



ELIT

Economic Laboratory Transition
Research Podgorica

Montenegrin Journal of Economics

For citation:

Batayneh, K.I., Aleqab, M.M., Salamat, W.A. (2024), "The Impact of Fiscal and Monetary Policies on Economic Growth: An Empirical Study of the USA", *Montenegrin Journal of Economics*, Vol. 20, No. 3, pp. 113-126.

The Impact of Fiscal and Monetary Policies on Economic Growth: An Empirical Study of the USA

KHALED I BATAYNEH¹ (*Corresponding author*), MAHMOUD M ALEQAB²,
and WASFI AL SALAMAT³

¹ Assistant Professor, Department of Economics, Faculty of Economics and Administrative Sciences, The Hashemite University, Zarqa, Jordan13133; e mail: kbatayneh@hu.edu.jo.

² Accounting Department, Yarmouk University, Irbid, Jordan, e-mail: Maleqab@yu.edu.jo

³ Associate Professor, Department of Banking and Financial Sciences, Faculty of Economics and Administrative Sciences, The Hashemite University, Zarqa, Jordan13133; e mail: wasfi.salamat@hu.edu.jo

ARTICLE INFO

Received February 15, 2023
Revised from March 15, 2023
Accepted April 15, 2023
Available online July 15, 2024

JEL classification: E4, E5, H6, E1

DOI: 10.14254/1800-5845/2024.20-3.8

Keywords:

Fiscal Policy,
Monetary Policy,
Economic Growth,
UVAR,
Financial Crisis,
COVID-19 Pandemic

ABSTRACT

This study aims to empirically investigate the impact of fiscal and monetary policies on economic growth in the US economy from 1964 (Q1)–2021 (Q3). In addition, it examines the impact of the (2007-2009) global financial crisis and COVID-19 pandemic on economic growth. The variables used in this study are: federal budget deficit, which represents fiscal policy; money supply, federal fund rate and exchange rate, which they represent monetary policy. The stationarity and Cointegration tests were tested. Cointegration test result confirmed there is no long-run relationship among variables used in the study. Thereafter, the short-run coefficients and Impulse response functions were conducted from unrestricted VAR model. Impulse response functions that were produced from the unrestricted VAR estimations showed that there is a positive impact of expansionary fiscal and monetary policies on economic growth. Regarding to the impact of exchange rate on economic growth, result showed there is no significant impact. These findings support that fiscal and monetary policies have played a crucial positive effects on economic growth. Finally, the study results confirmed that (2007-2009) global financial crises and COVID-19 pandemic adversely affected the U.S. economy.

INTRODUCTION

Fiscal and monetary policies are considered to be the most effective policies which designed to stimulate the economy. Whereas, an appropriate and well-coordinated fiscal and monetary policies are considered to be the main prerequisites of macroeconomic stability and sustainable economic growth. Many countries adopt these two policies for solving economic problems, like low economic growth, high unemployment rates, high inflation rates and other economic obstacles.

According to Keynesian theory which suggests that the expansionary fiscal policy leads to an increase the aggregate demand and the level of output. According to the Keynesian theory, expansionary fiscal

policy leads to an increase in the aggregate demand and the level of output. where, the use of expansionary fiscal policy by increasing government spending or reducing taxes lead to the creation of new job opportunities and thus reduce unemployment rates. This will increase the income of owners of production factors, and leads to an increase in aggregate demand, which in turn leads to an increase in production and achieving stable and sustainable economic growth.

On another hand, some countries use expansionary monetary policy by increasing the money supply to reduce interest rates. According to the IS/LM model, increasing money supply leads to decreasing interest rates, which contributes to reduce the cost of doing business for firms and borrowing costs for individuals. For firms, reducing the cost of doing business encourages them increasing the volume of their investments which resulting in expanding the production. on the other hand, lower borrowing costs helps individuals to increase the consumption, especially that of durable goods. In both cases, the decrease in interest rates contributes to an increasing investment and level of production. Accordingly, an expansionary monetary policy is considered very effective in achieving economic growth.

In the last two decades, the U.S economy suffered from two major crises which led to a negative impact on economic growth and other economic criteria (inflation, unemployment, etc.). The first was the financial crisis of late 2007, which led to a decline in economic growth to become 0.1% in 2008 and -2.6% in 2009. The second was the COVID-19 pandemic, which led to a big decline in economic growth reaching -3.4% (Authors' calculations).

The global financial crisis that began in late 2007 and extended till 2009 constituted a sharp downturn for the global economy in general and for the American economy, in particular, as it was the most serious financial crisis that faced the American economy since the Great Recession that hit the American economy for several years between 1929-1934. The crisis began in the United States and spread to include most countries in the world.

The monetary crash led to the Great Recession, which was up to that time the most serious worldwide recession since the Great Depression (Gopinath, 2020; Eigner and Umlauf, 2015). It was one of the five worst monetary crises that faced the world; it led to more than \$2 trillion loss in the world's economy (Bondarenko, 2020).

The gross domestic product (GDP) showed a huge drop in the fourth quarter of 2008 by an average of 8.4% (Federal Reserve Economic Data). As for unemployment rate, it sharply went up to 11.0% in October 2009, which was the highest rate since 1983 and about double the rate before the crisis (Bureau of Labor Statistics, February 2012).

Many countries consequently adopted necessary monetary and fiscal policies in an attempt to avoid more serious deterioration of the economic situation. Governments and central banks, including the Federal Reserve, made available trillions of dollars in bailouts and stimuli, including expansionary fiscal and monetary policies to compensate for lower consumption and lending capacity, avoiding additional collapse, encourage loans, and restore faith in integrated commercial paper markets.

Starting in 2008, many countries began devising fiscal stimulus plans to curb economic stagnation, where they employed a combination of government spending and tax reductions to help their failing economies. Most of these plans were based on the Keynesian theory which stipulates that spending by governments can compensate for a fall in aggregate demand during recession and stop wastage of economic resources that may be caused by lack of demand. In addition, the International Monetary Fund recommended countries to adopt monetary stimulus plans equal to 2% of their GDP to help curb the global downturn (Group of Twenty: Global Economic Policies and Prospects, 2009).

