



## **How Effective are Past Stimulus Checks and How Might They Affect the United States in the Future**

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In times of economic crisis, the United States government turns to fiscal policy as a tool for combating a decreasing GDP. Stimulus checks are tax rebates which take the form of a one-time payment or a tax credit. Last year, the largest stimulus in U.S. history was implemented as a part of the CARES Act to help fight the effect of COVID-19 on the economy. The outbreak of Coronavirus forced the hands of the U.S. government to implement stay-at-home orders to control the spread of the virus. This sudden action caused a cataclysmic breakdown of the financial system and the economy. The size of the collapse in the economy required a response larger than the stimulus in 2009 during the aftermath of the housing crisis. This 2020 stimulus package was \$2 trillion. Compared with 2009, which held the previous record for U.S. government stimulus at \$831 billion, this over doubled it in size. This stimulus package was much more ambitious than the 2001 and 2008 packages. The effects of the recent Coronavirus Relief Package, which totalled \$600 in one-time payments and \$900 billion in size, is yet to be seen. These economic stimulus packages are based on the Keynesian Economic Theory. Keynes advocated for increasing government expenditures and decreasing taxes to stimulate demand in an economy. In his theory, he describes the Multiplier Effect, where a consumer's extra income will be spent at a business, which in turn becomes another individual's income and will be spent somewhere else. We use this theory as the hypothesis of our regression for testing how a stimulus affects consumption. This effect magnified at a significantly larger scale, in this instance the U.S., is the driving force behind stimulus packages.

### **II. Related Literature**

The paper "The U.S. Consumption Analysis: Using a Linear Regression Model" by Songyi Paik highlights the effect of different variables on consumption. It also touches on policies to improve consumption using the history of the Great Recession. The main regression in this paper shows how disposable income, oil price, and recession have a significant effect on consumption while interest rates do not.<sup>1</sup> This paper simplifies multiple regression without sacrificing the explanation of results. This paper relates to our regression, giving us insight on how using a recession as a variable can lead to a bias because of the relation in consumption and an oncoming recession. This paper is a good starting point for a basic understanding of how to use regression properly to support our view.

Jonathan A. Parker, Nicholas S. Souleles, David S. Johnson, and Robert McClelland analyze spending and stimulus checks in 2008 in their paper, "Consumer Spending and the Economic Stimulus Payments of 2008." The paper measures the change in household spending caused by the receipt of the Economic Stimulus Payments, which they were able to test from the structure of the 2008 tax cut. By working with the Bureau of Labor Statistics to conduct the analysis through Consumer Expenditure Surveys, they use their previous paper on the 2001 tax rebates as

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<sup>1</sup> Songyi Paik, "The U.S. Consumption Analysis: Using a Linear Regression Model," accessed April 6, 2021, <https://knightscholar.geneseo.edu/proceedings-of-great-day/vol2015/iss1/21/>.

the methodology for this paper. They calculated that, on average, households spent roughly 12-30% of their stimulus payments on nondurable goods during the three-month period in which the payments were received. They also found a significant effect on the purchase of durable goods (primarily the purchase of new vehicles), bringing the average response of total consumption expenditures to about 50-90% of the payments in the quarter of receipt.<sup>2</sup> Their paper relates to our goal to see if there is extra spending from the stimulus checks. Our ultimate goal goes deeper, trying to find if the extra spending impacts consumption enough to boost GDP and help the economy.

Claudia R. Sahm, Matthew D. Shapiro, and Joel Slemrod write about the 2001, 2008, 2009 fiscal policies and how they aim to increase household spending. In this paper, they first differentiate between the three stimulus checks and how they were allocated to help Americans spend money quickly.<sup>3</sup> While they argue for the use of fiscal stimulus during economic downturns, their goal is to determine whether the delivery mechanism of fiscal stimulus has an effect on whether the extra income is spent or saved. Unlike our paper, they don't argue the position of whether or not fiscal stimulus works, but rather conclude which form of the stimulus is most effective as a means of increasing spending as efficiently as possible. They used regression analysis to examine the spending and saving responses to three different recent stimulus policies, using data gathered off several different surveys. The bias of the paper stems from the responses in the survey and if they were accurate.<sup>4</sup>

A paper by Samantha Sterba on the effectiveness of fiscal policy as a tool analyzes the 2001 and 2008 tax rebates. Both were stimulus packages aligning with President Bush's pledge to lower taxes in 2001 and the hope of helping the economy during the heart of the housing crisis.<sup>5</sup> Similar to our paper, Sterba is analyzing the economy in the start of a respective recession. Using two different regression equations to find the effect of a tax rebate stimulus on personal consumption expenditures from January 2002 to October 2008. She similarly chose PCE because it is a large portion of GDP and where stimulus checks play the biggest role. In her equations, she makes the stimulus a dummy variable (*stim*) and the anticipation of the stimulus another dummy variable (*ann*). She acknowledges that due to the recentness of the stimulus and the limited amount of stimulus checks during the six-year span there is some bias. Aligning her hypothesis with the Permanent Income Hypothesis, her results find the stimuli to be insignificant on all levels.<sup>6</sup> However, even if accurate, her results stem from the fact that stimulus checks in 2001 and 2008 were both during recessions. This means PCE is always decreasing when controlling for the dummy variables *stim* and *ann*. This made the equations already negatively biased. Also, since she used disposable income as a variable, which is calculated without personal current taxes, she could see the significance of lower taxes rates, which were a prominent part of the two stimuli.

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<sup>2</sup> Jonathan A. Parker et al., "Consumer Spending and the Economic Stimulus Payments of 2008," *The American Economic Review* 103, no. 6 (October 2013): 2530–53, <http://dx.doi.org.geisel.idm.oclc.org/10.1257/aer.103.6.2530>.

<sup>3</sup> Claudia R. Sahm, Matthew D. Shapiro, and Joel Slemrod, "Check in the Mail or More in the Paycheck: Does the Effectiveness of Fiscal Stimulus Depend on How It Is Delivered?," *American Economic Journal. Economic Policy* 4, no. 3 (August 2012): 216–50, <https://doi.org/10.1257/pol.4.3.216>.

<sup>4</sup> Sahm, Shapiro, and Slemrod.

<sup>5</sup> Samantha Sterba, "Are Stimulus Checks an Effective Fiscal Policy Tool?," 2009, n.d., <https://libguides.roanoke.edu/c.php?g=315971&p=2109232>.

<sup>6</sup> Sterba.

