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**Investigating the Effects of Tax Cuts on Capital Expenditures as an Alternative to Restore the United States Economy from the COVID-19 Pandemic**

An Honors Thesis submitted in partial fulfillment of the requirements for Honors in  
*The School of Accountancy and Finance*

By  
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Under the mentorship of *Dr. Lowell Mooney*

ABSTRACT

The Corona Virus has interrupted several years of strong economic expansion in the United States. In fact, it has disrupted the lives of every single person and organization in the world. After reaching its peak in mid-April, the rate of cases and related deaths has finally started to slow down. The U.S. Government passed three different pieces of legislation to address the effects of the virus. It is now considering legislation (referred to as Phase IV) to accelerate the return of the U.S. economy to its pre-pandemic level. Studies have shown that capital expenditures have been essential during periods of economic recovery. This study evaluates whether a reduction in corporate tax rates leads to an increase in capital expenditures by examining capital spending in two different time periods, one prior to the 2017 tax cut and one immediately following. The Tax Cuts and Jobs Act of 2017 significantly reduced corporate tax rates, from 35 to 21 percent, effective January 1, 2018 (Auerbach, 2018, Vol. 32, No. 4, Fall ). The results of this study will help the U.S. Congress determine whether a tax cut should be included in its upcoming Phase IV stimulus package which in turn could help restore the U.S. economy from the effects of the COVID-19 pandemic.

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## **INTRODUCTION**

In recent years, the United States has experienced a strong and long expansion with record-low unemployment numbers and numerous stock market highs. The U.S. economy, which economists had predicted would lose its ranking as the world's largest economy by 2020, began surging and has now significantly increased its lead over second-place China. However, in early 2020, the U.S. economy was ground to a virtual halt by a virus, the novel Corona Virus (COVID-19), which originated in China in late 2019.

The virus spread worldwide, disrupting normal operations and bringing everything to a standstill. In the U.S., during one three-week period alone, over 16 million people were put out of work (Cohen & Hsu, 2020). To date, the United States Congress has passed three phases of legislation to address the impact of the virus. Phase I was an \$8.3 billion emergency aid package to help contain and treat the health impacts of the virus. Phase II guaranteed free testing and provided funds for paid emergency leave, enhanced unemployment insurance, food security programs, and increased Medicaid funding to the states at a cost of approximately \$100 billion. Phase III provided direct payments to taxpayers, expanded unemployment benefits, created a loan program for small businesses, established a lending fund for financially distressed businesses, and

provided additional emergency funding to health care systems, communities, and state and local governments. The estimated cost of Phase III is over \$2 trillion (Hild, et al., 2020).

Fortunately, by late April 2020, COVID-19-related deaths in the United States began to plateau and the President and his administration began publicly discussing the need to provide additional assistance, referred to as Phase IV, to help accelerate the effort to reignite the U.S. economy. According to reports, Phase IV will provide additional relief for families affected by COVID-19 but will also provide billions of dollars for energy and transportation infrastructure. Energy infrastructure refers to capital investments in oil and gas pipelines, power plants and associated transmission lines, and other investments associated with the energy grid. Transportation infrastructure refers to capital investments in highways, roads, bridges, railroads, airports, and ports, and other transportation systems. It is not surprising that infrastructure spending is under consideration since many consider it to be a catalyst for economic growth (Bivens, 2017). The purpose of this study is to evaluate whether the Phase IV economic stimulus plan should include a reduction in corporate income taxes to turbo charge capital investment spending which in turn could help the economy rebound quickly from the devastating impact of the COVID-19 pandemic.

## **LITERATURE REVIEW**

This section presents key findings from the literature about the relationships between capital spending and productivity and between capital spending and corporate income taxes.

## **The Link Between Capital Spending and Productivity**

Capital expenditures are funds spent to purchase, improve, or maintain long-term assets to improve the efficiency or capacity of the company. Example capital investments include assets such as property, equipment, or infrastructure (CFI). An individual investment's overall impact on economic output largely depends on how effective the investment is in increasing productivity—in other words, how helpful it is in the production of goods and services (Stupak, 2018). While determining the effects of different types of capital expenditures on productivity is beyond the scope of this study, research has shown that, overall, higher quality infrastructure boosts productivity and wages (Mcnicol, 2019).

