United States Tax Rates and Economic Growth

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Abstract
American politicians aim to create economic activity that will expand the economy and provide opportunities for citizens. Today (in 2022), President Joseph Biden presents an ambitious tax plan to grow the economy and provide for more equal opportunities. With Biden’s aim for a tax increase, this research examines the impacts of tax and other economic variables on economic wellbeing. In turn, this research provides a timely update on contributing factors to economic growth. Previous academic research shows the impacts of tax rates and common economic variables related to U.S. economic growth. We gather data from 1960 to 2020 to explore U.S. real gross domestic product (GDP) per capita. Through a series of multiple regression models, we find that increases in the highest statutory corporate and personal income tax rates reduce real GDP per capita. Growth in net exports of goods and services, M2 money supply, multifactor productivity and cost, collectively increase real GDP per capita, while, the personal savings rate, and the market value of gross federal debt decrease real GDP per capita. We recommend that if Congress elects to raise tax rates, it should start with the personal income tax rate.

Keywords
United States public policy, United States economic growth, tax rates and economic growth, tax policy

Introduction
The United States accounts for 25% of global gross domestic product (GDP; Kose et al., 2017). The largest share of the largest 500 private companies, with nearly a quarter, are headquartered in the United States (Fortune, 2021). The economic power of the United States extends beyond corporations and includes individuals, with the country having the highest number of billionaires in the world, with 724 (Dolan et al., 2021).

The role of the economy has long been a central theme amongst politicians. As the 1992 Bill Clinton campaign succinctly put it, “the economy, stupid” emphasizes the importance of economic performance is often a deciding factor in elections. Indeed, William McKinley is the only president to win reelection with a recession occurring at some point in the last 2 years of the first term (Hutzler, 2020). Contemporary claims between both political parties lay claim to building and maintaining the United States’ hegemonic economic status.

Due to their importance, tax policy has long been a central focus of presidential administrations. The so-called Reagan revolution in the 1980s hailed and championed in rhetoric if not necessarily in policy, the return of government to the people and the emphasis on cost effective government programs. The impact of government programs was to be measured by costs and benefits. In almost a financial model, this would spread to Clinton’s emphasis on the New Performance Review (Gore, 1993). In 2001, George W. Bush cut income taxes further while Barack Obama fought to raise them; still, the Bush tax cuts largely remained. Trump’s Tax Cuts and Jobs Act in 2017 re-emphasized income and corporate tax cuts while Biden now proposes to raise taxes on America’s corporations and highest earners.

With President Biden’s aspiration to raise taxes on America’s wealthiest individuals and corporations, our research question gets to the heart of questions, and actions proposed by economists, politicians, academics, and business leaders. The main objective of the paper seeks to test empirically the effects of the United States government tax policy on the real gross domestic product (GDP) per capita. Specifically, we propose to investigate what conditions lead to growth in real GDP per capita? Our approach to responding to this research question is twofold. First, in this

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investigation, we identify commonly correlated variables with real GDP per capita; second, we devise a regression analysis showing the impacts of the top correlated variables associated with real GDP per capita. In our exploration, at both stages we emphasize and identify the highest statutorily approved tax rates. We studied the top rates given Mr. Biden’s tax change focus centered on corporations and top earners rather than average tax rates.

Our outcome of interest is real GDP per capita. The World Bank considers GDP as the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion as well as the degradation of natural resources (World Bank, 2020). Nonetheless, to measure the impact on whether the GDP is growing or contracting for year-over-year analysis, the “real” GDP must be considered. The GDP considers nominal or current prices. For “real” GDP, the nominal value is adjusted to consider price adjustments to see whether the value of an output is increasing (Callen, 2020). In other words, real GDP considers the effects of inflation, while real GDP per capita takes into consideration the population basis.

While we considered many variables measuring economic wellbeing, including median personal income, the United Nations Human Development Index (discussed later), and U.S. life expectancy, we have focused our analysis on real GDP per capita. While this measure does not capture the overall standard of living or well-being for a country, particularly in countries with high levels of income inequality, the benefits of using this outcome entail long ranging readily available historical data. Moreover, the real GDP per capita in the U.S. highly correlates to other newer metrics encapsulating economic wellbeing.

Since 1990, the United Nations computes a Human Development Index, which ranks countries not just based on data flowing into real GDP per capita, but on other factors such as life expectancy, literacy, and school enrollment (Human Development Reports, 2021). An examination of the United Nations Human Development Index in comparison to real GDP per capita from 1990 to 2019 reveals a positive correlation of .950 with a p-value of 3.305E−15. Similarly, life expectancy from 1960 to 2020 in the United States highly correlates with the real GDP per capita at the level of .979 with a p-value of 8.899E−42. Notably, all of these correlations were statistically significant at the alpha level of .05.

Understandably, real GDP per capita may not measure the overall standard of living or well-being for a typical citizen in a particular country. To illustrate, the Saudi Arabian royal family stands as the richest royal family with a net worth of $1.4 trillion with plentiful oil reserves (Umoh, 2018); nonetheless, estimates put the Saudi Arabian poverty rate at upwards of 1/4 of the country (Sullivan, 2013). In context, the United States Census describes its poverty rate at 10.5% (Semega et al., 2020). In this case, it may be difficult to distinguish whether the average citizen is better or worse off just by utilizing the real GDP per capita. Moreover, increased outputs may come at the cost of environmental damage or other external costs including loss of leisure time or the overall distribution of wealth in the country. Other metrics such as the Genuine Progress Indicator or Bhutan’s Gross National Happiness seek to compute this economic wellbeing.