## GDP vs. Consumption

The United States uses Gross Domestic Product to measure its economic health. GDP is the total market value of all the finished goods and services produced within a country's borders in a specific time period. The change in GDP is one of the ways policymakers, businesses, and investors make decisions for the future. There are several approaches to calculating GDP. The one we will analyze in this paper is the most common one: the expenditure approach. This equation is shown below.

$$\text{GDP} = \text{Consumption} + \text{Government Spending} + \text{Investment} + \text{Net Exports}$$

The biggest portion of the expenditure approach equation is consumption, which makes up more than two-thirds of the GDP in the United States. Consumption captures consumers spending on goods and services. Because it makes up such a large part of GDP, any shift in consumption plays a large factor in the movement of GDP. Using consumption as a response variable in the upcoming regression is a significant factor in capturing changes in GDP and how the economy is affected. This means we can identify the effect of stimulus check on the economy more easily by just looking at the effect on consumption. This also relates back to Keynesian Economic Theory that the stimulus checks will have a multiplier effect on consumer spending which will outweigh the negative government spending that will be seen in the GDP equation we are using.

## III. 2001 Stimulus

The year of 2001 also saw stimulus. The rebates came in the form of a 10-year tax-cut bill, where part of the rebate was mailed out in the form of a check. This advanced payment was fulfilled in amounts of \$300-\$600 between individuals and couples, and took roughly 3-4 months to arrive to people (this was a main criticism of the rebate in retrospect).<sup>7</sup> The idea of this stimulus (and all others) was to spur economic activity and consumer spending by putting money into the hands of the people. The stimulus should also not restrict any new business activity as a result of potentially increasing interest rates.

The results of this stimulus seemed positive, however, there are those who would consider this plan a failure when looking back on it: Brookings.edu concluded that the package was flawed, and that the consumer spending rate was “quite low” in comparison to what economists had expected at the time. They claim that the fact that roughly 22% of households spent this rebate, while the majority either saved the money or paid off debt with it, should be seen as a failure.<sup>8</sup> Brookings also cites the package’s tax-cuts were flawed due their inclusion of higher-income individuals and households. It seems as though Brookings held the minority opinion on this

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<sup>7</sup> Gerald Prante, “Did the 2001 Tax Rebate Checks Stimulate Consumption? The Economic Evidence,” *Tax Foundation* (blog), January 21, 2008, <https://taxfoundation.org/did-2001-tax-rebate-checks-stimulate-consumption-economic-evidence-stimulus/>.

<sup>8</sup> William G. Gale and Peter R. Orszag, “Evaluating President Bush’s Tax Stimulus Package,” *Brookings* (blog), November 30, 1AD, <https://www.brookings.edu/research/evaluating-president-bushs-tax-stimulus-package/>.

stimulus, though, as more economists believed that it achieved its goal of inducing an increase in consumer spending.<sup>9</sup>

A study conducted by UPenn Wharton comparing the 2008 stimulus to the 2001 package deemed 2001 a success: they cite statistics showing that households spent 20%-40% of the rebate on non-durable goods (food, clothing, health items, etc.) within the first three months of receiving the money.<sup>10</sup> This percentage jumped to 66% after six months, which seems to be conclusive evidence that the stimulus did, in fact, drive consumer spending up as it was intended to. Consumer spending jumped 2.9% in the Q3 and 2.1% in Q4 of 2001; this was a solid boost and helped end the recession, according to Wharton. Wharton also noted something that would be significant for the 2008 plan: lower income individuals and couples spent a whopping 63% more of the rebate money on non-durable goods than higher-income households did.<sup>11</sup> The 2008 stimulus package targeted the lower-middle income households more than higher-income, perhaps because of these statistics.

There existed people on both sides of this argument, though it is hard to argue with the Wharton data that suggests that consumer spending was affected in a significant way, boosting the U.S. out of recession in 2001. This conflict would persist when the 2008 stimulus came around, and economists again debated if the plan would work or become a total failure.

### **IV. 2008 Stimulus**

The great recession of 2008 saw its own stimulus doled out. The package totalled around \$168 billion dollars, with rebates of \$600-\$1,200 being sent to roughly 130 million households in total. An extra \$300 was given per dependent child in each household as well. The package payout was reduced by 5% for every \$1,000 of income made in excess of 75,000 (individuals) or 150,000 (couples). The total of this stimulus was a significant amount more than was spent in 2001; and since the 2001 stimulus appeared to work well, one would assume that more money being put into peoples' hands would mean more money spent.<sup>12</sup>

Another Wharton article foresaw success from this stimulus package, stating that its emphasis on lower-middle income households would work in its favor; these are the households that are more likely to spend this money. Wharton did, however, take issue with a couple of things: the question of if this stimulus was even necessary in the first place, and the lack of long-term tax cuts in the plan. Wharton saw the housing-bubble as an issue that would take the U.S. longer to recover from than the 2001 recession, and for this reason wanted to see a long-term tax cut to ease the elongated recovery period.<sup>13</sup> Some also questioned if this stimulus was necessary, thinking that the economy could have recovered on its own without the excessive government spending; in the end, the answer to this question will vary from person to person, but the worry of significant inflation was a legitimate cause for concern in the meantime.

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<sup>9</sup> Gale and Orszag.

<sup>10</sup> Gale and Orszag.

<sup>11</sup> Gale and Orszag.

<sup>12</sup> "The Economic Stimulus Package: Will It Work, and for Whom?," accessed April 6, 2021, <https://knowledge.wharton.upenn.edu/article/the-economic-stimulus-package-will-it-work-and-for-whom/>.

<sup>13</sup> "The Economic Stimulus Package."

The 2008 stimulus received more negative feedback and appeared less successful than the 2001 stimulus. This could have been for a number of reasons, not the least of which could be the fact that the housing bubble was a significantly larger problem than was being faced in 2001. Bankruptcy ended Lehman Brothers, and nearly got to Freddie Mac and Fannie Mae: it is clear that there were more severe problems being faced in this recession, and for that reason the stimulus may appear less effective. The 2001 stimulus was smaller but longer-term, and yielded significant increases in consumer spending driving the economy out of recession; this type of supporting data is not present for the 2008 stimulus.

