

Correlations Between Economic Factors and Governing Party in the USA from 1964 to 2022

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1 Introduction

Annual growth of five economic variables (GDP, per capita GDP, Gini Index, poverty rate, and unemployment rate) are correlated with each other as well as to the presence of a political party (either Democrat or Republican) in power to determine how each party affects (and settle whether either party better manages) the economy.

1.1 The Quantitative Variables

Yearly economic data for the USA between 1963 and 2022 (both inclusive) was downloaded from the World Bank's databank[1] for the following series:

- GDP per capita growth (annual %)
- GDP growth (annual %)
- Gini Index
- Poverty headcount ratio at \$2.15 a day (2017 PPP) (% of population)
- Unemployment (% of total labor force)

These correspond to rows 2 to 6 of the `data.csv` file (the first row is delegated to labeling, not data).

We must take care that, for example, if the unemployment rate is high during a year where the Democratic is incumbent we may not conclude the party caused the high unemployment rate, as it is possible unemployment skyrocketed previous to the party entering power, in a period where the Republican party was incumbent. For such reasons it is preferable to analyze the *increase* of unemployment while a political party is in power. With that goal in mind the annual growth rate of the last three variables will later be computed with the `growth` function in R. Thus, the five quantitative variables in the study are:

- `gdp`: GDP per capita growth (annual %)
- `pcgdp`: GDP growth (annual %)

- **gini**: Gini Index growth (annual %)
- **pov**: poverty headcount ratio growth at \$2.15 a day (2017 PPP) (% of population) (annual %)
- **une**: unemployment rate growth (% of total labor force) (annual %)

where the values run from 1964 to 2022.

1.2 The Qualitative Variables

The official website for the House of Representatives[2] explains the process of passing a new law as follows:

“Laws begin as ideas. First, a representative sponsors a bill. [...] If the bill passes by **simple majority** (218 of 435), the bill moves to the Senate. In the Senate, the bill is assigned to another committee and, if released, debated and voted on. Again, a **simple majority** (51 of 100) passes the bill. Finally, a conference committee made of House and Senate members works out any differences between the House and Senate versions of the bill. The resulting bill returns to the House and Senate for final approval. The Government Printing Office prints the revised bill in a process called enrolling. The President has 10 days to sign or veto the enrolled bill.”

In a nutshell, there are three actors involved: the House of Representatives, the Senate (these two constitute the Congress), and the President. Thus, the following binary variables were added to the `data.csv` file:

- **rep**: simple majority in the House of Representatives (0 for Republican, 1 for Democrat).
- **sen**: simple majority in the Senate (0 for Republican, 1 for Democrat).
- **pre**: political affiliation of the President (0 for Republican, 1 for Democrat).

These correspond to rows 7 to 9 in `data.csv`, and are the qualitative variables of our study. As all three branches are relevant to the passing of a law, we define a new variable:

- **ele**: for ‘electability’ of a political party, defined as

$$\mathbf{ele} := \mathbf{rep} + \mathbf{sen} + \mathbf{pre}.$$

Such variable, which can take any value from 0 (Republican party having control of the three branches of government) to 3 (Democratic party in control of the three branches) could be argued to be either quantitative or qualitative.

For our convenience, from 1962 to 2022 either party has dominated each of the three branches of government i.e. at no point was there a 50 – 50 split of either House of congress, nor was there a president affiliated to an independent party. Furthermore, new politicians enter office in January the 3rd (House of Representatives & Senate) or January 20th (President), so we can relatively safely attribute economic changes of the incumbent year to said politician.

The data used runs until the year 2022 as the value of all variables for the following years has not been (at time of writing) included into the World Bank’s databank. The reason for using data beginning in 1964 are historical:

1.3 A Brief History

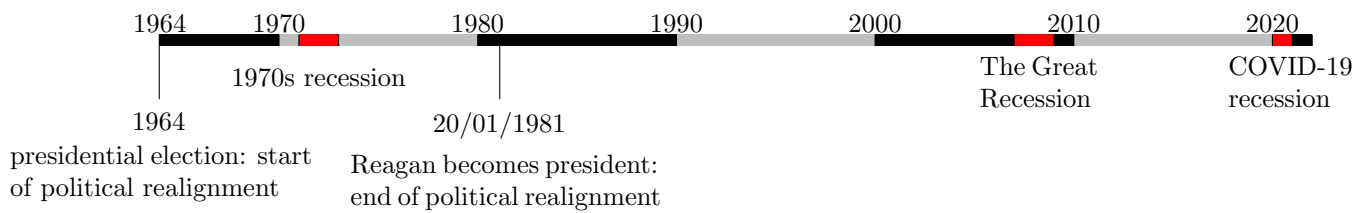
Libertarian conservatism began attracting the republican party in the 1950s, with the 1964 presidential election marking the first republican presidential candidate, Barry Morris Goldwater, to advocate for lower taxes, little government intervention, and a translation of power from social welfare to independent business; two years later Ronald Reagan entered the political stage when he was elected governor of California, only to become president of the United States in 1981 and mark the end of the economic realignment of the Republican party towards a laissez-fair philosophy. Throughout the process, the Democratic party followed suit, and aligned its economic ideals as

those opposed (within the margin of american politics) to the Republicans i.e. higher taxes, federal government intervention, and social welfare.[3]

We can thus only correlate economic variables beginning from 1964, as previous to that the political parties in power each lacked a consistent set of economic principles.

It is also worth mentioning that there were three periods of economic instability between 1963 to 2022, these being the 1973-1975 recession, the 2007-2008 financial crisis, and the first year (2020) of the COVID-19 pandemic. It can be argued that it is unfair to judge the government in times of economic instability; although the contrary -that precisely in those times we ought to judge the actions of the government- may be argued as well. As such, years for which the economy was erratic are not removed.[4]

All the events mentioned can be summerized in the following graph:



	min	max	mean	median	var	varp	sd	sdp
<i>pcgdp</i>	-3.7	6.31	1.93	2	4.64	4.56	2.15	2.13
<i>gdp</i>	-2.77	7.24	2.92	3	4.77	4.69	2.18	2.17
<i>gini</i>	-4.34	5.21	0.11	0	2.21	2.17	1.49	1.47
<i>pov</i>	-80	100	-0.22	0	479.23	470.97	21.89	21.7
<i>une</i>	-33.59	119.54	1.87	-5.5	538.78	529.49	23.21	23.01

Figure 1: Summary of Quantitative Variables

2 Data Analysis

2.1 Univariate Study

Three types of graphic are included:

- A **summary table** having as rows all quantitative (or qualitative) variables, and as columns the minimum (min), maximum (max), mean, median, corrected variance (var), variance (varp), corrected standard deviation (sd) and standard deviation (sdp). See Figures 1 and 4.
- **Histograms**, each of which contains six vertical lines corresponding to the mean (red), median (green), corrected variance (dark blue), variance (light blue), corrected standard deviation (purple), standard deviation (pink). See Figures 2 and 5. Sometimes lines overlap and are not visible; in such case see the summary instead.
- **Frequency tables**, each of which has as rows the values taken by the variable up to the nearest integer (with the exception of poverty rate, in which case it is rounded to the nearest decade), and as columns the frequency (Freq), relative frequency (Freq.Rela), cumulative frequency (Freq.Cum), and relative cumulative frequency (Freq.Rela.Cum). See Figures 3 and 6.

We begin by studying the quantitative variables. From the histograms it is easy to note that the average GDP and GDP per capita is positive, meaning that the period saw a positive general economic growth (of about 3% average increase in annual GDP).

Poverty rate, unemployment rate and Gini Index rate are instead marked by averages close to (and with frequencies concentrated at) zero, meaning these variables did not experience much change during this period.

Focusing on the frequency table for the poverty rate we can appreciate that, while the vast majority (43 out of 58) of the (rounded) data points lie at zero, some attain a (rounded) value of -80 or 100. Such behavior explains why the corrected variance of such variable is so high: 479.23. A similar situation applies to the unemployment rate.

Moving on to the qualitative variables, we find that the Democratic party had simple majority of each of the houses of congress for about two thirds of the period, while only being head of the executive branch little less than 50% of the time. In general, we can say the Democratic party had more electability (control of most branches of government) than the Republican party during the period.

