ANALYZING THE HEALTH OF THE U.S. ECONOMY FROM 1940 TO 2022: HOW DOES THE PARTISAN MAKEUP OF CONGRESS AND THE PRESIDENCY AFFECT THE UNITED STATES' ECONOMY?

By

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Abstract

Political, economic, and financial researchers have attempted to determine and measure the effect that the composition of the federal government has on the U.S. economy for decades. Both Republican-leaning and Democratic-leaning researchers believe that their party's respective control of the Presidency and both congressional houses yields higher economic growth than the other party can achieve. This unique research paper takes an objective approach to this age-old question by dissecting data analysis into four party control components: the House of Representatives, Senate, Presidency, and "Government Type" (divided or unified) respectively. Before linear regression models are constructed and applied to the four components—each represented by a two-part hypotheses—I discuss the various variables in my dataset, which independent and dependent variables are used, the statistical significance threshold and why it was selected, why a model with high predictive power for this cross-practice analysis was rejected, and how the failure of the first model influenced changes in the model-making process that yielded four viable models—one for each hypothesis. Although the results of my study are nonconclusive, my research creates a foundation for future research by discussing problems that I encountered as well as methods that can mitigate them in future research.

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Introduction & Objectives

"Does the U.S. Economy perform better under the Republican Party or the Democratic Party?" is an age-old question frequently pondered by historians. Unsurprisingly, individuals and organizations affiliated with the Republican Party claim that GOP rule yields better economic results, whereas individuals and organizations affiliated with the Democratic Party claim that Democratic rule yields better economic results. This research paper provides objective statistical insight into this question and attempts to resolve the dispute. However, this paper will not answer this general question. Instead, I split this broad question into four specific components, which are listed below.

1. Does the United States' economy perform better under a unified government or a divided government?
2. Does the United States' economy perform better under a House of Representatives with a Republican majority or a Democrat majority on average?
3. Does the United States' economy perform better under a Senate with a Republican majority or a Democrat majority on average?
4. Does the United States' economy perform better with a Republican or Democrat president?

These questions will be answered with objective statistical analysis conducted on the Presidency, House of Representatives Majority, the Senate Majority, and unified government individually. Each portion will be split into two-part hypotheses. The first part is the Null Hypothesis, which states that there is no significant difference in the U.S. economy's performance under the

Republican Party and the Democratic Party. The second part is the Alternative Hypothesis, which states that the U.S. economy performs better under a Republican presidency/House Majority/Senate Majority than under a Democrat presidency/House Majority/Senate Majority. Additionally, analysis will be performed on outlier years that significantly stray from the average long-run trend line. A linear regression model will be crafted to answer each of the above questions, and Python will be used to calculate the answers to each question. Lastly, the dependent variable in each hypothesis will be the Real GDP Growth Rate, which serves as a measure of economic growth.

Literature Review

I was inspired by a multitude of academic papers throughout the formation of this research paper. Although some researchers have found that partisan conflicts negatively affect economic performance globally (Alesina et al., 1992), I limited the scope of my research to the United States. Additionally, other researchers have identified a worldwide connection between income inequality and limited economic growth (Alesina et al., 1991; Alesina et al., 1996). However, this study adopts a macroeconomic perspective by analyzing national-level indicators of economic growth in the United States such as the unemployment rate, GDP, and financial market performance. Also, various researchers analyzed foreign influences on U.S. economic growth, such as import competition from China (Autor et al., 2013), international trade (Melitz, 2003), offshoring (Grossman et al., 2008), and foreign direct investment (Axarloglou et al., 2011). However, I limited the scope of this paper to include largely domestic factors or influences on U.S. economic growth.

The subsequent research papers analyze the effect of the partisan makeup of the federal government and of state governments on a multitude of entities that contribute to the U.S. economy. First, researchers Alan Blinder and Mark Watson analyzed U.S. economic performance under Democratic and Republican presidents from Truman through Obama's first term in "Presidents and the U.S. Economy: An Economic Exploration". They found that, on average, the economy has grown faster under Democratic presidents, with a real GDP growth averaging 4.3% per year compared to Republican presidents—with a real GDP growth averaging 2.5% per year (Blinder et al., 2014). These researchers attributed this GDP difference to factors such as oil shocks, productivity growth, and consumer expectations rather than presidential policy actions. While my research covers a longer time frame, incorporates different independent variables, and focuses on policy actions, my *Hypothesis 3* analysis similarly found that the U.S. economy has grown faster under Democratic presidents.

Second, researchers Atif Mian, Amir Sufi, and Nasim Khoshkhou attempted to determine if the partisan bias of U.S. voters affected their economic expectations and household spending in "Partisan Bias, Economic Expectations, and Household Spending" by utilizing large datasets from the Thomson Reuters University of Michigan Survey of Consumers and the Gallup Daily survey by Gallup, Inc. that consist of hundreds of thousands of survey responses that span thirty and ten year periods respectively. The trio of researchers concluded that partisan bias "exerts a significant influence on survey measures of economic expectations, and this bias is increasing substantially over time" (Mian et al., 2023). Notably, the explanatory power of power affiliation on economic expectations—as measured by the linear regression's R-Squared metric—has risen "fourfold from 0.07 to 0.28 from the George W. Bush to Trump administrations" (Mian et al., 2023). However, the researchers could not discover a change in spending driven by changes in economic expectations due to partisan bias. They concluded that “partisan bias in economic expectations has little to no effect on household spending” (Mian et al., 2023).

Third, researchers Carl Rudolf Blankart, Andrew D. Foster, and Vincent Mor evaluated the effect of partisan political control on the financial performance, structure, and outcomes of for-profit and not-for-profit U.S. nursing homes in “The Effect of Political Control on Financial Performance, Structure, and Outcomes of US Nursing Homes”. Blankart et al. utilized a “nineteen-year panel (1996-2014) of state election outcomes, financial performance data from nursing home cost reports, operational and aggregate resident characteristics from OSCAR of 13,737 nursing homes” as the dataset for their linear panel model. They deduced that Democratic political control of state governments leads to an increase in financial flows to for-profit nursing homes. Although profits increased, no observable improvements in resident outcomes were produced. Conversely, a shift from Medicaid to more “profitable private-pay residents following Republican political control is observed for all nursing homes” (Blankart et al., 2018). However, the financial performance of “not-for-profit nursing homes is not significantly affected by changes in political control” (Blankart et al., 2018). The researcher trio concluded that the “political control of the two legislative chambers—but not of the governorship—shapes the structure of the nursing home industry as seen in provider behavior” (Blankart et al., 2018).

Fourth, Erik Snowberg, Justin Wolfers, and Eric Zitzewitz sought to calculate how the partisan makeup of Congress influences the U.S. economy in “Party Influence in Congress and the Economy”. Snowberg et al. compared financial market responses in recent midterm elections to Presidential elections to “understand the extent to which partisan majorities in Congress influence economic policy” (Snowberg et al., 2006). They utilized prediction markets tracking election outcomes to precisely time and calibrate the arrival of news and purported that it gave them substantially more accurate estimates than a traditional event study methodology. Snowberg et al. deduced that “equity values, oil prices, and Treasury yields are slightly higher with Republican majorities in Congress, and that a switch in the majority party in a chamber of Congress has an impact that is only 10-30 percent of that of the Presidency”. They also found “evidence inconsistent with the popular view that divided government is better for equities, finding instead that equity valuations increase monotonically, albeit slightly, with the degree of Republican control” (Snowberg et al., 2006).

Lastly, researchers Xuan Hu, Agus Salim, Kai Shi, and Meng Yan calculated the effect of partisan conflict on government spending in “Partisan Conflict and Government Spending: New Evidence from the United States”. These researchers utilized the PC index, which is a semantic search approach to measuring newspaper coverage as the frequency of articles reporting political disagreement about government policy—both within and between national parties (Hu et al., 2022). The PC index is normalized by the total number of news articles within a given period. For this study, the researchers utilized “aggregate annual PC index data for the United States from 1981 to 2018, extracted from the Federal Reserve Bank of Philadelphia based on data availability” (Hu et al., 2022). The researchers included other variables, such as taxes, output, and aggregate government spending to investigate the response of macroeconomic variables to the PC index. They also “assess[ed] the ways in which the PC index has a stronger effect on disaggregated US government spending, including defense, economic affairs, income security, disability, welfare and social services, education, health, general public services, recreation, and culture” (Hu et al., 2022). The researchers concluded that “one standard deviation shock of the partisan conflict index reduces aggregate and disaggregated government spending, except in the health and general public service sectors, with the greatest reduction in the education sector" (Hu et al., 2022). Therefore, higher levels of partisan conflict led to reduced government spending.

Data Collection & Variable Discussion

Data Metrics

My dataset consists of information sourced from public datasets and government databases[1]. I collected data from 1940 to 2022 to capture long-term trends. Additionally, most databases lack data before 1940, which limits the scope of this study. I divided my data into three categories: Political Variables, Economic Variables, and Financial Variables. The categorized variables are visualized in the following tables. Each table lists the variable name and the variable's unit type. The "additional information" category contains pertinent information for each variable if needed. Lastly, the "in model" column reveals whether the variable is in the linear regression models. However, most "string" variables that are not in the linear regression models are represented by a dummy variable (DV) equivalent.

It can be successfully argued that some variables in the "economic variables" category can be placed in the "financial variables" category and vice versa. However, I placed my collected metrics into three categories to segment my metric selection reasoning into three sections, and the categorical classification of each variable (political, economic, financial) have no effect on the linear regression models, the interpretation of the linear regression models, or the statistical significance testing results.

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[1] My dataset and the Python model-building code files are on my GitHub page. My GitHub page can be accessed by clicking on the appropriate link in the "References" section.