On the other hand, the COVID-19 pandemic is considered one of the worst blows the American economy has faced since the Great Recession (1929-1934). The GDP fell by more than 30% (measured at an annual rate) in the second quarter of 2020. In addition, the economy lost more than 22 million jobs in the first sixty days at the beginning of the pandemic, as the unemployment rate went up to 15% in April, 2020; declined in aggregate demand, a sharp increase in prices. All of these abnormalities in economic activity led to a substantial tightening of monetary conditions and prevented credit flow to individuals and firms. The fiscal and monetary policies reactions in the America to the collapse due to the pandemic were unique thus far in their scale, scope, and velocity. A sequence of legislations agreed upon by the Congress in

March, 2020, December, 2020, and March, 2021 made available nearly \$5.8 trillion in financial aid to the U.S. economy, which represented about 28% of U.S. GDP, (for more details see Clarida et al., 2021). As for the role of the Federal Reserve when the COVID-19 started, it intervened in a decisive and fast way by using well-known tools of monetary policy to foster credit flow to individuals and institutions. These measures were classified into four groups: 1. The first included cuts in interest rate, and forwarding consultation, reassessment and rejump programs to buy treasury bonds and mortgage-backed securities, as well as repurchase agreement (repo) operations. 2. The second included measures to make available liquidity and financial help to support the operations of the financial market. 3. The third included a number of measures launched by the Federal Reserve to foster the flow of credit directly to individuals, firms, federal government and local government. 4. The fourth group encompassed temporary resets of regulations and supervisory measures to urge banks to support credit flow to customers and firms. (For more details see Clarida et al., 2021).

Therefore, the main objective of this paper is find out the role of fiscal and monetary policies in stabilizing the U.S economic growth for the period from 1964 (Q1) to 2021 (Q3). In addition, the study attempts to determine the impact of the 2007-2009 global financial crisis and COVID-19 pandemic on economic growth.

1. LITERATURE REVIEW

This section reviews the theoretical literature and empirical studies related to the relationship between fiscal and monetary policies and economic growth.

1.1 Theoretical Review of the Relationship between Fiscal policy and Economic Growth

Much of the works on the economy dealt with the main role that fiscal policy plays in making economic growth. Bergh and Henrekson (2011) considered three major analytical frameworks that account for the determinants of economic growth including financial policy. These analytical frameworks include neoclassical growth models, endogenous growth theory and the role of institutions.

Regarding the neoclassical growth theory, fiscal policy can have short-term effect on economic growth, and in the long term the economy grows at the exogenously determined rate of technological progress (Solow, 1956; Swan, 1956). The endogenous growth theory is the main analytical technique used to measure the effects of fiscal policy on economic growth. According to Lopez et al. (2008), this theory underlines four main tools through which government spending and taxes may increase long-term growth; these are presented as follows: a) *Physical capital*: according to Nourzad and Vrieze (1995) and Sanchez-Robles (1998), government spending that aims at helping successful public investments, like spending on infrastructure, may improve the private sector's productivity and thus, up the rate of return on private investment at the corporate and individual levels. Therefore, the increase in productivity leads to the increase of the long-term output growth level. On the other hand, tax-cut on capital income may increase savings and investments, and therefore foster long-term growth (Rebelo, 1991; Devereux and Love, 1994). b) *Human capital*: according to Lucas (1988) and Barro (2001), human capital is an important factor of economic growth. Government expenditure on education and health may lead to optimal human capital, an, thus, improves productivity, thereby achieving highly desired economic growth. c) *Total factor productivity*: spending on public investment has the capability to raise private sector factor productivity, as has been mentioned in both neoclassical (Barro, 1990; Glomm and Ravikumar, 1994; Turnovsky and Fisher, 1995) and endogenous (Baier and Glomm, 2001). In particular, increasing government spending on education/health infrastructure and services, like R&D, transportation system and national defense can directly ameliorate private sector productivity and achieve technological progress. d) *Labor supply*: within the framework of endogenous growth theory, some studies have investigated the tools by which fiscal policies can raise the supply of labor and foster economic growth in the long term (Devereux and Love, 1994; Turnovsky, 2000).

1.2 Theoretical Review of the Relationship between Monetary Policy and Economic Growth

The central bank uses monetary policy tools such as interest rate policy, lending rate, open market operation, bank reserve, etc., which in turn helps to stabilize the exchange rate, price stability, limiting high inflation rates, achieving full employment, avoiding financial problems, as well as achieving high and stable economic growth rates.

Economic growth and Monetary policy theories have advanced quickly over time. The classical monetary theory is considered to be the earliest well-known theory of monetary policy based on the Irving Fisher QTM, which set up the framework for the link between monetary policy and economic variables (Twinoburyo and Odhiambo, 2018a). The money supply was considered to be exogenous in Keynesian liquidity preference theory, and any rise in the money supply would lead to a lower interest rate. Lower interest rates positively affect the marginal efficiency of investment and capital flow, resulting in output expansion and economic growth (Backhouse and Bateman, 2011). However, the monetary policy helps government authorities in a market economy routinely affect the direction and speed of overall economic activity, which includes not only the amount of aggregate output and employment but also the price stability (Friedman, 2000). In classical theory, money plays a passive role in determining economic growth. Hence, money as a source of investment or capital stock cannot be overlooked in defining economic growth. Tobin (1965) confirmed that a rise in the money supply might contribute to higher growth. Putting it simply, increased money supply results in inflation, which lowers the own rate of return on money and promotes a portfolio shift toward real capital. This leads to a rise in capital stock and a greater output level per person in the long term.

1.3 Review of Previous Empirical Studies

The empirical studies on the relationship between monetary policy, fiscal policy and economic growth were the subject of a great debate among researchers for a long period of time. Indeed, this relationship attracted the attention and aroused the interest of many scholars in developed and developing countries. Tan et al. (2020) use ARDL model to examine the long-run relationship monetary and fiscal policies on economic growth in Malaysia, Singapore and Thailand from 1980: Q1 to 2017: Q1. The results show that monetary policy had a negative relationship on economic growth in Malaysia, Singapore and Thailand. The government spending has a negative relationship with economic growth in Malaysia and Singapore, but positive in Thailand. Adefeso and Mobolaji (2010) examine the effect of monetary policy and fiscal policy on economic growth in the context of Nigeria by using co-integration test and find that economic growth is positively affect by government spending and money supply. However, monetary policy has stronger affect than fiscal policy. Ubi-Abai and Ekere (2018) analyze the effects of fiscal and monetary policies on economic growth in a panel of 47 sub-Saharan African economies from 1996 to 2016 by using dynamic panel General Method of Moment and the Dumitrescu - Hurlin causality; the scaling quantity analysis inclusive. Their findings showed that fiscal and monetary policies have a positive impact on economic growth. Moreover, fiscal policy has a greater role in enhancing economic growth in sub-Saharan Africa. Fetai (2013) attempted to evaluate the effectiveness of monetary and fiscal policy on economic growth during the financial crisis in 66 developing and emerging countries. He applied the techniques of ordinary least squares with robust standard errors and GMM estimator. It was founded that during the financial crisis, monetary and fiscal policy contractions were connected with an increase of the output cost. Moreover, the expansion of fiscal policy was accompanied with smaller output cost over the financial crisis, whereas the expansion of monetary policy had not showed a clear effect. Qayyum and Manzoor (2018) used ARDL model to examine the impact of fiscal and monetary policies on economic growth in Pakistan economy for the period 1980 – 2017.