Ultimately, we settled on real GDP per capita as our measurement of consideration for the economic wellbeing focus for the United States in this study. This selection stemmed from our desire to start our data sample to contain data from 1960 to 2020. This gave us a longer history and more data than what many of the newer wellbeing indexes could provide.

Academic studies of economic wellbeing have been extensive. In this section, we summarize these efforts focusing on particular subsets of relevant literature and the specific contributory variables being considered. With our focus on empirical work, we emphasize literature and theories that can be measured through observational means.

Lee and Gordon (2005) note in economic theory that both neoclassical and endogenous economic theories consider the influence of taxes on growth. Neoclassical theories examine the relationship between capital and labor in an economy as determining the total output. Neoclassical theories consider taxes as only a temporary influence on income growth rates moving toward equilibrium growth models. In contrast, endogenous growth models assume steady state growth determined by economic agencies. Therefore, taxes affect parameters like return of return, or amount invested in research and development, and may influence steady state growth.

In the realm of tax policy, early scholars observe on taxes and rates of capital investment that low current effective tax rates on new investment suggest faster short-run growth, resulting from an investment boom in response to temporarily lower tax rates (Hall & Jorgenson, 1967). Well-documented empirical research identifies and confirms the impact of higher taxes coinciding with lower economic growth (Adams 1984; Canto & Webb, 1987; Vedder, 1995). More recently, employing an endogenous growth model, Poulson and Kaplan (2008) analyze the impact of marginal tax growth across states confirming through a regression analysis a significant negative impact of higher marginal tax rates on economic growth. Marples and Gravelle (2014) find two economic variables labor supply, and savings and investment to be relatively insensitive to tax rates with capital gains taxes having but a modest effect on the cost of capital; still promised feedback effects on tax reductions seem to fail to materialize and justify the cuts. From a developing country perspective, Rodrick (2014) expressed a difficulty in finding a strong correlation between tax rates and rates of economic growth.

More recent literature attempts to evaluate and speak directly to the projected impacts of Biden’s tax proposals.
Scholars projected as of June 2020 that Biden’s tax proposals would modestly reduce gross domestic product by 0.06% over the next decade, slightly increase the GDP the second decade, and result in a small reduction in GDP in the long run 0.2% (Pomerleau et al., 2020). A separate study found more unfavorable outcomes from the Biden tax plan suggesting it would reduce GDP by 1.62% over the long term, and a 1.9% decline in after-tax incomes for all taxpayers on average (Watson et al., 2020). Another study suggests that Biden’s tax agenda will result in a 4% to 5% decline in real GDP per capita in the long run (Mulligan, 2020). While those forecasts, provide context on the potential growth, our model running with historical data shows the impact of rates as they relate to the past trends in economic growth.

Methodology

The timeframe for our study includes a time series analysis from 1960 to 2020. First, for practical considerations this timeframe was selected due to the reliable and readily available published data. Second, practically speaking, the 1960s marked a transformational time of change in the United States as technological, political, and social changes began to emerge. Beginning in 1960, the United States elected Democrat John F. Kennedy. As president, Kennedy (1962) accelerated growth in the Space Program with the emphasis of putting a man on the moon by the end of the decade. This space program growth turned into a catalyst for technological innovation in this era. Moreover, Kennedy’s 1963 assassination on live television deeply moved the country (Sheatsley & Feldman 1964).

The 1960s also witnessed an emphasis on equality, and inclusion by prominent Civil Rights leaders such as Martin Luther King, Jr. and Malcolm X. The 1964 Civil Rights Act signed into law by Lyndon B. Johnson prohibited discrimination based on race, color, religion, sex, or national origin. The act improved voting rights and pushed for school desegregation. The 1960s also marked the coming of age for children of the baby boom including President Biden from America’s Post World War II push for continued industrialization and technological modernization. Woodstock, anti-war movements, the environmental movement, and a beginning of an emphasis on post-materialism all eclipsed the decade (Inglehart & Abramson 1999). In Public Administration theory, New Public Administration began to emerge with scholars such as Waldo, Frederickson, and Krislov all spoke on social equity expanding the considerations for what the public sector should entail.

Our empirical strategy employs a quantitative regression analysis seeking to measure the United States real GDP per capita. First, our analysis identifies real GDP per capita as our y-dependent variable. Next, we identify possible x-independent variables for inclusion. As mentioned, our sample data includes annual data from 1960 to 2020 from United States government sources for all variables. We start with common government measurements related to economic wellbeing in the United States to see how they relate to our intended dependent variable of real GDP per capita. A correlation analysis compares the dependent variable with the varying independent variables. Prior to conducting regression analyses, we performed a unit root test on our dependent variable (real GDP per capita) to ascertain if it is stationary and make adjustments to our modeling as appropriate. Subsequently, we conducted a series of regression analyses to explore our data. Namely, we emphasize in these analyses the top personal and corporate tax rates along with other variables. We then run a stepwise regression analysis based on the top four variables in addition to the top corporate and top personal tax rate to create our least squares regression model. We also run a best subsets regression model. To conduct the statistical analyses we used Microsoft Excel accompanied with the statistical analysis add-in Phstat2.

Data Selection and Data Set

In this section, we identify and describe each of the potential variables for our regression analysis. Following is a list of those variables and a working definition for each of those for our analysis.