The evaluation and selection of capital projects is referred to as capital budgeting. Capital budgeting ensures that selected “capital expenditures represent the most profitable outlays of funds, that these expenditures are in accordance with company policy, and that such expenditures do not jeopardize the financial well-being of the company” (Andersson, 2000). As corporations increase their capital expenditures, they also increase their organizational efficiency. The ability of businesses to produce goods and services more efficiently is a crucial determinant of economic growth, and increased infrastructure investment—if well targeted—contributes to increased productivity and leads to higher GDP over the long term (Stupak, 2018).

Productivity has been defined in several ways in different studies and by different organizations. Fabricant, the Japan Productivity Center (1955), defines productivity in terms of wages and living standards: The maximization of the use of resources, man power, facilities and so on, in a scientific way, reduces production costs, expands

markets, increases employment and real wages to improve living standards so that workers, managers and consumers benefit. The European Productivity Agency (1958) measures productivity as the effective use of production factors and the National Iran Productivity Office (1995) defines productivity as the rational approach to life and work whose aim is to work more intelligently and achieve a better life (Beinabaj, 2013 ).

Productivity is primarily an intellectual perspective that always tries to improve what already exists and is based on the idea that people can accomplish their tasks and responsibilities better today than the day before. In addition, productivity requires continuous efforts to adapt economic activities to constantly changing business conditions and apply new theories and methods. From these studies, it can be inferred that productivity is the measure of how efficiently organizations can utilize their resources in order to adapt constantly to different economic conditions. This allows organizations to improve their existing available resources and find ways to increase production in order to achieve financial growth. Therefore, determining the factors that influence corporate productivity is important for evaluating different alternatives for helping stimulate the economy and overcome financial uncertainty.

### **Capital Follows Profitability**

Since previous studies have shown that an increase in capital expenditures leads to an increase in productivity, how can government stimulate corporations to maximize their investments? Economic reasoning suggests that capital follows profitability. In other words, capital investments are guided by the profitability of the underlying investment opportunities (Biddle, 2001, Vol. 6, no. 2/3 ). According to Biddle, et. al, research on this line of reasoning has shown that future capital growth is positively

related to current profitability. When a company's net margin exceeds the average for its industry, it is said to have a competitive advantage, meaning it is more successful than other companies that have similar operations (Silver, Chen, Kagan, & Frankenfield, 2019).

### **Cost of Capital Impacts Capital Spending**

Another factor that impacts profitability is the firm's cost of capital. While there are different capital budgeting methods, most analyze a project's cash flows discounted at the firm's cost of capital. The cost of capital refers to the net of tax cost of the funds (both debt and equity) that a company uses to invest in capital projects. Thus, a firm's cost of capital is impacted significantly by interest and taxes. If companies can reduce either one, they would have more cash to expand their capital investments. A lower cost of capital would also allow for a wider range of investments opportunities. For example, projects that would otherwise be rejected for failing to recover the firm's cost of capital could now be accepted. In summary, a lower cost of capital leads to an increase in profitability (net margin) thanks to lower interest and/or lower income tax costs. When a company's net margin exceeds the average for its industry, it is said to have a competitive advantage.

### **Taxes Influence Capital Investments**

Graham et. al (Graham, 2017 Vol. 30, No. 9) assessed the impact of tax rates on corporate financing and investment decisions by studying the relationship between capital

structure and capital investment, among others. Even though the scope of the study was to analyze the different types of taxes that were used for decision-making, the researchers reported that tax rate choices are highly correlated across different decision contexts (ranging from 0.66 to 0.93). In fact, the specific correlation between tax rates and investment decisions was found to be 0.80. This clearly shows that tax rates have a significant influence on capital expenditure decisions.

The Tax Cuts and Jobs Act of 2017 (TCJA), the most sweeping revision of U.S. tax law since the Tax Reform Act of 1986, provides an excellent opportunity to analyze the impact of changes in corporate taxes on capital expenditures. While the TCJA changed the U.S. Tax Code in many ways, the most significant change was the reduction of the federal corporate tax rate from 35 percent to 21 percent. (Auerbach, 2018, Vol. 32, No. 4, Fall ). The tax cut offers us the opportunity to test our research hypothesis that a reduction of corporate taxes leads to an increase in capital expenditures.

