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RESEARCH ARTICLE

THE CORONAVIRUS ECONOMIC CRISIS: LESSONS FROM THE GREAT DEPRESSION

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ABSTRACT

The Coronavirus, known as COVID-19, grievously impacted the US economy. In response to economic turmoil the US administration implemented rigorous stimulus packages to revitalize the economy and prevent another Great Depression. The objective of this study is to look at the efficacy of macroeconomic policies implemented during the Great Depression and to compare it with those policies undertaken by the US government during the current COVID-19 crisis. Further, the study investigates the number of length lags it takes for the implementation of the macroeconomic policies to be reflected in economic recovery. This will entail the use of U.S. real GDP, narrow definition of money and budget deficit obtained for the years 1926-1945. The study estimated the US monetary and fiscal multipliers during the Great Depression and found that the implemented monetary policy proved effective in economic recovery whereas the fiscal policy was not. However, this result might not hold true during the current disruption. This is because the stimulus packages undertaken are the highest in the US history and the fear of crowding out of the government spending is not applicable as the interest rates are kept at a zero bound. Further, the current government spending share stands at 38% of US GDP, unlike the 5% recorded during the 1930s. Moreover, the study found that the optimum lag length for recovery during the Great Depression was two years. However, if the US contains the current crisis with proper measures and tools, then the pace of economic recovery should be faster.

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INTRODUCTION

The 2019 Coronavirus, officially called COVID-19 by the World Health Organization spread to over 212 countries and territories around the globe resulting in over 21 million confirmed cases by mid August 2020 and 775 thousand deaths. This pandemic severely impacted the world economic activity and caused much uncertainty. The economic repercussions and the more profound and unpredictable effects are predicted to cause the global economy to fall into deep recession with a decline in economic growth by 3% in 2020. Alternatively, if it is wisely contained and the world economy returns to normalcy, then a 4.7% economic growth is predicted in 2021 (IMF World Economic Outlook). This calls for the use of aggressive economic policies to fade the pandemic and save the lives of millions while restoring economic activity. In light of aggressive policies, there is a specific need for the implementation of expansionary fiscal and monetary policies to support the consumers, investors and the markets.

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The United States, the world's largest economy, has suffered from the pandemic outbreak as it registered, by Mid of July 2020, more than a 3.5 million confirmed cases and over 140,000 deaths. The terrifying pandemic severely impacted the US economy as the economic growth that was stable in January and February of 2020 at 3.6% shrank by 4.8% in the first quarter of 2020. Moreover, millions of Americans filed for unemployment benefits making a historical level high of more than 30.3 million in the past six weeks, representing approximately 18.6% of the US labor force. This comes in light of businesses having laid off workers during the stay home and forced lockdown orders. The US Bureau of Labor Statistics projects that the unemployment rate surged to 14% in April 2020, the highest since the monthly data series began in 1948 (CNN, April 2020). Moreover, crude oil prices dropped by 65%, metal prices fell by 15%, natural gas prices decreased by 38% and financial markets witnessed a deeper downturn (IMF, 2020). This caused socio-economic unrest where thousands of workers have lost or run the risk of losing their jobs as many businesses are incurring losses and facing bankruptcy. The U.S. government acted promptly to cure the economy by implementing fiscal and monetary stimulus packages in bid to increase the consumer and business confidence.

The initial package was a historical $2 trillion bill virus stimulus to confront the Coronavirus crisis and to revitalize the damaged economy. Moreover, the Federal Reserve Bank acted before the government and adopted a monetary stimulus of over $2.3 trillion.

Table 1. US Economic Indicators (1926-1945)

Year	RGDP	M1	Deficit
1926	1207	26.2	3.795
1927	1194	26.1	4.013
1928	1181	26.4	3.9
1929	1109	26.6	3.862
1930	1020	25.8	4.058
1931	950	24.1	3.116
1932	828	21.1	1.924
1933	817	19.9	1.997
1934	906	21.9	2.955
1935	986	25.9	3.609
1936	1113	29.6	3.923
1937	1170	30.9	5.387
1938	1132	30.5	6.751
1939	1222	34.2	6.295
1940	1330	39.7	6.548
1941	1566	46.5	8.712
1942	1862	55.4	14.634
1943	2178	71.8	24.001
1944	2352	80.9	43.747
1945	2329	94.1	45.159

Source: the publications of the Bureau of Economic Analysis for real GDP, the Office of Management and Budget, US government historical tables for budget deficit and Treasury Annual Reports, 1945 (historical statistics of the US. 1789-1945) for M1.