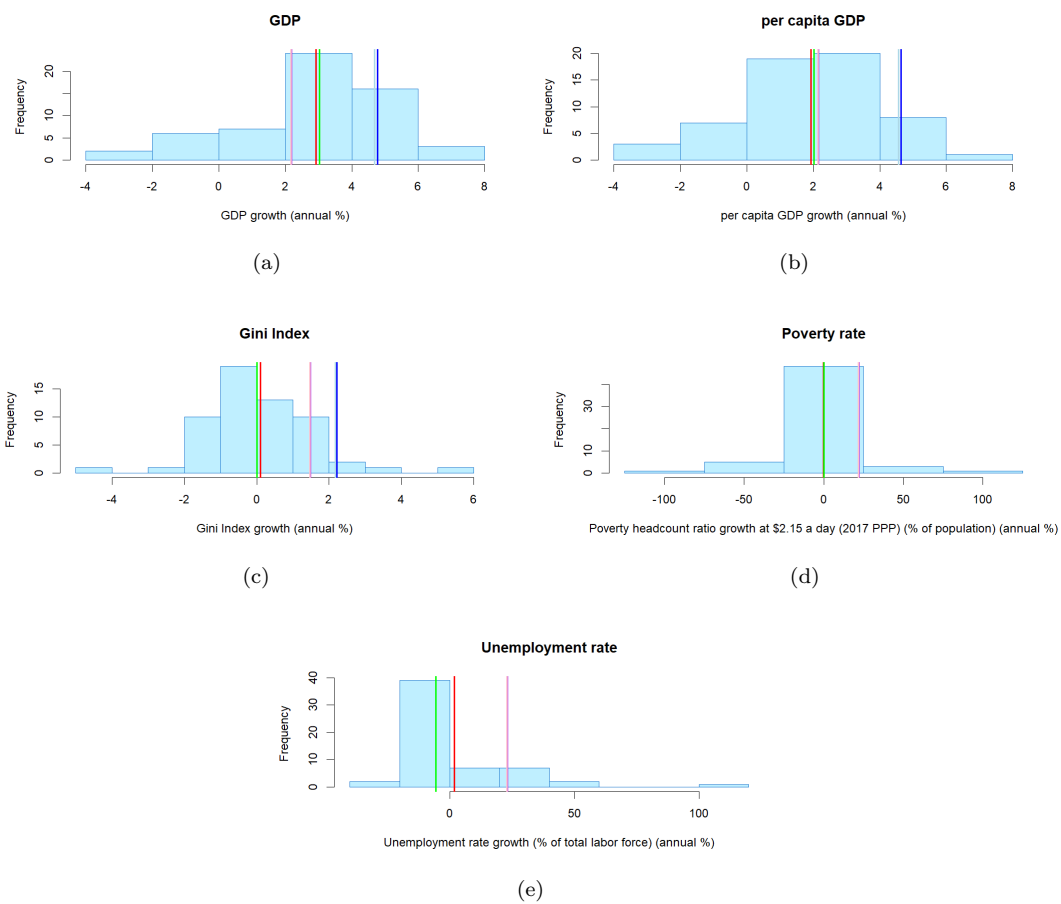


Figure 2: Histograms of Quantitative Variables

x	Freq	Freq.Rela	Freq.Cum	Freq.Rela.Cum
-3	2	0.03448276	2	0.03448276
-2	1	0.01724138	3	0.05172414
-1	1	0.01724138	4	0.06896552
0	5	0.08620690	9	0.15517241
1	1	0.01724138	10	0.17241379
2	10	0.17241379	20	0.34482759
3	15	0.25862069	35	0.60344828
4	10	0.17241379	45	0.77586207
5	6	0.10344828	51	0.87931034
6	5	0.08620690	56	0.96551724
7	2	0.03448276	58	1.00000000

(a) GDP

x	Freq	Freq.Rela	Freq.Cum	Freq.Rela.Cum
-4	1	0.01724138	1	0.01724138
-3	2	0.03448276	3	0.05172414
-1	6	0.10344828	9	0.15517241
0	1	0.01724138	10	0.17241379
1	9	0.15517241	19	0.32758621
2	14	0.24137931	33	0.56896552
3	12	0.20689655	45	0.77586207
4	8	0.13793103	53	0.91379310
5	3	0.05172414	56	0.96551724
6	2	0.03448276	58	1.00000000

(b) GDP per capita

x	Freq	Freq.Rela	Freq.Cum	Freq.Rela.Cum
-4	1	0.01724138	1	0.01724138
-2	6	0.10344828	7	0.12068966
-1	10	0.17241379	17	0.29310345
0	21	0.36206897	38	0.65517241
1	12	0.20689655	50	0.86206897
2	6	0.10344828	56	0.96551724
3	1	0.01724138	57	0.98275862
5	1	0.01724138	58	1.00000000

