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Role of Oil Price in Fiscal Cyclicality in Saudi Arabia

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ABSTRACT

Testing cyclicality of fiscal policy is pertinent in any country to observe its type of cyclicality with the business cycle. In the oil abundant economy, oil price and trade openness may also play a role in determining the fiscal policy cyclicality. This research probes the role of economic growth, trade openness, and oil price on government consumption growth to verify the type of cyclicality in Saudi Arabia from 1971 to 2018. The cointegration test of Pesaran (2001) is utilized to test the cyclicality hypothesis with augmented critical bound statistics developed by Kripfganz and Schneider (2019). We corroborate the long and short-run relationships in the fiscal model of Saudi Arabia. Further, procyclicality is proved in the long run and countercyclicality is corroborated in the short run with a 1-year lag effect. Moreover, government revenue has a positive effect on expenditure. However, oil prices and trade openness could not affect government spending.

Keywords: Fiscal Cyclicality, Oil Price, Trade Openness, Government Consumption, Economic Growth
JEL Classifications: E62, Q41, P33, O43

1. INTRODUCTION

Saudi Arabia is the leading oil-producing and oil-exporting country in the world. Its export revenue from oil consists of about 90% of total government revenue (Government of Saudi Arabia, 2020). Therefore, it's spending budget and fiscal policy majorly depending on growth in the oil sector. There is a need for diversification, particularly in promoting the private sector and to generate public revenue from other sources as well. During negative oil price shock, it is very hard to maintain its spending pattern. Its oil revenue is the main source of growth and oil price shocks may disturb the growth of the overall economy. Secondly, the Saudi economy is also facing a budget deficit in the last years. It is due to the oil subsidy and the low tax rate in Saudi Arabia. Consequently, there can be a problem of raising government debt in the economy.

All discussed problems may emerge the issue of financial problems and may create a burden for the upcoming government spending plans. Further, fiscal policy should be to correct economic cycles. The right policy action would ensure the correct direction of a country on the economic cycle. Therefore, it is pertinent to probe the nature of fiscal policy cyclicality in any country. It is also very important to investigate this issue in the case of Saudi Arabia because of heavy dependence on the oil sector to meet the fiscal spending requirement. It is necessary to make fiscal policy response to the economic situation in the long run and to avoid the burden of today's fiscal imbalances on the future generations of Saudi Arabia.

A countercyclical policy may also ensure to sustain the recovery or boom period to be extended for a long time to put the country on a prosperous path or to protect the economy from recession period, particularly in the oil price crisis period. Oil consumption is rising sharply with a rising population and economic growth. It is estimated that it will consume more than twenty percent of total oil production if oil consumption grows at the same rate.

This may also create a problem for fiscal spending. Major public revenue is depending on oil production and exports. Moreover, the budget surplus is going to change in budget deficit on oil price crises which is an alarming situation for the oil-depending nation. Hence, there is a need to save the oil-revenue to maintain the high spending in the days of oil-revenue loss and to sustain the fiscal policy to oil-rich countries.

A very limited number of studies investigated the Saudi Arabian economy to investigate the fiscal issue. Some studies have been done descriptive debate to discuss the issue of fiscal sustainability by showing the trends of data (Al-Hamidy, 2012). Mahmood (2016) investigated the fiscal sustainability of Saudi Arabia using a cointegration approach but found weak sustainability. Hence, there has been no single study, which has tried to explore the cyclicality in Saudi Arabia. The present study aims at applying the recent and efficient unit root and cointegration tests to ensure the reliability of estimates to explore the nature of the cyclicality of fiscal policy in Saudi Arabia. The misleading results of previous most of the studies are due to negligence in adopting a suitable sample and due to ignoring the cointegration (Afonso, 2005; Mahmood, 2019). Moreover, we also incorporate trade openness and oil price variables. Because most of the Saudi trade is tariff-free and the Saudi economy majorly depends on the oil sector. Therefore, trade and oil prices may play a significant role in the fiscal policy of Saudi Arabia.