## V. 2009 Stimulus

Less than a year after the 2008 stimulus, the American Recovery and Reinvestment Act was created in 2009 in response to the Great Recession as well. This act was meant to help create jobs while providing temporary relief programs for those affected by the recession. The original estimate for the American Recovery and Reinvestment act was \$787 billion, but is really \$831 billion.<sup>14</sup> The stimulus had two different parts. One-time payments, called Economic Recovery Payment, went out in May of that year worth \$250. These went to more than 52 million individuals in certain federal programs. These included Social Security, Supplemental Security Income, Railroad Retirement Board and the Department of Veterans Affairs. These aren't classified as tax rebates like the ones in 2001, 2008, and currently 2020. The tax rebates given out in 2009 didn't come in the form of checks, but totalled \$400 per person and \$800 per family for anyone who filed taxes in 2007 or 2008. This part of the stimulus package was called Making Work Pay, where the Obama administration argued it would impact Americans faster than waiting for a rebate after filing for taxes in 2010.<sup>15</sup>

There was initial backlash for this specific stimulus package. Its main goal was to create new jobs for those in the middle class and initially people felt it didn't reach its goal. However, in Time Magazine Michael Grunwald speaks of the lasting impact of the Making Work Pay Program in his article "The Long Road Back".<sup>16</sup> In it, he looks at the effect five years after the initial creation of the program. Even though people had little faith in the program, Grunwald documents that the White house argued it was the difference between a contraction and growth. They found that GDP increased by 2 to 2.5 percentage points from late 2009 through mid-2011. He acknowledges the bias of the report from the White House given the report came from them, but backs up the statement with estimates lining up with the nonpartisan Congressional Budget Office and several private-sector analysts.<sup>17</sup>

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<sup>14</sup> "Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from October 2011 Through December 2011 | Congressional Budget Office," February 22, 2012, <https://www.cbo.gov/publication/43013>.

<sup>15</sup> "Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from October 2011 Through December 2011 | Congressional Budget Office."

<sup>16</sup> Michael Grunwald, "The Long Road Back | Time," accessed April 6, 2021, <https://time.com/8702/the-long-road-back/>.

<sup>17</sup> Grunwald.

While this stimulus didn't have rebates in the form of checks, it was still a rebate given to individuals quickly. The \$250 given to those who qualified was important, but it was the Making Work Pay program which truly impacted the U.S. GDP in the long-run.

### **VI. The CARES Act**

The CARES Act was signed into law March 27th, 2020. The stimulus checks to families, called Economics Impact Payments, up to \$1,200 for individuals and \$2,400 for joint families. It also included \$500 per child for families or up to \$3,400 for families of four.<sup>18</sup> These EIP's were the biggest stimulus checks in U.S. history. The collapse of businesses and the job loss caused by the government lockdown was the argument behind such a large stimulus. Government data on consumption might seem like the stimulus had little effect on GDP. As of November 2020, the Bureau of Economic Analysis recorded PCE at a high of 14.877 trillion in February. The following months saw a drop in consumption as the lockdown started to take effect on consumers. In March PCE was 13.878 trillion, April PCE was 12.112 trillion, and in May PCE was 13.165 trillion.<sup>19</sup> At first glance the stimulus still resulted in a drop in consumption over the two months EIP's were sent out. However, this is where the stimulus effects need to be lagged by a month in order for individuals to acquire the checks. With this lag we see we assume the effect takes place the next month and is where we see an increase in PCE for the first time since the initial decrease in March. This strengthens the argument for stimulus checks as a positive causation in consumption, which then captures the positive causation of stimulus checks on overall GDP. This increase also happened when the coronavirus was getting worse and lockdown orders were still in effects in each state.

Another way to analyze the effects of the stimulus from the CARES Act is to look at the data of spending in different industries. The Bureau of Economic Analysis researched the use of card transaction data as an early barometer of spending in the United States. They used the daily payment card data used to measure the effect of the pandemic on spending, which was updated approximately every two weeks, shown in Table 1, Table 2, and Table 3.<sup>20</sup> The event study estimates "the difference in percentage points in spending from the typical level prior to the pandemic declared by the World Health Organization on March 11, 2020."<sup>21</sup> It is important to note this data isn't necessarily representative of total spending in an industry. All three tables show a noticeable increase in spending around the day the CARES Act was signed into law up until the beginning of July. This is another proof of the impact of stimulus on the economy. Through the EIP's, consumers had income to spend on the economy, which is captured in the positive correlation on the tables. While the increase in spending stops in July, this only proves the argument for the stimulus checks since the extra income was spent by that time.

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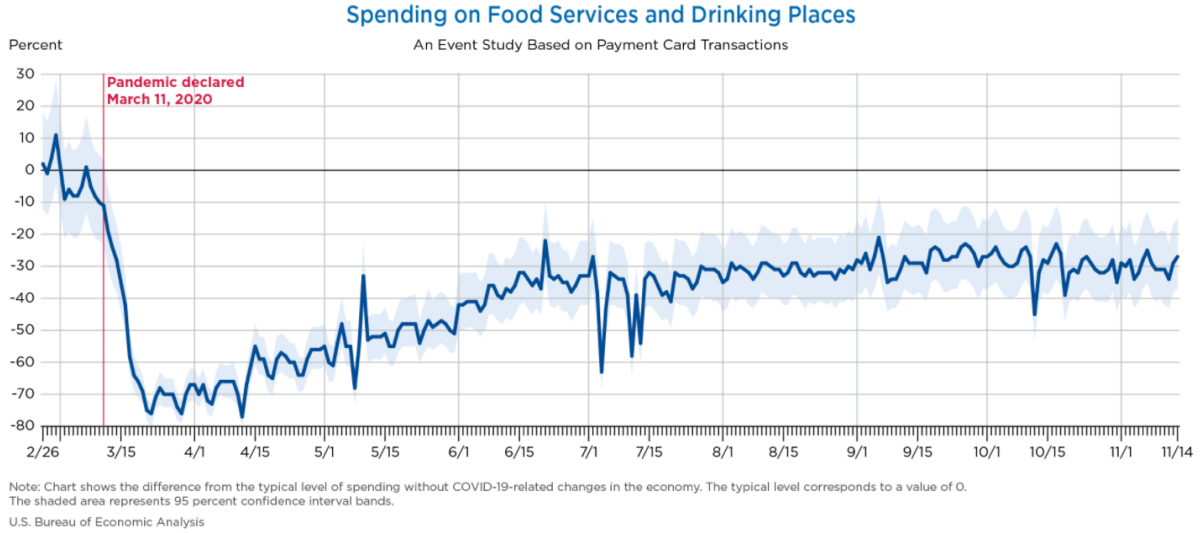
<sup>18</sup> "Treasury, IRS Announce Delivery of 159 Million Economic Impact Payments | U.S. Department of the Treasury," accessed April 6, 2021, <https://home.treasury.gov/news/press-releases/sm1025>.

<sup>19</sup> "U.S. Bureau of Economic Analysis (BEA)," accessed October 26, 2020, <https://www.bea.gov/>.