The economic drawback of COVID-19 is somehow similar to the one witnessed during the Great Depression, except that the unexpected collapse in the recent crisis caused all economic activities to shrink at a faster and unexpected rate than that of the 1930s. The Great Depression forms a turning point in the world and US economy. The depression started after a peak of the 1920s to a trough in March 1933 when output dropped by 52%, unemployment rate at 22.9% in 1932, wholesale prices decreased by 38% and real income fell by 35%. Further, the aggregate demand collapsed as consumers and investors lost confidence and faith in the economy and policy makers as they were refrain from spending due to expectation of deflation and uncertainty. Therefore, the objective of this article is to look at lessons learned from the Great Depression and the efficacy of macroeconomic policies that were implemented and compare it to those policies undertaken by the US government during the current COVID-19 pandemic crisis. Further, the objective is to investigate the number of lags in response time it takes the implementation of the macroeconomic policies to be reflected in economic recovery. Moreover, the study will run the vector autoregressive model(VAR) and the Granger Causality Wald Test to check whether fiscal policy (budget deficit)and monetary policy (narrow definition of money M1) Granger cause real GDP using time series annual data for USA for the period of 1926-1945. The data was obtained from the Treasury's annual reports of 1945, the historical data from the Office of Management and Budget, and the National Income and Product Accounts Tables. All the data used, and the results of the analysis, are presented in the appendix of this paper. The macroeconomic model that will be used is the one developed by Romer (1992), to examine the efficacy and magnitude of aggregate demand policies in ending the Great Depression. The study is disaggregated into six sections. Section 1 provides an introduction to the topic at hand, section 2 delves into an overview of the economic indicators in both the Great Depression and the COVID-19 crisis. Section 3 presents the literature review of both the embarked aggregate demand policies in both eras and their validities in stimulating the economy. Section 4 presents the methodology and data used. Section 5 is analysis and results of the used model and section 6 concludes the paper

Overview of US. Economic Indicators: The US economy enjoyed very favorable economic results after WWI as both the automobile and the construction sectors flourished during which huge investment was accompanied with higher productivity and price stability. Further, the US accounted for 60% of international lending during the period of 1924-1931. (Craft and Fearon 2010). However, in 1929, the FED implemented a tight monetary policy where it increased the discount rate from 3.5% to 5% and sold government securities in an effort to curb stock market speculative bubble and decrease inflation. This act severely affected the economy and drove it into its longest and deepest economic catastrophe of its history. As the borrowing from banks became expensive, investors borrowed money from non-bank sources. The US economy reached a peak in August 1929 and companies had expanded to the bubble point, but as corporate results were revealed with losses, the stock market crashed in October 1929. This was followed by a loss of confidence in consumers and investors with unemployment rate increasing from 2.9% in 1929 to a double digit figure in 1931 and a record high of 22.9% in 1933. Further, the GDP deflator dropped to 74.2%in1933 (1929=100), output declined by 52%, and the aggregate demand collapsed. There was a fundamental structural weakness in the US economic system as the fragile banking system did not provide guarantees to their customers who speculated recklessly in stocks. Further, agricultural prices were low during the 1920s which made farmers unable to make any noticeable recovery. Also, the interventional policies of the newly appointed President Hoover had little impact in mitigating the crisis. The details of the policies and their effectiveness will be studied and analysed in the following literature review section. The COVID-19 had started in Wuhan. China in December 2019, affected almost all countries of the world. The US economy was hit severely by the repercussions of the disease that outbreak the biggest economy of the world and left millions of workers to join the unemployment pool. This comes as a consequence of having firms, businesses and financial markets closed down, with repercussions reaching those of the Great Depression. The economic fallout of the crisis remain uncertain and hard to speculate with several factors including the speed and stringent measures of containment, the aggressiveness of government policies implemented to tackle the crisis, the repercussions of the global financial markets, and the confidence of customers and investors in the undertaken policies. As a result, the U.S. production tumble 5.4% in March 2020 as many factories were shut down while others suffer attributed to low product demand leading factory output to drop by 6.3% in March, the worst since 1946. This is compounded by the halting of business operations driven by an effort to protect workers from the pandemic outbreak (Tappe and Isidole, April 2020). Further, the price a barrel of West Texas Intermediate (WTI) turned negative for the first time in history due to low demand and excess supply of oil. Additionally, more than 30 million Americans filed for unemployment benefits in the last six weeks of April 2020. This high figure might be a result of the low wages of many casual workers who might get more money from the unemployment compensation than what they would earn from their regular jobs.