### **Company Size and Industry Also Impact Capital Investments**

We must also consider that capital expenditures may vary depending on the size of the firm and the firm's industry. Interestingly, studies show that small firms have significantly higher investment rates than large firms, which shows that size is important, both economically and statistically, in explaining the variation in corporate investments (Gala & Julio, 2016). Therefore, we include size as an independent variable in our study. This will allow us to extrapolate more granular information in order to measure whether the inclusion of a corporate income tax reduction in the Phase IV economic stimulus should include more specific derivations that attempt to maximize productivity on a larger spectrum, benefitting companies of all sizes.

The following ten industries are examined in the study: Utilities, Technology, Materials, Industrials, Health Care, Financials, Energy, Consumer Staples, Consumer Discretionary, and Telecommunications. Research shows that different industries require different levels of capital expenditures. The amount of capital spending required by a company to grow financially varies. Typically, companies that must invest more in infrastructure, facilities and land, tend to have higher capital expenditures. This normally brings Energy, Telecommunications and Health Care companies to the top of the list, as these sectors are more capital intensive (Maverick, 2018).

In conclusion, our review of the literature leads us to hypothesize that a reduction in corporate income taxes in the Phase IV economic stimulus plan will produce a significant increase in capital expenditures and help restore our economy quickly from the impact of the COVID-19 pandemic. It will result in an increase in cash savings; however, it is important to ensure that organizations maintain investment confidence for the stimulus to be effective. Naturally, corporations will attempt to use the cash savings in the most efficient way possible, even if this means saving instead of spending the funds. To maximize the stimulus effect, the Phase IV legislation might need to include incentives targeting companies based on size and industry. Since every organization requires different levels of capital expenditures, incentives will also help organizations with low capital intensity to increase their investment confidence and spend their money in capital expenditures instead of other alternatives.

## METHODOLOGY

To assess the relationship between taxes and capital expenditures, the study uses a multiple linear regression model with  $k$  predictor variables,  $X_1, X_2, \dots, X_k$  and  $n$  observations:

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip} + \varepsilon_i \text{ for } i = 1, 2, \dots, n.$$

The dependent variable,  $y_i$  is the level of capital expenditures. The independent, or explanatory, variables are effective income tax rates,  $x_{i1}$ , company size,  $x_{i2}$ , measured by market capitalization, and industry,  $x_{i3}$ .

### Corporate Taxes

We expect to find an inverse relationship between income tax rates and capital expenditures, which would be represented by a negative coefficient. The results would support our hypothesis if we find a significant p-value below 0.05. We will also use the S&P 500 index as our source of United States companies. It holds approximately 80% of the entire U.S. stock market, and nearly \$10 trillion in assets (De Silva, 2019). It is highly reflective of the U.S. economy. Companies included in our study were members of the S&P 500 index 5 years before the implementation of the Tax Cuts and Jobs Act of 2017, effective January 1<sup>st</sup>, 2018, and 2 years after. This gives us more accurate results, as we examine a total of 7 years of financial data, including the limited 2 years available after the tax provision became effective.

## **Company Size and Industry**

Company size is also expected to have a negative coefficient, as studies mentioned earlier show that smaller companies tend to have larger capital expenditures. As company size increases, we expect capital expenditures to decrease. We will use dummy variables to reflect the 10 industries examined in the study. We expect to have coefficients ranging from negative to positive, as different industries require different levels of capital expenditures.

## **Data Collection**

The data for this study were collected using a Bloomberg terminal. Bloomberg terminals make it possible to extrapolate financial data for hundreds of corporations. We used year-end financials from companies in the S&P 500 before and after the implementation of the Tax Cuts and Jobs Act of 2017.

Overall, we expect to find a high level of correlation and causation between our independent variables and capital expenditures. Even though our primary focus is the impact of corporate income taxes, we believe our regression equation will allow us to measure more accurately capital expenditure levels in general. More importantly, our model will provide useful information about the impact of including a corporate tax cut in the Phase IV stimulus plan.

Furthermore, we expect to draw conclusions about the need for special incentives to increase capital expenditures, or the need to target companies of a particular size or in a particular industry. This would allow the government to maximize the positive impact

of its next economic stimulus package. Incentives could motivate larger companies and industries with low capital intensity to increase their capital expenditures, both of which are known for lower levels of capital spending. Understanding what factors help boost the economy will allow us to more efficiently recover from the pandemic.

