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The Effect of Changes in US Money Supply on S&P 500 Returns During the Global Financial Crisis and COVID-19 Recession

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Abstract

The goal of this paper is to perform a comparative analysis between the United States Federal Reserve's response to the 2008 Global Financial Crisis and the COVID-19 recession, and determine how each response affected the United States stock market. I have found that during the 2008 Global Financial Crisis, money supply increases did not have a substantial impact on the US stock market, while factors such as market volatility and unemployment rate had highly significant negative effects on stock returns. During the COVID-19 recession, money supply changes did have an impact on stock returns, and had a positive relationship with the price of the S&P 500 index. Furthermore, factors such as market volatility and unemployment rate were negatively correlated with S&P 500 prices. The results of this study carry important implications for both policymakers and investors on how to better handle future recessionary events, and potentially profit from them.

Keywords: Recessions; Monetary Policy; Investors; The Federal Reserve

1. Introduction

In 2007, the United States fell into the largest economic crisis since the Great Depression, known as the Global Financial Crisis ("GFC", henceforth). This event was caused by a variety of factors that can be dated back years before the crisis itself, with regulatory neglect having been the most impactful (Blinder, 2014). A lack of significant oversight from the Federal Reserve ("The Fed", henceforth) allowed a rapid growth in subprime mortgages and securitization that eventually led to the housing market being overwhelmed, and the rest of the US economy following suit. As a result, the Global Financial Crisis led to a massive overhaul of US monetary policy, and a reshaping of the US Federal Reserve. After a little over a decade, the world faced a new global crisis in the form of the COVID-19 pandemic in March of 2020. The onset of the pandemic led to a complete shutdown of the US economy in a way that had never been seen before. Similar to the Global Financial Crisis, The Fed had to take the lead in adopting new policies, in order to avoid a complete collapse of the battered economy. Although many of the policies introduced in 2008 were once again reimplemented during the pandemic, others were not, with new programs being introduced instead.

This study will use OLS linear regressions to determine the relationship between the S&P 500 index and changes in the US M2 money supply during both the Global Financial Crisis, and COVID-19 recession. In my analysis, I find that there is a correlation between M2 money supply changes and US stock market performance during the 2020 COVID-19 pandemic, but not during the 2008 GFC.

During the Global Financial Crisis, the Fed policy that was utilized to combat the recession was focused on maintaining stability within the banking system. As we can see in the regression results associated with the GFC, M2 money supply changes were not a significant

variable associated with decreases in the S&P 500, while factors such as volatility and unemployment rate were. The COVID-19 results on the other hand told a much different story. Unlike the GFC, many of the Fed policies implemented during the COVID-19 recession involved stimulus packages that went directly to small businesses and US citizens. In turn, the S&P 500 reacted positively with increases in the M2 money supply, as US citizens had extra money to invest with. Additionally, many businesses were able to grow their stock value inorganically when the US economy began to open up, as citizens began to spend extra funds that they had not used during the onset of the recession. Though the market reacted positively during the COVID-19 recession, there were several negative effects that were felt as the US economy began to react to this inorganic growth. Despite Fed policy being ineffective in maintaining the stock market during the GFC, it provided stability within the economy and allowed for a healthy rebound from this recession.

Prior to 2007, numerous studies have attempted to determine if US monetary policy and changes in money supply were indicators of how the stock market may react. These studies however, have had very conflicting results, signaling that monetary policy prior to the Global Financial Crisis was not a direct indicator of stock performance. US monetary policy and the Fed's role in controlling the US money supply shifted drastically in 2008 as a result of the Global Financial Crisis. In this study, I will analyze how the US stock market reacted to the money supply shocks in both recessions, to determine if modern Federal Reserve policy has had an effect on the US stock market. The implications of this study could benefit both policymakers and investors in the US to determine whether or not to implement a particular monetary change, and whether or not to invest based on monetary policy in the future.