Political Variables

Political Variables			
Variable Name	**Unit Type**	**Additional Information**	**In Model?**
President Name	String	N/A	No
President DV	Boolean	0 if Democratic, 1 if Republican	Yes
Congress Iteration	String	N/A	No
Senate Party Majority	String	N/A	No
Senate DV	Boolean	Senate Majority: 0 if Democratic, 1 if Republican	Yes
House of Representatives Party Majority	String	N/A	No
House of Representatives DV	Boolean	House of Representatives Majority: 0 if Democratic, 1 if Republican	Yes
Government Type	String	N/A	No
Government Type DV	Boolean	0 if Divided Government, 1 if Unified Government	Yes

Table 1: Political Variables

The "Political Variables" table, represented by the above Table 1, contain variables related to the political state of the federal government. The four variables from this table that are included in the linear regression models are the "President" dummy variable, the "Senate" dummy variable, the "House of Representatives" dummy variable, and the "Government Type" dummy variable. For reference, dummy variables (DV) represent qualitative (non-numeric) data. Dummy variables are of the unit type Boolean, which indicates that they can only take one of two values: 0 or 1. In this particular study, I am attempting to deduce whether a Republican president, a Republican majority in the Senate, a Republican majority in the House of Representatives, or a Unified Government yield higher economic growth relative to a Democratic president, a Democratic majority in the Senate, a Democratic majority in the House of Representatives, or a Divided Government in the four respective hypotheses. Therefore, I set the dummy variables to 1 if they represent a Republican president, House, Senate, or Unified Government. If the dummy variables represent the Democratic and divided government counterparts, then the dummy variables are set to 0. However, my hypotheses approach each dummy variable separately. For example, the first hypotheses concerns solely the House of Representatives political majority through the House of Representatives dummy variable.

Economic Variables

Economic Variables			
Variable Name	**Unit Type**	**Additional Information**	**In Model?**
Annual GDP	Decimal	Measured in FY 2017 USD (Billions of USD), Annual	No
Real GDP	Decimal	Measured in FY 2017 USD (Billions of USD), Annual	No
Real GDP Growth Rate	Percentage	Used 1939 Real GDP (1312.40) to calculate real GDP growth rate for 1940	Yes
Net Exports of Goods and Services	Decimal	Billions of Dollars, Not Seasonally Adjusted, Annual	Yes
Average Inflation Rate	Percentage	Annual	Yes
Unemployment Rate	Percentage	Annual	Yes
Production Volume: Economic Activity: Industry (Except Construction)	Decimal	Index 2015=100, Not Seasonally Adjusted	Yes
Production Volume: Economic Activity: Manufacturing	Decimal	Index 2015=100, Not Seasonally Adjusted	Yes

Table 2: Economic Variables

The economic variables, represented in the above Table 2, contain quantitative data regarding the state of the U.S. economy. Since a “State of the U.S. Economy” variable does not exist in my sourced datasets, I collected variables that represent different measures of economic health. Importantly, I am using the real U.S. Gross Domestic Product (GDP) measurements in this study. The difference between “annual” and “real” GDP is that “real” GDP accounts for inflation and enables me to compare GDP values from drastically different years. All real GDP values are represented in fiscal year (FY) 2017 USD. In addition to the overall GDP measures, I also included the net exports of goods and services metric. A country ideally aspires to have a large net export value because it indicates that it produces a surplus of goods and services that can be sold to other nations. A high net export value tends to signify that a nation does not significantly rely on another country to possess a healthy economy. Conversely, a negative net export value indicates that it purchases more goods and services from other nations than it sells to other nations, which signifies that the nation significantly relies on other nations to maintain a healthy economy.

The average inflation rate and unemployment rate variables, which are discussed in-depth in the “Dependent Variable Selection” section, are strong indicators of the health of an economy.

A nation ideally aims to possess low inflation rates and low unemployment rates. However, uncontrolled economic growth tends to increase the inflation rate, which can cause an economic recession if unaccounted for. Additionally, a low unemployment rate is desirable because it indicates that only a small percentage of citizens who want to work cannot find work. For example, an ideal unemployment rate is 3%, which indicates that 97% of a nation's labor force—which consists of individuals who are actively seeking employment—are employed.

Lastly, a nation's economic health can be deduced through growth in domestic industry. In a healthy, growing economy, businesses tend to expand operations. Therefore, an increase in economic activity in the industrial and manufacturing sectors indicate that a nation's economy is healthy and growing. The units for these last two variables are unique because they are indexes, which are used to express values relative to a baseline. The index 2015 = 100 reveals that the value of the index is set to 100 for the year 2015. All other values are relative to this baseline. For example, if the index is 105 in a certain year, then it indicates a 5% increase compared to 2015. If the index is 95 in a certain year, then it represents a 5% decrease compared to 2015.

Financial Variables

Financial Variables			
Variable Name	**Unit Type**	**Additional Information**	**In Model?**
Federal Budget	Decimal	Millions of dollars, annual, not seasonally adjusted	No
Federal Budget DV	Boolean	Dummy Variable; 0 if deficit (negative), 1 if surplus (positive)	Yes
S&P 500 Index Return	Percentage	Total Annual Return (%) Includes Returns Both from Dividends & Changes in Price Index	Yes
Dow Jones Index Return	Percentage	Total Annual Return (%) Includes Returns Both from Dividends & Changes in Price Index	Yes
Government Consumption Expenditures and Gross Investment (GCEA)	Decimal	Billions of dollars, not seasonally adjusted, annual	Yes
Gross Private Domestic Investment (GPDIA)	Decimal	Billions of dollars, not seasonally adjusted, annual	Yes
Consumption of Fixed Capital	Decimal	Billions of dollars, not seasonally adjusted, annual	Yes

Table 3: Financial Variables

The financial variables, represented by the above Table 3, are metrics that largely consist of "reactions" to the health of the U.S. economy. First, the federal budget is the U.S. federal government's financial plan for a fiscal year, which includes expected revenues and expenditures. A positive federal budget indicates a budget surplus, where federal revenue exceeds expenditures. Conversely, a negative federal budget indicates a budget deficit, where the federal expenditure exceeds revenue. Each yearly budget deficit increases the national debt, and a larger national debt indicates that the federal government has to borrow more funds and allocate more funds toward loan and interest repayments in future federal budgets. As a result, the federal government must divert allocated funds toward loan and interest repayments, which may result in a limited ability to respond to future economic crises or invest in long-term growth. If the federal government prints more money in an attempt to repay loans and interest payments, then inflation increases—and the economy suffers. Conversely, a federal budget surplus enables the federal government to use the extra revenue to reduce the national debt or allow for future investments without borrowing. A surplus tends to indicate healthy economic growth, higher tax revenues, lower government spending, and a smaller inflation rate. Federal budget surpluses and deficits are represented in the model by the dummy variable "Federal Budget DV". A federal budget deficit is represented by a 0, whereas a federal budget surplus is represented by a 1. One can argue that a dummy variable for the federal budget is not needed, but I am utilizing a dummy variable to account for the fact that the federal budget has exponentially increased from 1940 to 2022 because I did not calculate a "real" equivalent like I did for GDP. Therefore, the "Federal Budget DV" treats all surpluses and deficits equally for this study.

The "S&P 500 Index Return" and the "Dow Jones Index Return" variables represent the stock market's perspective of the health of the U.S. economy. The S&P 500 is a market-capitalization-weighted index of five hundred of the largest publicly traded companies in the U.S. across various sectors and thus captures how different industries are responding to economic conditions. A positive S&P 500 return tends to suggest investor optimism about the U.S. economy because it indicates that the value of the companies in the index is rising. Higher returns indicate confidence in the U.S. economy's future prospects. Higher returns often are spurred by robust earnings growth, innovation, or favorable monetary policies such as low-interest rates. Thus, strong economic growth, rising corporate profits, and favorable economic conditions typically are reflected in a rising S&P 500 index. However, both negative and decreasing returns may suggest concerns about economic slowdowns (recessions), rising inflation rates, or other factors that could decrease corporate profits or worsen business conditions. On the other hand, the Dow Jones Industrial Average (DJIA) consists of 30 large, established companies. These companies are predominantly in "blue-chip sectors" such as manufacturing, technology, and financial services. Unlike the S&P 500, which is based on market capitalization, the Dow Jones Industrial Average is price-weighted, which indicates that companies with higher stock prices have a greater influence (weight) on the index's performance. The Dow Jones Index returns can offer insight into the health of the industrial and blue-chip sectors of the economy and are strong indicators of future trends that will also affect the broader economy. If the companies in the Dow Jones Index perform well, as indicated by positive DJIA returns, then the general economy tends to also perform well—which may also indicate strong consumer confidence, business investment, and robust economic activity. However, declining DJIA returns may indicate that these large corporations may perform worse in the future due to economic contraction, rising costs, or market uncertainty. Declining performance in DJIA corporations tend to reflect a decline in the health of the overall U.S. economy in the future—which may consequently yield higher inflation and interest rates.

Next, the Government Consumption Expenditures and Gross Investment (GCEA) metric is a component of Gross Domestic Product (GDP). More specifically, GCEA is a component of the expenditure approach to measuring GDP which represents the total spending by the federal government on goods, services, and long-term investments and therefore provides insights into the health of the economy. I extracted four insights into the health of the U.S. economy from GCEA. First, high GCEA can stimulate demand and help the economy recover from downturns through economic growth and employment initiatives. Second, government investment in infrastructure, education, and technology boosts future productivity and thus contributes to sustained economic growth. Third, GCEA reflects the fiscal health and priorities of the federal government. Exorbitant spending without sufficient revenue may signal fiscal instability or rising debt, which will affect the U.S. economy as a whole. Lastly, GCEA tends to rise during recessions to stimulate the economy and stabilizes during periods of economic growth. Thus, GCEA reveals the government's response to economic conditions. Therefore, the GCEA variable represents the federal government's role in supporting short-term recovery and long-term economic stability.