**Dependent variable**
- Real GDP per capita—this has been previously articulated in the paper.

**Independent variables**
- Top corporate rate—historical top statutory corporate tax rates at the federal level on U.S. corporations. The effective tax rate may vary due to corporate-level deductions and distributions (Tax Policy Center, 2020).
- Top personal rate—historical top personal tax rates that apply to U.S. citizens when filing personal taxes. This refers to the highest marginal tax rate a filer can pay if their income surpasses a certain threshold. This rate does not include deductions that filers may receive or take on personal taxes (Bankrate, 2021).
- Net exports of goods and services (2020)—is the difference between U.S. exports of goods and services and U.S. imports of goods and services. Exports refer to the total U.S. production of the gross domestic product that is supplied to the rest of the world. Imports refer to total U.S. gross domestic purchases that are provided by the rest of the world to the U.S.
- M2 money supply—includes M1 (cash and checking deposits) along with money market securities, mutual funds, and other “near money” time deposits (Anderson, 2021)
- Market value of gross federal debt—market value of U.S. government debt that is adjusted to reflect
market interest rates for the period being observed (Fed, 2021c).

- Personal saving rate—is calculated as personal income minus personal outlays and personal taxes; the personal saving rate is a percentage of disposable personal income (Fed, 2021b).
- Effective federal funds rate—the interest rate at which depository institutions trade federal funds (balances held at the Federal Reserve Banks) with each other overnight (Fed, 2021a).
- Multifactor productivity and cost—is a measure of economic performance that compares the amount of goods and services produced (output) to the amount of combined inputs used to produce those goods and services. Inputs can include labor, capital, energy, materials, and purchased services (United States Bureau of Labor Statistics, 2021a, 2021b).
- Unemployment rate—the proportion of unemployed individuals as a percentage of the labor force (the labor force is the sum of the employed and unemployed; United States Bureau of Labor Statistics, 2021a, 2021b).
- S&P 500 annual return—annual YoY return on the market-capitalization-weighted index of the 500 largest publicly-traded companies in the U.S (Kenton & Boyle, 2021).
- U.S. President party affiliation—is a qualitative metric that represents what political party the President of the United States belonged to. In our data, we coded with a dummy variable with a “0” representing a Republican President in office. In contrast, a “1” represents a Democratic President in office (Prints and Photographs Division, 2021).

The study data came from government and non-profit sources. The real GDP per capita came from the St. Louis Fed. The top corporate rate and top personal rate came from the Tax Policy Center. The net exports of goods and services, M2 money supply, market value of gross federal debt, personal saving rate, and the effective federal funds rate came from the St. Louis Fed. The multifactor productivity and cost, and the unemployment rate came from the U.S. Bureau of Labor Statistics. The S&P 500 annual return came from Macrotrends. The U.S. President party affiliation came from The Library of Congress. Summary statistics for each of the potential independent variables are included in the Appendix. Source locations are further cited in the paper’s bibliography.

**Results**

In this section, we highlight our process of analyzing the data, including the use of correlation, and a series of regression analyses. A correlation matrix of the real GDP per capita lag 1 and the independent variables selected for this analysis can be seen in Figure 1 below.

We created a correlation matrix with the data from identified variables which resulted in 11 independent variables compared to real GDP per capita. From the matrix, we singled out the top corporate rate and the top personal rate against real GDP per capita. We generated scatter plots to visually illustrate any trends. The top corporate rate and real GDP per capita had a correlation of −.898 and a p-value of 2.171E − 22, thus prompting us to observe across that data set that as the top corporate rate increased real GDP per capita tends to decrease. Notably, in the scatter plot Figure 2 below a least squares regression equation was created allowing us

| Real GDP per capita (L1) | Top corporate rate | Top personal rate | Net exports of goods and services | M2 money supply | Market value of gross federal debt | Personal saving rate | Effective federal funds rate | Multifactor productivity and cost | Unemployment rate | Unemployment rate | Unemployment rate | S&P 500 annual return | S&P 500 annual return | US President party affiliation |
|--------------------------|-------------------|------------------|----------------------------------|----------------|----------------------------------|--------------------|-----------------------------|---------------------|----------------|----------------|----------------|-----------------|----------------|---------------------|
| Real GDP per capita (L1) | 1                 |                  |                                  |                |                                  |                    |                             |                     |                |                |                |                 |                 |                     |
| Top corporate rate        | -0.8980           | 1                |                                  |                |                                  |                    |                             |                     |                |                |                |                 |                 |                     |
| Top personal rate         | -0.8372           | 0.8752           | 1                                |                |                                  |                    |                             |                     |                |                |                |                 |                 |                     |
| Net exports of goods and services | -0.9027         | 0.7240           | 0.6468                          | 1              |                                  |                    |                             |                     |                |                |                |                 |                 |                     |
| M2 money supply           | 0.51604           | -0.82083         | -0.64012                         | -0.85869       | 1                                |                    |                             |                     |                |                |                |                 |                 |                     |
| Market value of gross federal debt | 0.88831           | -0.78675         | -0.58909                         | -0.82621       | 0.99310                          | 1                  |                             |                     |                |                |                |                 |                 |                     |
| Personal saving rate      | -0.69736          | 0.90757          | 0.70882                          | 0.65644        | -0.43254                         | -0.38380           | 1                            |                     |                |                |                |                 |                 |                     |
| Effective federal funds rate | -0.53739          | 0.45436          | 0.31206                          | 0.60806        | -0.62294                         | -0.65707           | 0.38230                      | 1                   |                |                |                |                 |                 |                     |
| Multifactor productivity and cost | 0.96601           | -0.85546         | -0.77137                         | -0.92084       | 0.95238                          | 0.93127            | -0.62995                     | -0.60299            | 1              |                |                |                 |                 |                     |
| Unemployment rate         | 0.02514           | 0.03990          | -0.09625                         | 0.04671        | 0.02441                          | 0.03003            | 0.19250                      | 0.05166             | 0.06999        | 1              |                |                 |                 |                     |
| S&P 500 annual return     | 0.06605           | -0.12422         | -0.11823                         | 0.06420        | 0.08985                          | 0.10590            | -0.02302                     | -0.09565            | 0.06133        | -0.20210        | 1              |                 |                 |                     |
| US President party affiliation | -0.07567          | 0.11952          | 0.20426                          | 0.12138        | -0.02895                         | 0.04521            | -0.07972                     | -0.26309            | -0.04014       | -0.04463        | 0.17474        | 1                |                 |                     |