2. Literature review

In terms of the GFC, a paper that closely analyzes the Fed's response is Stella (2009). This study gives a numerical breakdown of how the United States' balance sheet changed at the beginning of the GFC, as well as background on the history of the Fed's balance sheet. It explains how the US balance sheet diversified greatly after the Lehman bankruptcy, not only in terms of total asset and liability value, but also in regards to what assets and liabilities the Fed held. Prior to 2008, the Fed's asset side of the balance sheet was dominated by government securities, which made up $784 billion of the $868 billion in total assets. However, the Fed's balance sheet at the end of 2008 was made up of only $502 billion in government securities out of the now $2,230 billion in total assets. In terms of liabilities, we see that the Fed's balance sheet consisted of $783 billion in Federal Reserve Banknotes, out of $868 billion in total assets. Federal Reserve Banknotes now made up $853 billion of the liabilities side out of $2,230 in total assets, while bank deposits became the largest liability in terms of total value ($860 billion). This information is important to my study because it signals numerically where a large portion of the Fed's monetary response was going towards, which was the US banking system. As we can see, the majority of the money being printed during this monetary expansion period was being used to maintain US bank stability, rather than as stimuluses for businesses and individuals.

Another paper Bagus et al. (2009), looks at these balance sheet changes through a different lens. This paper is a comparative analysis between the 2008 Central bank balance sheets in the United States and Europe. It demonstrates that Europe began to expand their balance sheet much quicker than the US did, with both Central Banks undergoing massive monetary expansion by the end of 2008. The paper concludes that, from a numerical perspective, the European response was more effective in combating the recession, while the US seemed to be in a better

position to emerge successfully from a qualitative standpoint. This analysis is one that has remained valid over time, as the United States was able to avoid most inflationary and negative economic effects after the crisis.

In regards to the COVID-19 recession, the financial literature is much more limited in comparison to that of the GFC. This is not surprising, given that we are still in the midst of the COVID recession, and new data surrounding the event is still being released in the present day. The first paper that I will discuss is Burdekin (2023), which analyzes the monetary policy responses by the Federal Reserve during the COVID-19 recession, and how this has affected the general state of the US economy. The paper explains how the monetary expansion of 2020 was offset by a decline in velocity of spending which justified the Fed's initial relief response. However, as velocity of spending increased, the Fed failed to adjust their monetary policy to account for the massive increase in consumer spending. As a result, we are currently seeing high levels of inflation that were not seen in 2008. This stems from the Fed's inaction in adjusting and accounting for the monetary expansion implemented at the onset of the pandemic.

The second paper regarding the COVID-19 recession that I will discuss is Occhino (2020). This study takes an in-depth look at the direct lending and quantitative easing programs enacted by the Federal Reserve in 2020. The paper includes several models that demonstrate the relative effectiveness of different economic programs, and explains why the Fed's use of direct lending was different from the one we saw in 2008. Overall, the paper concludes that unsubsidized direct lending to firms has similar effects to quantitative easing. However, subsidized direct lending has two additional effects: a lump-sum subsidy to firms, which is relatively small, and a decrease in firms' marginal borrowing rate, which can be large.

In terms of stock market performance Omair et al. (2020) discusses how certain sentiments generated by COVID-19 news relate to market volatility, and changes in stock prices. The paper's conclusion demonstrates that panicked media coverage surrounding the pandemic led to higher levels of volatility in equity prices. Interestingly, this relationship was stronger for industries that were more heavily hit by the effects of the pandemic. However, the data shows that sentiment and the amount of media coverage had little effect on volatility of prices. This concept ties into the ideas I will discuss in my paper, as much of the media coverage on the pandemic was headed by the Federal Reserve's responses. Furthermore, Omair et al. can be used as an explanation for why stock prices during the pandemic were moving alongside stimulus payments, as this was heavily covered by the media.

Baig et al. (2021) discusses how a variety of economic variables may have affected the US stock market during the COVID-19 pandemic. The paper discusses whether or not there is a link between factors such as deaths, liquidity, and lockdowns and relative stock market performance. Narayan et al. (2021) is another paper that looks at the relationship between government measures combating the pandemic and stock market performance across G7 countries. The paper concluded that lockdowns, travel bans, stimulus packages all had a positive effect on G7 stock markets, which was consistent with the other literature discussed.