The Gross Private Domestic Investment (GPDIA) is the private sector equivalent to the GCEA. GPDIA is a key component of GDP and measures the total private sector investment in physical assets within the U.S. economy and includes expenditures by businesses and households on assets like machinery, infrastructure, housing, and inventory. The GPDIA metric is essential for assessing the health of the economy because it reflects both current economic activity and future growth potential. High GPDIA indicates strong investment activity, which is driven by confidence in future demand and profitability. Strong investment activity supports economic growth through increased production, employment, and innovation. However, low GDPIA may signal economic uncertainty, reduced business confidence, or weak demand—which are all factors that can slow economic growth. GPDIA includes investment in capital goods, such as factories and equipment, which increase the economy's productive capacity. Investment in capital goods yields sustainable long-term growth. However, reduced investment can constrain future productivity and limit economic expansion.

The GDPIA is highly sensitive to the business cycle, which in itself is highly sensitive to the economic cycle. During expansions, businesses invest more in capacity (capital goods) to meet rising demand. During recessions, the GPDIA metric tends to decline as businesses decrease spending due to decreased demand or tighter credit. Thus, the GPDIA constitutes a leading indicator of businesses sentiment, which is expressed through spending. Increased spending on infrastructure and equipment reveals corporate optimism about future economic growth conditions, whereas declines may indicate concerns about the economy declining.

Importantly, the GPDIA metric reflects residential investment, which serves as a key indicator of consumer confidence and financial stability. Housing investment tends to increase in periods of economic growth and decrease in periods of economic decline. Also, changes in private inventories—reflected in the GPDIA—can highlight shifts and demand. Rising inventories may suggest weak consumer spending, whereas declining inventories may indicate either robust sales or supply constraints. Therefore, GPDIA is a strong measure of short-term growth and long-term productivity, which makes it a key metric for understanding the health of the U.S. economy.

The final variable in my model is "Consumption of Fixed Capital". The consumption of fixed capital (CFC) represents the depreciation of physical assets such as buildings, equipment, and infrastructure over time due to aging, obsolescence, or depreciation. It measures the value of these assets consumed during a given period and thus reflects how much investment is needed to maintain the economy's productive capacity. A high CFC value indicates significant asset use, which suggests a need for investment to either replace or upgrade aging capital. Notably, whether the investments are made or not signifies economic health. Economic growth is indicated if the investments are made because it reveals that firms have the liquid assets needed to pay for the investments. Conversely, the failure to make these investments signals a weakening of the economy's productive capacity over time because firms are unable to procure the funds needed to upgrade capital. Interestingly, the CFC metric reflects the state of both public sector (government) and private sector (businesses) infrastructure. Therefore, the "Consumption of Fixed Capital" variable reflects the health of the U.S. economy by indicating both the usage of capital and the investments required by public and private sector entities needed to maintain long-term sustainability and economic growth.

Summary Statistics for Real GDP

This section delves into the summary statistics for the variable "Real GDP", which were calculated with Python[2]. I chose to analyze Real GDP instead of Actual GDP because the units of the Real GDP variable have been adjusted to account for inflation. By converting all Actual GDP values to the same unit—"Fiscal Year 2017 Billions of USD"—I can directly compare GDP values from 1940 to 2022.

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[2] I utilized the pandas, numpy, and scip.stats modules in Python to calculate and format the below summary statistics table. I then utilized Tableau Desktop to visualize the rate of change of the U.S. Real GDP from 1940 to 2022.

Summary Statistics

Real GDP Summary Statistics	
Statistic	**Value**
Count	83
Mean	9154.91
Standard Deviation	6083.331
Minimum	1428.1
25th Percentile	3545.2
Median (50th Percentile)	7307.3
75th Percentile	14351.7
Maximum	21822
Variance	37006912.28
Skewness	0.532
Kurtosis	-1.045

Table 4: Summary Statistics for Variable "Real GDP"

The dataset contains 83 observations of Real GDP values. The average Real GDP across the dataset is approximately $9,154.91 billion. Notably, there is a significant variation in Real GDP values as evidenced by the standard deviation value of $6,083.331 billion. This value indicates a relatively widespread distribution around the mean. Notably, the minimum and maximum Real GDP values are the 1940 and 2022 Real GDP values, which indicates that the United States' Real GDP has increased from 1940 to 2022. 25% of the observations have a Real GDP value below $3,545.2 billion, which indicates the presence of a lower quartile dominated by small Real GDP values. On the other hand, half of the values are below the median Real GDP value of $7,307.3 billion and half of the values are above the median. Interestingly, the median is lower than the mean, which suggests a slight positive skew. 75% of the observations have a Real GDP value below $14,351.7 billion, which indicates that the upper 25% of observations form a "top quartile" with Real GDP values above $14,351.7 billion.

Next, the variance value is $37,006,912.28 billion. The variance measures "how spread out" the data is, and this large value indicates a high variability in observation Real GDP values. For reference, a skewness value between -0.5 and 0.5 indicates that the distribution is fairly symmetrical (Oracle). The skewness value is a positive 0.532, which indicates that the distribution of Real GDP values is slightly right-skewed with a tail extending toward higher values. The skewness value of 0.532 indicates that the distribution of Real GDP values is moderately skewed, yet the distribution is fairly symmetrical. Additionally, the Kurtosis value of -1.045 reveals that the distribution of Real GDP values is flatter than a normal "platykurtic" distribution with fewer extreme outliers.

Real GDP Visualization

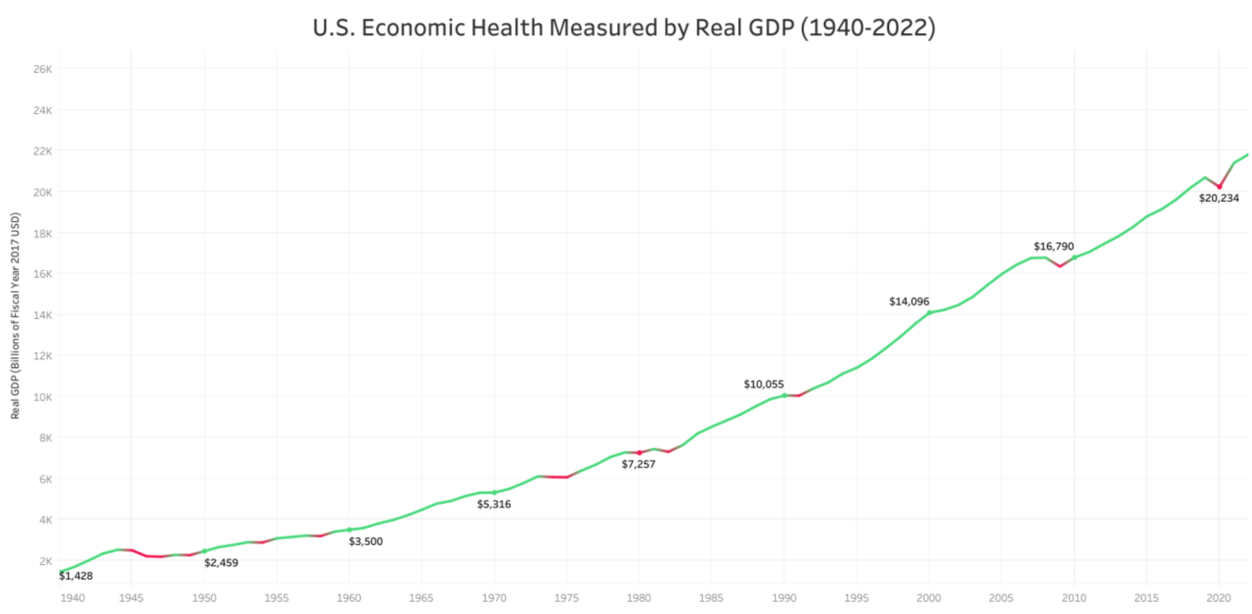

Figure 1: U.S. Economic Health Measured by Real GDP (1940-2022)

The above Tableau visualization charts the change of the United States' Real GDP from 1940 to 2022. Notably, the rate of change of the Real GDP variable is the dependent variable "Real GDP Growth Rate". For reference, I included the Real GDP values for the start of every decade. Increases in Real GDP are indicated by the green portions of the line chart, whereas decreases in Real GDP are indicated by the red portions of the line chart. Interestingly, the line chart almost resembles a series of sloped steps. I purport that these "steps" result from temporary decreases in Real GDP caused by economic downturns. For example, the 2010 "step" reflects the Great Recession (2007-2009) and the 2020 step is caused by the COVID-19 Pandemic.

Hypotheses

This research paper contains four hypotheses that address the economic performance of the United States under varying political conditions. Each hypothesis will be tested through the utilization of linear regression models. The hypotheses are outlined below.

Hypothesis 1: House of Representatives Majority

Null Hypothesis (H_0): There is no significant difference in the U.S. economy's performance under a Republican majority versus a Democratic majority in the House of Representatives.

$H_0: \mu_{House_R} = \mu_{House_D}$

Alternative Hypothesis (H_A): The U.S. economy performs better under a Republican majority in the House of Representatives compared to a Democratic majority.

$H_A: \mu_{House_R} > \mu_{House_D}$

Hypothesis 2: Senate Majority

Null Hypothesis (H_0): There is no significant difference in the U.S. economy's performance under a Republican majority versus a Democratic majority in the Senate.

$H_0: \mu_{Senate_R} = \mu_{Senate_D}$

Alternative Hypothesis (H_A): The U.S. economy performs better under a Republican majority in the Senate compared to a Democratic majority.

$H_A: \mu_{Senate_R} > \mu_{Senate_D}$

Hypothesis 3: Presidency

Null Hypothesis (H_0): There is no significant difference in the U.S. economy's performance under a Republican president versus a Democratic president.

$H_0: \mu_{President_R} = \mu_{President_D}$

Alternative Hypothesis (H_A): The U.S. economy performs better under a Republican president compared to a Democratic president.

$H_A: \mu_{President_R} > \mu_{President_D}$

Hypothesis 4: Unified Versus Divided Government

Null Hypothesis (H_0): There is no significant difference in the U.S. economy's performance under a unified government compared to a divided government.