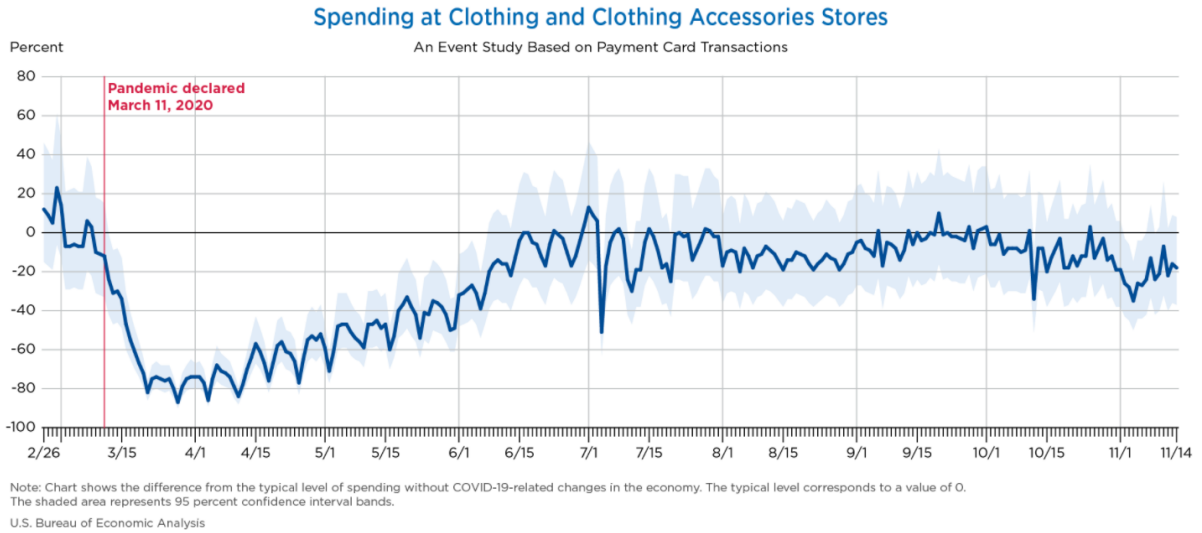
<sup>20</sup> "U.S. Bureau of Economic Analysis (BEA)."

<sup>21</sup> "U.S. Bureau of Economic Analysis (BEA)."

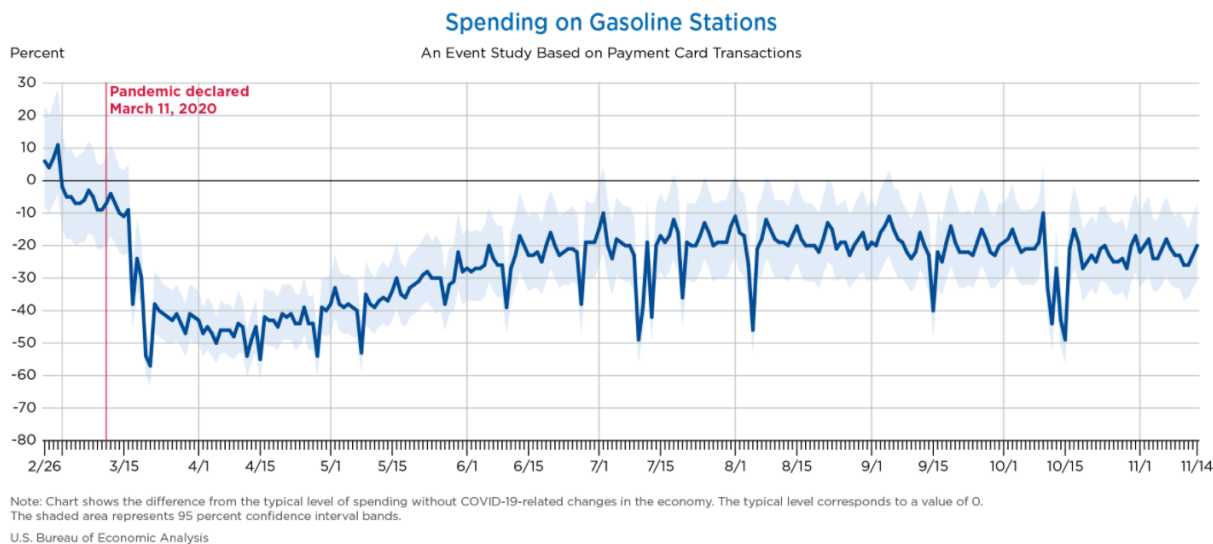
**Table 1: Estimate on Spending on Food Services and Drinking Places (BEA)**



**Table 2: Estimate on Spending at Clothing and Clothing Accessories Stores (BEA)**



**Table 3: Estimate on Spending on Gasoline Stations (BEA)**



## VII. Data & Regression Methodology

Most of the data we gathered came from the Bureau of Economic Analysis (BEA) which is maintained by the U.S. Federal Government's Department of Commerce. Here we collected data on Personal Consumption Expenditures, Disposable Personal Income, Unemployment Insurance, and Other Government Social Benefits (OGSBs). Personal Consumption Expenditures are household purchases of durable goods, nondurable goods, and services. Disposable Personal Income is the sum of all the incomes received by all the individuals or households after personal current taxes. Unemployment Insurance records benefits which pay out when an individual loses a job or meets certain eligibility requirements. OGSBs are classified as benefits for individuals from the government excluding social security, Medicare, Medicaid, unemployment insurance, and veteran benefits. This is where the tax rebates various stimulus packages are categorized under by the United States. All these variables were collected as figures in the United States by month, seasonally adjusted to annual rates, and recorded in Billions of U.S. dollars. It is important to note that these variables weren't chained to any dollar, since dollars chained to 2012 only went back to the year 2002. More importantly, the Bureau of Economic Analysis lacked data on Unemployment Insurance, government social benefits that are chained to a specific dollar amount.<sup>22</sup> Confidence and Unemployment Rates were recorded from Federal Reserve Economic Database (FRED). Similar to the other variables, FRED used the BEA to collect and organize Unemployment Rates on a monthly rate. Unemployment Rate is the percent of individuals who are jobless and are actively seeking work. Confidence was collected by FRED through the Organization for Economic Co-operation and Development. The Confidence variable is an index of surveys collected to measure deviation in confidence in consumers over time, where normal confidence was equal to 100.<sup>23</sup> S&P Index data gathered from Yahoo

<sup>22</sup> "U.S. Bureau of Economic Analysis (BEA)."