The empirical analysis that I perform in this paper is very similar to the one used in Maskay (2007), which discusses the relationship between changes in money supply and stock market prices over the course of several decades. The results of this Honors project support the view of the real activity hypothesis which states that a positive money supply shock would increase stock prices and vice versa. The results also support the opponents of Efficient Market Hypothesis that anticipated change in money supply matter more than unanticipated changes in

money supply in determining stock prices. This paper will focus in more detail on the programs implemented during each of the recessions and how these policies qualitatively and quantitatively affected the stock market, as well as the Federal Reserve's balance sheet.

Although there is a lot of research on the Fed's responses to each of the recessions, a direct link examining the relationship between these policies and stock market performance is not something that has been extensively discussed by economists. Many economists have looked at how restrictions and lockdowns have affected stock prices, and how The Fed's policies affected the overall state of the US economy in both 2008 and 2020. However, an analysis of these two variables and their relationship with

one another is essential in understanding how the Fed's monetary policies could be improved. I found that the inflation rates associated with the COVID-19 monetary response are in line with the findings from Burdekin (2023), and the positive market performance that occurred during this recession is in line with that of the G7 countries discussed in Baig et al. (2021). Furthermore, the literature surrounding the Fed's balance sheet in Stella (2009) provides a clear understanding of why the stock market was not associated with changes in M2 money supply, given that the majority of the balance sheet changes were associated with maintaining stability within the US banking system, rather than putting money directly into the hands of potential investors.

3. Data and Methodology

3.1. Data Overview

The data collection process surrounding my research involved the use of several publicly available sources, which I use to conduct my analysis. In terms of my dependent variable, I use the S&P 500 average monthly returns, obtained directly through the Nasdaq website. The data

was collected as the average value of the index at the beginning of each month, along with the month over month percent change. My main independent variable, M2 money supply, was collected via the St. Louis FRED database, and is reported in terms of monthly value and monthly percent change in terms of billions of US dollars. Along with the two main variables I am analyzing, I examined a number of control variables that may also have an effect on the value of the S&P 500 index. These variables include VIX index (volatility), consumer price index-U (inflation), and unemployment rate. Like my other two variables, these were collected via public sources on a monthly basis. Initially, I intended to use two other control variables in my regression analysis, consumer confidence and effective federal funds rate. However, collinearity issues associated with both of these variables forced me to remove them from the analysis. I determined that the best measure of my independent variable would be to analyze the M2 money supply month over month change, rather than total value. Another factor that I needed to consider when breaking down the data was which dates to use when analyzing both the Global Financial Crisis and the COVID-19 recession. To analyze the GFC, I felt it was best to begin in October 2007, and collect data through the end of 2010. I made this decision on the basis that the recession was essentially over in 2010, and Fed monetary policy had begun to ease by 2010. For the COVID-19 recession, I decided to collect data starting March of 2020, and ending with January of 2023. Below, I have presented the summary statistics for each of the two recessions:

Table 1: Summary Statistics

VARIABLES	Mean (COVID)	Standard Deviation (COVID)	Mean (GFC)	Standard Deviation (GFC)
% Change in M2 Money Supply	0.910	1.405	0.472	0.530
S&P 500 Average Price	3,864	551.0	1,126	232.0
% Change in S&P 500 Price	0.00812	0.0609	-0.0105	0.0634
VIX Index Monthly Average	24.68	7.680	30.67	12.49
Consumer Price Index-U	273.7	15.01	214.1	3.216
Unemployment Rate	5.638	2.778	7.329	2.030

Note: The Data for this analysis was obtained via the FRED, NASDAQ, and Federal Bureau of Labor Statistics databases

3.2. Methodology

For my regression, I based my analysis on a 2007 study that performed an OLS linear regression analysis on the effect of US money supply on stock returns (Maskay 2007). In this study, Maskay attempts to test the Efficient Market Hypothesis, by determining whether or not anticipated or unanticipated changes in money supply have an effect on stock returns over the course of several decades. Although I will not be analyzing this relationship in my paper, I have chosen to base my regression analysis on this previous study due to the similarities in variables used. For my initial regression, I ran a basic OLS linear regression that I have presented below:

(1) $$y_t = \alpha_0 + \alpha_1 x_{1t} + \alpha_2 x_{2t} + \alpha_3 x_{3t} + \alpha_4 x_{4t} + e_t$$

Table 2: Description of Variables

Variable	Term	Coefficient
S&P 500 Value	y_t	N/A
Constant	N/A	α_0
% Change in M2	x_{1t}	α_1
VIX Index	x_{2t}	α_2
CPI-Index	x_{3t}	α_3
Unemployment Rate	x_{4t}	α_4

4. Results

4.1. Main Recessionary Models

Table 3: Global Financial Crisis Regression Results (10/1/2007-1/1/2010)

VARIABLES	SP500AvgPrice
% Change in M2 Money Supply	-20.30
	(38.19)
VIX Index Monthly Average	-10.71***
	(1.548)
Consumer Price Index-U	1.104
	(4.570)
Unemployment Rate	-80.25***
	(8.173)
Constant	1,816*
	(966.4)
Observations	28
R-squared	0.915

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The above regression results for the Global Financial Crisis show us that both the VIX-index and unemployment rate are statistically significant at the 1% level, and are both negatively correlated to S&P 500 returns. In terms of the VIX index, this coefficient indicates that a 1 unit increase in the VIX is associated with a 10 point decrease in the average monthly price of the S&P 500. Moving into the unemployment rate, a 1% increase in US unemployment was associated with an 80 point decrease in the value of the S&P 500 index. In terms of the main independent variable in the study, percent change in M2 money supply, this was not statistically significant at any confidence level. On top of this, the CPI index was also not statistically significant at any confidence level. As a whole, the above regression results appear to be strong with an R-squared value of 0.915 and a constant that is statistically significant at the 10% confidence level.

Table 4: COVID-19 Regression Results (1/1/2020-1/1/2023)

VARIABLES	SP500AvgPrice
% Change in M2 Money Supply	180.2**
	(74.66)
VIX Index Monthly Average	-52.07***
	(8.856)
Consumer Price Index-U	10.42*
	(5.233)
Unemployment Rate	-101.3***
	(35.28)
Constant	2,738*
	(1,520)
Observations	36
R-squared	0.692

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Moving into the COVID-19 regression, we can see that every variable is statistically significant at the 10% confidence level. In terms of the main independent variable, % change in M2 money supply, we can see that it is positively correlated to S&P 500 stock returns, in that a 1% increase in the M2 money supply was associated with a 180.2 point increase in the S&P 500 index. Similar to the GFC regression results, both the VIX index and unemployment rate were statistically significantly at the 1% confidence level, and negatively correlated with S&P 500 returns. In terms of the CPI Index, we can see that it is positively correlated with S&P 500 returns, and specifically, a 1 point increase in the CPI index is associated with a 10 point increase in the S&P 500 index. As a whole, the regression has an R-squared value of 0.692 which indicates the model is somewhat significant, but not as accurate as the results obtained from the GFC regression.

4.2. Robustness Checks

In order to check for robustness in my regression model, I have run several robustness tests in which I have replaced certain variables in the regression with similar indexes. The first robustness check I performed was using the NASDAQ composite index in place of the S&P 500, to determine if my results are consistent across different stock indices. The data for the NASDAQ composite was collected via the FRED database, and is presented as the monthly average of the index. The results I have obtained from this regression are presented below for both recessions, and are consistent with the results I obtained using the S&P 500:

Table 5: Global Financial Crisis Robustness Check 1:

VARIABLES	Nasdaq Composite Monthly
% Change in M2 Money Supply	-106.0
	(73.94)
VIX index monthly average	-20.73***
	(2.997)
Unemployment Rate	-107.6***
	(15.82)
Consumer Price Index-U	7.713
	(8.846)
Constant	1,909
	(1,871)
Observations	28
R-squared	0.889