**Figure 1.** Correlation matrix of dependent and independent variables.
to observe that for each 1% increase in the top corporate rate real GDP per capita drops $1,336.

The top personal rate saw a similar trend compared to real GDP per capita with a correlation coefficient of −.837 and a p-value of 7.740E−17 showing statistical significance at the alpha of .05. Figure 3 below shows the relationship between real GDP per capita and the top personal rate.

As shown previously, in a similar fashion to the top corporate rate, the graph shows that for each 1% increase in the top personal rate, real GDP per capita drops $546.22. Scatter plots for the remaining independent variables to real GDP per capita can be seen in the Appendix.

Prior to conducting our regression analyses, we conducted a unit root test to determine if the trending data should be differenced or regressed on deterministic units of time for the data to be stationary. Diebold and Kilian (2000) found that pretesting for unit roots in time-series models is necessary for an improved forecasting model. A Dickey-Fuller Test is an appropriate test to conduct in a time series analysis as a way to verify if a variable data must be regressed. In our research we conducted an augmented Dickey-Fuller test for our dependent variable of interest, real GDP per capita. The null hypothesis for a unit root is present in an autoregressive time series model, with the alternative hypothesis being that the data is stationary. Calculating the augmented Dickey-Fuller at level for our real GDP per capita, we found a t-statistic of −2.767292, and a p-value of .2149. Given these results we cannot reject the null hypothesis and conclude that the time series is nonstationary at level. Recalculating the augmented Dickey-Fuller unit root test at a one lag difference, we calculated a t-statistic of −4.824687, and a p-value of .0013. As a result, we can conclude that the first lagged difference is stationary.

With the lagging making the real GDP per capita stationary, we used one lag for our dependent variable. The frequency of our study data being annual data also guided us in choosing one lag as compared to more. Moreover, the Akaike information criterion, Schwarz, and Hannan-Quinn information criterion, all recommended using the first lag. As such, our regression models encompass a lagged effect for our dependent variable as compared to the non-lagged impact variable for our independent variables.

Due to our interest in exploring the impact of tax rates on economic wellbeing, we next devised a multiple regression analysis that included both the top corporate rate and the top personal rate compared to the lagged result of the real GDP per capita. The output of our model can be seen below (Figure 4).

The Multiple Regression results reveal that approximately 81.8% of real GDP per capita can be explained by the top corporate rate and the top personal rate with an overall model SE of $5,193.49. Both independent variables are significant at alpha levels less than .10, but the top personal rate is not significant at the alpha of .05. The multiple regression model is seen to be statistically significant and an increase in the top corporate rate is expected to have a more profound impact on real GDP per capita by reducing it by approximately $1,052.77 for every one-point increase in the top corporate rate. While the top personal rate is expected to decrease real GDP per capita by approximately $141.97.

Using the equation derived from this model it is predicted that 2020’s real GDP per capita is as follows:

\[ $59,322.06 = 86,683.11 + -1,052.766 \times 21 + -141.972 \times 37. \]

The real GDP per capita in 2020 was $55,810.25, thus resulting in our model overstating real GDP per capita by $3,511.81 for 2020. This was expected due to the model’s SE of $5,193.49. The variance inflation factor accounting for multicollinearity in the data fell within an acceptable range of 4.275 or below 10 for the model.

Upon analyzing the results of the multiple regression model, we sought to improve its usefulness by adding the four highest correlated variables from the correlation matrix. Collectively, these six independent variables are as follows: top corporate rate, top personal rate, net exports of goods and
services, M2 money supply, market value of gross federal debt, and multifactor productivity and cost. Again, we ran a forward selection regression. The forward selection regression resulted in five independent variables entered in the following order: multifactor productivity and cost, top personal rate, top corporate rate, market value of gross federal debt, and M2 money supply with net exports of goods not being entered. The results of the stepwise regression analysis are as follows (Figure 5).

Although this model is statistically significant and has an \( R^2 \) of .993 and a \( SE \) of $1,081.21. The independent variable top personal rate is the only variable to have a \( p \)-value > .05. Using the equation derived from this model it is predicted that 2020’s real GDP per capita is as follows:

\[
\begin{align*}
\$57,801.89 &= 15,701.166 + -238.372 \times 21 \\
&\quad + -15.398 \times 37 + 0.893 \times 17,679.76 \\
&\quad + -0.817 \times 27,910.32 + 492.667 \times 111.01.
\end{align*}
\]

The real GDP per capita in 2020 was $55,810.25, thus resulting in our model overstating real GDP per capita by $1,991.64 for 2020. Next checking for multicollinearity, the variance inflation factors for this regression model yielded the following results: top corporate rate 9.21, top personal rate 9.21, M2 money supply 9.21, market value of gross federal debt 9.21, and multifactor productivity and cost 9.21.

| Figure 4. Results of multiple regression model. |
|---|
| Figure 5. Results of stepwise regression I model. |
rate 8.31, M2 money supply 137.339, market value of gross federal debt 100.069, and multifactor productivity and cost 22.638.