Their results show that contractionary fiscal policy is not effective in the long-run due to large tax evasion, while the money supply has a positive impact on economic growth in both short and long-run. Islam et al. (2022) studied the short-run and long-run impact of monetary policy on economic growth in Bangladesh and UK economies during the period from 1980 to 2019. Long-run coefficients result from the ARDL model showed that money supply significantly boosts economic growth in Bangladesh and the UK. Besides,

the short-run coefficients portray random effects at different lags in both cases. Taylor et al. (2012) examine the role of fiscal deficit on economic growth in the context of the USA by using quarterly data over the period 1961-2011. The results show that the economic growth is positively affected by fiscal deficit. Hayat and Naeem (2018) investigate the impact of fiscal policy on economic growth for a group of countries including the USA during the period (2002-2014). Panel data (ARDL) technique is used for data analysis. They find that the economic growth is positively affected by economic spending.

Amaral et al. (2022) analyze the short and long run impact of monetary policy on US economic growth. Using quarterly time series data for the period 1959 to 2022. Empirical works were based on Vector Autoregressive (VAR) model, Granger causality test and Impulse Response Function (IRF). Results confirm that expansionary monetary policy does have a positive impact on economic growth in the short-run though it does not last long.

This study contributes to the literature by reducing the dearth concerning the impact of fiscal and monetary policies. Majority of studies have examined the impact of fiscal policy and monetary policy on economic growth separately. To the best of authors' knowledge, this study differs from the previous studies in some features: it takes a long period of time and quarterly data and takes into account the effect of the global financial crises (2007-2009) as well as takes the effect of COVID-19. The results of this study may help policy makers and regulatory bodies to adopt appropriate policies to keep economic growth sustainable and stable.

2. DATA AND ECONOMETRIC METHODOLOGY

2.1 Data

To achieve our study's objective, this study uses five macroeconomic variables. The macroeconomic variables are: real gross domestic product, federal budget deficit, money supply, interest rate and real exchange rate. Real GDP is used as a proxy variable for economic growth, federal budget deficit (federal government revenues minus federal government expenditures) which measured as percentage of GDP is used as proxy for fiscal policy, money supply (M2), interest rate (federal fund effective rate) and exchange rate (Real Narrow Effective Exchange rate) are three instruments of monetary policy. Real GDP (RGDP) and money supply (MS) are transformed to natural logarithms, while federal government deficit (FD), interest rate (FFR) and exchange rate (EXC) kept in their level form. Real GDP, money supply and federal budget deficit are seasonally adjusted. All the time series data used in this study are quarterly and ranging from 1964Q1 to 2021Q3. The reason for choosing this period is because there is no exchange rate data available before this date. Besides including the two major components of economic policies, the study also tried to find out the effect of two major factors that possibly slow down economic growth. So, it added two more dummy variables: D1 and D2 to the investigation. D1 represents the effect of the 2007-2009 global financial crisis on economic growth, and D2 represents the effect of COVID 19 pandemic that prevailed in 2020 and 2021 on economic growth. The source of the time series macroeconomic variables was obtained from the Federal Reserve Bank of St. Louis. The five macroeconomic variables are presented in Figures (1). Also basic descriptive statistics of the variables are presented in Table (1).

2.2 Econometric Methodology

This section represents the empirical work that needed to be applied in order to achieve the study objective determined in the introduction. Choosing an appropriate econometric technique depends on some of the properties of the time series variables under study. The main properties of most macroeconomic variables are the following: they might have a unit root (not stationary) and they might have long-run relation (Cointegration). In general, we could write our basic model as follows:

$$LRGDP_t = \beta_1 + \beta_2 FD_t + \beta_3 LMS_t + \beta_4 FFR_t + \beta_5 EXC_t + D_1 + D_2 + \varepsilon_t \quad (1)$$

Where, LRGDP is the natural logarithm of real gross domestic product (GDP), FD is the federal budget deficit as percent of GDP, LMS is the natural logarithm of money supply (M2), FFR is the Federal Funds Effective Rate, EXC is the Real Narrow Effective Exchange Rate, D_1 is a dummy variable representing the 2007-2009 financial crisis, D_2 is a dummy variable representing 2020-2021 COVID-19, and ε_t is the error term. Therefore, we started our empirical work by testing the properties of the data used in this study and after that we could determine which appropriate econometric technique should be applied to move on to further analyses.

Table 1. Basic Data Descriptive Statistics

Variables	LRGDP	FD	LMS	FFR	EXC
Descriptive					
Mean	9.174	3.63	8.02	5.00	116.00
Maximum	9.877	28.88	9.94	17.78	149.37
Minimum	8.256	-1.75	5.98	0.06	93.366
Std. Dev.	0.474	3.11	1.07	3.76	15.78
Observations	231	231	231	231	231