The US Department of Labor projects the unemployment to reach a record of 14%, one of the highest since the Great Depression. Many economists believe that the second quarter of2020 will be more tragicomic since 1947 as Morgan Stanley predicted that the economy will drop by 30.1% in the second quarter of 2020, which is close to the figure estimated by Goldman Sachs of34%. (Roberts, 2020)

Literature Review: In this section I will review the different studies and views that tackled the effectiveness of the macroeconomic policies that were adopted during the Great Depression along with stimulus packages that the US government had adopted to cope with COVID-19. Due to the lack of official and accurate data for the present crisis, as it is premature to judge or analyse the efficacy of the policies undertaken, I will review the current stimulus packages only and look back at the history to extrapolate the future impact on economic recovery. Following the WWI, the US was a heaven for sustained recovery as it enjoyed a boom on automobile, construction and other sectors with increased investment, full employment and price stability. The majority of the world's economies were tied to each other through the gold standards, with the US and France accounting for 60% of the world's gold stock. In January 1928, the FED embarked on tight monetary policy to prevent the stock market speculative bubble by imposing a higher discount rate (5% instead of 3.5%) to limit borrowing and sold government securities to suck the excess liquidity in the market. However, this act had a negative unpredictable effect on domestic and international markets with spiraled panic erupting in the financial market. Moreover, consumers and investors lost confidence as they were refrain from spending due to the further future price cuts (deflation). Some economists argued that the FED act of tightening the monetary policy led the vulnerable economy to a recession in the 1920s(Ayres and Gordon, 1939). Others echoed that view and concluded that the FED's act in 1929-1933 drove the recession into depression (Friedman and Schwartz, 1963). Unemployment was another cause of the depression as it increased from 2.9% in 1929 to a record high of22.9% in 1933 with no unemployment compensation system. Further the loss of confidence in the economy and the policy makers made people reluctant to spend due to deflation and uncertainty about investment. As a result, in 1932, the Congress approved Reconstruction Finance Corp (RFC) to finance the troubled banks and stabilize the financial market. Further, the Hoover administration induced a large increase in federal spending on work relief projects, but the share of the budget at that time was modest at only 4% of GDP, even though the budget deficit of1931 is said to be the largest deficit in the entire decade. As President Roosevelt took office, he had a new deal in 1933-1935, that urged paying farmers to cut on their acreage in order to limit supply of agricultural products and increase their incomes. The New Deal was not Keynesian, neither fiscal nor monetary policy were used to recover the economy (Craft and Fearon, 2010). In her study to measure the impact of the aggregate demand stimulus on hampering the Great Depression, Romer, (1992) found out that the recovery of the US economy before 1941 was due to ease monetary policy. Without it, she explains, the depression would have lasted longer. Romer also concluded that there is a lag between policy implementation and its reflection on output growth. Her results were consistent with the findings of the Massachusetts Institute of Tech- University of Pennsylvania, Social Research Council (MPS) model, in that both fiscal and monetary policy shocks take time to be counteracted for twelve quarters after the shocks. The increase in the money supply was induced by the huge inflow of gold from Europe who lived in the fear of another war outbreak and further political instability and not because the FED increased the money stock to accommodate the increased demand for money (Bloomfield, 1950). Others found out that the Keynesian multiplier model of fiscal policy was not successful in mitigating the depression, not because of fiscal policy itself, but since the fiscal policy was not used properly (Brown, 1956). In another finding by Woodford (2011), the government spending should have a strong impact to restore the economy from the Great Depression if it has no crowding out effect. This follows the rationale that if monetary policy is constrained by zero lower bound on short term nominal interest rates then fiscal policy would have an impact on the economy. Indeed, evidence during the 1930s Great Depression supported Woodford's argument as substantial fiscal multipliers were attained. Further, Gordon and Krenn (2010) used Vector Autoregressive model (VAR) analysis to calculate the government expenditure multiplier before WWII and found that it was 1.8 in 1940 falling to 0.8 by the end of 1941. They deduced that high fiscal multipliers for defense spending during the Great Depression reflect a greater degree of monetary accommodation. The above results are crucial to the analysis as it can be deduced that fiscal and monetary stimulus, if properly managed to avoid the crowding out of interest rate, could be a savvier from recession and restore economic recovery.