$H_0: \mu_{Unified} = \mu_{Divided}$

Alternative Hypothesis (H_A): The U.S. economy performs better under a unified government compared to a divided government.

$H_A: \mu_{President_R} > \mu_{President_D}$

Dependent Variable Selection

I will test these hypotheses by examining whether there is a significant relationship between the aforementioned political independent variables and the Real GDP Growth Rate. Although the Unemployment Rate and the Inflation Rate are suitable “Dependent Variable” candidates, I purport that the Real GDP Growth Rate serves as the best measure of economic growth for this study. Typically, economic growth is represented by an increase in the United States’ annual GDP, and I purport that analyzing the Real GDP Growth Rate allows me to both compare different time periods in equal units and focus on the political independent variables.

I believe that the Unemployment Rate variable is not the best-fit measure of economic growth due to historical evidence revealing economic growth despite high unemployment rates. For example, the U.S. Annual GDP grew by 10.8% in 1934 despite the unemployment rate being a near record-worst 21.7% (Amadeo, 2022). Typically, economic expansion is accompanied by low unemployment rates. For example, Okun’s Law reveals that a “1 percent decrease in GDP has been associated with a slightly less than 2-percentage-point increase in the unemployment rate” (Sánchez). Therefore, I purport that historical deviances from this trend indicate that a low unemployment rate is not the best indicator for economic growth.

Additionally, I believe that the Inflation Rate is not the best indicator for economic growth because economic growth has been observed in periods with low inflation and in periods with high inflation. In the first quarter of 2024, the U.S. economy grew at an annualized rate of 1.6% despite inflation increasing from 1.8% to 3.4% (BBC). Conversely, the U.S. economy grew at an annualized rate of 3% in the second quarter of 2024 (Wiseman) despite inflation decreasing from 3.4% to 2.5% (WhiteHouse.gov). Therefore, I purport that the Inflation Rate variable does not capture economic growth as well as the Real GDP Growth Rate. Although the

Unemployment Rate and Inflation Rate variables were not selected to be the dependent variable due to their lack of a consistent direct correlation of economic growth, I included them as control independent variables because they are key measures of the health of the U.S. economy in their own right.

Statistical Significance Threshold Selection

I utilize the p-value significance test in this research paper. The p-value significance test is used to evaluate the strength of evidence against the null hypothesis (H_0). The null hypothesis is the default assumption which tends to state that there is no effect or no difference. This is represented in the regression model if an independent variable's coefficient is zero. The hypothesis that I want to test for is called the alternative hypothesis (H_A), which typically states that there is an effect or a difference. This alternative hypothesis is represented in the regression model if an independent variable's coefficient is not equal to zero.

The p-value is the probability of observing the test statistic (or one more extreme) assuming the null hypothesis is true. A lower p-value indicates stronger evidence against the null hypothesis. The p-value is compared against the significance level, α, which serves as a threshold that enables you to reject or fail to reject the null hypothesis. The most common significance level is 0.05 (5% significance level), but the significance levels of 0.10 and 0.01 are also used. A p-value threshold of 0.05 represents a 5% risk of erroneously rejecting the null hypothesis when it is true, which is called a Type I Error. Conversely, a Type II Error occurs when a statistical test failed to reject the null hypothesis even when the alternative hypothesis is true. The probability of a Type I error is represented by the significance level α, whereas the probability of a Type II error is represented by β. Therefore, a Type I error is a false positive, where one detects an effect or difference that does not actually exist. A Type II error is a false negative, where one fails to detect an effect or difference that actually exists.

If the calculated probability value is less than or equal to the significance level, then you can reject the null hypothesis and accept the alternative hypothesis. Otherwise, you fail to reject the null hypothesis. As an aside, you never accept the null hypothesis. You either reject or fail to reject the null hypothesis.

I chose the significance level of 0.10 because it enables more findings to be labeled as “statistically significant”. Thus, a benefit of utilizing a significance level of 0.10 is that it increases the likelihood of detecting an effect if it exists. However, a detriment of the 10% significance level is that the risk of Type I error increases compared to the 1% and 5% significance levels—which means that I may falsely identify an effect where no effects exist. I purport that missing potential effects is more problematic than making incorrect claims in this initial study because I am measuring the effect of political independent variables on the dependent variable “Real GDP Growth Rate”. Subsequent studies will utilize the stricter significance levels of 0.05 and 0.01 to determine if any of the statistically significant findings at the 10% level are significant at the 5% and 1% levels, respectively.

The p-value threshold of 0.10 represents a 10% risk of rejecting the null hypothesis when it is true (Type I Error) and indicates that I am satisfied with being 90% confident in my decision to reject the null hypothesis when I interpret the results of my significance testing. If I repeated by significance tests one hundred times, then I would correctly reject the null hypothesis when it is false or fail to reject the null hypothesis when it is true ninety times. Therefore, the threshold that I will use to determine statistical significance in my linear regression model results is $\alpha =$

0.10, and beta coefficients with $p < 0.10$ indicate that the corresponding variable has a statistically significant effect.

Hypothesis 1: House of Representatives Majority

Null & Alternative Hypotheses Recap

Null Hypothesis (H_0): There is no significant difference in the U.S. economy's performance under a Republican majority versus a Democratic majority in the House of Representatives.

$H_0: \mu_{House_R} = \mu_{House_D}$

Alternative Hypothesis (H_A): The U.S. economy performs better under a Republican majority in the House of Representatives compared to a Democratic majority.

$H_A: \mu_{House_R} > \mu_{House_D}$

Variable Selection Discussion

The Dependent Variable is the Real GDP Growth Rate. The dependent variable is what I am trying to explain or predict with independent variables. In the linear regression equation, it takes the place of variable Y. The Real GDP Growth Rate measures the annual percentage change in the Real Gross Domestic Product (GDP) of the Unites States, which reflects the overall economic growth or decline in the nation.

The key independent variable is the House of Representatives Party Majority Dummy Variable (House DV). This is the main independent variable, which means that it is crucial to my test of determining whether the political party in control of the House affects the U.S. economy's performance. It takes the place of an X variable in the linear regression equation.

Control variables are a type of independent variable that accounts for other factors that might influence the dependent variable (Real GDP Growth Rate) but are not the focus of my study. Essentially, these variables help isolate the effect of the main independent variable "House DV" on the economy by removing potentially confounding effects. Control variables consist of the other X variables in the linear regression model. For an in-depth explanation of why these variables are used to predict the health of the U.S. economy, please refer to the "Data Collection & Variable Discussion" section. In the "Interpreting the OLS Regression Results" sections for each hypothesis, the main independent variable analyzed in each hypothesis has the "DV" acronym written fully as "Dummy Variable". For example, "House DV" is written as "House of Representatives Dummy Variable" when discussing the Ordinary Least Squares (OLS) regression results of the Hypothesis 1 Revised Model. The control variables are displayed below.

Control Variables Overview		
Control Variable Number	**Control Variable Name**	**Representation in Theoretical Model**
1	Net Exports of Goods and Services	Net Exports
2	Average Inflation Rate	Average Inflation Rate
3	Unemployment Rate	Unemployment Rate
4	Production Volume: Economic Activity: Industry (Except Construction)	Industry Activity
5	Production Volume: Economic Activity: Manufacturing	Manufacturing Activity
6	Federal Budget DV	Federal Budget DV
7	S&P 500 Index Return	S&P 500 Index Return
8	Dow Jones Index Return	Dow Jones Index Return
9	Government Consumption Expenditures and Gross Investment (GCEA)	GCEA
10	Gross Private Domestic Investment (GPDIA)	GPDIA
11	Consumption of Fixed Capital (CFC)	CFC

Table 5: Control Variables Overview

Theoretical Linear Regression Model

$$Real\ GDP\ Growth\ Rate = \beta_0 + \beta_1(House\ DV) + \beta_2(Net\ Exports) + \beta_3(Average\ Inflation\ Rate) + \beta_4(Unemployment\ Rate) + \beta_5(Industry\ Activity) + \beta_6(Manufacturing\ Activity) + \beta_7(Federal\ Budget\ DV) + \beta_8(S\&P\ 500\ Index\ Return) + \beta_9(Dow\ Jones\ Index\ Return) + \beta_{10}(GCEA) + \beta_{11}(GPDIA) + \beta_{12}(CFC) + \varepsilon$$

The theoretical linear regression model contains one dependent variable, one key independent variable, eleven control independent variables, and the error term epsilon.

<u>Linear Regression Model Non-Variable Terminology Discussion</u>

There are 3 non-variable sets of terms included in the equation. First, the Beta Intercept Coefficient β_0 is the constant or intercept of the regression model. It represents the expected value of the dependent variable "Real GDP Growth Rate" when the independent variable and all control variables are 0. It is the baseline growth rate when no other factors are influencing the Real GDP Growth Rate.

Next, twelve Beta Coefficients (β_1 through β_{12}) represent the relationship between each independent variable and the dependent variable. Each coefficient reveals the expected change in Real GDP Growth Rate for a one-unit increase in the corresponding variable while holding all other independent variables constant. I provide two examples of how these Beta Coefficients are interpreted. β_1 represents the change in the Real GDP Growth Rate for a change in House DV (from Democrat to Republican majority), holding all other independent variables constant. β_2 represents the change in the Real GDP Growth Rate for a one-unit increase in Net Exports, holding all other factors constant.

Lastly, the Error Term Epsilon (ε) accounts for the variation in the Real GDP Growth Rate that is not explained by the independent and control variables in the model. It includes factors not captured by the variables in the regression, such as external shocks, unforeseen events, or any other unmeasured influences on the Real GDP Growth Rate.

Results of First Model

I utilized Python to craft the first model[3]. I divided the regression output into two sections: the R-Squared value and the condition number. I will discuss the regression results in the second model for Hypothesis 1. The second model will remediate the multicollinearity issues discussed in the first model.

