Monetary and Fiscal Policy: The Road to Stimulation?

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I.   Abstract/ Introduction

The purpose of this study is to uncover the complications surrounding fiscal and monetary policy. This paper will inspect the factors that impact GDP and determine whether the stimulus packages, proposed by policymakers, are truly influential in stimulating the economy. Now, more than ever, the significance behind fiscal and monetary policy will be tested as the COVID19 pandemic unravels in the United States. In an attempt to understand these policies, I have articulated a model to determine GDP growth by using the following independent variables: commercial and industrial loans, 10-Year minus the 2-Year Treasury, delinquency rate on consumer loans, median household income in the US, unemployment rate, personal consumption expenditures, and the effective federal funds rate. I proceeded by calculating a linear regression with GDP as the observational variable. As many would suspect from such a study, my results were nebulous at best with only one variable (personal consumption expenditures) having a statically significant relationship with GDP growth.

II.   Background

The current state of the United States' economy hinges on the ability of the Federal Reserve, Central Bank, and policymakers to stimulate the economy through fiscal as well as monetary policies. Many individuals are prohibited from going into work or even socially gathering due to the inherited risks posed by the COVID19 outbreak. Companies that relied on services such as barbers, ridesharing, airlines, utilities sector, and many more are all severely affected by the "shelter in place" emergency protocols. Unfortunately, various companies that were merely making ends-meat before the pandemic, will struggle to operate during this time. This is seen by Reinicke (2020), reporter for Business Insider, who states that "US weekly claims were 6.6 million for the week ending April 4, the Labor Department reported on Thursday… figure brings the three-week total to roughly 16.8 million unemployment fillings." In other words, Reinicke (2020) is emphasizing the drastic increase in unemployment filings which means that companies have to either layoff employees to continue to operate or dissolve. In the discussion surrounding the COVID19 recession, fiscal and monetary policies will be tested far beyond any Laissez-faire extremists.

Furthermore, the most recent recession in 2008-2009 can give immense insight into the influence that fiscal and monetary policies have on stimulating the economy. Luckily, during that time, the chairman of the Federal Reserve, Ben Bernanke, was an individual that was extremely well-versed in the study of economic downturns. Many debate that the Federal Reserve's response was necessary in avoiding a global economic meltdown. On the other hand, numerous economists questioned the importance of fiscal and monetary policies in times of recovery. Agnello and Sousa (2011) argue that "a positive fiscal policy shock has a negative impact on both stock prices and housing prices… governments place an upward pressure on real interest

rates when they run a budge deficient. This, in turn, 'crowds-out' private consumption and investments and brings down asset prices." In making this comment, Agnello and Sousa (2011) suspect that fiscal policies actually devalues assets and takes away from the private market enterprises due government intervention and increased pressure on interest rates.

On the opposing side, there are those who do not necessarily disagree with the utilization of fiscal policies, but rather, the timing of these policies. According to C. Romer and D. Romer (2019), "conducting policy in normal times to maintain fiscal space provided valuable insurance in the event of a financial crisis, and domestic and international policymakers should not let debt ratios unnecessarily determine the response to a crisis." C. Romer and D. Romer (2019) are simply suggesting that it would be quite logical to, not only, use fiscal policies for recessionary periods but to implement these policies well before any signs detect an economic depression. This way, countries would have some source of preventative actions or insurance to combat economic recessions. This would seem as logical and feasible as proposing that all individuals should also look both ways before crossing the road… oh wait.

In any event, fiscal and monetary policies in general are utterly complexed and not remotely cookie-cutter. Even if a perfect bill was crafted to account for all affected parties in an economic crisis, the way that the bill is enacted could still cause complications. For instance, stimulus bills passed during the housing bubble were seemingly effective but received massive criticism for bailing out the financial institutions that were the primary cause for the recession. An Op-ed contributor for the New York Times, Barofsky (2011) further elaborates on this issue by writing that "the country was assured that regulatory reform would address the threat of our financial system posed by large banks … this promise also appears likely to go unfulfilled. The biggest banks are 20 percent larger than they were before the crisis and control a larger part of our

economy than ever." Essentially, Barofsky (2011) argument highlights the unintended

consequences that stem from the way that fiscal policies are enacted. In this scenario, the

stimulus bill was met with heighted regulations, but somehow the banks that caused the mayhem

also benefitted greatly from it.