Source: own processing

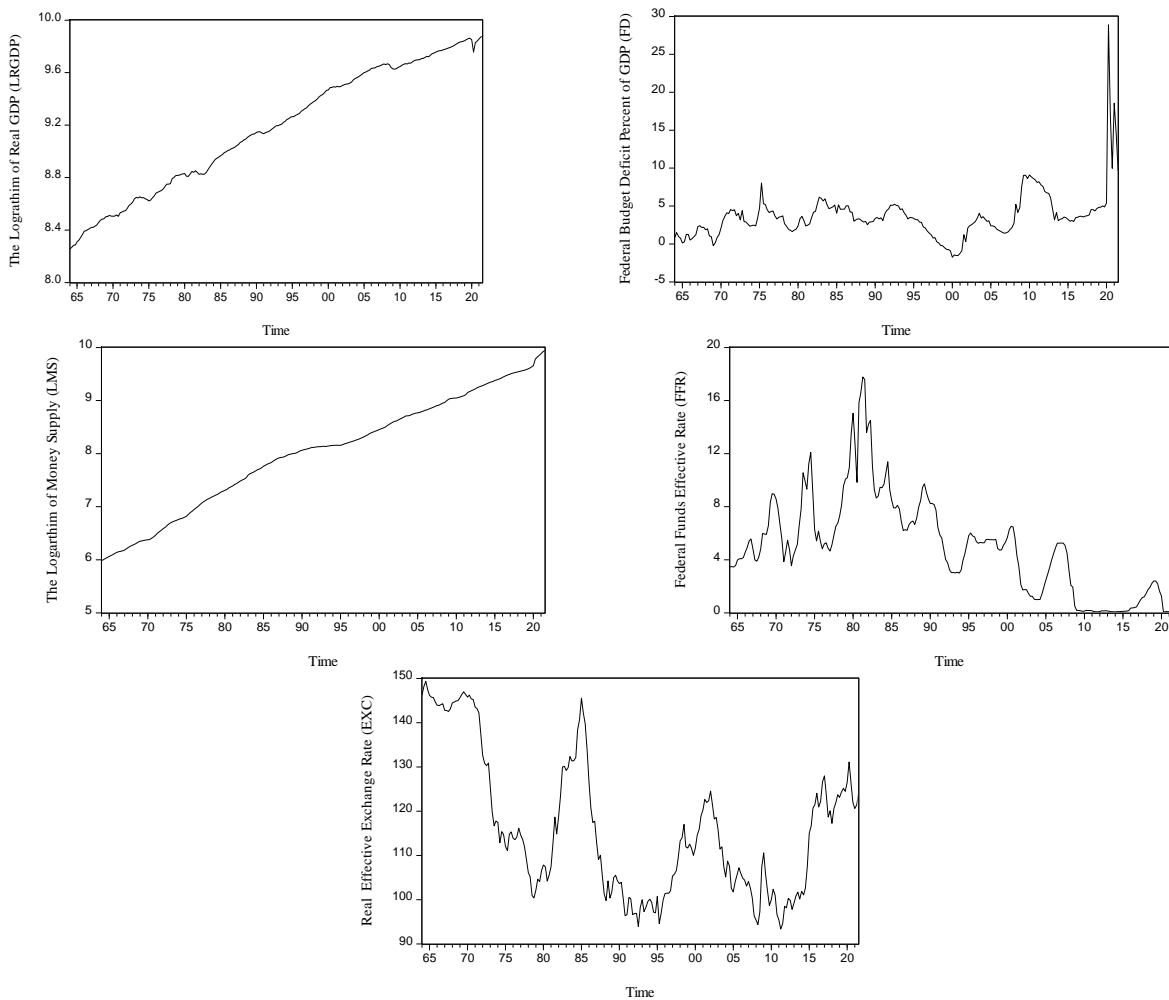


Figure 1: Plot of the Data set, 1964 (Q1) to 2021(Q3)

Source: Data from Federal Reserve Bank

3. EMPIRICAL RESULTS

This section presents econometric technique and the results of the empirical work, including those of stationarity tests, lag order selection criteria, results of cointegration tests, UVAR results, impulse response functions, and residual diagnostic tests.

3.1 Results of Stationarity Tests

One of the main properties of time series macroeconomic variables is the existence of a unit root (nonstationary) in each variable. Therefore, analyzing the relationship between these variables in this way may give inaccurate results according to Sims, Stock and Watson (1990). Accordingly, and before applying any technique to study the impact of fiscal and monetary policies and the effect of the above mentioned dummy variables on economic growth, all macroeconomic variables were examined for unit root tests. Two of the main most used unit root tests were performed. They are the Augmented Dickey-Fuller (AD-F) and Phillips-Perron (P-P). Unit root tests results are presented in Table (2), which shows that all the variables have a unit root in their level form at 5% level of significance. Also, Table (2) shows results for a unit root for the variables in first difference form. Results indicate that all the variables do not have a unit root in their first difference, so they are stationary.

Table 2. Results for Unit Root Test

Variables	ADF		PP		Order of integration
	Level				
	Intercept	With Trend	Intercept	With Trend	
LRGDP	-2.36	-1.60	-2.32	-1.71	I(1)
FD	-2.26	-2.26	-5.17*	-5.72*	I(1)
LMS	-0.53	-1.76	-0.83	-1.64	I(1)
FFR	-1.73	-3.01	-2.07	-3.09	I(1)
EXC	-2.37	-1.96	-2.23	-1.84	I(1)
	First Difference				
Δ LRGDP	-14.89*	-15.17*	-14.94*	-15.17*	-
Δ FD	-10.21*	-10.22*	-21.73*	-21.70*	-
Δ LMS	-5.14*	-5.14*	-8.83*	-8.850*	-
Δ FFR	-6.66*	-6.69*	-11.89*	-11.89*	-
Δ EXC	-11.24*	-11.33*	-11.25*	-11.30*	-

Notes: * indicates 1% significance level. Δ is first difference.

Source: Authors' analysis results

3.2 Lag Order Selection Criteria

The Johansen cointegration test is sensitive to lag length and it could produce mix results. So, to avoid this problem, we need to estimate UVAR model by estimating the variables in their level form and then choose the optimal lag length based on different selection criteria. Table (3) shows that the tow of criteria suggests 4 lags as the optimal lag length. The optimal 4 lag length was chosen based on Final prediction error, Akaike information criterion.

Table 3. VAR lag order selection Criteria on the length of lags

Lag	LR	FBE	AIC	SC	HQ
0	NA	26.352	17.460	17.536	17.491
1	4297.895	9.87e-08	-1.941	-1.486	-1.758
2	208.281	4.66e-08	-2.692	-1.857*	-2.355
3	89.001	3.80e-08	-2.896	-1.681	-2.406*
4	64.393	3.47e-08*	-2.990*	-1.395	-2.346
5	24.717	3.84e08	-2.892	-0.918	-2.095
6	50.364*	3.71e-08	-2.929	-0.576	-1.979

*indicates lag order selected by the criterion

Source: Authors' analysis results

3.3 Results of Cointegration Tests

The stationarity tests results shown in Table 2 confirmed that all variables were nonstationary in the level form but stationary in first difference. This means that all the variables are cointegrated, and it is possible that they have common long-run relationship. So, in the case of the existence of cointegration, the Vector Error Correction Model (VECM) is the appropriate technique to be used instead of the Unrestricted Vector Autoregression (UVAR) model. Using (VECM) gives us the advantage to capture the long-run equilibrium relationship among the variables.