Hypothesis 1 Model 1 R-Squared Value

The R-Squared Value is an essential statistical metric used to deduce the "goodness of fit" of regression models. More specifically, it indicates how well the model explains the variability in the dependent variable by measuring the proportion of the variance in the dependent variable that are explained by the independent variables in the model. The R-Squared value ranges from 0 (model explains none of the variance) to 1 (model explains all of the variance). My model possesses an R-Squared value of 0.214, which reveals that 21.4% of the variation in the dependent variable "Real GDP Growth Rate" is explained by the model, and 78.6% of the variation is caused by other factors—which are either not included in the model or from random variation.

It is difficult to determine if this R-Squared value is "good" because different scientific fields have different standards for a "good" R-Squared value. For example, some social scientists suggest that an R-Squared value of at least 0.10 is "acceptable in social science empirical modelling provided that some or most of the explanatory variables are statistically significant"

[3] I utilized the pandas, statsmodel.api, sklearn.preprocessing, and statsmodels.stats.outliers_influence modules in Python to create and run the Ordinary-Least-Squares Linear Regression Model.

(Ozili, 2023). I purport that a “good” R-Squared value for a study performing cross-sectional analysis of economics and political science lies within a 0.10 to 0.20 range due to the complex questions that I posed in my hypothesis.

Hypothesis 1 Model 1 Condition Number & Multicollinearity

One glaring problem arose once I analyzed the OLS Regression results is the large condition number. If the condition number is between 1,000 and 30,000, then the condition number indicates potential multicollinearity. Therefore, my model’s condition number of 15,519.759 indicates potential multicollinearity or variable scaling issues. My objective is to reduce the condition number to a value of less than 1,000 because it would indicate that my model is affected by neither multicollinearity nor variable scaling issues.

Multicollinearity refers to a phenomenon where two or more independent variables (predictors) are highly correlated with each other. Consequently, the highly correlated independent variables provide redundant or overlapping information about the dependent variable. When multiple independent variables are highly correlated, it becomes difficult to determine the individual effect of each predictor on the dependent variable. Thus, it is difficult to assess the individual contribution of correlated predictors to the dependent variables.

A comparable scenario arises in special negligence doctrines. In a *res ipsa loquitur* negligence case, the plaintiff knows that an individual from a specific group of people caused them harm. However, the plaintiff does not know which individual from that group caused them harm. For example, if I underwent a surgical procedure and a member of the surgery team left a medical instrument in my body before sewing me back up, then I would be a victim of medical malpractice. However, I would not know which member of the surgical team left a medical instrument in my body because I was under anesthesia. Multicollinearity is the statistical equivalent because I know that a group of highly correlated independent variables are responsible for the multicollinearity issue. However, I do not know which independent variable has the highest impact on my dependent variable.

I will use the Variance Inflation Factor (VIF) test to remediate the multicollinearity issue. The VIF test is particularly useful because it quantifies how much the variance of my estimated regression coefficients is inflated due to multicollinearity. Variables with a VIF score exceeding 10 are possible sources of multicollinearity. The results of the VIF test are shown in Table 6.

Hypothesis 1 Model 1 Variables with High VIF Scores	
Variable	**VIF Score**
CFC	2317.965
Manufacturing Activity	1781.259
Industry Activity (Except Construction)	1502.828
GCEA	1361.849
GPDIA	446.555
Constant (Model's Intercept)	32.427
Net Exports	18.969
S&P 500 Index Return	13.643
Dow Jones Index Return	13.602

Table 6: VIF Scores

The most notable VIF scores are those of the CFC, GPDIA, GCEA, and production volume variables. The extremely high VIF scores indicate that these variables should be removed from the model. However, I purport that removing variables that are highly correlated with other variables should reduce the VIF scores of the remaining variables. Table 7 reveals the correlation scores for all independent variable pairs in the VIF table that are above 0.8. For reference, a correlation value exceeding 0.8 indicates a strong correlation.

Hypothesis 1 Model 1 Correlation Values		
Variable 1	**Variable 2**	**Correlation**
Manufacturing Activity	CFC	0.897
Industry Activity (Except Construction)	CFC	0.907
Industry Activity (Except Construction)	Manufacturing Activity	0.998
GCEA	CFC	0.995
GCEA	Manufacturing Activity	0.925
GCEA	Industry Activity (Except Construction)	0.932
GPDIA	CFC	0.993
GPDIA	Manufacturing Activity	0.914
GPDIA	Industry Activity (Except Construction)	0.922
GPDIA	GCEA	0.986
Net Exports	CFC	-0.931
Net Exports	Manufacturing Activity	-0.865
Net Exports	Industry Activity (Except Construction)	-0.862
Net Exports	GCEA	-0.936
Net Exports	GPDIA	-0.937
Dow Jones Index Return	S&P 500 Index Return	0.951

Table 7: Correlation Values

There are four distinct independent variable groups with high correlation values. First, the two "production volume" independent variables are highly correlated with each other, so I will remove the manufacturing production volume variable from the model. Second, the GPDIA, GCEA, and CFC independent variables are all highly correlated with each other. In an attempt to remediate this, I will remove the CFC and GPDIA variables. Second, the Dow Jones and S&P 500 Index returns variables are highly correlated with each other. I will remove the Dow Jones independent variable from the model because the S&P 500 includes more corporations in its index. Lastly, "Net Exports of Goods and Services" is highly correlated with all non-index independent variables, so I will remove it from the model. After removing the "problem" variables, the revised model lacks both variables with high VIF scores and high correlation to other variables. The revised model is provided below.

<u>Revised Model for Hypothesis 1</u>

$$Real\ GDP\ Growth\ Rate = \beta_0 + \beta_1(House\ DV) + \beta_2(Average\ Inflation\ Rate) + \beta_3(Unemployment\ Rate) + \beta_4(Industry\ Activity) + \beta_5(Federal\ Budget\ DV) + \beta_6(S\&P\ 500\ Index\ Return) + \beta_7(GCEA) + \varepsilon$$

Hypothesis 1 Revised Model Condition Number & VIF Scores

Now that the multicollinearity problem has been resolved, I will utilize Python to conduct Ordinary Least Squares (OLS) regression analysis on the new model. I utilized the pandas, statsmodel.api, sklearn.preprocessing, statsmodels.stats.outliers_influence, and tabulate modules. Before I delve into the coefficient interpretations and R-Squared value, I will analyze the condition number to determine if I need to modify my regression model further before the coefficient interpretation stage. The condition number for model 2 is 8,097.24, which indicates either non-severe multicollinearity or variable scaling. First, I am going to use the Variance Inflation Factor test to determine if multicollinearity is still present. For reference, a VIF score above 10 indicates problematic multicollinearity for that variable. The results of the VIF test are displayed in Figure 9 below.

Revised Model Variance Inflation Factor Results	
Variable	**Variance Inflation Factor (VIF) Score**
Constant (Model's Intercept)	1
House of Representatives Dummy Variable	1.587
Average Inflation Rate	1.113
Unemployment Rate	1.109
Industry Activity (Except Construction)	8.694
Federal Budget Dummy Variable	1.229
S&P 500 Index Return	1.107
GCEA	8.011

Table 8: VIF Scores for New Hypothesis 1 Model

Table 8 reveals that multicollinearity is not a significant issue in my model because none of the VIF values for my independent variables are greater than or equal to 10. Importantly, most of the VIF scores for my independent variables are close to 1, which indicates that the independent variables are not strongly correlated. Therefore, the large Condition Number is likely due to scaling differences between the variables. Variable scaling occurs when variables possess significantly different units or magnitudes. For example, the "Federal Budget" independent variable's values are listed in millions of dollars, whereas the "Unemployment Rate" independent variable's values are listed as percentages. To remediate this issue, I am going to standardize the variables by using the StandardScaler function from the "scikit-learn" module.

Hypothesis 1 Revised Model Condition Number

As shown in Table 7, standardizing the variables caused the Condition Number to decrease from 8,097.24 to 6.179. A Condition Number of 6.179 reveals excellent numerical stability in my model due to standardizing the independent variables. It also confirms that the large original condition number was due to scaling differences.

Hypothesis 1 Revised Model R-Squared

My model possesses an R-Squared value of 0.093, which reveals that 9.3% of the variation in the dependent variable "Real GDP Growth Rate" is explained by the model, and the remaining 90.7% of the variation is caused by other factors—which are either not included in the model or from random variation. Although the revised model's R-Squared value of 0.093 is notably lower than the original model's 0.214 R-Squared value, the revised model lacks the multicollinearity and scaling issues that plagued the original model. Holding all else equal, a model with less multicollinearity is preferable.

Interpreting the Ordinary Least Squares (OLS) Regression Results for Hypothesis 1 Revised Model

Hypothesis 1 Revised Model Linear Regression Results			
Coefficients, Standard Errors, and P-values			
Variable	**Coefficient**	**Standard Error**	**P-value**
Constant (Model's Intercept)	3.523	0.445	0
House of Representatives Dummy Variable	0.081	0.561	0.886
Average Inflation Rate	-0.291	0.47	0.537
Unemployment Rate	-0.439	0.469	0.352
Industry Activity (Except Construction)	-0.803	1.312	0.542
Federal Budget Dummy Variable	-0.584	0.494	0.24
S&P 500 Index Return	-0.24	0.468	0.61
GCEA	-0.418	1.26	0.741
Dependent Variable			
Real GDP Growth Rate			
Key Model Metrics			
Metric	**Value**		
R-Squared	0.093		
Condition Number	6.179		

Table 9: Hypothesis 1 Revised Model Linear Regression Results

As indicated in Table 9, there are eight coefficients prepared for interpretation. However, discussing the coefficient and error term for the key independent variable "House of

Representatives Dummy Variable" is paramount to solving my hypothesis. The "House of Representatives Dummy Variable" Beta Coefficient is equal to 0.081 ($\beta_1 = 0.081$). The positive coefficient suggests that, when there is a Republican majority in the House of Representatives (Dummy Variable = 1), the Real GDP Growth Rate is expected to increase by approximately 0.081 standard deviations compared to when a Democratic majority exists in the House of Representatives. All other independent variables are held constant. This coefficient is not statistically significant because the p-value of 0.886 is greater than the p-value of 0.10. Next, the standard error measures the variability or uncertainty in the coefficient estimate for the House of Representatives Dummy Variable. The large standard error contributes to the high p-value (0.886) because it is used to compute the t-statistic, which is then used to determine the p-value. A high standard error relative to the coefficient reveals that the coefficient estimate is unstable or imprecise, which implies that different samples of data could produce significantly different coefficient values. The standard error for the House of Representatives Dummy Variable (0.561) is much larger than the coefficient for the House of Representatives Dummy Variable (0.081), which indicates that the coefficient estimate is highly uncertain and likely varies significantly across different samples, which means that I cannot determine whether the observed relationship is real or due to random variation. Therefore, I cannot confidently conclude that the party in control of the House of Representatives significantly alters the Real GDP Growth Rate because the House of Representatives Dummy Variable is not statistically significant.