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: COVID-19 Robustness Check 1:

	(1)
VARIABLES	Nasdaq Composite Monthly
% Change in M2 Money Supply	555.7*
	(311.0)
VIX index monthly average	-205.3***
	(36.89)
Consumer Price Index-U	-25.04
	(21.80)
Unemployment Rate	-455.5***
	(146.9)
Constant	26,396***
	(6,329)
Observations	36
R-squared	0.621

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

On top of using the Nasdaq to test for robustness, I also wanted to validate my results using a more diverse US stock index. I have thus replicated the regression analysis replacing the S&P 500 with the Wilshire 5000, which consists of virtually all publicly traded companies in the US. The results of these regressions are presented in the appendix (Tables A3 and A4), and are nearly identical to the original regression results for both the GFC and COVID-19 recessions.

For my next robustness check, I used a different volatility index in place of the VIX. The rationale behind manipulating this control variable was based on the fact that it was highly significant in both recessions, and felt it was necessary to perform a robustness test to confirm these results. The index I determined was best suited for this robustness analysis was the Economic Policy Uncertainty Index (EPU). Unlike the VIX, this index is a measure of uncertainty in terms of economic policy, rather than the stock market. The EPU Index is constructed using three main components: the frequency of news articles discussing economic policy uncertainty, the level of disagreement among economic forecasters, and the volatility of

stock market returns. As we see below in Table 7, the results obtained from this robustness check are not entirely in line with the original regression results in terms of the Global Financial Crisis. The main independent variable in the study becomes statistically significant when we replace the VIX index with the EPU index. Despite the large change in statistical significance, the money supply variable still has a negative correlation coefficient with S&P 500 returns that is in line with the original GFC regression. The fact that the money supply variable is now significant can be explained by the new volatility index being based on overall public uncertainty, rather than uncertainty in the stock market specifically. Below I have presented the robustness tests for each of the two recessions, using the Economic Policy Uncertainty Index for United States (USEPUINDXD) in place of the VIX index:

Table 7: Global Financial Crisis Robustness Check 2:

	(1)
VARIABLES	SP500AvgPrice
% Change in M2 Money Supply	-95.93**
	(37.50)
Economic Policy Uncertainty Index	-2.009***
	(0.366)
Consumer Price Index-U	1.899
	(5.281)
Unemployment Rate	-87.82***
	(9.098)
Constant	1,677
	(1,116)
Observations	28
R-squared	0.886

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: COVID-19 Robustness Check 2:

	(1)
VARIABLES	SP500AvgPrice
ChangeM2	143.3*
	(83.22)
Economic Policy Uncertainty Index	-5.792***
	(1.273)
Consumer Price Index-U	10.41*
	(5.916)
Unemployment Rate	62.62
	(49.38)
Constant	1,673
	(1,728)
Observations	36
R-squared	0.609

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Discussion and Limitations

When we compare the above two regression models, we can see that there are several similarities and differences associated with each of the two recessions. The first glaring difference is the statistical significance associated with the main independent variable, % change in M2 money supply. In terms of the Global Financial Crisis, this variable was not significant at any confidence level, for both the standard and robust (Table A1) regressions. However, this makes sense when one considers how the money supply shocks during this recession were actually implemented. During the GFC, the majority of the money printed by the Federal Reserve was kept in the banking system in order to maintain these struggling institutions (McKitrick 2022) . As a result, these extra funds were not being used to invest in the stock market, which explains the nonexistent relationship we see in the above regression.