    To try to make sense of this issue, some economists dived into understanding the optimal

methods for executing and implementing fiscal policies. Mountford and Uhlig (2009) found that

"deficit-financed tax cuts work best … to improve GDP, with a maximal present value multiplier

of five dollars of total additional GDP per each dollar of the total cut in government revenue 5

years after the [fiscal] shock." In making this statement, Mountford and Uhlig (2009) believe that

fiscal policy that is enacted through tax reliefs is one of the most effective and efficient ways to

positively stimulate GDP growth. There are also many more proponents of this notion to utilize

the tax system in aiding the economy as a preventative measure or even stimulator for the

economy. This idea is seen by Angeletos (2003), who proposes that "it[s] optimal to lower the

tax rate by less than what it would have done under complete markets, that is, by less than what

is necessary to offset the negative cyclical shock. And because fiscal policy can no longer do it

all, it becomes optimal to use monetary policy also for the purpose of output stabilization." To

reiterate, Angeletos (2003) is urging for fiscal and monetary policies to be applied through the

tax system in order to build a safeguard against unforeseen economic meltdowns.

    Speaking of meltdowns, lets dive into the recommendations of this study. The key factors

utilized in this research pertain to lending levels such as the fluctuation of federal reserve rates,

delinquency on loans, and commercial loans for businesses. The reasons behind observing these

variables are to identify whether increasing the ability to borrow money would actually lead to

stimulation in an economy rather than an influx of defaults on debt or credit. Also, many

stimulus bills propose more direct funding to individuals via checks in the mail or direct deposits in hopes of increasing spending. In order to capture the effects that direct funding has on GDP, I have incorporated the personal consumption expenditure. The PCE has a statistically significant relationship with GDP and suggests that for every percentage point increase in PCE will increase GDP by 17 percentage points. Thus, bills that propose more direct funding to individuals has the most potential upside for stimulating the economy.

Ultimately, the decision is placed upon policymakers who are plagued with the complexities of determining the correct timing, the appropriate fiscal or monetary policies to implement, in addition to the channels that these policies should be enacted through. Many of these policymakers are not economists but have to make decisions as if they were. Therefore, the purpose of this study is to uncover certain relationships and metrics of the way that policymakers should implement fiscal policies to affect the economy.

III.   Description of Model

I have designed a multivariable model that regresses commercial and industrial loans, 10-Year minus the 2-Year Treasury, delinquency rate on consumer loans, median household income in the US, unemployment rate, personal consumption expenditures, and the effective federal funds rate on the growth of the gross domestic product. All experimental variables along with the dependent variables in this linear regression are measured in percent changes which enables this model to follow the classical regression model, $Y = X\beta + \epsilon$. Y is the observational variable of Percent Change of GDP, while the X variables can be explained further in Model and Figure 1.

Model:

$$GDP\_PCH = \beta_1 + \beta_2 BUSLOANS\_PCH + \beta_3 T10Y2Y\_PCH + \beta_4 DRCLACBS\_PCH$$
$$+ \beta_5 MEHOINUSA646N\_PCH + \beta_6 UNRATE\_PCH + \beta_7 PCE\_PCH$$
$$+ \beta_8 FEDFUNDS\_PCH$$

The Chart below will identify each of the variables mention in the Model.