As the Coronavirus crisis continued to weigh on US economy, with huge rapid ongoing loss of purchasing power and jobs, aggressive monetary and fiscal stimulus packages were enacted to reduce systematic stress and support confidence. Fiscal stimulus can preempt a steeper decline in confidence and shift aggregate demand. President Trump signed the CARES Act on March 27, 2020 with $2 trillion bill package and congress expanded unemployment benefits to include an extra $600 per week on top of state benefits, for up to four months. They already expanded the eligibility requirements (CNN edition, April 30). The historic stimulus bill targeted almost all sectors as it covers assistance to big businesses, local government loans, direct payments to families, tax cuts, small business loans and grants, unemployment insurance expansion and state and local stimulus funds (Harney, April 2020). This is unlike the policies used during the Great Depression or the financial crisis in 2009, in which the stimulus package was too small, and the results were a painful slow recovery. However, some may argue that the current huge spending in the Coronavirus crisis might result in higher aggregate demand, aggravating both interest rates and inflation which ultimately will lead to a crowding out. Nevertheless, the likelihood of that is slim as the interest rate is close to zero band and well monitored by the FED.As such, this constitutes the right time where big government spending is needed. (Roberts, Mar 2020). Even an economist like Krugman called recently, before the Coronavirus crisis, for a 2% of US GDP to be spent annually on education and infrastructure as long as inflation rates remain low.(Roberts, Mar 2020). As for the monetary policy that was carried out during the present crisis by the FED, aiming to stimulate and keep the flow of money in the economy, a generous package was announced targeting small and big businesses alike as well as households and governments with a $2.3 trillion stimulus bill. Some of the FED's deal brackets urged a cut in interest rate, lower the discount rate by 1.5% point, buy of commercial papers or the short term unsecured debt and provide credit to smoothen the

money market. Further, the Fed's package calls for buying municipal debt, supporting the Treasury's Program Payment Protection to motivate businesses to keep their workers during the crisis lockdown and supporting a $300 billion credit program for businesses and consumers.(Cox, CNBC April 2020). The new monetary stimulus is not the same as that used during the Great Depression as in the latter the increase in money supply was due to the massive capital inflow and gold from Europe rather than increasing stock of high powered money.

The Methodology and Data: To assess the effectiveness of both the fiscal and monetary policies on the economic recovery of the US economy during the current Coronavirus outbreak, I looked at the history of the Great Depression as both crisis have severely impacted the economy and both policies have been used to end the depression .I have constructed the Vector Autoregressive Model (VAR), given its wide use in macroeconomics. The model quantifies an economy's response to an exogenous shock and tries to find the fiscal and monetary multipliers and the optimum lag lengths that takes the shock to have an impact on economic recovery. The VAR approach also addresses the causality bias as economic variables are both affected by the macroeconomic policies and may affect the decision to use them. Therefore, I will analyze whether economic growth in the US and other macroeconomic policies are co-integrated, and if so, is there existing Granger causality relation between them. The study will examine the co-integration between real GDP and two endogenous variables, namely monetary policy(the narrow definition of money stock M1) and government budget deficit using annual data from the year 1926 till 1945.This period captures most of the historical events in the history of the United States as it covers the flourished era after the WWI, the depression of1929-1933, the boom that follows, the recession of 1937-1938 and the boom prior to WWII. The data that will be used in this study are obtained from the publications of the Bureau of Economic Analysis for real GDP, the Office of Management and Budget, US government historical tables for budget deficit and Treasury Annual Reports, 1945 (historical statistics of the US. 1789-1945) for M1. All the data is shown in (table 1) found in the appendix of the study.