(c) Gini Index

x	Freq	Freq.Rela	Freq.Cum	Freq.Rela.Cum
-80	1	0.01724138	1	0.01724138
-30	2	0.03448276	3	0.05172414
-29	3	0.05172414	6	0.10344828
-17	3	0.05172414	9	0.15517241
0	43	0.74137931	52	0.89655172
20	2	0.03448276	54	0.93103448
40	2	0.03448276	56	0.96551724
43	1	0.01724138	57	0.98275862
100	1	0.01724138	58	1.00000000

(d) Poverty rate

x	Freq	Freq.Rela	Freq.Cum	Freq.Rela.Cum
-30	1	0.01724138	1	0.01724138
-20	3	0.05172414	4	0.06896552
-10	28	0.48275862	32	0.55172414
0	11	0.18965517	43	0.74137931
10	4	0.06896552	47	0.81034483
20	5	0.08620690	52	0.89655172
30	2	0.03448276	54	0.93103448
40	1	0.01724138	55	0.94827586
50	1	0.01724138	56	0.96551724
60	1	0.01724138	57	0.98275862
120	1	0.01724138	58	1.00000000

(e) Unemployment rate

Figure 3: Frequency Tables of Quantitative Variables

	min	max	mean	median	var	varp	sd	sdp
<i>rep</i>	0	1	0.66	1	0.23	0.23	0.48	0.48
<i>sen</i>	0	1	0.64	1	0.24	0.23	0.48	0.48
<i>pre</i>	0	1	0.45	0	0.25	0.25	0.5	0.5
<i>ele</i>	0	3	1.74	2	0.79	0.78	0.89	0.88

Figure 4: Summary of Qualitative Variables

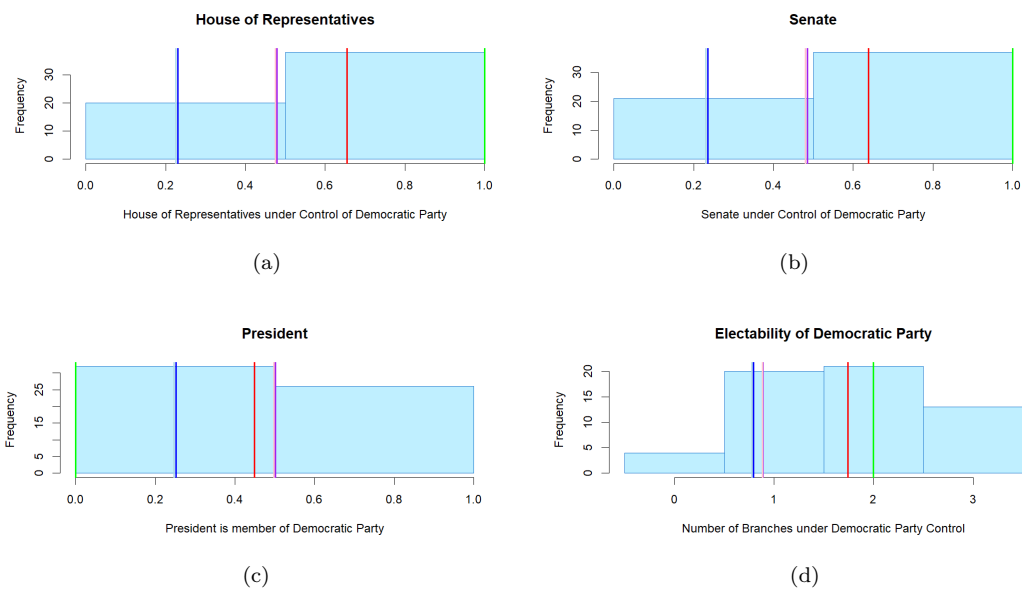


Figure 5: Histograms of Qualitative Variables

x	Freq	Freq.Rel	Freq.Cum	Freq.Rel.Cum
0	20	0.3448276	20	0.3448276
1	38	0.6551724	58	1.0000000

(a) House of Reps.

x	Freq	Freq.Rel	Freq.Cum	Freq.Rel.Cum
0	21	0.362069	21	0.362069
1	37	0.637931	58	1.000000

(b) Senate

x	Freq	Freq.Rel	Freq.Cum	Freq.Rel.Cum
0	32	0.5517241	32	0.5517241
1	26	0.4482759	58	1.0000000

