormous amount of data. I use their data on GDP (PPP) per capita, GDP growth, inflation, unemployment and labor force participation. I used the latest data available on their website (https://data.worldbank.org) at the time (23 January 2022).
- *The IMF*. The IMF (International Monetary Fund) is an international organization the provides loans to countries in need. They have a data set about the debt to GDP ratio per country. I used the latest available data set (https://www.imf.org/external/datamapper/datasets/GDD) at the time (24 January 2022).
- *Penn World Table*. The University of Groningen has a large data set containing output, productivity and inflation. This extensive data set contains data starting from 1950. I used the latest version (10.0) that could be found on their website (https://www.rug.nl/ggdc/productivity/pwt/) at the time (27 January 2022).

DATA WRANGLING METHODS

Democracy

The democracy data sets were in CSV and Excel formats, these were loaded in a Jupyter Notebook using the default Pandas functions `pd.read_csv(file)` and `pd.read_excel(file)`. For the V-Dem data set we select the five relevant columns. Its data is updated throughout the year, thus we convert all the dates to `datetime`-objects and resample the data to yearly values. Since the V-Dem data set does not contain one final score we combine take the average of the five main categories to give every country a "democracy score". This is all stored in a `DataFrame`-object, with a `MultiIndex` of the country name and year.

The Economist data set was already in the correct format, thus only the index was renamed and sorted. The Freedom House data set required a bit more data wrangling. The column names contained spaces thus those were stripped using a **`lambda`**-function. To easily combine the data with the other two data sets, it was "stacked". The year index values were converted to **`int`**s and all contents of the `DataFrame` were converted to **`float`**s.

All these three tables were joined together using the `.join()` function. I created a scatter plot using the `matplotlib.pyplot` library. A Linear Regression was added using the `statsmodels.api` library.

Finally I created a "democracy score" based on these three metrics. First I rescaled the scores to a ratio from 0.0 (worst) to 1.0 (best), then I took the average from these three data points. I stored this `DataFrame` in a `HDF` file so that I could easily reuse this in the following analyses.

GDP

The GDP data can easily be read from a CSV file using the same function as before. The parameter `skiprows` was added to ignore the first four lines, which contain no relevant data. Then all the columns are converted to **`int`**s. Then by unstacking the `DataFrame` is transformed into the same format as the democracy data. The same is done to the GDP growth data, which was stored in a similar format.

The data set of the world bank goes back through 1990. This is a time span of just 30 years, thus I appended the (higher quality) World Bank data set with the Penn World Table. This data is read from the Excel file. Then all the data that is not in the GDP `DataFrame` is appended from the Penn World Table data set using `.isin()`.

The average GDP and the average democracy score over the last 10 years is calculated and they are joined together. Then a log-linear regression using the Least Absolute Deviations (LAD) model is created, LAD is used because the data contains quite a few outliers. This model is plotted on a scatter plot of the data.

A similar technique is used to create a Linear Regression for the GDP growth model, however using the OLS model. Finally I used the `pd.cut`-function to group the countries into four groups. I grouped by these groups and the year, and took the median GDP per capita per group. I created a plot of the exponential moving and rolling average over the last three years so that you can clearly the economic growth per group of countries.

Unemployment, Labor Force Participation & Inflation

Since the unemployment data, labor force participation and inflation data are all from the World Bank too, the data wrangling steps are similar (excluding the Penn Wold steps). They all use the OLS model, the unemployment and inflation models use a log-linear model, the labor force model uses a regular linear model.

Debt to GDP

Comparing the debt to GDP ratios was slightly more complicated, since some countries are set up differently, some countries only report central government debt (e.g. the US), and other only report total government debt (e.g. the Netherlands). Both of these variables have their own data set.

I parsed both data sets using `pd.read_excel(file)` first, then I renamed the index and columns. Then I unstacked the data and let it sort based on the index. All the data that was not in the central government debt data

set was appended from the general government debt data set using `pd.concat`. Then I calculated the average debt to GDP ratio over the last five years. With this value and the average democracy score over the last 15 years I calculated a linear regression. This was all displayed in a scatter plot.

A similar technique as for the Unemployment & Labor Force Participation time series plot was used.

CONCLUSION

Democracy

Reliable measurements of democracy do exists, or at least they all seem to largely agree with each other. Linear regressions between the three democracy scores show an R^2 between 0.8 and 0.9. This can all be clearly seen in Figure 1.