The model that will be estimated is simple and similar to that used by Romer (1992):

$$\Delta y_t = \beta_t \Delta m_{t-1} + \beta_f \Delta g_{t-1} + \varepsilon_t$$

Where:

Δy_t is the annual change in the growth of real GDP.

Δm_{t-1} is the deviation of annual money growth rate between 1923-1927 (or the deviation of money growth from normal).

Δg_{t-1} is the ratio of real federal surplus to real output.

β_m and β_f are multiplier for monetary and fiscal policy.
ε_t is a residual term that captures supply shocks (lag between policy changes and output changes as policy changes takes time to be reflected on real output).

Therefore, the model that will be used in this study is as follows:

$$Z_t = A_t Z_{it} + V_i + \gamma_{it} + f_t + \varepsilon_{it} \quad (1)$$

Where

Z_{it} = vector of endogenous variables
ε_{it} = vector of residuals with E(ε_{it})=0 and E($\varepsilon_{it}\varepsilon_{jt}$)=$\pi$ for all i and t
The set of endogenous variables is:
$Z_{it} = g_{it}, y_{it}, m_{it}$

Where:

$g$is the public spending deficit
$y$is the real GDP
m is the narrow definition of money (M1)

Analysis and results

I first estimated the simple regression of equation (1) where the endogenous variable was the log of real GDP and the exogenous variables were the logs of M1 and the government budget deficit.

The results were as follows:

$$\text{Log y} = 2.27 + 0.49\,\text{M1} + 0.1\,\text{g} \quad (2)$$
$$(9.65)\ (2.38)((0.99)$$

The numbers in parenthesis are the t-statistics. We can see from the results in equation (2) that money supply was significant in affecting the real GDP at 2.38% significant level, whereas the government deficit was not significant. This is expected as has been estimated by many authors, as shown in the literature review section, who found out that the fiscal stimulus during the Great Depression was not a factor behind the economic recovery as it was improperly used and the share of government spending during that era was at most 5% of GDP. Brown (1956) argued that the fiscal policy was not successful during the Great Depression as it was not used. We can deduce that it is not the case during the Coronavirus outbreak as the government spending implemented by Trump administration is far more aggressive and covers a wide variety of sectors, businesses, local governments and consumers. Further, the current US share of the government expenditure is approximately38% of US GDP. Hence, we expect the fiscal stimulus to be more effective in tackling the Coronavirus crisis. As for the multipliers, the monetary multiplier found in equation (2) was 0.49 and the fiscal multiplier was modest at 0.1, whereas it was found by Romer (1992) that the money multiplier was 0.82 and the fiscal multiplier was 0.23. We expect the fiscal multiplier during the Coronavirus crisis to be much higher than that figure registered during the Great Depression as there will be no crowding out since the US interest rate is at the zero bound. In order to use the VAR model the first step is to determine the number of lags that should be used in the system equation. This is very important element in our study as it represents the lag in response time of the dependent variable (Real GDP) to shocks in the independent variables (M1 and budget deficit). The results of the lag order are presented in (table 2). Based on the selection order criteria, the Akaike Information Criterion (AIC), the Schwarz Baysian Information Criterion (SBIC), the Final Prediction Error (FPE) criterion and the Hannan-Quinn Information (HQIC) criterion show that the optimum lag to be used in this model is 2 lags, so that there is any serial correlation in the residuals. This means that it takes two lags (in our case two years) from the time policies were adopted to

Table 2: Selection -order criteria

Selection -order criteria

sample: 1929 - 1945 Number of obs=17

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-98.6474				9176.22	11.9585	11.9731	12.1056
1	-97.7946	1.7055	1	0.192	9385.74	11.9758	11.9953	12.1719
2	-91.1942	13.201*	1	0	4899.98*	11.317*	11.3413*	11.562*
3	-91.0892	0.21	1	0.647	5519.8	11.4223	11.4515	11.7163