(c) President

x	Freq	Freq.Rel	Freq.Cum	Freq.Rel.Cum
0	4	0.06896552	4	0.06896552
1	20	0.34482759	24	0.41379310
2	21	0.36206897	45	0.77586207
3	13	0.22413793	58	1.00000000

(d) Total Electability

Figure 6: Frequency Tables of Qualitative Variables

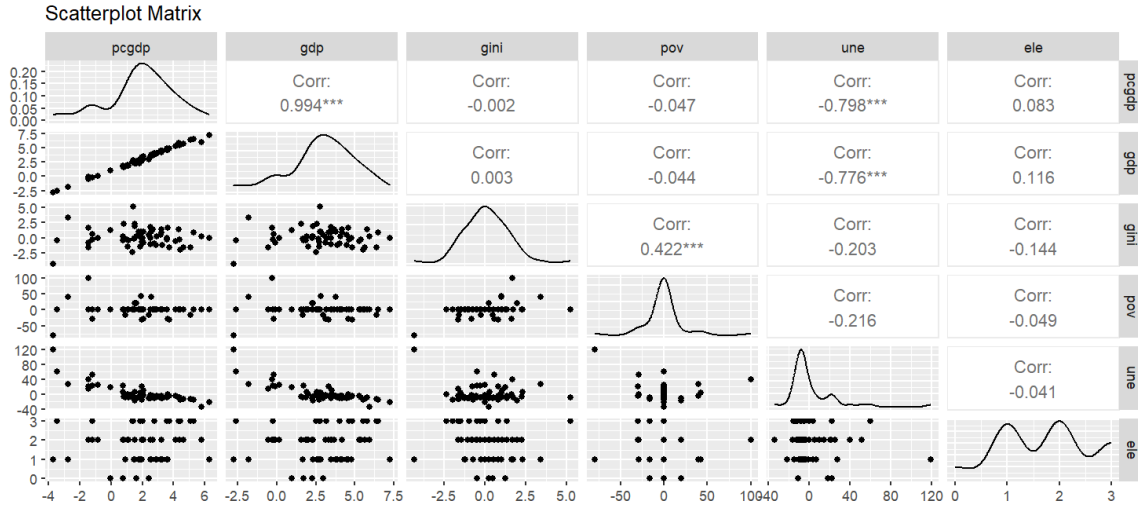


Figure 7: Scatterplot Matrix

2.2 Bivariate Study

Figure 7 shows a scatterplot matrix of the five quantitative variables together with the electability variable `ele`.

The highest absolute value of a Pearson correlation coefficient is that between GDP (`gdp`) and per capita GDP (`pcgdp`), with a value of 0.994. Such a result is to be expected: assuming population growth is relatively slow, whenever the total GDP of the nation increases, so should the per capita GDP. The lowest correlation coefficient is that between (the growth of the) unemployment rate (`une`) and (the growth of the) per capita GDP (`pcgdp`), with a value of -0.798. Again, to be expected: steps towards employment should coincide with greater per capita earnings.

Another expected result is a high correlation (0.422) between the Gini coefficient (`gini`) and poverty rate (`pov`), pointing to the fact that increasing inequality is reflected by increasing poverty. Amusingly, growth of the Gini index barely correlates with growth in GDP or per capita GDP, implying that economic growth does not lead to a more equal society.

The most surprising result is that of the negative correlation between unemployment and poverty. Naturally, we should expect increases in unemployment to cause increases in the poverty rate, so this data point is the only one that remains unexplained.

Finally, we should note that there is a small positive correlation between the electability variable `ele` and both kinds of GDP (0.083 for `pcgdp` and 0.116 for `gdp`), as well as a negative correlation between `ele` and the Gini index, poverty rate, and unemployment rate (-0.144, -0.49, and -0.41 respectively). Such results show that the Democratic party having more political power leads to better economic changes relative to the Republican party in all of the five quantitative variables studied, although the difference between both party is negligible.

References

- [1] *World Bank's Databank*: <https://databank.worldbank.org/reports.aspx?source=2&series=>
- [2] *The Legislative Process*: <https://www.house.gov/the-house-explained/the-legislative-process>
- [3] Laura Jane Gifford and Daniel K. Williams (2012) *The Right Side of the Sixties: Reexamining Conservatism's Decade of Transformation*, especially the Introduction: *What Happened to Conservatism in the 1960s?*
- [4] Michael French (1997) *US Economic History since 1945*