## **ANALYSIS**

When evaluating which organizations to include in the regression analysis, companies which had not formed part of the S&P500 consistently from 2013-2019 were excluded from the sample. Companies which had no data posted were also excluded. This will allow us to get more accurate results. This resulted in a sample population of 371 companies. Two multiple regression analysis were performed. The first one represents data from 2013 to 2017, which is five years prior to the implementation of the Tax Cuts and Jobs Act of 2017 (TCJA). The results for corporate taxes were not significant. The second regression analysis represents data from 2013 to 2019, which include the two years available post implementation of the tax provision. This resulted in a significant negative tax coefficient. A 7-year regression analysis, including 5 years before the implementation of the tax provision, was fit for the study as not many years are available post the implementation of the TCJA, so this allows for a broader spectrum of information.

The breakdown for our sample population by industry is presented in Table 1.

Table 1: Sample population breakdown by industry

<b>Industry Category</b>	<b>Count</b>	<b>% of Total</b>
Consumer Discretionary	52	14.02%
Technology	43	11.59%
Communications	16	4.31%
Health Care	43	11.59%
Financials	76	20.49%
Industrials	44	11.86%
Materials	19	5.12%
Utilities	24	6.47%
Energy	23	6.20%
Consumer Staples	31	8.36%
<b>Total</b>	<b>371</b>	<b>100.00%</b>

The company breakdown shows that not every industry is represented equally in the regression analysis. This is a limitation of the study. However, since our sample was extracted from the S&P 500, which represents a large portion of the United States stock market and holds trillions of dollars in assets, our sample produces a regression analysis reflective of the U.S. economy.

## RESULTS

The regression results for the first regression are presented in the following table:

Table 2: Regression analysis covering 5 years before TCJA (2013-2017)

<b>Model:</b>	Multiple Regression Model					
<b>Dependent Variable:</b>	Capital Expenditures (CapEx)					
<b>Independent Variables:</b>	Effective Tax Rates, Market Cap, Industries					
<b>Regression Statistics: Multiple regression model for CapEx (12 variables, n=371)</b>						
Multiple R	0.706					
R Square	0.499					
Adjusted R Square	0.483					
Standard Error	2.296					
Observations	371					
<b>Analysis of Variance (ANOVA): Multiple regression model for CapEx (12 variables, n=371)</b>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	11	1883.375	171.216	32.466	0.000	
Residual	359	1893.267	5.274			
Total	370	3776.642				
<b>Summary Table: Multiple regression model for CapEx (12 variables, n=371)</b>						
	<i>Coefficients</i>	<i>Std. Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.206	0.515	0.401	0.689	-0.806	1.218
Effective Tax Rate	-0.936	0.974	-0.961	0.337	-2.850	0.979
Market Capitalization	0.024	0.002	14.396	0.000	0.021	0.028
Consumer						
Discretionary	0.270	0.523	0.517	0.606	-0.758	1.299
Technology	-0.352	0.544	-0.648	0.518	-1.422	0.717
Communications	1.466	0.713	2.057	0.040	0.065	2.868
Health Care	-0.761	0.544	-1.400	0.162	-1.830	0.308
Financials	-0.479	0.495	-0.968	0.334	-1.452	0.494
Industrials	0.353	0.540	0.653	0.514	-0.709	1.415
Materials	0.478	0.675	0.708	0.479	-0.849	1.805
Utilities	2.865	0.628	4.565	0.000	1.631	4.099
Energy	4.746	0.633	7.493	0.000	3.501	5.992

The first regression shows our independent variables were fit for our analysis, represented by a 0.706 and a 0.499, for the Multiple R and Adjusted R, respectively. The significant independent variables were market capitalization and the industries for communications, utilities and energy, which are represented by a p-value below 0.05. However, the regression did not result in a significant coefficient for tax rates, with a p-value of 0.337.

The initial findings support our expectation in certain ways. As expected, the utilities and energy industries tend to be more capital intensive, which is supported by a significant p-value, and high positive coefficients of 2.865 and 4.746, respectively. However, the results for market capitalization were not expected, as a positive coefficient infers that capital expenditures increase alongside an increase with company size. Our initial expectation was an inverse relationship between company size and capital expenditures, which would have resulted in a negative coefficient. Corporate tax rates showed a negative coefficient, which goes along with our expectation of taxes having an inverse relationship with capital expenditures, but the results were not significant. This does not allow us to reject our null hypothesis that there is no relationship between tax cuts and capital spending. However, the overall regression was significant and shows there is a strong correlation between our independent variables and capital expenditures.