Endogenous: Lrefugees LGDP CapitaUnemploy Lpercapitaspending Exogenous: _cons

Table 3. Johansen Test of Cointegrations

Johansen tests for cointegration

Trend: constant Number of obs = 19

Sample: 1927 - 1945 Lags = 1

maximum rank	parms	LL	eigenvalue	trace statistic	critical value 5%
0	3	-220.5845		77.5866	29.68
1	8	-197.9292	0.90789	32.2761	15.41
2	11	-182.0537	0.81196	0.5251*	3.76
3	12	-181.7911	0.02726		
maximum rank	parms	LL	eigenvalue	trace statistic	critical value 5%
0	3	-220.5845		45.3106	20.97
1	8	-197.9292	0.90789	31.7509	14.07
2	11	-182.0537	0.81196	0.5251	3.76
3	12	-181.7911	0.02726		

Table 4: Vector error-correction model

Sample: 1928 - 1945 Number of obs = 18

AIC = 20.1148

Log likelihood = -164.0332 HQIC = 20.23075

Det(Sigma_ml) = 16519.29 SBIC = 20.95571

Equation	Parms	RMSE	R-sq	chi2	P>chi2
D_RGDP	5	73.9776	0.8035	53.15752	0
D_M1	5	2.58969	0.883	98.09248	0
D_Deficit	5	2.23539	0.8768	92.55954	0

	Coef	Std. Err	z	P>|z|	[95% Conf. Interval]	
D_RGDP						
ce1						
L1	-0.2718187	0.1774592	-1.53	0.126	-0.61963	0.075995
RGDP						
LD	0.8485486	0.4452056	1.91	0.057	-0.02404	1.721136
M1						
LD	-9.612805	12.03287	-0.8	0.424	-33.1968	13.97118
Deficit						
LD	31.70834	27.98185	1.13	0.257	-23.1351	86.55176
cons	0.0735033	27.76816	0	0.998	-54.3511	54.4981
D_M1						
ce1						
L1	-0.0016694	0.0062122	-0.27	0.788	-0.01385	0.010506
RGDP						
LD	0.0387341	0.015585	2.49	0.013	0.008188	0.06928
M1						
LD	-0.45506	0.4212274	-1.08	0.28	-1.28065	0.370531
Deficit						
LD	0.6830841	0.9795438	0.7	0.486	-1.23679	2.602955
cons	1.378114	0.9720633	1.42	0.156	-0.5271	3.283323
D_Deficit						
ce1						
L1	-0.0125021	0.0053623	-2.33	0.02	-0.02301	-0.00199
RGDP						
LD	-0.0250725	0.0134528	-1.86	0.062	-0.05144	0.001295
M1						
LD	1.164568	0.3635989	3.2	0.001	0.451927	1.877209
Deficit						
LD	1.62336	0.8455315	1.92	0.055	-0.03385	3.280572
cons	-1.782112	0.8390744	-2.12	0.034	-3.42667	-0.13756

Table 5: Lagrange-Multiplier Test

Lagrange-multiplier test

Lag	chi2	df	Prob> chi2
1	10.0117	9	0.34954
2	4.711	9	0.85874

H0: no autocorrelation at lag order

Table 6: Jarque-Bera Test

Jarque-Bera test

Equation	chi2	df	Prob> chi2
D_RGDP	0.452	2	0.79772
D_M1	5.722	2	0.0572
D_Deficit	0.699	2	0.70487
ALL	6.874	6	0.33267

have an impact on economic recovery. On the upside, if the US can contain the virus and continue applying the health standards to deal with the pandemic disease with social distancing and other health preventive measures as well as more stimulus bills to be passed, then the current crisis should not last for another two years and is expected to witness a faster recovery. The next test in the analysis is to run the Johansen test of co-integration. The precondition for this test is that the variables are not stationary at levels, however, when all the variables are converted into first difference they become stationary (integrated of same order).