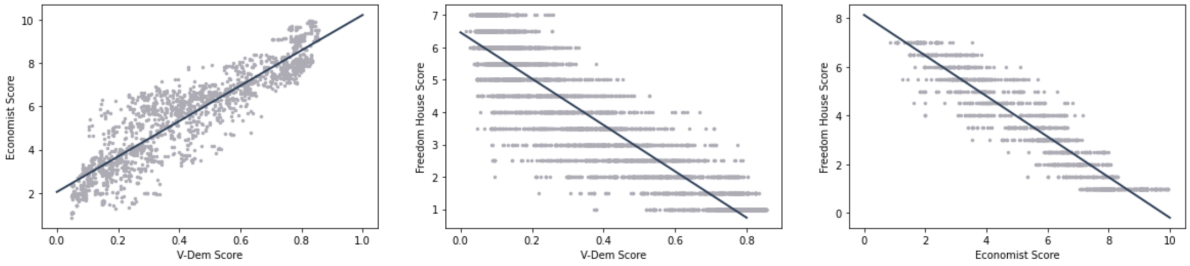
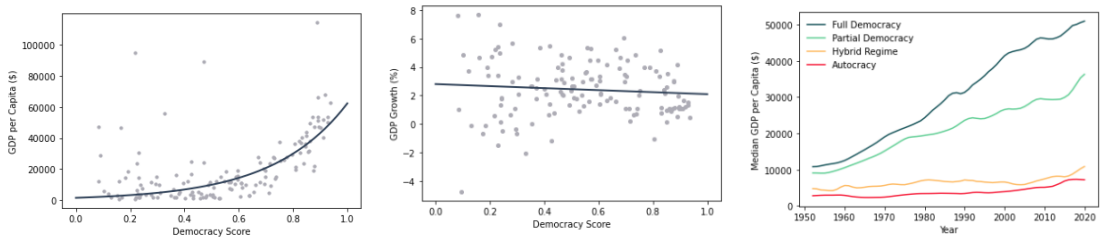


Figure 1. The democracy indices tend to agree in their ratings

GDP

When comparing the democracy score and GDP we can see a clear relation (Figure 2a). This means that democracies tend to be rich, however this does not imply causation. If look at scatter plot (Figure 2b) of GDP growth and democracy we can see a slight negative impact of democracy on GDP growth (though the effect is not significant at $p = 0.3$). This confirms what has been seen in previous research. If we look at the median GDP over time (Figure 2c) we can clearly see that more democratic countries have consistently been richer.

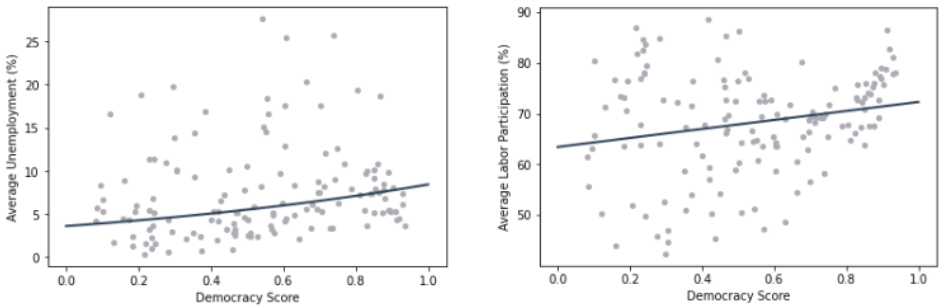


(a) GDP **(b)** GDP growth **(c)** GDP over time

Figure 2. Democratic countries tend to be richer, however the impact on GDP growth is insignificant

Unemployment & Labor Force Participation

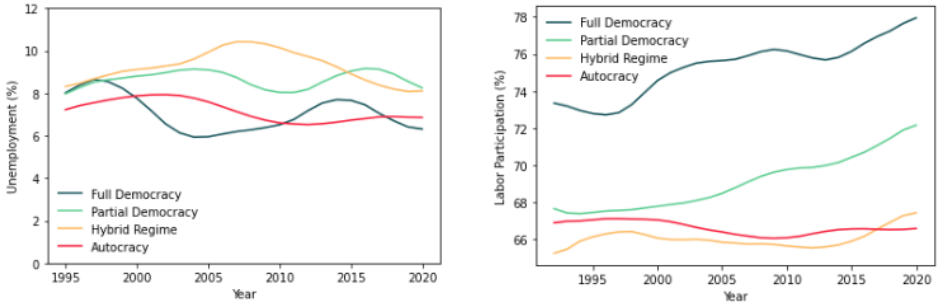
Our results suggest that more democratic countries tend to have a higher unemployment rate (Figure 4a). However data from the same source also suggests that more democratic countries have a higher labor force participation too (Figure 4b). This could suggest that authoritarian countries 'true' unemployment rates are higher, but they hide it by not including people in the labor force.