However, the COVID-19 results tell us that the money supply shocks associated with this recession did have an impact on the stock market. For both the standard and robust regressions (Table A2), the money supply variable was significant at the 5% confidence level. Along with both regressions having statistically significant R-squared values, we can assume that the money supply shocks during the COVID-19 recession did have an impact on the value of the S&P 500. These results do make sense due to the nature of the money supply changes that occurred during the pandemic. This is because unlike the GFC, the money being printed by the Federal Reserve was being put into the hands of everyday citizens rather than being kept in the US banking system. This was done through stimulus checks provided by the US government to businesses, unemployed individuals, and those under a particular income threshold ("The Federal Response to COVID-19"). Although these extra funds were intended to provide these individuals with the necessary funds to maintain their financial stability, the lack of spending in the overall economy allowed them to use these funds in the stock market instead. Many businesses and industries in which the average American would typically spend their disposable income were shut down during the beginning of the pandemic, and allowed people to use these funds in the stock market as a result (Greenwood et al. 2022). Due to this, the US stock market was able to grow inorganically through the stream of investments from individuals and businesses with extra money, and can help us explain why the increase in money supply was positively correlated with S&P 500 returns. Furthermore, as the US economy began to recover and allowed businesses to be reopened, many Americans were using their money to buy everyday retail goods, which allowed stocks within this industry to grow rapidly as a result (Greenwood et al. 2022). Many of the businesses that appear in the S&P 500 index fall under this retail category, and can also

explain why the stock market continued to show signs of improvement as the pandemic continued, and businesses began to reopen.

Moving into the control variables, I will first analyze the GFC results. For this recession, we can see that the VIX index and unemployment rate were both significant at the 1% confidence level, and negatively correlated with S&P 500 returns. In terms of volatility, this variable was highly significant at all confidence levels for both the standard and robust regressions. Once again, this is a result that makes sense and mirrors the findings of Qadan et al., which concluded that there is a negative correlation between the VIX index and anticipated stock returns. The coefficient of -10.71 is low in comparison to the coefficient associated with unemployment rate, but the incredibly high significance level associated with the variable tells us that although the relationship between Volatility and S&P 500 returns is not a numerically large one, it is a statistically consistent relationship.

Moving into unemployment rate, this variable was also highly significant, and had a very large negative coefficient in comparison to the VIX. This could be explained by the fact that the values used in the regression data for unemployment rate are much smaller numerically in comparison to the VIX numbers, meaning that a one unit change in unemployment rate is a lot more impactful than a one unit change in the VIX index. Despite this, the regression results associated with unemployment rate are consistent with previous studies, including Maskay '07 which found a negative correlation between unemployment rate and S&P 500 returns from 1959 to 2007. In this study, the regression results found that unemployment rate was statistically significant at the 1% confidence level, which is consistent with the results of my regression analysis. However, the coefficient associated with this variable in Maskay's analysis is only -41.169, which is much smaller than the coefficient of my regression. This indicates that the

effects of unemployment during the GFC were much more impactful than the ones seen in years prior on stock returns. This could be explained by the fact that there was a lack of trust in the stock market due to the collapse of major financial institutions such as the Lehman Brothers in the years leading up to the crisis, which caused investors to build up feelings of fear and uncertainty in the US stock market (Becchetti and Ciciretti 2011). As a whole, the results from the GFC are consistent with the results of previous studies, that changes in money supply were not a significant predictor for how the S&P 500 would react, while factors such as unemployment rate and volatility were in fact significant.

In terms of the COVID-19 recessions control variables, we can see that the results obtained from both the standard and robust regressions are very similar to the ones obtained from the GFC regression in terms of statistical significance. Both unemployment rate and the VIX index were statistically significant at the 1% confidence level, and are negatively correlated to S&P 500 returns. However, when comparing the coefficient values of the robust regressions, we can see that the COVID-19 recession coefficients are much larger than the GFC ones. In terms of volatility, the data during the COVID-19 recession was more consistent numerically in comparison to the GFC numbers. More specifically, the average VIX index during the GFC was 25% larger, which could be an explanation for the larger negative coefficient. However, the coefficient being five times larger for the COVID-19 recession means that this factor cannot be the only explanation for this difference. The other explanation for this large difference could be attributed to the extreme volatility and massive stock market crash that occurred at the onset of the pandemic. From January 2020 to March 2020, the US stock market lost over 20% of its value, while the VIX index increased around four fold.