<sup>23</sup> "Federal Reserve Economic Data | FRED | St. Louis Fed," accessed April 6, 2021, [https://fred.stlouisfed.org/?gclid=CjwKCAjwjbCDBhAwEiwAiudBywkyA1vTcICBbL5p2UFAuu1dLkKYd\\_HppqEf6amLOmPKklFxr3pdxRoCAmwQAvD\\_BwE](https://fred.stlouisfed.org/?gclid=CjwKCAjwjbCDBhAwEiwAiudBywkyA1vTcICBbL5p2UFAuu1dLkKYd_HppqEf6amLOmPKklFxr3pdxRoCAmwQAvD_BwE).



Finance were the numbers recorded at the close of the Standard & Poor's 500 Index at the end of each month in US dollars. The index is a market capitalization weighted index of the 500 largest U.S. publicly traded companies. This was provided for them through ICE Data Services in real time.<sup>24</sup> The U.S. Annual Vehicle-Distance Traveled (AVDT) was collected from the U.S. Department of Transportation Federal Highway Administration as the annual vehicle distance traveled in miles total. Data was collected at approximately 5,000 continuous traffic counting locations nationwide. Estimates are adjusted annually to match the vehicle miles of travel from the Highway Performance Monitoring System. All Data was collected from January 2000 to October 2020.<sup>25</sup> Finally, Time is its own time trend variable to control for gaps in time. Since there are gaps in months over several years, all years except the year 2000 get an increasing time trend number. Starting in January 2001 which gets a value of 1 and increases by one for each month until October 2020 where it gets a value of 238. It is also important to note that recent data during the impact of Coronavirus is not analyzed due to the unprecedented effect on all variables that would have caused the information gathered to be less accurate. There is also a lag in certain variables to account for the delayed impact on PCE. In this case there is a one-month lag for Other Government Social Benefits, Unemployment Insurance, and Confidence, meaning these variables data ranges from December 1999 to September of 2020. Along with this all variables except Unemployment Rates and Time are logged to help record a better relationship between variables.<sup>26</sup>

Of the three recessions since the start of the century, the Great Recession and the 2020 recession have had one-time payment checks given to individuals. These stimulus checks are classified under Other Government Social Benefits by the U.S. Federal Government's Department of Commerce on the Bureau of Economic Analysis.<sup>27</sup> OGSBs, as stated earlier, rule out benefits like: Social Security, Medicare, Medicaid, Unemployment Insurance, and Veteran Benefits. This means they are a part of a broader category of benefits, but make up an important portion when put into action. The hope of a stimulus check is to increase spending in the economy, helping businesses continue to operate and keep the velocity of money from falling. The best way to analyze the effect of these one-time cash payments is to look at how consumption was affected in the equation for GDP. This can be done by running two multiple regressions. One using a Stimulus dummy variable “*Stim*” to see the effect on consumption. The other regression focuses on the effect of OGSBs on consumption. Both regressions will control for other variables that may present biases.

Capturing the effect of OGSBs and a Stimulus dummy variable on Personal Consumption Expenditures, we must control for other variables that have an effect on PCE to try to rule out any bias in our regression. We will control for several other variables: Disposable Personal Income, Unemployment Insurance, Unemployment Rates, Standard and Poor's Index, Consumer Confidence, and U.S. Average Vehicle Distance Traveled.

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<sup>24</sup> “Yahoo Finance - Stock Market Live, Quotes, Business & Finance News,” accessed April 6, 2021, <https://finance.yahoo.com/>.

<sup>25</sup> “Office of Highway Policy Information - Policy | Federal Highway Administration,” accessed April 6, 2021, [https://www.fhwa.dot.gov/policyinformation/travel\\_monitoring/tvt.cfm](https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm).

<sup>26</sup> “U.S. Bureau of Economic Analysis (BEA).”

<sup>27</sup> “U.S. Bureau of Economic Analysis (BEA).”

Disposable Personal Income is an important variable to omit because the biggest factor in personal consumption is the amount of income an individual can spend after being taxed. Unemployment Rates show who is in the workforce in the U.S. and plays an important role in the rate of consumption if more or less individuals are out of the workforce. If less people are working, then there is less money being spent by consumers. Unemployment Insurance is related to the unemployment rates, capturing how much money is going out to those filed for unemployment. This is key in capturing the benefits people are already getting from the government. The S&P 500 index shows the financial markets reaction to news and plays a role in if individuals think they should be saving more or less depending on if the United States is in or out of a recession. Finally, U.S. AVDT is a way of controlling the amount individuals travel. AVDT is an important part of consumption, like going on vacations, work related trips, or fears of traveling in times of uncertainty.

**Equation 1:**

$$(1) \quad PCE = \beta_0 + \beta_1 \text{OGSB\_1} + \beta_2 \text{ Disposable Personal Income} + \beta_3 \text{ Unemployment Insurance\_1} + \beta_4 \text{ Unemployment Rates} + \beta_5 \text{ S\&P 500 Index} + \beta_6 \text{ AVDT} + \beta_7 \text{ Confidence\_1} + \beta_8 \text{ Time} + U$$

Because stimulus checks are expected to help stimulate the economy, the null hypothesis will set OGSBs ( $\beta_1$ ) as less than or equal to zero. We must assume that the OGSBs, our way of measuring stimulus checks, has either no effect or a negative effect on the economy. This means our alternative hypothesis is ( $\beta_1$ ) is greater than zero.

**Equation 2:**

$$(2) \quad PCE = \beta_0 + \beta_1 \text{STIM\_1} + \beta_2 \text{ Disposable Personal Income} + \beta_3 \text{ Unemployment Insurance\_1} + \beta_4 \text{ Unemployment Rates} + \beta_5 \text{ S\&P 500 Index} + \beta_6 \text{ AVDT} + \beta_7 \text{ Confidence\_1} + \beta_8 \text{ Time} + U$$

Again, because stimulus checks are expected to help stimulate the economy, the null hypothesis will set *Stim* ( $\beta_1$ ) as less than or equal to zero. We must assume that *Stim* has either no effect or a negative effect on the economy. This means our alternative hypothesis is ( $\beta_1$ ) is greater than zero.

**VIII. Data & Regression Methodology**

In the first equation there were 250 observations in the regression, from the years 2000 to 2020. The regression controlled for eight variables, with a standard error of 0.007, R Square equals 0.995 and Adjusted R Square equals 0.995. The three biggest influencers of PCE were Confidence with a coefficient of -1.217, AVDT with a coefficient of 0.621, and Unemployment Rates with a coefficient of -0.602. This seems accurate since confidence tells how much

someone is willing to spend, individual's traveling more means money is being spent outside of the home, and individual employment affects the income they have and are able to consume. We analyzed OGSBs at the 1% significance level to determine the statistical significance of it on Consumption. OGSBs had a coefficient of 0.022 with the standard error of 0.008 resulting in a test statistic of 2.73 and a P-value of 0.007. Due to having 250 observations the critical value for significance level of 1% was 2.33. With this data, we found that Other Government Social Benefits does have a statistically significant impact on PCE in the United States and therefore we reject the null hypothesis.