Hypothesis 1 Results

My hypothesis stated that specific independent variables—primarily the House of Representatives political party majority, but also inflation, unemployment, industrial economic activity, the federal budget, S&P 500 Index Returns, and GCEA—have an effect on economic growth, which is represented by the Real GDP Growth Rate.

However, the lack of statistical significance for my independent variables and the model forced me to fail to reject the null hypothesis. The null hypothesis was that these independent variables do not have a significant effect on the Real GDP Growth Rate. Therefore, based on the results detailed in previous sections, I reject the alternative hypothesis. My alternative hypothesis stated that these independent variables significantly affect the Real GDP Growth Rate.

Therefore, Hypothesis 1 does not hold because my model does not provide the robust evidence needed to reject the null hypothesis and accept the alternative hypothesis.

Notes for Subsequent Hypothesis Testing

First, I had to remove the Dow Jones Index, CFC, GPDIA, Net Exports, and “Production Volume: Economic Activity: Manufacturing” variables to address the multicollinearity issue in this model, the models for the subsequent three hypotheses will also omit these variables. Second, since the independent variables present in the models present variable scaling issues, I will standardize the independent variables for subsequent models. Lastly, the dependent variable and most of the independent variables will not change from model to model, so I will not redefine them. However, the newly introduced variables will be defined alongside the results of hypothesis testing.

Hypothesis 2: Senate Majority

Null & Alternative Hypotheses Recap

Null Hypothesis (H_0): There is no significant difference in the U.S. economy's performance under a Republican majority versus a Democratic majority in the Senate.

$H_0: \mu_{Senate_R} = \mu_{Senate_D}$

Alternative Hypothesis (H_A): The U.S. economy performs better under a Republican majority in the Senate compared to a Democratic majority.

$H_A: \mu_{Senate_R} > \mu_{Senate_D}$

Variable Selection Discussion

The only new variable introduced in this model is the "Senate DV" independent variable. It replaces the "House of Representatives DV" from Hypothesis 1. This dummy variable is crucial to my test of determining whether the political party in control of the Senate affects the performance of the U.S. economy—which is represented by the Dependent Variable "Real GDP Growth Rate". It represents the change in the Real GDP Growth Rate for a change in Senate DV (from Democrat to Republican majority), holding all other independent variables constant.

Theoretical Linear Regression Model

$$Real\ GDP\ Growth\ Rate = \beta_0 + \beta_1(Senate\ DV) + \beta_2(Average\ Inflation\ Rate) +$$
$$\beta_3(Unemployment\ Rate) + \beta_4(Industry\ Activity) +$$
$$\beta_5(Federal\ Budget\ DV) + \beta_6(S\&P\ 500\ Index\ Return) + \beta_7(GCEA) + \varepsilon$$

Results of Model

I used Python to create this model[4]. I first discussed the VIF scores, then the condition number, R-Squared, and OLS regression results.

Hypothesis 2 VIF Scores

Hypothesis 2 Model Variance Inflation Factor Results	
Variable	**Variance Inflation Factor (VIF) Score**
Constant (Model's Intercept)	1
Senate Dummy Variable	1.252
Average Inflation Rate	1.098
Unemployment Rate	1.081
Industry Activity (Except Construction)	8.177
Federal Budget Dummy Variable	1.164
S&P 500 Index Return	1.161
GCEA	7.964

Table 10: Hypothesis 2 Model VIF Scores

Table 10 reveals that neither multicollinearity nor variable scaling are significant issues in my model because none of the VIF values for my independent variables are remotely close to 10. Importantly, most of the VIF scores for my independent variables are close to 1, which indicates that the independent variables are not strongly correlated with each other.

Hypothesis 2 Model Condition Number

A condition number less than 1,000 is considered "generally safe", which means that my model contains neither multicollinearity nor variable scaling. Thus, the condition number of

[4] I utilized the pandas, statsmodel.api, sklearn.preprocessing, and statsmodels.stats.outliers_influence modules in Python to create and run the Ordinary-Least-Squares Linear Regression Model.

5.891 indicates that this model does not possess model-altering multicollinearity or variable scaling issues.

Hypothesis 2 Model R-Squared

My model possesses an R-Squared value of 0.092, which reveals that 9.2% of the variation in the dependent variable "Real GDP Growth Rate" is explained by the model, and the remaining 90.8% of the variation is caused by other factors—which are either not included in the model or from random variation.

Interpreting the OLS Regression Results for Hypothesis 2 Model

Hypothesis 2 Model Linear Regression Results			
Coefficients, Standard Errors, and P-values			
Variable	**Coefficient**	**Standard Error**	**P-value**
Constant (Model's Intercept)	3.523	0.445	0
Senate Dummy Variable	-0.007	0.498	0.988
Average Inflation Rate	-0.299	0.467	0.524
Unemployment Rate	-0.45	0.463	0.334
Industry Activity (Except Construction)	-0.736	1.273	0.565
Federal Budget Dummy Variable	-0.563	0.48	0.245
S&P 500 Index Return	-0.231	0.48	0.631
GCEA	-0.44	1.256	0.727
Dependent Variable			
Real GDP Growth Rate			
Key Model Metrics			
Metric	**Value**		
R-Squared	0.092		
Condition Number	5.891		

Table 11: Hypothesis 2 Model Linear Regression Results

As indicated in Table 11, there are eight coefficients prepared for interpretation. However, discussing the coefficient and error term for the key independent variable "Senate

Dummy Variable" is paramount to solving my hypothesis. The "Senate Dummy Variable" Beta Coefficient has a value of -0.007 ($\beta_1 = -0.007$). The negative coefficient suggests that, when there is a Republican majority in the Senate (Dummy Variable = 1), the Real GDP Growth Rate is expected to decrease by approximately 0.007 standard deviations compared to when a Democratic majority exists in the Senate. All other independent variables are held constant. This coefficient is not statistically significant because the p-value of 0.988 is greater than the p-value of 0.10. Next, the standard error measures the variability or uncertainty in the coefficient estimate for the Senate Dummy Variable. The large standard error contributes to the high p-value (0.988) because it is used to compute the t-statistic, which is then used to determine the p-value. A high standard error relative to the coefficient reveals that the coefficient estimate is unstable or imprecise, which implies that different samples of data could produce significantly different coefficient values. The standard error for the Senate Dummy Variable (0.498) is much larger than the coefficient for the Senate Dummy Variable (-0.007), which indicates that the coefficient estimate is highly uncertain and likely varies significantly across different samples, which means that I cannot determine whether the observed relationship is real or due to random variation. Therefore, I cannot confidently conclude that the party in control of the Senate significantly alters the Real GDP Growth Rate because the Senate Dummy Variable is not statistically significant.

Hypothesis 2 Results

My hypothesis stated that specific independent variables—primarily the Senate political party majority, but also inflation, S&P 500 Index Returns, the Federal Budget, and the

Unemployment Rate—have an effect on economic growth, which is represented by the Real GDP Growth Rate.

However, the lack of statistical significance for my independent variables and the model forced me to fail to reject the null hypothesis. The null hypothesis was that these independent variables do not have a significant effect on the Real GDP Growth Rate. Therefore, based on the results detailed in previous sections, I reject the alternative hypothesis. My alternative hypothesis stated that these independent variables significantly affect the Real GDP Growth Rate.

Therefore, Hypothesis 2 does not hold because my model does not provide the compelling evidence needed to reject the null hypothesis and accept the alternative hypothesis.

Hypothesis 3: Presidency

Null & Alternate Hypotheses Recap

Null Hypothesis (H_0): There is no significant difference in the U.S. economy's performance under a Republican president versus a Democratic president.

$H_0: \mu_{President_R} = \mu_{President_D}$

Alternative Hypothesis (H_A): The U.S. economy performs better under a Republican president compared to a Democratic president.

$H_A: \mu_{President_R} > \mu_{President_D}$

Variable Selection Discussion

The only new variable introduced in this model is the "President DV" independent variable. It replaces the "Senate DV" from Hypothesis 2. This dummy variable is crucial to my test of determining whether the political party in control of the presidency affects the performance of the U.S. economy—which is represented by the Dependent Variable "Real GDP Growth Rate".

Theoretical Linear Regression Model

$$Real\ GDP\ Growth\ Rate = \beta_0 + \beta_1(President\ DV) + \beta_2(Average\ Inflation\ Rate) + \beta_3(Unemployment\ Rate) + \beta_4(Industry\ Activity) + \beta_5(Federal\ Budget\ DV) + \beta_6(S\&P\ 500\ Index\ Return) + \beta_7(GCEA) + \varepsilon$$

Linear Regression New Non-Variable Terminology Discussion

The new non-variable term introduced in this model is beta coefficient β_1 for the "President DV" independent variable. It represents the change in the Real GDP Growth Rate for a change in President DV (from Democrat to Republican president), holding all other independent variables constant.