Now as the variables of our study are stationary once they are in first difference, we can run the Johansen test as follows:

H_0 : there is no co-integration among variables
H_1 : there is co-integration among variables

Therefore, as can be seen from the results presented in (table 3) the trace statistics and max statistics are greater than the 5% critical value, leading us to reject the null hypothesis and accept the alternative. This means our variables real GDP, Money supply (M1) and government budget deficit are co-integrated (have a long run association or they move together in the long run). To determine whether one time series is useful in forecasting another, Granger (1969) argued that causality in economics could be tested for by measuring the ability to predict the future values of a time series using prior values of another time series. Therefore, to check if variables are jointly significant in the long run, the Granger causality test was used. The results of the Granger causality test are presented in (table 4). As can be seen from(table 4), the F-statistics for the whole model is high, meaning that the variables are jointly significant in affecting the real GDP or the lagged values of the independent variables Granger cause the dependent variable.
In order to check whether the whole model is good or bad, I run the Lagrange Multiplier (LM) test of the VAR model as follows:

H_0: no autocorrelation at lag order
H_1: there is autocorrelation at lag order

The rule is to accept the null hypothesis if the Probability value is greater than 5%. The result of the LM model is shown in (table 5). As can be seen from table 5, at lag 2 we cannot reject the null hypothesis as the P-value is greater than Chi^2, meaning the model is well specified.

Finally, in order to check whether the residuals are normally distributed, we used Jarque -Bera test as follows:

H_0: residuals are normally distributed
H_1 : residuals are not normally distributed

The rule is to reject the null hypothesis if the probability value is less than 5%. The results of the Jarque-Bera test for residuals are shown in (table 6). As can be seen from table 6, the probability values are greater than 5%, hence we cannot reject the null hypothesis, meaning that the residuals are normally distributed.

Conclusion

The Coronavirus has affected the lives of millions all over the world and severely impacted all economies. The US as the largest world economy was hit destructively by the crisis and left millions of workers out of their jobs while crashing the financial markets and dropping the oil price to an all-time low. For the latter, the excess supply of oil with decreased aggregate demand on all goods to the point that economists and policy makers felt that the speed and magnitude of the crisis might be similar to that of the Great Depression of the 1930s. Goldman Sachs projected a drop of 6% of US. GDP in the first quarter of 2020 and 24% reduction in the second quarter. People filing for unemployment benefits increased to more than 30 million Americans and the US. Bureau of Labor Statistics expect unemployment rate to surge to14% in April 2020, the highest since 1948. In order to mitigate the crisis impact on the economy and to drift the country from a prospected depression, the US government and the Federal Reserve Bank took aggressive stimulus fiscal and monetary policies by passing a revitalization bill of over $6 trillion beside other health measures. The objective of this study was to look at lessons learnt from the Great Depression and the efficacy of macroeconomic policies implemented during that crisis and to compare it with those policies undertaken by the US government during the current COVID-19 crisis.

Further, the objective is to investigate the number of lags in response time it takes the implementation of the macroeconomic policies to be reflected in economic recovery. Moreover, the study runs the vector autoregressive model(VAR) and the Granger Causality Wald Test to check whether fiscal policy (budget deficit) and monetary policy (narrow definition of money M1) Granger cause real GDP using time series annual data for USA for the period of 1926-1945. The study estimated the monetary and fiscal multipliers during the Great Depression for the period 1926-1945 and found that monetary policy was effective in the economic recovery, whereas the fiscal multiplier was small and not significant. However, this result might not be viable during the current disruption as the stimulus packages undertaken are the highest in the US history and the fear of crowding out of the government spending is not applicable as the interest rates are kept at a zero bound.

Further, current government spending consists of around 38% of US GDP, unlike the 5% figure of 1930s. Moreover, the study reveals that the optimum lag length for recovery during the Great Depression was two year, but if the US can contain the current crisis with proper measures and tools, then the pace of economic recovery should be faster. We also checked to see if the variables that were used in this study were co-integrated and found out that there is a long run association between the variables. When Granger-Causality test was used, the results reveal that the variables of the study are jointly significant and the model used was well specified as there was no autocorrelation at lag orders. This study is run at a time where official data and scientific research are still premature, therefore there is a need for further future studies to evaluate the effectiveness of macroeconomic policies in alleviating the recession and restoring the economy.

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