Figure 1 – *Defining Variables*

GDP_PCH	Percent change of GDP – Observational Variable
β_1	Constant Variable
BUSLOANS_PCH	Commercial and Industrial Loans – Explanatory Variable
T10Y2Y_PCH	10-Year Treasury Minus 2-Year Treasury - Explanatory Variable
DRCLACBS_PCH	Delinquency Rate on Consumer Loans – Explanatory Variable

MEHOINUSA646N_PCH	Median Household Income in the US – Explanatory Variable
UNRATE_PCH	Unemployment Rate - Explanatory Variable
PCE_PCH	Personal Consumption Expenditures – Explanatory Variable
FEDFUNDS_PCH	Effective Federal Funds Rate – Explanatory Variable

The observable variable (GDP) is under evaluation for this study, since many economists had widely accepted the value behind this metric in recessionary times. A renown economic columnist for Investopedia, Chappelow (2020) writes that "[a] recession is a macroeconomic term that refers to a significant decline in general economic activity … It had been typically recognized as two consecutive quarters of economic decline, as reflected by GDP in conjunction with monthly indicators like a rise in unemployment." In making this statement, Chappelow (2020) explains that GDP has played a prominent role in economics through identifying recessionary periods. Therefore, I will assume GDP to be an appropriate measurement to use in order to quantify economic stimulation. If independent variables positively affect GDP, then I will presume that these factors are also stimulators. There are various attributes that makeup GDP such as consumption, Investment, government, exports, and imports. These contributing factors will highlight the impact that these explanatory variables have on GDP.

One of the tools at the Federal Reserve's disposal is the ability to manipulate rates. In times of economic uncertainty, the Federal Reserve will typically decrease rates to enable individuals and companies to borrow money at extremely low interest rates. In theory, lowing rates would encourage more consumption and spending within the economy. The evaluation of

the relationship between the Federal Funds Rates and GDP will give tremendous insight into whether fiscal and monetary policies should be implemented during times of economic duress.

As the Federal Reserve lowers interest rates in order to increase consumption, then there should also be an uptick in loans issued by corporations and individuals. Now, especially, the amount of loans should increase considerably due to the introduction of SBA loans for smaller companies. This study expects to see the amount of loans increase as interest rates plummet which, in return, shall boost the consumption portion of GDP. In addition, this study will also strive to evaluate and comprehend the relationship that delinquencies on loans play into the gross domestic product. Since many companies and people will pursue loans as well as increased credit lines, it would appear that this could potentially lead to long term complications. For instance, the housing bubble from 2008-2009 was caused from individuals getting approved for loans at low variable rates that were used for purchasing houses. Eventually, this bubble burst from individuals defaulting on their loans once the variable rates increased. Thus, it is vital to understand the relationships between increasing loans, delinquencies, and the affects these have on GDP in order to grasp the efficiency of fiscal and monetary policy.

Well, what about individuals who simply cannot or will not seek out loans nor credit for support? A plausible solution for this issue is illustrated in the article "Covid-19 Stimulus Bill: What it Means for States," Ramsdell and Kennedy (2020) emphasizes that "a $1,200 direct payment to many Americans and $500 for each dependent child." The essence of Ramsdell and Kennedy's (2020) statement is that policymakers are giving money directly to the people. The explanatory variable, personal consumption expenditure, should have a positive effect on GDP if individuals are receiving direct funds from the government. Monitoring the past for similar policies (like the Bush Administration's rebate check), will give a better understanding of

whether these policies truly impacted spending on the individual level. Hence, I assume that some increases in PCE will have come from the implementation of fiscal policies throughout the years. In addition, if the PCE positively or negatively effects GDP, then I presume that some fiscal along with monetary policies can be linked to stimulating or declining GDP.

One of the most noble hedge fund managers, Dalio (2013) explains that the economy functions as a machine where "one person's spending is another person's income." Dalio's (2013) point is that the economy relies on consumption, since that is someone else's income. When the economy retracts and spending comes to a halt, then unemployment levels typically rise. In order to observe the effects of unemployment on GDP, I use the unemployment rate. In many ways, the unemployment rate shall have an inverse relationship to the part of GDP that is consumption. Moreover, this paper anticipates another inverse connection between the independent variables unemployment rates and median house-hold income. These two variables seem to be linked inevitably due to the fact that unemployment level rising would imply median house-hold incomes to decrease from layoffs. However, median house-hold income should run parallel to GDP, meaning that higher median house-hold incomes would lead to higher GDP since more consumption correlates to higher incomes.