We then decided to reassess our correlation matrix with plans to remove net exports of goods and services, due to it being a variable that makes up the value of real GDP per capita, replace it with the next highest correlated independent variable with real GDP per capita and that correlates $\geq 0.70$. Leading us to our next forward regression analysis with real GDP per capita as the dependent variable and the independent variables as follows: top corporate rate, top personal rate, M2 money supply, market value of gross federal debt, personal saving rate, and multifactor productivity and cost. The independent variables were accepted in the forward regression model in the following order: multifactor productivity and cost, top personal rate, personal saving rate, top corporate rate, market value of gross federal debt, and M2 money supply. The results of the stepwise regression analysis are as follows (Figure 6).

| Regression Statistics |
|-----------------------|
| Multiple R ^2 | 0.9968 |
| R Square | 0.9935 |
| Adjusted R Square | 0.9928 |
| Standard Error | 1015.6905 |
| Observations | 60 |

### ANOVA

| Source | df | SS | MS | F | Significance F |
|--------|----|----|----|---|----------------|
| Regression | 6 | 8401778794.6200 | 1400296465.7700 | 1357.3668 | 0.0000 |
| Residual | 53 | 545762398.0822 | 10316721.1662 | | |
| Total | 59 | 8956645034.4281 | | | |

### Coefficients

| Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% |
|--------------|----------------|--------|---------|-----------|-----------|
| Intercept    | 20127.9713     | 2610.2009 | 7.7113 | 0.0000 | 14892.5713 | 25363.3713 |
| Top corporate rate | -213.2230 | 50.6130 | -4.2128 | 0.0001 | -314.7399 | -111.7061 |
| Top personal rate | -16.6886 | 20.8044 | -0.8981 | 0.3732 | -60.4119 | 23.0447 |
| M2 money supply | 1.0640 | 0.3604 | 2.9523 | 0.0047 | 0.3411 | 1.7868 |
| Market value of gross federal debt | -0.7410 | 0.1862 | -3.9798 | 0.0020 | -1.1145 | -0.3676 |
| Personal saving rate | -244.7523 | 85.5148 | -2.8924 | 0.0060 | -416.2733 | -73.2314 |
| Multifactor productivity and cost | 427.6537 | 34.9021 | 12.1259 | 0.0000 | 357.6489 | 497.6585 |

The model is statistically significant with an $R^2$ of .994 and a $SE$ of 1,015.691. The model accepted all six independent variables, though one of them, the top personal rate, has a $p$-value $> .05$. Using the equation derived from this model it is predicted that 2020s real GDP per capita is as follows:

$$\$56,639.19 = 20,127.971 + -213.223 * 21 + -18.684 * 37 + 1.064 * 17,679.76 + -0.741 * 27,910.32 + -244.752 * 16.03 + 427.654 * 111.01.$$

The real GDP per capita in 2020 was $55,810.25, thus resulting in our model overstating real GDP per capita by $828.94 for 2020. Next checking for multicollinearity, the variance inflation factors for this regression model yielded the following results: top corporate rate 9.495, top personal rate 8.335, M2 money supply 141.230, market value of gross federal debt 102.137, personal saving rate 3.602, and multifactor productivity and cost 39.272.

We then decided to run a best subsets multiple regression analysis with the dependent variable as real GDP per capita, and the independent variables as follows: top corporate rate, top personal rate, M2 money supply, market value of gross federal debt, personal saving rate, and multifactor productivity and cost. This resulted in 63 combinations of independent variables that created statistically significant regression models. We narrowed down the regression models that had four or more independent variables, that were statistically significant, and all independent variables had an alpha $< .05$, resulting in nine regression models to analyze. Of the nine, only one regression model included the top corporate rate and top personal rate. The results of this stepwise regression analysis are as follows (Figure 7).

The regression model has an $R^2$ of .991 and a $SE$ of 1,147.071. The model and each of the independent variables are statistically significant at an alpha of .05. We then used the equation from the regression model to forecast the 2020 real GDP per capita and the results are as follows:

$$\$56,096.08 = 24,594.59 + -187.035 * 21 + -48.784 * 37 + -3552.903 * 16.03 + 386.373 * 111.01.$$

The real GDP per capita for 2020 was $55,810.25, which resulted in our forecasted real GDP per capita being overstated by $285.83. Next checking for multicollinearity, the variance inflation factors for this regression model yielded the following results: top corporate rate 6.840, top personal rate 6.840, M2 money supply 8.534, market value of gross federal debt 13.204, personal saving rate 3.927, and multifactor productivity and cost 39.272.

Figure 6. Results of stepwise regression II model.
rate 5.56, personal saving rate 2.18, and multifactor productivity and cost 4.07. The variance inflation factors accounting for multicollinearity in the data fell within an acceptable below 10 for the model.