However, it should be mentioned there is a bias in this data since stimulus checks aren't the only form of government social benefits. Some of these are benefits unrelated to stimulus checks. However, it highlights the positive effects of benefits similar to one-time payments on consumption.

**Table 4: Equation 1 Regression Results**

	<b>Coefficients</b>	<b>Standard Error</b>	<b>t Stat</b>	<b>P-Value</b>
<b>Intercept</b>	3.187	0.372	8.57	1.21E-15
<b>OGSB</b>	0.022	0.008	2.73	0.007
<b>Disposable Income</b>	0.255	0.066	3.86	1.46E-04
<b>Unemployment Insurance</b>	0.007	0.003	2.26	0.025
<b>Unemployment Rates</b>	-0.602	0.061	-9.85	1.93E-19
<b>Monthly S&amp;P Index</b>	-0.019	0.013	-1.49	0.137
<b>Confidence</b>	-1.217	0.155	-7.88	1.12E-13
<b>AVDT</b>	0.621	0.085	7.33	3.40E-12
<b>Time</b>	0.001	7.34E-05	11.48	1.32E-24

In the second equation there were also 250 observations in the regression, from the years 2000 to 2020. The regression controlled for eight variables, with a standard error of 0.007, R Square equals 0.996 and Adjusted R Square equals 0.996. The biggest influencers of PCE were also Confidence with a coefficient of -1.374, AVDT with a coefficient of 0.604, and Unemployment Rates with a coefficient of -0.469.

We analyzed *Stim* at the 1% significance level to determine the statistical significance of it on Consumption. *Stim* had a coefficient of -0.021 with the standard error of 0.004 resulting in a test statistic of -5.84 and a P-value of 1.65E-08. Due to having 250 observations the critical value for significance level of 1% was 2.33. With this data, we found that *Stim* does have a statistically significant impact on PCE in the United States and therefore we reject the null hypothesis.

## Effectiveness of Stimulus Checks

It should be mentioned there is a negative bias in this data because stimulus checks are only given out during recession, which are periods when PCE is decreasing. Along with this, out of the 250 observations, there were only 4 instances of stimulus checks being handed out during a 20-year period. While the results align with our hypothesis, the lack of instances of stimulus checks since 2000 makes the result inaccurate. Along with the high t-stat of -5.84, the four instances of stimulus checks out of 250 months shows how adding any extra instance of a stimulus check would drastically change the outcome of the regression. Ultimately, we wouldn't recommend using a stimulus dummy as a variable to calculate the impact of the stimulus on consumption.

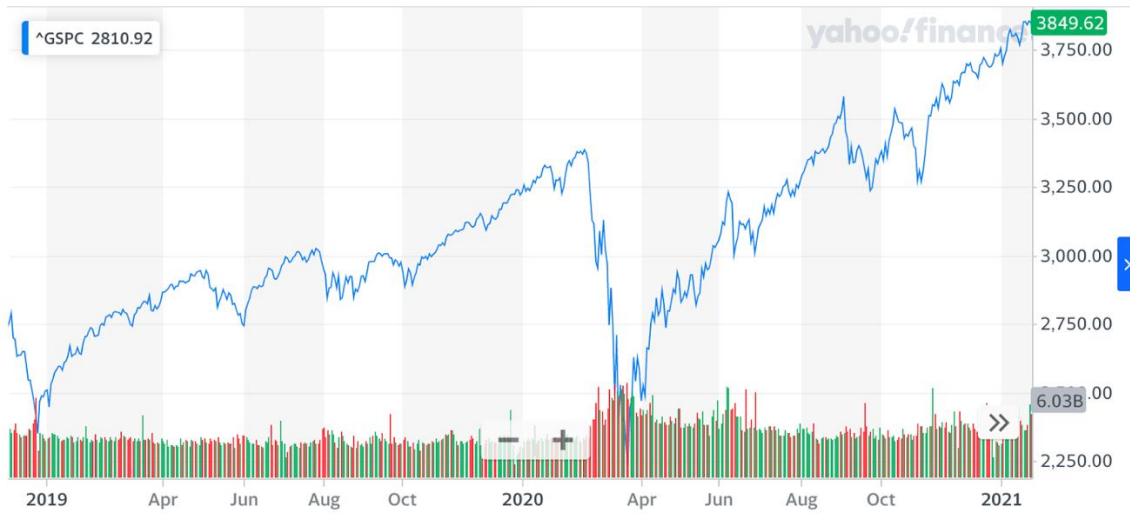
**Table 5: Equation 2 Regression Results**

	<b>Coefficients</b>	<b>Standard Error</b>	<b>t Stat</b>	<b>P-Value</b>
<b>Intercept</b>	3.261	0.351	9.29	9.50E-18
<b>STIM</b>	-0.021	0.004	-5.84	1.65E-08
<b>Disposable Income</b>	0.334	0.063	5.26	3.13E-07
<b>Unemployment Insurance</b>	0.003	0.003	0.84	0.402
<b>Unemployment Rates</b>	-0.469	0.058	-8.15	2.01E-14
<b>Monthly S&amp;P Index</b>	-0.007	0.012	-0.57	0.571
<b>Confidence</b>	-1.374	0.142	-9.65	7.55E-19
<b>AVDT</b>	0.604	0.080	7.72	1.08E-12
<b>Time</b>	0.001	7.15E-05	10.51	1.63E-21