The last explanatory variable is the inverse of the yield curve for the two-year and ten-year United States treasury bonds which is incorporated into this model for a few reasons. This metric is promulgated all throughout finance and captures every headline, because the inverted yield curve commonly suggests that a recession is underway. Investors desire higher returns for riskier investments. More time typically correlates with more risk, and a ten-year treasury will usually provide higher yields to compensate for the long amount of time and risk. However, the only real scenario where the yield for the two-year treasury bond is ever higher than the ten-year

treasury bond is when investors are inherently indicating that short-term bonds are riskier due to the current state of the economy. What makes this metric utterly interesting is its influence on GDP. In the "What Does The Yield Curve Tell Us About GDP Growth?" Ang, Piazzesi, and Wei (2004) claim that "higher the slope or term spread, the larger GDP growth is expected to be in the future." Basically, Ang et al. (2004) are suggesting that the greater differential between the inverted yield curve of the two- and ten-year treasuries could correlate to an exponential growth potential for GDP. In addition, since the inverted yield curve has massive media coverage and is thoroughly examined in the financial industry, I will utilize this independent variable to access consumer confidence of the economy.

Most of the research in this field looks into the channels that should be maximized for dispersing fiscal policies such as direct payments or through the tax system. This is similar to the debate about UBI taking the form of EITC for the purpose of minimizing costs and being overall more efficient. Others debate on when these monetary polices should be applied, whereas this study strives to see whether the fiscal and monetary policies proposed in stimulus packages, in times of economic contractions, will actually help stimulate GDP.

There will inevitably be omitted variable bias, since not every variable that could possibly affect GDP was accounted for in this study, however, the fixed effects should have mitigated the impacts of omitted variable bias. Additional studies done in this field should consider more variables such as time sensitivity, quantitative tightening, global debt levels, and increasing the minimum wage requirement. Also, more methods like machine learn and Heckman model could be used to calculate the maximums and minimums of GDP in relation to these variables which could potentially capture a better picture of policy impacts in recessionary periods.

IV. Description of the Data Used

All of the data was sourced from the Federal Reserve Bank of St. Louis. It is widely known for having reliable information, and a robust collection of updated economic data. As for the data used in this research, the years range from 1988 – 2018 due to the availability of data for each of the independent variables as well as dependent variable. All variables were converted into annual percent changes for the simplicity of interpretations. There was a total of 31 observations and seven independent variables. The data is also all time series, since its one entity being tracked over different periods of time.

V.   Interpretation of the Variable and Estimated Model

Interpretations of Figures 2-4 are in terms relating to percent change ($\%\Delta y \approx \beta_1 \%\Delta\chi$) as all

the predictor variables are regressed on the response variable of GDP growth. These are the

following results:

Figure 2 – *Regression Results for Model*

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                          Dependent variable:
                          -------------------------
                                GDP_PCH
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BUSLOANS_PCH                      2.448
                                 (2.090)

T10Y2Y_PCH                        0.035
                                 (0.041)

DRCLACBS_PCH                     -0.980
                                 (1.715)

MEHOINUSA646N_PCH                 5.582
                                 (9.749)

UNRATE_PCH                        0.146
                                 (1.802)

PCE_PCH                          17.306*
                                 (8.976)

FEDFUNDS_PCH                     -0.040
                                 (0.249)

Constant                       -126.808**
                                (49.714)

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Observations                        31
R2                                 0.424
Adjusted R2                        0.248
Residual Std. Error       62.744 (df = 23)
F Statistic               2.416* (df = 7; 23)
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Note:                  *p<0.1; **p<0.05; ***p<0.01
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Figure 3 – *Regression Results for the Model with Robust Standard Errors*

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Call:
lm_robust(formula = GDP_PCH ~ BUSLOANS_PCH + T10Y2Y_PCH + DRCLACBS_PCH +
    MEHOINUSA646N_PCH + UNRATE_PCH + PCE_PCH + FEDFUNDS_PCH,
    data = df)