The regression analyses seem to imply that the higher the top corporate rate and top personal rate are the lower the real GDP per capita which could mean a lower standard of living for U.S. citizens. It is seen that as the personal saving rate increases real GDP per capita decreases. The last independent variable implies that a higher multifactor productivity and cost results in a higher real GDP per capita.

**Limitations**

Our study emphasized a regression analysis across 61 years of historical data (1960–2020). Our data and projections should be considered within their scope and not beyond the band of the scope. In looking forward, we recognize that past performance may not be entirely indicative of future performance. In that regard, emphasizing lower and lower top personal and top corporate rates may not translate directly to a higher standard of living for U.S. citizens nor necessarily a better future.

A model’s outputs are only as good as the respective inputs. We sought to limit bias by selecting each data point through a reliable source. Throughout our regression models we encountered multicollinearity measured through the Variance Inflation Factors. Multicollinearity was particularly apparent with our two stepwise regression models where the independence variables Variance Inflation Factors exceeded a value of 10 presenting challenges in taking those conclusions just at face value.

For our study, there are other variables that we would have liked to test but did not have adequate data for our desired time frame; these variables included the number of U.S. billionaires per year, government education spending, the Case-Shiller index, Gini Index, and the U.S. debt per capita. We felt that these variables could lead to an interesting story, but we were not able to gather the desired data. We also considered including a qualitative variable identifying the United States president’s political affiliation, that is, democrat or republican into our regression model. Nonetheless, as shown previously, in the correlation matrix, the correlation with real GDP per capita was not linearly related with a correlation coefficient of \(-0.076\), which did not prove to be statistically significant with a \(p\)-value of 5.656E\(-01\).

As noted, we also wanted an independent variable that represented U.S. education, however, we were not able to find a variable for our time frame. We did test government current expenditures: education compared to lagged real GDP per capita (1960–2019) which had a correlation of 0.969 and was statistically significant with a \(p\)-value of 1.756E\(-36\). We also checked the variable “percent of people 25 years and over who have completed high school or college” for the U.S. non-institutionalized population (1964–2020) which had a correlation of 0.946 with real GDP per capita and was statistically significant at a \(p\)-value of 2.141E\(-28\).

**Implications**

With other indices considering broader measurements of quality of life and economic wellbeing, now in place, the real GDP per capita may not be the best indicator of the collective success of public policy decisions relating to the United States expanding economy. Nonetheless, for the period under consideration for our data, these other indices readily available did not contain valuable historical data that we could include in our model. To that end, we stuck with the real GDP per capita measurement. We tested this measurement

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**Figure 7.** Results of best subsets regression model.

```
Regression Statistics

|                |       |
|----------------|-------|
| Multiple R     | 0.9957|
| R Square       | 0.9914|
| Adjusted R Square | 0.9908|
| Standard Error | 1147.0714|
| Observations   | 60    |

ANOVA

|                | df | SS         | MS     | F       | Significance F |
|----------------|----|------------|--------|---------|----------------|
| Regression     | 4  | 838407532.4777 | 2096021883.1194 | 1392.9969 | 0.0000         |
| Residual       | 55 | 72367501.9505 | 1315772.7627 |         |                |
| Total          | 59 | 8456455034.4281 |         |         |                |

Coefficients Standard Error t Stat P-value Lower 95% Upper 95% Lower 95% Upper 95% VIF
Intercept 24594.5896 2363.7125 10.4051 0.0000 19857.6040 29331.5753 29331.5753 29331.5753 6.8402
Top corporate rate -187.0345 48.5144 -3.8552 0.0003 -284.2596 -98.8094 -284.2596 -89.8094 6.5564
Top personal rate -48.7835 19.1986 -2.5410 0.0139 -87.2582 -10.3087 -87.2582 -10.3087 5.5654
Personal saving rate -352.9031 75.2609 -4.6891 0.0000 -503.7293 -202.0768 -503.7293 -202.0768 2.1874
Multifactor productivity and cost 386.3731 12.6943 30.4367 0.0000 360.9332 411.8131 360.9332 411.8131 4.0733
```
and its respective correlations against newer indices for available time frames (i.e., GINI Index, Human Development Index, and Government Current Expenditures: Education) all with statistically significant highly positive correlations. These correlations provided us with a sense of confidence in the real GDP per capita as a barometer of success.

Conclusions

Our research responds to what conditions lead to growth in real GDP per capita. Our research emphasizes economic independent variables that further explain real GDP per capita. The research augments previous scholarship regarding the impact of corporate and personal tax rates on real GDP per capita, our barometer for economic wellbeing.

A series of extensive models shows that the top corporate tax rate and top personal rate have an inverse relationship with real GDP per capita. In short, as the top corporate rate or top personal rate goes higher, the real GDP per capita decreases. The simple linear regression model states that for each 1% increase in the top corporate rate, real GDP per capita drops by $1,336. Similarly, the simple linear regression model for the personal top rate, reveals that for each 1% increase in the top personal rate, real GDP per capita drops by $546.22. Our combined multiple regression model with these two variables concurs with this relationship. In this instance, the top corporate rate reduces real GDP per capita by $1,052.77 for each 1% increase. Similarly, the top personal rate reduces real GDP per capita by $141.97.

As we considered and added other variables in our model, we found this relationship to be consistent. The first stepwise regression analysis confirmed this relationship of the top corporate and top personal having a negative impact on real GDP per capita. Also, the market value of gross federal debt contributed a negative effect on the real GDP per capita. This suggests that as federal debt increases, real GDP per capita decreases. The M2 money supply, and multifactor productivity cost result in a positive impact on real GDP per capita.