In terms of unemployment rate, the coefficient of this variable for the COVID recessions robust regression is nearly double that of the one for the GFC, but also supports the findings of Maskay. Similar to the VIX data, the average unemployment rate during the GFC was higher than the COVID average, which could be part of the explanation for why the coefficient is higher. However, it cannot be the only reason, due to this marginal difference being too low to be the sole explanation of this coefficient being nearly double for the COVID-19 regression. Another potential explanation for this large difference could be the fact that the unemployment data for the COVID-19 recession has much more variance then the data for the GFC. After the pandemic began to wind down during 2021, the US unemployment rate was somewhat low, despite the stock market not changing substantially in comparison to the beginning of the recession. This could be an explanation for why the coefficient is much higher than the GFC one, because a unit change in unemployment rate was much more dramatic during this timeframe than a one unit change during the GFC.

Finally, we can see that the standard regression for the COVID-19 pandemic had the CPI index as a somewhat significant variable that was positively correlated with S&P 500 returns. This was not the case for the GFC regression, with the CPI index being insignificant at all confidence levels for both the standard and robust regressions. Once again, this is a result that makes sense, and supports the findings of McKitrick. The CPI index during the GFC only increased by 7.4 points over the course of time I measured in this study, despite the stock market reacting aggressively over this time period. For this reason, we can understand why this variable was not statistically significant at any confidence level for the GFC recession. However, the CPI index during the COVID timeframe reacted much differently, with the index increasing over 15%, or 49.8 points over the course of this time period. The stock market itself also increased by

over 25% during the period, which can also explain why the variable would be significant in the regression.

A factor that should be considered when analyzing the results from the above regressions would be how some of the variables are endogenous. Typically, economic factors such as unemployment rate, inflation, and volatility are conditionally correlated with one another in terms of their reactions to recessionary times. When the economy is struggling, there are typically higher levels of unemployment and inflation, which is supportive of the regression results. Furthermore, these variables all had a negative coefficient which further supports this claim. Falling stock prices is typical during a recessionary time, and as a result, factors such as the ones I have previously discussed are often negatively correlated with stock prices as well. This is something that cannot be overcome in the study, but should be considered when analyzing the results of the regression and its limitations. In terms of limitations in the data, using the average monthly values of the S&P 500 may not capture some of the extreme changes that were experienced on specific days. However, data on M2 money supply is collected and distributed on a monthly basis, so the rest of the data had to follow suit in order to perform an effective analysis. Another limitation in the data is the time frames used for each of the recessions. Ideally, more data points would be used in order to have more robust results to analyze. However, the need to use monthly values and the fact that this analysis is based on particular time frames makes it necessary for the data to be presented in the timeframes and frequencies that I have used.

There are several individuals and institutions that would utilize these findings in making future economic decisions. The first of these would be investors in the US stock market. Along with other key financial metrics that are often used to determine future stock prices, one could

also look at Fed policy as another factor to consider. As we can see from the regression results, Fed money supply shocks that put money directly into the hands of investors could lead to inorganic growth, and thus, increased stock returns. In future recessions, investors should consider money supply shocks, as well as the nature of these shocks in order to make better investment decisions and potentially profit during economic crises. The other main group that should consider these results is policymakers, including the US Federal Reserve. The policies used by The Fed in each of the two recessions that I discussed had vastly different effects on both the US stock market and the economy as a whole. As we can see from the regression results, the policy used by The Fed during the COVID-19 recession allowed the US stock market to quickly recover, and allow investors to maintain confidence in The Fed and US economy. However, this did not come without any negative effects, as inflation rates rose into 2022 and 2023. Due to this, the US economy has experienced extremely high prices across all industries as a result of the policies implemented in 2020 and 2021. This is another important piece of information for policymakers to consider when reacting to future economic crises, in order to avoid inflationary effects that we are currently seeing today. Furthermore, these inflationary effects were essentially non-existent after the GFC, signaling that the policy used during that recession, although it had little effect on the stock market, allowed the US economy to recover in a more stable fashion. Using this information, future policymakers can make more informed decisions during future recessions in order to both maintain the US stock market and avoid an inflationary response similar to the one experienced today.