Therefore, Johansen cointegration test was implemented to discover if the variables are/are not cointegrated. Since the Johansen cointegration test is sensitive to lag length and since it could produce mix results, so, to avoid this problem, we need to estimate UVAR using the variables in their level form and then choose the optimal lag length which is based on different selection criteria. Table (3) shows that the majority of criterions suggest 4 lags as the optimal lag length. Therefore, we run cointegration test by using 4 lags length. The Johansen cointegration test result is based on two types of tests which are Trace and Max-Eigenvalue Statistic. The cointegration test results are presented in Table (4). Results from Both trace and max-eigenvalue tests indicate that there is no cointegration among the variables included in the study, meaning that there is no long-run relationship between the variables.

Table 4. Cointegration Results Based on Johansen's Cointegration Tests

Hypothesized No. of CE (s)	Trace Statistic	Critical Value 5%	Critical Value 1%	Prob.
None	59.96	69.81	77.81	0.23
At most 1	32.29	47.85	54.68	0.59
At most 2	14.77	29.79	35.45	0.79
At most 3	3.47	19.49	19.93	0.94
At most 4	1.80e.05	3.84	6.63	0.99
Hypothesized No. of CE(s)	Max-Eigen Statistic	Critical Value 5%	Critical Value 1%	Prob.
None	27.66	33.87	39.73	0.22
At most 1	17.51	27.58	32.71	0.53
At most 2	11.30	21.13	25.86	0.61
At most 3	3.47	14.26	18.52	0.91
At most 4	1.80e.05	3.84	6.63	0.99

Trace test indicates no cointegration at 5% and 1% levels.

Max-eigenvalue test indicates no cointegration at 5% and 1% levels

Source: Authors' analysis results

3.4 Results of Unrestricted Vector Autoregressive (UVAR)

Results obtained from unit root and cointegration tests help us to choose and determine the right and appropriate econometric techniques to go further in our analysis. First, unit root tests indicated that all variables are nonstationary in their level form but stationary in first difference level form; therefore, they were integrated of the same order $I(1)$ as mentioned in Table (2). Second, results of cointegration tests showed that there is no evidence of long-run relationship between the variables, as reported in Table (4). The results show that the critical values for both trace and Max-Eigen tests are greater than trace and Max-Eigen statistic. Therefore, the unrestricted VAR model was chosen as an appropriate technique to be applied for further analysis aiming to examine the short-run impacts of fiscal and monetary policies, interest rate, exchange rate, 2007-2009 global financial crisis and 2020-2021 COVID-19 pandemic on economic growth in the US. Thus, the empirical model can be specified as follows:

$$\Delta LR GDP_t = \alpha_1 + \sum_{i=1}^4 \alpha_{2,i} \Delta LR GDP_{t-i} + \sum_{i=1}^4 \alpha_{3,i} \Delta FD_{t-i} + \sum_{i=1}^4 \alpha_{4,i} \Delta LMS_{t-i} + \sum_{i=1}^4 \alpha_{5,i} \Delta FFR_{t-i} + \sum_{i=1}^4 \alpha_{6,i} \Delta EXC_{t-i} + D_1 + D_2 + \varepsilon_t \quad (2)$$

Where, Δ 's represents first differences, $\Delta LR GDP_t$ the growth rate of real GDP (which measures the economic growth), ΔLMS the money supply growth (which captures the expansionary monetary policy), ΔFD the change in federal budget deficit (which captures the expansionary fiscal policy), ΔFFR which capture contractionary monetary policy, ΔEXC is the change in exchange rate, D_1 dummy variable one (which captures the effect of 2007-2009 global financial crisis) and D_2 represents dummy variable two (which captures the effect of COVID-19). The short-run coefficients results of unrestricted VAR (4) estimations are reported in Table 5. Results indicate that economic growth up to lag two quarters has a significant positive impact on itself. For the impact of budget deficit on economic growth, results show that there is a significant positive impact on economic growth up to lag three quarters, this means that an expansionary fiscal policy leads to achieve an economic growth. These findings are supported by (e.g., Adefeso and Mobolaji, 2010; Ubi-Abai and Ekere, 2018; Taylor et al., 2012; Hayat and Naeem, 2018). The deficit-financed expenditures can increase the aggregate demand directly, leading to higher economic growth. On the other side, deficit-financed tax-cut could affect economic growth in direct way, with a tax cut people are better off because they have more disposable income causing a rise in aggregate demand, leading higher economic growth. As for the impact of money supply on economic growth, result shows the impact is positive in lag one quarter, meaning that expansionary money supply has a positive on economic growth. These findings are supported by (e.g., Islam et al., 2022; Adefeso and Mobolaji, 2010; Ubi-Abai and Ekere, 2018; Qayyum and Manzoor, 2018; Amaral et al., (2022). For the impact of federal fund rate (interest rate), the result shows that there is a positive impact in lag one quarter and negative at lag two quarters. The negative impact explains that a contractionary momentary policy (an increase in interest rate) leads to decline in economic growth. These findings are supported by (e.g., Tan et al., 2020; Islam et al., 2022). Finally, the impact of exchange rate on economic growth, the result show the impact is negative but insignificant. In addition, Table 5 reports the effect of 2007-2009 financial crisis (D_1) on economic growth; the result shows that the effect is negative and statistically significant. The effect of COVID-19 pandemic (D_2) on economic growth is also negative and statistically significant. Also, the results in Table 5 show that both dummy variables had a positive impact on federal budget deficit, which means that the global financial crisis and COVID-19 pandemic cause deficit to increase. This is actually due to the significant increase in government spending and tax cuts in these two periods to stimulate the U.S. economy.