Results of Model

I employed Python to create this model[5]. I include the VIF test and Variable Standardization components to ensure that my model is immediately ready for analysis. I will sequentially discuss the R-Squared value, the condition number, the VIF scores, and the variable coefficients.

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[5] I utilized the pandas, statsmodel.api, sklearn.preprocessing, and statsmodels.stats.outliers_influence modules in Python to create and run the Ordinary-Least-Squares Linear Regression Model.

Hypothesis 3 Model VIF Scores

Hypothesis 3 Model Variance Inflation Factor Results	
Variable	**Variance Inflation Factor (VIF) Score**
Constant (Model's Intercept)	1
President Dummy Variable	1.087
Average Inflation Rate	1.103
Unemployment Rate	1.094
Industry Activity (Except Construction)	8.125
Federal Budget Dummy Variable	1.129
S&P 500 Index Return	1.102
GCEA	8.267

Table 12: Hypothesis 3 Model VIF Scores

Table 12 reveals that multicollinearity is not a significant issue in my model because none of the VIF values for my independent variables are remotely close to 10. Importantly, most of the VIF scores for my independent variables are close to 1, which indicates that the independent variables are not strongly correlated with each other.

Hypothesis 3 Model R-Squared

My model possesses an R-Squared value of 0.128, which reveals that 12.8% of the variation in the dependent variable "Real GDP Growth Rate" is explained by the model, and the remaining 87.2% of the variation is caused by other factors—which are either not included in the model or from random variation.

Hypothesis 3 Model Condition Number

A condition number less than 1,000 is considered "generally safe", which means that my model contains neither multicollinearity nor variable scaling. Thus, the condition number of 5.785 indicates that this model does not possess model-altering multicollinearity or variable scaling issues.

Interpreting the OLS Regression Results for Hypothesis 3 Model

Hypothesis 3 Model Linear Regression Results			
Coefficients, Standard Errors, and P-values			
Variable	Coefficient	Standard Error	P-value
Constant (Model's Intercept)	3.523	0.436	0
President Dummy Variable	-0.799	0.455	0.083
Average Inflation Rate	-0.352	0.458	0.444
Unemployment Rate	-0.359	0.456	0.434
Industry Activity (Except Construction)	-0.252	1.244	0.84
Federal Budget Dummy Variable	-0.602	0.464	0.198
S&P 500 Index Return	-0.298	0.458	0.517
GCEA	-0.902	1.255	0.474
Dependent Variable			
Real GDP Growth Rate			
Key Model Metrics			
Metric	Value		
R-Squared	0.128		
Condition Number	5.785		

Table 13: Hypothesis 3 Model Linear Regression Results

As indicated in Table 13, there are eight coefficients prepared for interpretation. However, discussing the coefficient and error term for the key independent variable "President DV" is paramount to solving my hypothesis. The "President Dummy Variable" Beta Coefficient has a value of -0.799 ($\beta_1 = -0.799$). The negative coefficient suggests that, when there is a Republican president (Dummy Variable = 1), the Real GDP Growth Rate is expected to decrease by approximately 0.799 standard deviations compared to a Democratic president. All other independent variables are held constant. This coefficient is statistically significant because the p-value of 0.083 is less than the p-value of 0.10.

Next, the standard error measures the variability or uncertainty in the coefficient estimate for the President Dummy Variable. In this case, the estimated effect of a Republican president on

GDP growth varies by approximately 0.455 standard deviations across different samples. Notably, the standard error (0.455) is moderate compared to the coefficient value (-0.799), which suggests a reasonable level of precision. Together, the moderate standard error value and the statistically significant p-value indicate that the relationship between presidential party control and the Real GDP Growth Rate is not likely due to random chance. However, I cannot declare that the U.S. economy performs better under a Republican president due to the negative independent variable coefficient, which indicates that the U.S. economy performs better under a Democratic president. Therefore, I can confidently conclude that the party in control of the presidency significantly alters the Real GDP Growth Rate, but I cannot reject Hypothesis 3's Null Hypothesis and accept Hypothesis 3's Alternative Hypothesis because the Alternative Hypothesis stated that the U.S. economy performs better under a Republican president compared to a Democratic president.

Hypothesis 3 Results

My hypothesis stated that specific independent variables—primarily the political party of the president, but also inflation, S&P 500 Index Returns, the Federal Budget, and the Unemployment Rate—have an effect on economic growth, which is represented by the Real GDP Growth Rate.

Notably, the sole independent variable that was found to have a statistically significant effect on the dependent variable "Real GDP Growth Rate" is "President DV". Therefore, I can reject the null hypothesis and accept the alternate hypothesis, which stated that the political party affiliation of the president significantly affected the Real GDP Growth Rate. However, the OLS test results contradict my hypothesis, which stated that a Republican president would yield a higher Real GDP Growth Rate. Conversely, Democratic president yield a higher Real GDP Growth Rate. 8 Democratic presidents have served for a combined 44 years, whereas 7 Republican presidents served for a combined 44 years between 1940 and 2022. I purport that the complexity of this relationship is not captured fully in this linear regression model. Therefore, I cannot accept the alternative hypothesis because the results of my research proved the inverse of my alternative hypothesis.

Hypothesis 4: Unified Versus Divided Government

Null Hypothesis (H_0): There is no significant difference in the U.S. economy's performance under a unified government compared to a divided government.

$H_0: \mu_{Unified} = \mu_{Divided}$

Alternative Hypothesis (H_A): The U.S. economy performs better under a unified government compared to a divided government.

$H_A: \mu_{President_R} > \mu_{President_D}$

Variable Selection Discussion

The only new variable introduced in this model is the "Government Type DV" independent variable. It replaces the "President DV" from Hypothesis 2. This dummy variable is crucial to my test of determining whether the government being unified—where the same political party in control of both the White House and Congress—or divided affects the performance of the U.S. economy—which is represented by the Dependent Variable "Real GDP Growth Rate".

Theoretical Linear Regression Model

$$Real\ GDP\ Growth\ Rate = \beta_0 + \beta_1(Government\ Type\ DV) + \beta_2(Average\ Inflation\ Rate) + \beta_3(Unemployment\ Rate) + \beta_4(Industry\ Activity) + \beta_5(Federal\ Budget\ DV) + \beta_6(S\&P\ 500\ Index\ Return) + \beta_7(GCEA) + \varepsilon$$

Linear Regression New Non-Variable Terminology Discussion

The new non-variable term introduced in this model is beta coefficient β_1 for the "Government Type DV" independent variable. It represents the change in the Real GDP Growth Rate for a change in Government Type DV (from unified to divided), holding all other independent variables constant.

Results of Model

I used Python to create this model[6]. I include the VIF test and Variable Standardization components to ensure that my model is immediately ready for analysis. I will sequentially discuss the R-Squared value, the condition number, the VIF scores, and the variable coefficients.

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[6] I utilized the pandas, statsmodel.api, sklearn.preprocessing, and statsmodels.stats.outliers_influence modules in Python to create and run the Ordinary-Least-Squares Linear Regression Model.

Hypothesis 4 Model VIF Scores

Hypothesis 4 Model Variance Inflation Factor Results	
Variable	**Variance Inflation Factor (VIF) Score**
Constant (Model's Intercept)	1
Government Type Dummy Variable	1.305
Average Inflation Rate	1.099
Unemployment Rate	1.139
Industry Activity (Except Construction)	8.727
Federal Budget Dummy Variable	1.243
S&P 500 Index Return	1.097
GCEA	8.462

Table 14: Hypothesis 4 Model VIF Scores

Table 14 reveals that multicollinearity is not a significant issue in my model because none of the VIF values for my independent variables are remotely close to 10. Importantly, most of the VIF scores for my independent variables are close to 1, which indicates that the independent variables are not strongly correlated with each other.

Hypothesis 4 Model R-Squared

My model possesses an R-Squared value of 0.111, which reveals that 11.1% of the variation in the dependent variable "Real GDP Growth Rate" is explained by the model, and the remaining 88.9% of the variation is caused by other factors—which are either not included in the model or from random variation.

Hypothesis 4 Model Condition Number

A condition number less than 1,000 is considered "generally safe", which means that my model contains neither multicollinearity nor variable scaling. Thus, the condition number of

5.961 indicates that this model does not possess model-altering multicollinearity or variable scaling issues.

Interpreting the OLS Regression Results for Hypothesis 4 Model

Hypothesis 4 Model Linear Regression Results			
Coefficients, Standard Errors, and P-values			
Variable	Coefficient	Standard Error	P-value
Constant (Model's Intercept)	3.523	0.441	0
Government Type Dummy Variable	0.631	0.503	0.214
Average Inflation Rate	-0.286	0.462	0.537
Unemployment Rate	-0.316	0.47	0.504
Industry Activity (Except Construction)	-0.185	1.302	0.887
Federal Budget Dummy Variable	-0.375	0.491	0.447
S&P 500 Index Return	-0.207	0.461	0.656
GCEA	-0.852	1.282	0.508
Dependent Variable			
Real GDP Growth Rate			
Key Model Metrics			
Metric	Value		
R-Squared	0.111		
Condition Number	5.961		

Table 15: Hypothesis 4 Model Linear Regression Results

As indicated in Table 15, there are 8 coefficients prepared for interpretation. However, discussing the coefficient and error term for the key independent variable "Government Type DV" is paramount to solving my hypothesis. The "Government Type Dummy Variable" Beta Coefficient has a value of 0.631 ($\beta_1 = 0.631$). The positive coefficient suggests that, when there is a Unified Government (Dummy Variable = 1), the Real GDP Growth Rate is expected to increase by approximately 0.631 standard deviations compared to a Divided Government. All other independent variables are held constant. This coefficient is not statistically significant because the p-value of 0.214 is greater than the p-value of 0.10. Next, the standard error measures the variability or uncertainty in the coefficient estimate for the Senate Dummy Variable. The large standard error contributes to the high p-value (0.214) because it is used to compute the t-statistic, which is then used to determine the p-value. A high standard error relative to the coefficient reveals that the coefficient estimate is unstable or imprecise, which implies that different samples of data could produce significantly different coefficient values. The standard error for the Government Type Dummy Variable (0.503) is much larger than the coefficient for the Government Type Dummy Variable (0.631), which indicates that the coefficient estimate is highly uncertain and likely to vary significantly across different samples, which means that I cannot determine whether the observed relationship is real or due to random variation. Therefore, I cannot confidently conclude that the overall composition of the federal government (unified vs divided) significantly alters the Real GDP Growth Rate because the Government Type Dummy Variable is not statistically significant.