6. Conclusion

In the various models I have presented, I have sought to determine whether or not Federal Reserve policy surrounding US M2 money supply is a determining factor in stock market returns during a recession. Based on the regression analysis, one can conclude that Fed policy does have an effect on stock returns, but not on a definitive basis. During the Global Financial Crisis, the majority of the money being printed by the Federal Reserve was kept within the US banking system as reserves in order to stabilize these struggling institutions. As a result, these policy moves by the Fed did not have a substantial impact on the US stock market, because the money being printed was not being invested. On the other hand, during the COVID-19 recession, the M2 money supply increased much more significantly, with much of these funds being put directly into the hands of US citizens. As a result of this, money was being pumped into the United States stock market which inorganically grew the value of many stocks during the early stages of the pandemic. Furthermore, excess funds that Americans held during 2021 and beyond were used in industries such as retail and entertainment once the economy reopened, and pandemic restrictions began to be lifted. This led to companies in this industry to have financial success, which drove their stock prices up as M2 money supply continued to grow.

Although these results suggest that the monetary policy used during the pandemic were more successful in stabilizing the US economy, a closer examination of the current state of the US economy could easily refute this statement. Burdekin (2023) examines this concept by explaining how initial Federal reserve policy was effective in stabilizing the economy at the onset of the pandemic, but failed to adapt as the state of the country changed as the pandemic progressed. The current state of the US economy signals to us that the policies used during 2020, although effective at the time, were only useful for the extremely unorthodox economic

environment of the country during this year. Despite this, the results of this study are impactful in understanding how the US stock market could react to Fed policy in the future. Investors should never look at changes in pure money supply as a factor that affects stock returns, but rather they should look at the nature of the Fed policy itself. Policy that puts money into the banking system, similar to the ones utilized during the GFC should not be something that investors rely on when deciding whether or not to invest. However, policies that are similar to the ones used during the COVID-19 recession should signal to investors that a stock may grow inorganically, if there is more money in the hands of investors themselves.

A way to potentially build on this study in the future would be to analyze the effects of M2 money supply changes on other economic variables such as company valuations, or stock returns based on industry. These two studies would be easy to replicate, and would also provide useful information to Americans making investment decisions. Furthermore, one could also look at the timing of Fed policy in terms of announcement date and determine if that has an effect on various economic and investment factors such as stock market reactions or inflationary responses. Similar to what I previously mentioned, the results from a study such as this would provide policymakers and investors with useful information that could allow them to benefit from Fed policy in a way that has not been utilized in the past.

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8. Appendix

Table A1: GFC Robust Regression Results

VARIABLES	SP500AvgPrice
% Change in M2 Money Supply	-26.83
	(42.16)
VIX Index Monthly Average	-10.38***
	(1.709)
Consumer Price Index-U	-0.233
	(5.045)
Unemployment Rate	-79.73***
	(9.023)
Constant	2,093*
	(1,067)
Observations	28
R-squared	0.896

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A2: COVID-19 Robust Regression Results

VARIABLES	SP500AvgPrice
% Change in M2 Money Supply	188.9***
	(57.70)
VIX Index Monthly Average	-55.58***
	(6.844)
Consumer Price Index-U	2.566
	(4.045)
Unemployment Rate	-140.0***
	(27.27)
Constant	5,221***
	(1,174)
Observations	36
R-squared	0.809

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3: GFC Robustness Check (Wilshire 5000)

VARIABLES	Wilshire 5000
% Change in M2 Money Supply	-1.018
	(1.342)
VIX index monthly average	-0.417***
	(0.0544)
Consumer Price Index-U	0.162
	(0.161)
Unemployment Rate	-2.665***
	(0.287)
Constant	40.92
	(33.95)
Observations	28
R-squared	0.917

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A4: COVID-19 Robustness Check (Wilshire 5000)

VARIABLES	Wilshire5000
% Change in M2 Money Supply	8.231**
	(3.468)
VIX index monthly average	-2.700***
	(0.411)
Consumer Price Index-U	0.229
	(0.243)
Unemployment Rate	-6.513***
	(1.639)
Constant	223.8***
	(70.59)
Observations	36
R-squared	0.751

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1