Table 5. Vector Autoregressive Estimates: Δ LRGDP

	<i>Coefficient</i>	<i>Std. error</i>	<i>t-statistic</i>	<i>Prob.</i>
Δ LRGDP (-1)	0.342*	0.097	5.51	0.001
Δ LRGDP (-2)	0.194***	0.100	1.94	0.053
Δ LRGDP (-3)	-0.165	0.095	-0.177	0.860
Δ LRGDP (-4)	0.107	0.097	1.106	0.270
Δ FD (-1)	0.003*	0.6490e-3	5.82	0.000
Δ FD (-2)	0.002*	0.7478e-3	2.91	0.004
Δ FD (-3)	0.001*	0.6721e-3	2.79	0.006
Δ FD (-4)	0.7166e-3	0.6600e-3	1.08	0.279
Δ LMS (-1)	0.215**	0.105	2.050	0.035
Δ LMS (-2)	-0.016	0.118	-0.136	0.892
Δ LMS (-3)	0.090	0.122	0.743	0.458
Δ LMS (-4)	0.062	0.104	0.602	0.547
Δ FFR (-1)	0.001***	0.8246E-3	1.746	0.082
Δ FFR (-2)	-0.002**	0.8467E-3	-2.506	0.015
Δ FFR (-3)	0.001	0.8785E-3	1.600	0.111
Δ EXC (-4)	-0.001	0.8321E-3	-1.530	0.127
Δ EXC(-1)	-0.1117E-3	0.0553E-3	-0.437	0.662
Δ EXC (-2)	-0.1320E-3	0.2702E-3	-0.488	0.626
Δ EXC (-3)	-0.1183E-3	0.2652E-3	-0.446	0.656
Δ EXC (-4)	-0.4178E-3	0.2542E-3	-0.164	0.870
Constant	-0.0033***	0.0019	1.730	0.086
Dummy (D1)	-0.011*	0.003	-3.120	0.002
Dummy (D2)	-0.229*	0.00520	-4.409	0.000
R-Squared	0.36813			
Adj. R-squared	0.29965			
F-statistic	5.37, Prob. of F-stat. [0.000]			
Log likelihood	745.02			
Akaike AIC	-6.38			
Schwarz SC	-6.04	Serial Correlation CHSQ(4) = 2.3243 [.676]		
DW-statistic	1.8407	Heteroscedasticity*CHSQ(1) = .012069 [.913]		

Note(s): *, ** and *** denote statistically significant at 1, 5 and 10% level of significance, respectively

Source: Authors' analysis results

3.5 Impulse Response Functions

Impulse Response Functions (IRFs) can be produced from our estimated UVAR. They can help to capture the consequence of one positive standard deviation shock to one of the disturbances contained in the ε vector.

IRFs provide information about how economic growth responds to expansionary fiscal policy presented by an increase the budget deficit, expansionary monetary policy represented in growth of money supply, contractionary monetary represented by an increase in interest rate and an appreciation in exchange rate represented by an increase in the value of the dollar. The results of IRFs are provided in Figure 2.

The dynamic effect of expansionary fiscal policy in the form of higher federal budget deficit (FD) on economic growth is shown in Figure 2.a. Figure result shows that a temporary positive shock in federal budget deficit (FD) leads to increase economic growth strongly in the short-run. The positive effect stays for three quarters and then starts to declines and vanishes at tenth quarter, a suggestion that fiscal policy is active and effective only in the short-run as stated in the literature (Keynesian view). As for the result of the response of the economic growth to a temporary positive shock in expansionary monetary policy in the form of increasing money supply (MS) is reported in Figure 2.b. The result shows that the response of economic growth to expansionary monetary policy is positive for about five quarters. These findings are consistent and sited in the literature. With the sixth quarter, the effect of money supply shock on economic

growth vanishes, suggesting that monetary policy is active and effective only in the short-run as cited in the literature. The conventional explanation of the positive impact of expansionary monetary policy on economic growth suggests that an increase in money supply leads to a decrease in interest rate which leads to lower the cost of borrowing the money that used to finance firm's purchases of investment goods and individual's purchases on durable goods. As result of that, planned aggregate expenditures and output expected to increase. The dynamic effect of contractionary monetary policy in the form of higher federal fund rate (FFR) shown in Figure 2.c. The economic growth decrease strongly in respond to a positive shock in federal fund rate. The negative effect stays for almost three quarters before stars to decline and vanishes in the eighth quarter, indicating that the effect is for short-run as mentioned in the literature. This finding also support that a decrease in money supply leads to rise the interest rates and then increases the cost of borrowing money to firms and individuals that finance their purchases, thus aggregate planned expenditures and output decline. Finally, the dynamic effect of an appreciation of exchange rate in the form of higher exchange rate on economic growth is shown in Figure 2.d. Results based on table 5 and figure 2.d show that an appreciation in exchange rate has negative impact on economic growth but insignificant.

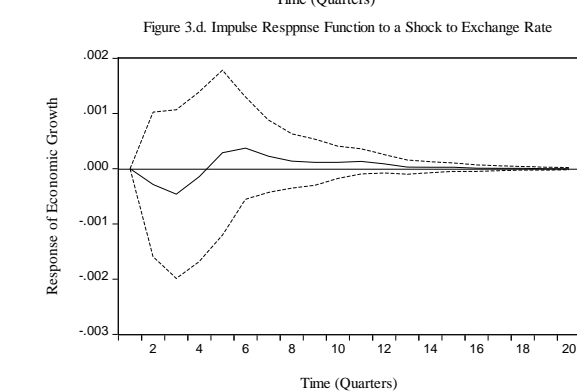
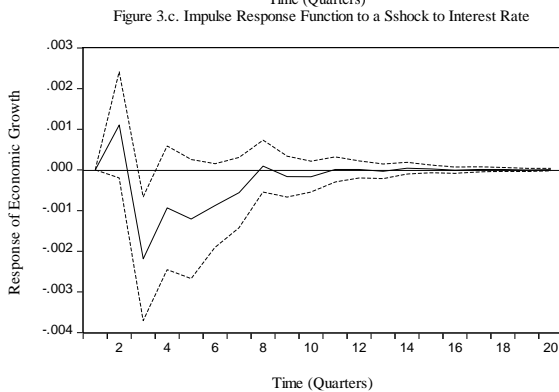
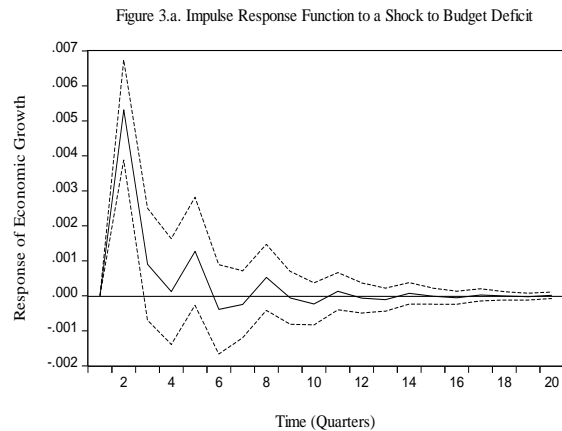
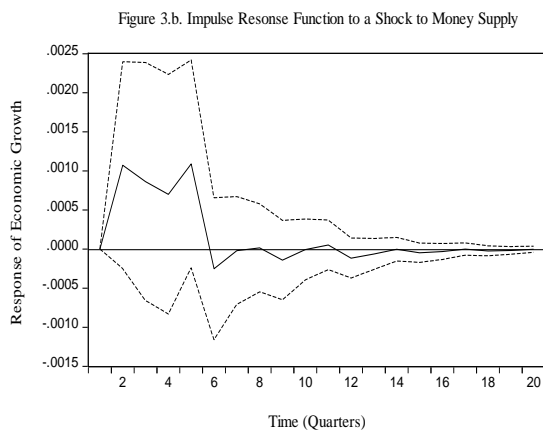