Hypothesis 4 Results

My hypothesis stated that specific independent variables—primarily the political party of the president, but also inflation, S&P 500 Index Returns, the Federal Budget, and the Unemployment Rate—have an effect on economic growth, which is represented by the Real GDP Growth Rate. None of the independent variables are statistically significant—including the Government Type DV. Thus, I cannot accept the alternative hypothesis and declare that the Government Type dummy variable has a statistically significant effect on the Real GDP Growth Rate.

Conclusion

I was unable to prove my hypotheses due to their lack of statistical significance. However, the dummy variable for the President's political party was statistically significant, which indicates that a collection of different independent variables and "President DV" may yield a hypothesis-proving model. An issue that I faced was finding independent variables that contained observations for every year of the study. Unfortunately, promising independent variable candidates were scrapped because they missed observations for at least 30 years of the timeframe explored in this study. Additionally, the multicollinearity problem encountered in Hypothesis 1 forced me to remove independent variables. Therefore, sourcing independent variables that possess observations for the full time period without generating multicollinearity is a priority for subsequent research. I also purport that the lack of significance in my models is due to endogeneity—a model-threatening issue that must be addressed to render the model interpretable and actionable.

Endogeneity refers to a situation where an independent variable is correlated with the error term epsilon in a regression model. The presence of endogeneity violates the assumption of exogeneity, which is essential for obtaining unbiased and consistent estimates in a multitude of statistical models—including Ordinary Least Squares (OLS). There are two primary consequences of endogeneity. First, the presence of endogeneity yields biased and inconsistent parameter estimates. Second, the presence of endogeneity can cause misleading inference, which can affect decision-making based on the model. There are three causes of endogeneity: Omitted Variable Bias, Simultaneity, and Measurement Error.

First, Omitted Variable Bias (OVB) occurs when a model is devoid of one or more relevant variables that are correlated with both the dependent variable and the independent variables included in the model. The omission of these variables consequently lead to biased or inaccurate estimates of the relationship between independent variables and the outcome. If a variable not in the model is correlated to both the dependent variable and at least one of the independent variables in the model, then the estimated effect of the included variables will be skewed because part of the effect is attributed to the wrong variable. Since part of the independent variable's coefficient is actually from a variable not included in the model, the coefficient interpretation for the independent variable's coefficient is incorrect. I purport that Omitted Variable Bias is present in my model because it is highly likely that there are independent variables that are correlated to both the Real GDP Growth Rate and at least one of my economic independent variables.

A potential source of Omitted Variable Bias (OVB) in my model is population growth, which is related to both the dependent variable "Real GDP Growth Rate" and independent variables such as "Unemployment Rate" and "Production Volume". Higher population growth expands the labor force, which leads to higher GDP growth even if productivity remains unchanged. By excluding population growth, my models may overestimate the negative effect of unemployment on "Real GDP Growth Rate" because economic growth may be driven by a growing labor force. Part of the effect of the "Population Growth" variable may have been lumped into the "Unemployment Rate" coefficient, which means that the observed effect on "Real GDP Growth Rate" by "Unemployment Rate" is magnified by the omitted variable "Population Growth". If I include the "Population Growth" independent variable, the "Unemployment Rate" coefficient may shrink and magnitude—which would reflect a more accurate relationship. Similar omitted variables, such as "Labor Force Participation Rate", "Technological Progress", and "Immigration Rates" may similarly inflate independent variables in my models. Other economic variables, such as independent variables that represents wars, major policy changes, and global GDP growth may yield similar adverse effects on my model and thus deserve independent variable consideration for future studies.

However, there are tests that can help researchers detect Omitted Variable Bias. For example, the Ramsey Regression Specification Error Test (RESET) checks for misspecification of the function form of the regression model. The RESET test can detect omitted variables that cause misspecification by adding powers or combinations of fitted values to the regression and check their joint significance. If researchers are interested in pursuing this topic in a future study, they must ensure that Omitted Variable Bias is not present. If you cannot accurately interpret your model, then you cannot prove or predict anything with it.

Second, Simultaneity occurs when there is a two-way causal relationship between the independent and dependent variables. For example, supply and demand are determined simultaneously because they influence each other. However, the dependent variable must not affect the independent variables. Lastly, measurement error occurs when a researcher erroneously measures an independent variable, which leads to attenuation bias—where coefficients are biased toward zero. If measurement errors are correlated with other variables, the bias may cause unpredictable levels of harm to the validity of my interpretations.

There are two potential cases of simultaneity in my model. The first potential case concerns the independent variable "Unemployment Rate" and the dependent variable "Real GDP Growth Rate". My model contains the assumption that unemployment affects GDP growth. However, GDP growth also affects unemployment via Okun's Law, as higher GDP growth reduces unemployment. This relationship may lead to simultaneity bias because the relationship goes in both directions. The second potential case concerns the independent variable "Gross

Private Domestic Investment (GPDIA)" and the dependent variable "Real GDP Growth Rate". My model contains the assumption that GPDIA leads to more GDP growth. However, higher GDP growth can also increase private investment, which means that GPDIA is both a "cause" and an "effect". Therefore, the relationship between GPDIA and "Real GDP Growth Rate" may exhibit simultaneity bias.

The third type of endogeneity, measurement error, may be present in my model. For example, the "Real GDP Growth" dependent variable may suffer from measurement errors due to inflation adjustments, data revisions, or national accounting errors. Additionally, independent variables that are surveyed may suffer from measurement errors due to errors in the survey process. Misreporting in surveys may bias the effect of such variables on GDP growth.

Endogeneity presents a serious challenge in regression analysis, and several methods that can address it are discussed. Since endogeneity often arises from Omitted Variable Bias, some of the proposed endogeneity solutions also address Omitted Variable Bias. First, the inclusion of Instrumental Variables (IV) can resolve endogeneity because IVs are correlated with the policy-related endogenous explanatory variables but not with the error term. For example, high government spending may coincide with low GDP growth not because spending reduces growth, but because it is a response to a recession. I could use IVs such as election cycles or exogenous events that influence policy but not GDP directly.

Second, the researcher can include omitted variables in the regression model, such as "Population Growth" or "Technological Growth". Addressing Omitted Variable Bias is discussed in-depth earlier in the conclusion.

Third, the researcher can control for time-invariant unobserved heterogeneity in panel data. An example of time-invariant unobserved heterogeneity is "ideology", which influences both policy and economic outcomes. Fixed effects help isolate the within-entity variation, which allows models to give researchers more reliable estimates of policy impacts. To clarify, panel data is a type of dataset that combines cross-sectional and time-series data, which means that it tracks multiple entities, or “panels”, across multiple time periods. My dataset is a panel dataset for three reasons. First, my dataset contains time variation, which is represented in the “Year” column. Second, I have observations across different potential entities—such as different Presidents and Congresses—which serve as cross-sectional entities. Third, the cross-sectional entities repeat across different years with varying values, which indicates panel data. For example, I have eighteen unique presidents and forty-two unique Congress iterations in my dataset. Each President and Congress iteration appear for multiple years.

Fourth, the researcher could use lagged versions of public policy indicators—such as lagged government spending or lagged partisan control—to reduce simultaneity concerns and more accurately reflect the delayed impact of policy on economic performance. To clarify, lagged variables are past values of explanatory variables used in my model to explain or predict current outcomes. In my model, they can answer questions such as “How did government spending in 2021 affect 2022’s Real GDP growth?". Since policy decisions made by one Congress iteration or President have delayed effects on the broader economy, I can utilize lagged variables to accurately account for the effects of past policy decisions on the U.S. economy. Instead of erroneously attributing the policy decisions of a past Congress iteration or President to a more recent Congress iteration or President, lagged variables link those effects to the correct political actors and time period in which the decisions were made. Lagged variables were not considered for this study because I considered this study to be an “initial foray” into a novel, cross-disciplinary topic that aims to establish a foundational understanding of the political-economic relationship. The primary goal of this research was to explore the effects of political, economic, and financial variables on Real GDP Growth. I envision the incorporation of lagged variables in a subsequent research paper, which would build upon this foundation by capturing and analyzing the delayed effects of policy decisions in greater depth.

Lastly, the researcher would explicitly model endogeneity by utilizing the Two-Stage Least Squares (2SLS) Method. For example, say I were interested in the effect of federal budget size on Real GDP Growth. However, the budget might itself be a response to economic performance—as governments might spend more during recessions. This “feedback loop” would make federal budget an endogenous variable—which I would model utilizing the 2SLS Method. Before I executed the 2SLS Method, I would decide to use the instrumental variable “the partisan composition of Congress two years prior” because it might influence spending levels but not directly affect Real GDP growth. In the first stage of the 2SLS Method, I would utilize this instrumental variable to isolate the exogenous (unbiased) part of the endogenous federal budget independent variable. The result would be a predicted value of the federal budget independent variable that would be based only on exogenous variation—and not on current economic conditions. In the second stage of the 2SLS Method, I would replace the actual (potentially biased) federal budget independent variable in my main models with the predicted budget from Stage 1. This stage would estimate the causal effect of the federal budget on Real GDP Growth by using only the portion of budget variation that came from the instrument—from political composition, not from reactions to the economy. This two-step process would help correct for reverse causality and omitted variable bias, which would allow me to more confidently interpret the relationship between public policy (like spending) as causal—not just correlational.

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