Standard error type:  HC2

Coefficients:
                   Estimate Std. Error  t value Pr(>|t|)   CI Lower CI Upper DF
(Intercept)       -126.80778   90.07695 -1.40777  0.17257 -313.14614 59.53059 23
BUSLOANS_PCH          2.44832    3.88688  0.62989  0.53497   -5.59230 10.48894 23
T10Y2Y_PCH            0.03511    0.02323  1.51143  0.14430   -0.01294  0.08315 23
DRCLACBS_PCH         -0.98037    1.68499 -0.58182  0.56635   -4.46604  2.50530 23
MEHOINUSA646N_PCH     5.58220   11.16435  0.50000  0.62182  -17.51303 28.67742 23
UNRATE_PCH            0.14642    2.51848  0.05814  0.95414   -5.06346  5.35630 23
PCE_PCH              17.30567    8.37637  2.06601  0.05027   -0.02218 34.63352 23
FEDFUNDS_PCH         -0.04009    0.18661 -0.21480  0.83181   -0.42612  0.34595 23

Multiple R-squared:  0.4237 ,   Adjusted R-squared:  0.2484
F-statistic:  7.31 on 7 and 23 DF,  p-value: 0.0001177
```

Figure 4 – *Regression Results for the Model with Robust Clustered Standard Errors*

```
lm_robust(formula = GDP_PCH ~ BUSLOANS_PCH + T10Y2Y_PCH + DRCLACBS_PCH +
    MEHOINUSA646N_PCH + UNRATE_PCH + PCE_PCH + FEDFUNDS_PCH,
    data = df, clusters = df$DATE)

Standard error type:  CR2

Coefficients:
                   Estimate Std. Error  t value Pr(>|t|)   CI Lower CI Upper     DF
(Intercept)       -126.80778   90.07695 -1.40777  0.18935 -327.36085  73.7453 10.056
BUSLOANS_PCH          2.44832    3.88688  0.62989  0.54830   -6.69804  11.5947  7.173
T10Y2Y_PCH            0.03511    0.02323  1.51143  0.24521   -0.04795   0.1182  2.499
DRCLACBS_PCH         -0.98037    1.68499 -0.58182  0.57318   -4.71928   2.7585 10.315
MEHOINUSA646N_PCH     5.58220   11.16435  0.50000  0.63406  -21.42504  32.5894  6.299
UNRATE_PCH            0.14642    2.51848  0.05814  0.95511   -5.69511   5.9880  7.742
PCE_PCH              17.30567    8.37637  2.06601  0.07162   -1.90914  36.5205  8.249
FEDFUNDS_PCH         -0.04009    0.18661 -0.21480  0.83937   -0.53747   0.4573  4.469