Figure 2. a, b, c and d: Impulse Response to a Shock to Federal Budget deficit, Money Supply, Federal Fund Rate, and Exchange Rate, respectively

[Response to Cholesky One S.D. (d.f. adjusted) Innovations \pm 2 S.E.]

Source: Authors' analysis results

3.6 The residual diagnostic tests

The residual diagnostic tests of the estimated model are shown in the following two tables: Table 6 illustrates the stability condition for UVAR (4), and Table 7 presents the serial correlation LM test. Results confirmed that the UVAR (4) satisfies the condition for stability, and that the model is free of serial correlation.

3.6.1 VAR Stability Tests

The condition of a VAR stability is that the characteristic equation roots of the estimated coefficients matrix of VAR should be inside the unit circle. To check the stability of the VAR model across time, we use the inverse roots of the characteristic AR polynomial test. Table 6 reports the stability of the VAR model used in this study. The results in Table 9 confirm that the stability of the VAR model, since Modulus is less than 1 and no root lies outside the unit circle.

Table 6. Stability Test Result: Roots of Characteristic Polynomial

Root	Modulus
-0.34 + 0.68	0.771034
-0.34 - 0.68	0.771034
0.75	0.752920
-0.16 + 0.66	0.689109
-0.16 - 0.66	0.689109
0.65 - 0.12	0.668523
0.65 + 0.12	0.668523
0.31 - 0.59	0.667946
0.31 + 0.59	0.667946
0.005 - 0.66	0.667259
0.005 + 0.66	0.667259
-0.61	0.617555
-0.14 - 0.51	0.537086
-0.14 + 0.51	0.537086
-0.44 - 0.23	0.500197
-0.44 + 0.23	0.500197
0.40 + 0.18	0.448114
0.40 - 0.18	0.448114
-0.42	0.429172
0.37	0.373053

No root lies outside the unit circle. VAR satisfies the stability condition.

Source: Authors' analysis results

3.6.2 VAR Residual Serial Correlation LM Test

The null hypothesis can be confirmed if the VAR residual serial correlation LM test shows no serial correlation at the lag h . Table 7 shows the results. The result of Breusch-Godfrey Serial Correlation LM test indicates that there is no serial correlation problem in the VAR model used in this study, since the p-values are greater than 5%.

Table 7. VAR Residual Serial Correlation LM Test

Lags	LM-Stat.	Prob.
1	32.44	0.084
2	20.04	0.21
3	19.86	0.75
4	29.58	0.24
5	31.68	0.069

All probability values confirm and support the null hypothesis of no serial correlation

Source: Authors' analysis results

CONCLUSIONS

Fiscal and Monetary policies play very effective crucial roles in stabilizing the economy. This paper inspects the impact of fiscal and monetary policies on economic growth in the U.S. during the period extending from 1964 (Q1) to 2021 (Q3). In addition, the paper examines the impact of the global financial crises in late of 2007 to 2009 and COVID-19 pandemic on economic growth as well. The results of stationarity test confirmed that all five variables are integrated of order $I(1)$. Further, the outcome from the Johansen's Cointegration Tests confirmed that there is no long-run relationship exists among economic growth and other variables included in this study based on Trace Statistic and Max-Eigen Statistic. Therefore, the unrestricted VAR approach was applied to examine the short-run impact of budget deficit (expansionary fiscal policy), money supply (expansionary monetary policy), federal fund rate (contractionary monetary policy) and exchange rate on economic growth. Impulse response functions were produced from UVAR to capture the response of economic growth to the other variables included. Impulse response functions confirmed that both fiscal and monetary policies have positive short-run impacts on economic growth. Besides fiscal and monetary policies variables, two more dummy variables were added to our model: D1 and D2. D1 represents the 2007-2009 global financial crisis, and D2 represents the 2020-2021 COVID-19 pandemic crisis. The dummy variables were added in order to capture if there is any effects of the global financial crisis and COVID-19 pandemic on economic growth. The effect of the global financial crisis (D1) and COVID-19 pandemic (D2) on economic growth was negative, as shown in Table 5 above. More specifically, U.S. economic data indicate economic growth rates of (-2.6) in 2009 and (-3.4) in 2020. But as a result of the role of monetary and fiscal policies, the U.S. economic growth rate got back to be more stabilized levels from 2010 until 2019, averaging about 2.5 percent. The same happened in 2021, when the growth reached 5.5 percent after registering (-3.4) percent the year before. In sum, these study findings support the claim that both fiscal and monetary policies played crucial and important roles in the stability of the U.S. economic growth. Our future research will be focused on the impact of COVID-19 on some specific sectors in the U.S. economy.