## IX. Stock Market Effects: The Numbers

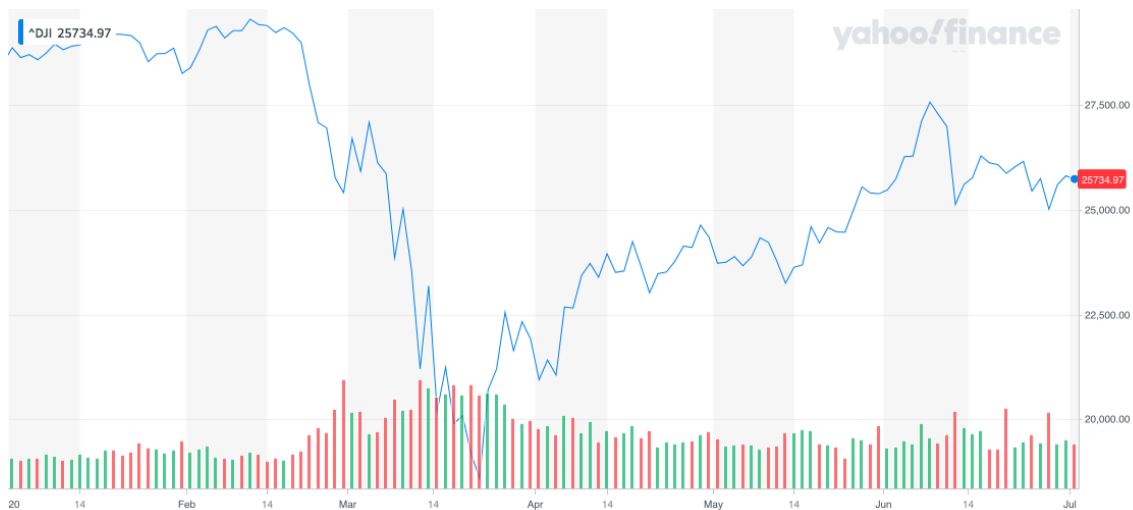
The Coronavirus Pandemic has had an unprecedented effect on the U.S. Stock Market: February 19th, 2020 was the final day before decline struck both the Dow Jones Industrial Average (^DJI) and the S&P 500 (^GSPC). The DJIA and S&P were on tremendous runs, with the DJIA closing at an (previous) all-time high 29,551.42 on February 12th, 2020, and the S&P closing at its all-time high of 3,386.15 on February 19th, 2020. One look at the YTD charts for both Indexes tells most of the story:

**Figure 1: Graph 1 S&P 500 Index (^GSPC)**



Note: Taken from Finance.Yahoo.com, January 28, 2021

**Figure 2: Graph 2 Dow Jones Industrial Average (^DJI)**



Note: \*Taken from Finance.Yahoo.com, January 28th, 2021

February 20th marked the beginning of a downward spiral for the stock market; this trend would continue until March 23rd, when both Indexes would hit their lowest points since the inception of the COVID-19 Pandemic. The DJI plummeted to a low of 18,591.93, while the S&P sank to 2,237.40. This was a monumental collapse within only a month and a half: the DJI moved -10,959.49 while the S&P moved -1,148.75. Both Indexes have begun their routes to recovery

over the past year, as the DJI sits at 25,734.97 as of January 28th; meanwhile, the GSPC has risen to an all-time high 3,849.62.<sup>28</sup>

### **X. Stock Market Effects: Why?**

Many are probably wondering how a crash like this could have ensued; this question arises because a pandemic is being dealt with, not an economically-induced problem like the 2008 housing crisis. The 2008 recession was a result of irresponsible lending, and the housing bubble was a byproduct of such behavior. This bankrupted Lehman Brothers, and nearly did the same to many of their competitors; naturally, this had major repercussions for the stock market.

2020 is a different case: there is no irresponsible economic or financial activity that caused this downturn, instead, it is Coronavirus; fear of a sickness is the reason for such a major slide in economic performance and stock market outcomes. The fear of COVID-19 brought with it a similar fear of eventual economic downturn; this led to many people selling off their holdings in the market, which spurred the negative trajectory of the market. This fear did not only impact the stock market, but the economy as a whole: once Coronavirus arrived in the U.S. and media outlets were covering it, projected business activity and consumer spending went down immediately. Consumer spending is a large part of the United States' Gross Domestic Product (a key economic indicator); when projected consumer spending took a hit, so did projected economic performance. This ended up being the case as many people spent less money across the U.S. as a whole once the pandemic began. Consumer spending declined 7.5% in the month of March, setting the record for the largest drop in a single month in U.S. history (Chaney, Sarah and Harriet Torrey). This data is representative of the repercussions that the virus has had on consumer spending in the United States as seen in Table 5.

Government spending also plays a role in the calculation of the United States' nominal GDP; as a result of the CARES Act, the U.S. government has spent over two-trillion dollars. This massive increase in spending will certainly affect the nation's GDP in a major way: offsetting the decrease in consumer spending that resulted from fear of the Coronavirus. This incredibly high amount of government spending is meant to induce higher consumption across the country. The two-trillion dollars spent by the government surely put more money into the hands of Americans that otherwise would not have been there, but it simultaneously may be hiding the underlying weakness of the economy and financial structure; the GDP is not yet reflecting the long-term effects of pandemic as the increase in government spending is masking the large decrease in consumption across the country.

A key point to note is that there had been an inverted yield curve in April of 2019, a usual signal of an incoming recession. Some may claim that the recession and market crash that we experienced this year were inevitable as a result of this inversion, and that the Coronavirus pandemic merely sped the process up.

The stock market had already been seeing high levels of volatility, especially in a few major stocks (Tesla being the primary example) prior to the inception of the Coronavirus pandemic in the United States. Tesla has fluctuated from \$211.00 all the way up to \$1,429.50 over the past

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<sup>28</sup> "Yahoo Finance - Stock Market Live, Quotes, Business & Finance News."

year; this is an absurd range and is exemplary of the volatility not only of Tesla, but the market as a whole (to a lesser extent, surely).<sup>29</sup> The aforementioned ranges for the S&P and DJIA respectively are also representative of market volatility in the year.

These circumstances combined to have an incredibly negative effect on both the economy and financial markets as a whole. The COVID-19 pandemic was a major factor in the downturn of the stock market and economy; this is the case regardless of whether it was the catalyst that began the slide or an accelerator in the process that started in April 2019.

## **XI. Stock Market Effects: An Uncertain Future**

Fear of the potential continuation of COVID-19 is posing a problem for many people in the United States: many are worried that consumer spending will severely shrink again if another major uptick in coronavirus cases and deaths arises. This potential lack of business activity could drive the economy further into plight and send the stock market towards another crash.<sup>30</sup> The stock market could see more people withdraw their funds due to this fear, similar to how it went from February to March of 2020. Another wave of cases and deaths (at any future time) from Coronavirus could send the economy and stock market into positions that would take years to recover from, similar to the Great Recession of 2008.

Wall Street and Economists are not only planning for the potential effects of the coronavirus vaccines, they are also preparing for the effects of the second wave of stimulus checks (the exact figures are not available currently, nor will they be for a while). This could be a cause for excitement or a cause for concern: some will be elated to have more money put in their pockets while unemployment remains high and they must provide for their families, while others will worry that the government is spending too much money. The consequences of excessive government spending can be troublesome for many individuals, as they may see an increase in taxes in order to make up the deficit that has been created. Another consequence is that the government spending could spur inflation to a higher level. This does not seem to be a concern: with such a decrease in consumer spending, inflation should decrease, and in turn be offset by this increase in government spending. The stimulus is also meant to increase economic/business activity and consumer spending. It seems as though there is not much cause for inflationary concern due to these usual reactionary movements.