(a) Unemployment **(b)** Labor Participation

Figure 3. Democratic countries appear to have a higher unemployment rate, however more people want to work in these countries too

Looking at the same data over time it appears that is result is not constant (Figure 4). So if I had run the regression on another period, the results could have been very different. This makes a relation between democracy and unemployment a lot less clear. The average labor participation appears to remain the same over time, this suggests a relation between democracy and employment.

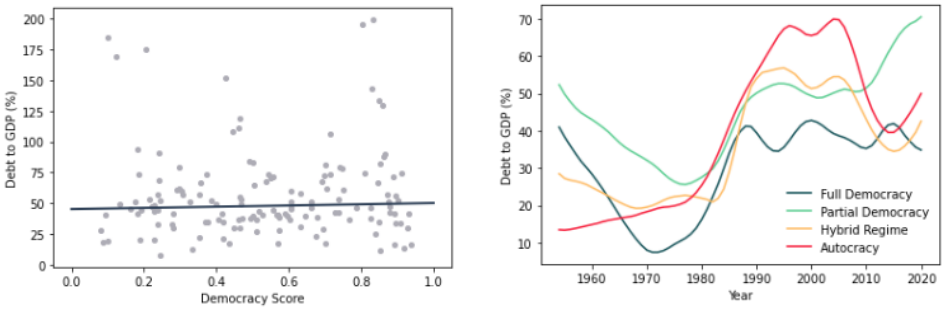


(a) Unemployment **(b)** Labor Participation

Figure 4. The relation between democracy and unemployment is unclear. A similar relation between labor participation and democracy appears over time.

Debt

In Figure 5 we can clearly see that there is no significant relation between a countries democracy score and its debt to GDP ratio ($p = 0.6$ and $R^2 = 0.002$). Looking at the same data over time suggests the same.

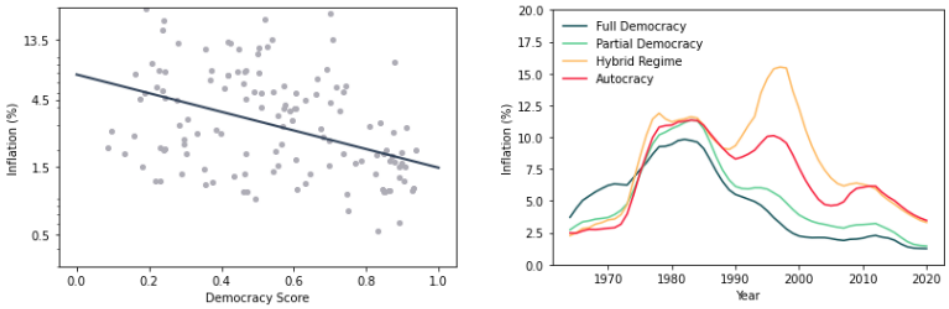


(a) Scatter Plot **(b)** Time Series

Figure 5. No clear relation between democracy and debt

Inflation

I found a clear relation between democracy and Inflation. In Figure 6 we can see a clear relation between the democracy score of a country and inflation. In Figure 6b it can clearly be seen that is relation appears to hold over time. Thus democratic countries tend to have a lower inflation rate.



(a) Scatter Plot **(b)** Time Series

Figure 6. Democratic countries tend to have a lower inflation rate

REFERENCES

Doucouliagos, H., & Ulubaşoğlu, M. A. (2008). Democracy and economic growth: A meta-analysis. *American Journal of Political Science*, *52*(1), 61–83. http://www.jstor.org/stable/25193797

The Economist. (2021). Global democracy has a very bad year. https://www.economist.com/graphic-detail/2021/02/02/global-democracy-has-a-very-bad-year