REFERENCES

- Adefeso, H., Mobolaji, H.I. (2010), "The Fiscal – Monetary policy and economic growth in Nigeria: Further empirical evidence", *Pakistan journal of social sciences*, Vol. 7, No 2, pp. 137-142
- Amaral, A., Dyhoum, T.E., Abdou, H.A., Aljohani, H.M. (2022), "Modeling for the Relationship between Monetary Policy and GDP in the USA Using Statistical Methods", *Mathematics*, Vol. 10, No. 21, p. 4137.
- Backhouse, R.E., Bateman, B.W. (2011), *Capitalist Revolutionary*, Harvard University Press, Cambridge, MA.
- Baier S.L., Glomm G. (2001), "Long-run growth and welfare effects of public policies with distortionary taxation", *Journal of Economic Dynamics and Control*, Vol. 25, pp. 2007–2042.
- Barro, R.J. (1990), "Government Spending in a Simple Model of Endogenous Growth", *Journal of Political Economy*, Vol. 98, No. 5, part 2, pp. 103-125.
- Barro R.J. (2001), "Human Capital and Growth", *American Economic Review*, Vol. 91, No. 2, pp. 12-17
- Bergh A., Henrekson, M. (2011), "Government Size and Growth: a survey and interpretation of the evidence", *Journal of Economic Surveys*, Vol. 25, No. 5, pp. 872–897.
- Bondarenko, P. (2020), "5 of the World's Most Devastating Financial Crises." *Encyclopedia Britannica*, <https://www.britannica.com/list/5-of-the-worlds-most-devastating-financial-crises>
- Bureau of Labor Statistics (2012), "The Recession of 2007–2009", February
- Clarida, R., H., Burcu, D.B., Chiara, S. (2021), "The COVID19 Crisis and the Federal Reserve's Policy Response", *Finance and Economics Discussion*, Series 2021-2035, Washington: Board of Governors of the Federal Reserve System.
- Devereux M., Love, D. (1994), "The Effects of Factor Taxation in a Two-Sector Model of Endogenous Growth", *The Canadian Journal of Economics*, Vol. 27, No. 3, pp. 509-536.
- Federal Reserve Economic Data (1947), "Real Gross Domestic Product", April.
- Friedman, B.M. (2000), "Monetary Policy", *Working Paper*, No. 8057, National Bureau of Economic Research, doi: 10.3386/w8057

- Eigner, P., Umlauft, T.S. (2015), "The Great Depression(s) of 1929-1933 and 2007-2009? Parallels, Differences and Policy Lessons", *MTA-ELTE Crisis History, Working Paper, No. 2, Hungarian Academy of Science*
- Fetai, B. (2013), "The effectiveness of fiscal and monetary policy during the financial crisis", *East-West Journal of Economics and Business*, Vol. 16, No. 2, pp. 53-66.
- Glomm G., Ravikumar, B. (1994), "Public investment in infrastructure in a simple growth model", *Journal of Economic Dynamics and Control*, Vol. 18, No. 6, pp. 1173-1187
- Gopinath, G. (2020), "The Great Lockdown: Worst Economic Downturn Since the Great Depression", IMF Blog, April, <https://www.imf.org/en/Blogs/Articles/2020/04/14/blog-weo-the-great-lockdown-worst-economic-downturn-since-the-great-depression>
- Group of Twenty (2009) *Global Economic Policies and Prospects*, London, U.K. March
- Hayat, U., Naeem, M. (2018), "The impact of fiscal policy on economic growth: Panel data analysis", *Pakistan business review*, Vol. 2, No. 20, pp. 465-476.
- International Monetary Fund (2015), "Fiscal Policy and Long-term Growth", *IMF Policy Paper*.
- Islam, S., Hossain, E., Chakroborty, S., Ema, N. (2022), "Does the monetary policy have any short-run and long-run effect on economic growth? a developing and a developed country perspective", *Asian journal of economics and banking*, Vol. 6, No. 1, pp. 26-49.
- Lopez, R.E., Thomas, V., Wang, Y. (2008), "The Quality of Growth: Fiscal Policies for Better Results", *IEG Working Paper, 2008/6*, World Bank, Washington, DC.
- Lucas R.E. Jr. (1988), "On the Mechanics of Development", *Journal of Monetary Economics*, Vol. 22, No. 1, pp. 3-42.
- Keynes, J.M. (1936), *The General Theory of Employment, Interest and Money*, Macmillan, London.
- Nourzad, F., Vrieze, M. (1995), "Public Capital Formation and Productivity Growth: Some International Evidence", *Journal of Productivity Analysis*, Vol. 6, No. 4, pp. 283-295.
- Qayyum, A., Manzoor, S. (2018), "Dynamism in Economic Policies to Achieve Economic Stability: Evidence from Pakistan", *Asian Journal of Economics and Empirical Research*, Vol. 5, No. 1, pp. 87-92.
- Rebelo, S.T. (1991), "Long-Run Policy Analysis and Long-Run Growth", *Journal of Political Economy*, Vol. 99, No. 3, pp. 500-521.
- Sanchez-Robles B. (1998), "Infrastructure Investment and Growth: Some Empirical Evidence", *Contemporary Economic Policy*, Vol. 16, No. 1, pp. 98-108.
- Sims, CA., Stock, J.H., Watson, M.W. (1990), "Inference in Linear Time Series Models with Some Unit Roots", *Econometrica*, Vol. 58, No. 1, pp. 113-144.
- Solow, R. M. (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics*, Vol. 70, No. 1, pp. 65-94.
- Swan, T.W. (1956), "Economic Growth and Capital Accumulation", *Economic Record*, Vol. 32, No. 2, pp. 334-361.
- Tan, C.T., Mohamed, A., Habibullah, M.S., Chin, L. (2020), "The Impacts of Monetary and Fiscal Policies on Economic Growth in Malaysia, Singapore and Thailand", *South Asian Journal of Macroeconomics and Public Finance*, Vol. 9, No. 1, pp. 114-130
- Taylor, L.L. Carvalho, C. Proaño, Barbosa, N. (2012), "Fiscal deficits, economic growth and government debt in the USA", *Cambridge Journal of Economics*, Vol. 36, No. 1, pp. 189-204.
- Tobin, J. (1965), "Money and economic growth", *Econometrica*, Vol. 33, No. 4, pp. 671-678.
- Twinoburyo, E.N., Odhiambo, N.M. (2018a), "Monetary policy and economic growth: a review of international literature", *Journal of Central Banking Theory and Practice*, Vol. 7 No. 2, pp. 123-137.
- Turnovsky, S. (2000), "Fiscal Policy, Elastic Labour supply and Endogenous Growth", *Journal of Monetary Economics*, Vol. 45, No. 1, pp. 185-210.
- Turnovsky S., Fisher, W. (1995), "The composition of government expenditure and its consequence for macroeconomic performance." *Journal of Economic Dynamics and Control*, Vol 19, No. 4, pp. 747-786.
- Ubi-Abai, I., Ekere, D. (2018), "Fiscal Policy, Monetary Policy and Economic Growth in Sub-Saharan Africa", *MPRA Paper, 91950*, University Library of Munich, Germany, https://mpra.ub.uni-muenchen.de/91950/1/MPRA_paper_91950.pdf