The U.S. government has been running a deficit for the past ten or more years; economists are constantly engaged in debates as to whether or not a deficit is bad for the economy. The short-term benefits of an increase in government spending (which increases the deficit) are plentiful; the major benefit being that money is put back into the hands of consumers (in the case of this stimulus, or the 2008 tax rebates), which can lead to a solid increase of consumer spending. More business and economic activity is a good thing for an economy, and in the short term it seems as though it is worth running a deficit. The long term is where most of the debate takes place in regard to the benefits and drawbacks of a deficit. There is potential for deficits to have a negative impact on long-term economic growth and health, “crowd out” the private sector, and to increase interest rates within the country. The St. Louis Fed states that, “according to Laubach’s

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<sup>29</sup> “Yahoo Finance - Stock Market Live, Quotes, Business & Finance News.”

<sup>30</sup> “U.S. Bureau of Economic Analysis (BEA).”

estimates, when the projected deficit to GDP ratio increases by one percentage point, long-term interest rates increase by roughly 25 basis points”.<sup>31</sup> The link between a higher deficit and higher long-term rates has been established, and is an argument in favor of those who believe that a deficit is bad for the United States’ economy in the long-run. It is clear that in the short-term the effects of the stimulus (and ensuing increase in the government’s deficit) could have a positive impact on business activity and consumer spending within the country; however, the longer-term effects of the largened deficit are more split, with some believing that it has little to no effect, and others stating that there are certain drawbacks in the terms of interest rates and long-run economic growth or health.

## **XII. Conclusion**

Government stimulus is an effective countermeasure in the short-term following a time of crisis; this claim is firmly supported by the government stimuli of 2001, 2008, and 2009. A look at the immediate data from 2020’s COVID-19 crisis shows a similar result already, with the short-term impact of the stimulus proving effective yet again. What remains to be seen are the longer-term implications of the two packages dealt out in 2020. The COVID crisis is significantly different from the aforementioned crises, because there remains uncertainty as to when the pandemic will subside. In our opinion, the Coronavirus Relief Package, which is the most recent stimulus signed into order, will be significant in aiding economic recovery. There are plenty of unknown consequences that will come in the future, which will have an impact on how “effective” these two most recent stimulus packages were. They have proved effective already, but even more may be needed in short order in 2021. In retrospect, this may make it seem as though the two stimuli were not effective; this could not be further from the truth. It is impossible to predict the future, thus it is a difficult task to give out a perfect stimulus package. The pandemic will be dealt with as need be, and should more stimulus be necessary, it will be given. The focal point of this discussion should remain that these two stimulus packages have already proven their worth while having immensely positive effects. Any future stimulus that comes as a result of the pandemic will likewise have a positive impact on both the people and the economy of the United States. Should it be the case that more stimulus is required (which one can only hope it is not), the benefits of another such package will far outweigh any drawbacks, if they exist in the first place.

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<sup>31</sup> “Federal Reserve Economic Data | FRED | St. Louis Fed.”



### XIII. References

“Estimated Impact of the American Recovery and Reinvestment Act on Employment and Economic Output from October 2011 Through December 2011 | Congressional Budget Office,” February 22, 2012. <https://www.cbo.gov/publication/43013>.

“Federal Reserve Economic Data | FRED | St. Louis Fed.” Accessed April 6, 2021. [https://fred.stlouisfed.org/?gclid=CjwKCAjwjbCDBhAwEiwAiudBywkyA1vTcICBbL5p2UFAuu1dLKkYd\\_HppqEf6amLOmPKklFxr3pdxRoCAmwQAvD\\_BwE](https://fred.stlouisfed.org/?gclid=CjwKCAjwjbCDBhAwEiwAiudBywkyA1vTcICBbL5p2UFAuu1dLKkYd_HppqEf6amLOmPKklFxr3pdxRoCAmwQAvD_BwE).

Gale, William G., and Peter R. Orszag. “Evaluating President Bush’s Tax Stimulus Package.” *Brookings* (blog), November 30, 1AD. <https://www.brookings.edu/research/evaluating-president-bushs-tax-stimulus-package/>.

Grunwald, Michael. “The Long Road Back | Time.” Accessed April 6, 2021. <https://time.com/8702/the-long-road-back/>.

“Office of Highway Policy Information - Policy | Federal Highway Administration.” Accessed April 6, 2021. [https://www.fhwa.dot.gov/policyinformation/travel\\_monitoring/tvt.cfm](https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm).

Parker, Jonathan A., Nicholas S. Souleles, David S. Johnson, and Robert McClelland. “Consumer Spending and the Economic Stimulus Payments of 2008.” *The American Economic Review* 103, no. 6 (October 2013): 2530–53. <http://dx.doi.org/geisel.idm.oclc.org/10.1257/aer.103.6.2530>.

Piak, Songyi. “The U.S. Consumption Analysis: Using a Linear Regression Model.” Accessed April 6, 2021. <https://knightscholar.geneseo.edu/proceedings-of-great-day/vol2015/iss1/21/>.

Prante, Gerald. “Did the 2001 Tax Rebate Checks Stimulate Consumption? The Economic Evidence.” *Tax Foundation* (blog), January 21, 2008. <https://taxfoundation.org/did-2001-tax-rebate-checks-stimulate-consumption-economic-evidence-stimulus/>.

Sahm, Claudia R., Matthew D. Shapiro, and Joel Slemrod. “Check in the Mail or More in the Paycheck: Does the Effectiveness of Fiscal Stimulus Depend on How It Is Delivered?” *American Economic Journal. Economic Policy* 4, no. 3 (August 2012): 216–50. <https://doi.org/10.1257/pol.4.3.216>.

Sterba, Samantha. “Are Stimulus Checks an Effective Fiscal Policy Tool?” 2009, n.d. <https://libguides.roanoke.edu/c.php?g=315971&p=2109232>.

“The Economic Stimulus Package: Will It Work, and for Whom?” Accessed April 6, 2021. <https://knowledge.wharton.upenn.edu/article/the-economic-stimulus-package-will-it-work-and-for-whom/>.

“Treasury, IRS Announce Delivery of 159 Million Economic Impact Payments | U.S. Department of the Treasury.” Accessed April 6, 2021. <https://home.treasury.gov/news/press-releases/sm1025>.

## Effectiveness of Stimulus Checks

“U.S. Bureau of Economic Analysis (BEA).” Accessed October 26, 2020. <https://www.bea.gov/>.

“Yahoo Finance - Stock Market Live, Quotes, Business & Finance News.” Accessed April 6, 2021. <https://finance.yahoo.com/>.