The results for our second regression analysis are presented in Table 3. The second regression shows an increase in the Multiple R and Adjusted R, represented by a 0.718 and a 0.515, for the Multiple R and Adjusted R, respectively. The significant independent variables were effective tax rates, market capitalization and the industries for communications, utilities and energy, which are represented by a p-value below 0.05. The

results were consistent with our original regression, however, the inclusion of data post implementation of the Tax Cuts and Jobs Act resulted in making tax rates a significant variable in our second regression.

As mentioned, the findings for our second regression are consistent with our original results, except for tax rates, which now have a significant p-value below 0.05. The negative coefficient for tax rates also further decreased with the inclusion of post implementation data, which shows a stronger inverse relationship between tax rates and capital expenditures. This supports our expectation and allows us to reject our null hypothesis. We conclude, therefore, that there is a significant relationship between tax cuts and capital spending.

Table 3: Regression analysis covering 7 years, including TCJA (2013-2019)

<b>Model:</b>	Multiple Regression Model					
<b>Dependent Variable:</b>	Capital Expenditures (CapEx)					
<b>Independent Variables:</b>	Effective Tax Rates, Market Cap, Industries					
<b>Regression Statistics: Multiple regression model for CapEx (12 variables, n=371)</b>						
Multiple R	0.718					
R Square	0.515					
Adjusted R Square	0.500					
Standard Error	2.149					
Observations	371					
<b>Analysis of Variance (ANOVA): Multiple regression model for CapEx (12 variables, n=371)</b>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	11	1762.262	160.206	34.690	0.000	
Residual	359	1657.918	4.618			
Total	370	3420.180				
<b>Summary Table: Multiple regression model for CapEx (12 variables, n=371)</b>						
	<i>Coefficients</i>	<i>Std. Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.561	0.455	1.234	0.218	-0.333	1.455
Effective Tax Rate	-1.751	0.839	-2.086	0.038	-3.401	-0.100
Market Cap	0.021	0.001	15.134	0.000	0.018	0.024
Consumer Discretionary	0.255	0.489	0.521	0.603	-0.707	1.217
Technology	-0.324	0.507	-0.639	0.523	-1.320	0.673
Communications	1.799	0.667	2.696	0.007	0.486	3.111
Health Care	-0.780	0.506	-1.541	0.124	-1.776	0.216
Financials	-0.531	0.459	-1.156	0.249	-1.435	0.372
Industrials	0.315	0.505	0.624	0.533	-0.678	1.309
Materials	0.353	0.628	0.562	0.575	-0.883	1.588
Utilities	2.939	0.587	5.011	0.000	1.786	4.093
Energy	4.139	0.592	6.996	0.000	2.975	5.302

## CONCLUSION

In conclusion, as the Corona Virus spread worldwide and disrupted normal operations, it is critical to evaluate ways to boost our economy. Capital expenditures have shown to be essential drivers to recover from economic downturns. Previous studies have

shown that capital investments are guided by the profitability of the underlying investment opportunities, which leads to an increase in productivity. Tax rates also have shown a relationship with corporate decision making and can be used to measure levels of capital expenditures. This study assessed the extent of the relationship between taxes and capital expenditures by performing a multiple regression analysis. Corporate tax rates were found to be a significant determinant of capital expenditures, supported by the implementation of the Tax Cuts and Jobs Act of 2017.

Since a significant inverse relationship was found between corporate taxes rates and capital expenditures, we can assume that tax cuts lead to an increase in capital expenditures. For this reason, we believe that Congress should include another tax cut as part of their Phase IV economic stimulus plan in order to further increase capital expenditures which in turn will help the United States economy recover quickly from the impacts of the COVID-19 pandemic. As our results show that capital expenditures vary based on company size and industry categorization, the inclusion of the tax cut provision should contain incentives that will also stimulate low capital-intensive organizations or should be restricted to target high capital-intensive organizations. This will maximize the effects of any tax cut included in the stimulus.

The long-term effects of tax cuts are still unknown, as only a few years have passed after the implementation of the Tax Cuts and Jobs Act of 2017. Also, the TCJA included many other provisions that were not assessed in this study such as immediate expensing of assets and the removal of the alternate minimum tax rate.

Further studies will continue to expand on the relationship between taxes and capital expenditures as more post-tax cut data becomes available. We will also evaluate

the relationship between the other tax provisions (mentioned above) and capital expenditures. This will allow us to assess alternative incentives for increasing capital expenditures to further boost the United States economy.

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