Multiple R-squared:  0.4237 ,   Adjusted R-squared:  0.2484
F-statistic:  7.31 on 7 and 30 DF,  p-value: 3.912e-05
```

The Figure 2 is a classical regression model that neglects consideration for heteroskedastic or serial correlation in order to emphasize the distinct differentials in the standard errors in this model compared to all of the other models. When dealing with time series

data there is the possibility that the fifth Gauss-Markov Assumption (Var(u|x) = Var(u)) is violated by being heteroskedastic rather than homoscedastic. To account for this inconsistency and to maintain BLUE (Best Linear Unbiased Estimator), I conducted a linear regression in Figure 3 with robust standard errors. In addition, Figure 4 utilizes clustered robust standard errors that groups variables via date, however, the results were identical to Figure 3 for the standard errors.

Most of the interpretation from this point forward will be from Figure 4, since it is identical to Figure 3 and accounts for serial correlation in addition to heteroskedasticity. The R-squared for all Figures 2-4 are .4237 which means that the predictor variables are capable of explaining 42% of the change in GDP. Due to the nature of R-square, it could be misleading since adding more variables, regardless of relevancy to GDP, can increase this metric. Therefore, R-square will has minimal significance to this study.

The only statistically significant relationship happens to be the personal consumption expenditure. It is statically significant at the 10% level and suggests that for every percentage change increase in personal consumption expenditures, will increase GDP by 17.3 percent. This may explain the reason behind administration's, even the current administration, desires to give the people money directly. The logic appears to be that if the government provides stimulus through directly giving money to the people, then this would drive GDP upwards through the consumption portion.

Moreover, the remaining variables were not statically significant at the 10 percent level; however, these are still worth interpreting. For every percent increase in the ten-year minus two-year, on average increased GDP growth by 0.035%. To further elaborate, the actual inversion of the yield curve and media coverage has led to GDP growth rather than decline. The main reason

for this cognitive dissonance may be due to the fact that the inverted yield curve has only taken

place approximately 5 or 6 times over the span of 30 years. Therefore, highs would be greater

than the lows on average. Whereas, the amount of delinquencies on loans had an expected effect

on GDP. GDP declines by -0.98037 percent for every percent increase in loan delinquencies. It is

quite surprising to see that this covariate was not statistically significant at the 10% percent level,

because the primary cause for the 2008-2009 recession came from defaults on loans for

mortgages. Another surprise comes from the independent variable median house-hold income.

For every percent increase in median house-hold income, GDP growth increases by 5.58220

percent. Unfortunately, this metric was not statically significant, even though it would have

seemed quite logical to assume that income would emphatically impact spending which, in

return, would boost GDP growth. Unless, the issue that emerges from this research happens to

explain the lack-luster increase in wage inflation over the years. This would also suggest that

median house-hold incomes might be less significant than probably corporate net incomes. As

for unemployment rate, GDP growth rises by 0.14642 percent for every percentage increase of

unemployment rate. In comparison, the effective federal funds rate makes much more sense.

GDP decreases by -0.04009 percent for each increase in interest rates proposed by the Federal

Reserve. The Federal Reserve typically lowers rates in times of economic retractions which

justifies the inverse relationship between GDP and interest rates.

VI.   Conclusion

Theoretically, the results suggest that there was only one statistically significant relationship that is utilized to improve GDP by policymakers which is any fiscal policies that encourages the increase of personal consumption expenditures. For example, in the stimulus bill to combat the coronavirus epidemic and recession there is a mandate to provide eligible individuals with a stipend between $1,200-3,400. In return, the government hopes that this will support spending on the individual level and should spur GDP growth.

Since I consider myself an economist, let's assume… that the relationship between median household income and GDP were statistically significant in Figure 4. It would follow that if society increased the minimum wage requirement so that the median household income increased by 1% and also increase PCE by merely 1%, then this could increase GDP by around a percentage change of approximately 18.77% ($Y = -126 + (.0558 * (1 + .01)) + (.173 * (1 + .01)) = \left(\frac{103 - 126.80}{-126.80}\right) = 18.77\%$). Hence, the importance of trying to increase GDP through direct funds to the people or potentially increasing the minimum wage requirements enough to push the median household income up by only 1%.

Although the study's results may appear vague in determining if fiscal or monetary policies could indirectly or directly impact GDP growth, I was able to emphasize the importance of striving to increase spending on the individual level (PCE). Meanwhile the variables Federal Reserve Rates, house-hold median income, inverted yield curve, commercial loans, delinquency on loans, and unemployment rate were not shown to have a statically significant relationship with GDP growth, but this does not infer that these variables could not have any impact on GDP. If fiscal policies were implemented in only recessionary or prosperous periods, then a linear regression might render the data irrelevant. The maximums and minimums of GDP may play a

more important role in understanding the effects that fiscal policy has on GDP, since these

policies are only administered during the boom and bust cycles. Although not promulgated as

much, the central bank does implement monetary policies in a booming economy such as the

quantitative tightening seen a few years ago. This was an effort to regain losses on their balance

sheet due to the 2008-2009 recession.

I would suggest that further research certainly needs to be conducted within this arena with

the usage of other models. A study that could capture the net effects or dive more into the peaks

of the data could lead to more insight in determining the overall effectiveness of fiscal policies

on GDP. As of this moment, any fiscal policies that supports the personal consumption

expenditure shall be prosperous for GDP, especially during this time of COVID19.

VII.   Works Cited

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