Our second stepwise regression model revealed a consistent relationship with the top corporate rate, and top personal rate having a negative impact on real GDP per capita. The market value of gross federal debt and personal saving rate also had a negative impact. In contrast, the M2 money supply, and the multifactor productivity and cost contributed positively to the real GDP per capita.

Our final model, the best subsets regression model included four variables the top corporate rate, top personal rate, personal saving rate, and the multifactor productivity and cost. In this model, each of the individual variables and the model were statistically significant at the alpha of .05. The top corporate rate decreased real GDP per capita by $187.03 for each 1% increase, while the top personal rate decreased real GDP per capita by $48.78. Similarly, the personal saving rate decreased the real GDP per capita by $352.90 while the multifactor productivity and cost increased real GDP per capita by $386.37.

Recommendations

Clinton’s 1992 campaign emphasis on the economy, still rings true today. While, our research confirms and updates prior research exploring tax policy and the respective economic implications, our research also contributes to the academy through a valuable empirical addition to the impact of taxes on economic wellbeing. Our correlation and regression across 61 years of history (1960–2020) find that increases in both the top personal and top corporate rate decrease real GDP per capita. In this case, as President Biden and congressional democratic leadership seek to increase taxes on corporations and America’s wealthiest, they must concede that this impact may not have the overall desired effect on the average “Joe’s” across the country and may instead lead to a lower standard of living. Of course, the unknown in the legislation which is still being considered and written is if the investment or government commitments to citizens offered through President Biden’s aggressive legislative ambitions will materialize. For instance, will those payments or benefits to citizens offset the downward pressure on real GDP per capita they will face with higher taxes?

In short, based on our research we would recommend the following, if Congress and the President wish to increase taxes, they should emphasize an increase in the personal top tax rate before raising the top corporate tax rate. The models show that the negative impact of increases on the corporate tax rate can be as high as 9x the size of the personal tax rate on GDP per capita. This impact may stem from the argument that corporations do not pay taxes. Rather, corporations merely act as pass-through institutions insofar as they are able. Moreover, our stepwise model also suggests that government officials should aim to reduce the market value of gross federal debt as it negatively contributes to real GDP per capita. The personal savings rate also negatively contributes to real GDP per capita. However, given the state of personal finances in this country, we would not emphasize that the government should discourage personal savings.

Given this topic’s paramount influence on contemporary life, we recommend more research on tax rates and economic growth. Undoubtedly, we recommend more research on President Biden’s proposal when further details are revealed. Other expansion research topics on this subject should include research on tax rates impact on offshoring, R&D impacts relative to the tax rate, personal tax rates, and the propensity to move out of their origin country. Further research needs to be updated on the impact of tax rates not just in the United States but also in other countries. Additional analysis should consider impacts that if the United States were to drop tax rates further, how would that help or hinder the country? Will the United States be able to cover the costs by raising tax rates (i.e., higher effective tax rates)? Further
research could also reveal the impact of tax rates on corporate debt to equity ratios. At some point, a decrease in taxes will not spur growth and could have a significantly detrimental effect on a nation’s ability to service its debts in addition to potentially devastating economic and national effects. Better indicators beyond the real GDP per capita may need to be utilized further to assess public policy effects on the economic wellbeing of average citizens (Figure 8–17).
Figure 13. Scatter plot of real GDP per and multifactor productivity and cost.

Figure 14. Scatter plot of real GDP per and effective federal funds rate.

Figure 15. Scatter plot of real GDP per and unemployment rate.

Figure 16. Scatter plot of real GDP per and S&P 500 annual return.

Figure 17. Scatter plot of real GDP per and U.S. president party affiliation.
Appendix

| Statistical summary |
|---------------------|
| Real GDP per capita (L1) | Top corporate rate | Top personal rate | Net exports of goods and services | M2 money supply | Market value of gross federal debt | Personal saving rate | Effective federal funds rate | Multifactor productivity and cost | Unemployment rate | S&P 500 annual return | US President party affiliation |
| N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| M | 37,292.36 | 40.08 | 50.69 | (225.80) | 4,561.15 | 6,181.74 | 8.89 | 4.95 | 66.79 | 6.01 | 8.49 | 0.47 |
| Median | 37,028.25 | 35.00 | 39.60 | (94.43) | 3,282.17 | 3,462.75 | 8.64 | 4.97 | 60.75 | 5.64 | 11.85 | — |
| Minimum | 18,035.75 | 21.00 | 28.00 | (770.92) | 324.83 | 286.18 | 3.08 | 0.09 | 31.38 | 3.49 | (38.49) | — |
| Maximum | 58,112.50 | 52.80 | 91.00 | 17,679.76 | 27,910.32 | 16.03 | 16.38 | 111.01 | 9.71 | 34.11 | 1.00 |
| SD | 11,972.04 | 8.05 | 18.35 | 260.46 | 4,360.40 | 7,177.20 | 2.93 | 3.64 | 23.74 | 1.61 | 16.06 | 0.50 |

Author Contributions

Conceptualization, T.P. and Z.B.; methodology, T.P., and Z.B.; software, Z.B.; validation, T.P. and Z.B.; formal analysis, T.P.; investigation, Z.B.; resources, T.P.; data curation, T.P.; writing—original draft preparation, T.P., and Z.B.; writing—review and editing, T.P.; and Z.B. visualization, T.P.; and Z.B.; supervision, T.P.; project administration, T.P. All authors have read and agreed to the published version of the manuscript.

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References

Adams, J. (1984). Secrets of the tax revolut. Harcourt Brace Jovanovich.
Anderson, S. (2021). M2. Investopedia. https://www.investopedia.com/terms/m/m2.asp
Bankrate. (2021). Marginal tax rate. Author. https://www.bankrate.com/glossary/m/marginal-tax-rate/
Callen, T. (2020). Gross domestic product: An economy’s all. International Monetary Fund. https://www.imf.org/external/pubs/fandd/basics/gdp.htm
Canto, V., & Webb, R. (1987). The effect of state fiscal policy on state relative economic performance. Southern Economic Journal, 54(1), 186–202.
Diebold, F. X., & Kilian, L. (2000). Unit-root tests are useful for selecting forecasting models. Journal of Business & Economic Statistics, 18(3), 265–273. https://doi.org/10.1080/07350015.2000.10524869
Dolan, K., Wang, J., & Peterson-Withorn, C. (2021). World’s billionaires list. Forbes.
Fed, S. L. (2021a). Effective federal funds rate. https://fred.stlouisfed.org/series/FEDFUNDS
Fed, S. L. (2021b). Personal saving rate. https://fred.stlouisfed.org/series/PSAVERT
Fed, S. L. (2021c). Market value of gross federal debt. https://fred.stlouisfed.org/series/MVGFD027MNFRBDAL
Fortune. (2021). Global 500. Author.
Gore, A. (1993). Common sense government: Works better and costs less. National Performance Review.
Hall, R., & Jorgenson, D. (1967). Tax policy and investment behavior. American Economic Review, 57(3), 391–414.
Human Development Reports. (2021). Human development index. Author. Retrieved October 18, 2021, from http://hdr.undp.org/en/indicators/137506#
Hutzler, A. (2020, March 20). All the U.S. Presidents who won re-elections during a recession. Newsweek.
Inglehart, R., & Abramson, P. (1999). Measuring postmaterialism. American Political Science Review, 93(3), 665–677.
Kennedy, J. (1962). John F. Kennedy moon speech–Rice stadium. Retrieved October 15, 2021, from https://er.jsc.nasa.gov/seh/ricetalk.htm
Kenton, W., & Boyle, M. (2021). The S&P 500 Index: Standard & poor’s 500 Index. Investopedia https://www.investopedia.com/terms/s/sp500.asp
Kose, M., Lakatos, C., Ohnsorge, F., & Stocker, M. (2017). The global role of the U.S. economy: Linkages, policies and spillovers (CAMA Working Paper 13/2017). World Bank.
Lee, Y., & Gordon, R. (2005). Tax structure and economic growth. Journal of Public Economics, 89(5–6), 1027–1043. https://doi.org/10.1016/j.jpubeco.2004.07.002
Marple, D., & Gravelle, J. (2014). Corporate expatriation, inversions, and mergers: Tax issues. Congressional Research Service.
Mulligan, C. (2020). The economic effects of Joe Biden’s tax proposals. Committee to Unleash Prosperity.
Net Exports of Goods and Services. (2020). https://www.bea.gov/system/files/2019-12/Chapter-8.pdf
Pomerleau, K., DeBacker, J., & Evans, R. (2020). An analysis of Joe Biden’s tax proposals. American Enterprise Institute.
Poulson, B., & Kaplan, J. (2008). State income tax rates & economic growth. *Cato Journal, 28*(1), 53–71.

Prints and Photographs Division. (2021). *Chronological list of presidents, first ladies, and vice presidents of the United States.* Author. https://www.loc.gov/rr/print/list/057_chron.html

Rodrick, D. (2014). The past, present, and future of economic growth. *Challenge, 57*(3), 5–39. https://doi.org/10.2753/0577-5132570301

Semega, J., Kollar, M., Shrider, E., & Creamer, J. (2020). *Income and poverty in the United States: 2019–Current population reports.* US Census Bureau.

Sheatsley, P., & Feldman, J. (1964). The assassination of president Kennedy: A preliminary report on public reactions and behavior. *Public Opinion Quarterly, 28*(2), 189–215.

Sullivan, K. (2013). Saudi Arabia’s riches conceal a growing problem of poverty. *The Guardian.*

Tax Policy Center. (2020). *Corporate top tax rate and bracket.* Author. Retrieved May 13, from https://www.taxpolicycenter.org/statistics/corporate-top-tax-rate-and-bracket

Umoh, R. (2018). *This royal family’s wealth could be more than $1 trillion.* Makeit. https://www.cnbc.com/2018/08/18/this-royal-family-s-wealth-could-be-more-than-1-trillion.html

United States Bureau of Labor Statistics. (2021a). *Labor force statistics from the current population survey.* Author. https://www.bls.gov/cps/definitions.htm#:~:text=U%2D2%20is%20calculated%20as,of%20civilian%20labor%20force

United States Bureau of Labor Statistics. (2021b). *Multifactor productivity.* Author. https://www.bls.gov/mfp/#data

Vedder, R. (1995). *State and local taxation and economic growth: Lessons for federal tax reform.* Joint Economic Committee of Congress.

Watson, G., Li, H., & LaJoie, T. (2020). *Details and analysis of president Joe Biden’s campaign tax plan.* Tax Foundation.

World Bank. (2020). *Databank metadata glossary.* Author. Retrieved June 21, 2021, from https://databank.worldbank.org/metadataglossary/jobs/series/NY.GDP.MKTP.KD.ZG