This study is pioneering in two ways. At first, as discussed, it is a very first attempt to check the fiscal cyclicality in the case of Saudi Arabia. Secondly, most of the previous literature on fiscal cyclicality has been ignored the cointegration in the analysis. After investigating the cyclicality issue in the case of Saudi Arabia by using unit root and cointegration technique to verify this important issue of fiscal cyclicality, this study would discuss that fiscal policy is correcting the economic cycle or not and would recommend the most reasonable choice of policy to smooth the economic cycle.

2. LITERATURE REVIEW

Fiscal cyclicality is the response of fiscal variables to the change in income level or economic cycle. If fiscal variables are not responding to any change in the business cycle, then fiscal policy is claimed as acyclical. Classical economists have advocated the acyclical fiscal policy because they assumed limited government intervention and a self-adjusted economy based on a flexible price mechanism. In line with Classical orthodox thoughts, Barro (1979) preferred an acyclicality of debt policy. On the other hand, Neo-Classical Economists are following the Keynesian thoughts that fiscal policy should be countercyclical to ensure an active fiscal role of government (Blanchard and Fisher, 1989; Baxter and King, 1993). The countercyclical policy suggests reducing spending and to increase taxes to put the economy on a countercyclical path.

Due to the economic constraints of developing countries, another approach exists that is a procyclical fiscal policy which was highlighted, at first, by Gavin and Perotti (1997) that the developing countries could not spend well in recession due to insufficient external resources. This approach narrates that any economic cycle equally affects the government's ability of fiscal response. For an instant, the government of the resource-constraint economy cannot spend more in recession and would possibly put the tress of taxes on an economy. Both fiscal behaviors of the government would prolong the recession and are procyclical. A vast literature has established that developing countries are following countercyclical or acyclical policy and developing countries are indulged in pro-cyclical fiscal policy (Auerbach, 2009; Frankel et al., 2013; Fatas and Mihov, 2009; Lee and Sung, 2007; Schlarek, 2007).

The empirical literature has intensively investigated the influence of institutional quality (IQ) on the cyclicality of fiscal policy. For example, Thornton (2008) investigated cyclicality in African poor countries. They found evidence of the procyclicality of public consumption. Procyclicality degree was found more in the aid recipient countries and corruption level was low. On the other hand, Procyclicality degree was found lesser in the countries with democracy and unequally distributed income. Contrarily, Calderon et al. (2016) explored the role of IQ for the cyclicality of policy for a large sample of 112 countries. They found that stronger IQ helped to promote the countercyclicality and weaker IQ was found responsible for the procyclicality of the policy. Hence, IQ has also mattered along with the growth level of any country to adopt either countercyclical or procyclical policy. Cronin and McQuinn (2018) investigated the cyclical policy before and after the parliamentary system in Ireland. They found evidence of procyclicality in both sample periods. Hence, this system could help significantly to reduce the procyclicality of policy. Frankel et al. (2013) investigated the IQ and cyclicality of policy. They found that developing economies are procyclical but about 30% of developing economies have shifted towards countercyclical policy in the recent decade. Moreover, IQ helped significantly to reduce the extent of procyclicality in the developing countries.

Other than IQ, many other proxies have also been tested in the fiscal cyclicality model. For example, Aghion and Marinescu (2007) explored the fiscal cyclicality in OECD countries. They found that the budgets of most OECD countries were countercyclical. But, the evidence of countercyclicality is not found in the case of some European Union countries. Moreover, rising financial development, falling trade openness, and inflation reducing policies are found supportive of countercyclical fiscal policy. Akitoby et al. (2004) investigated fiscal cyclicality in the relationship of income and public spending in a mixed group of 51 countries and found that most of the countries are following the procyclicality in the public spending policy. Moreover, output and financial volatility contributed to the procyclicality of fiscal policy.

Lee and Sung (2007) investigated the cyclicality of different fiscal variables. They found that current types of public spending variable response countercyclical to the economic cycle. But, the capital type of spending and tax revenue exhibit procyclical behavior. Hence, asymmetry is corroborated in the cyclicality of different fiscal policies. Mesea (2013) investigated the type of cyclicality in the European Union and found that the developing

countries were prominently following procyclicality while developed countries were following the countercyclicality or acyclicality. Slimane et al. (2010) investigated cyclicality in the MENA region and found evidence of procyclicality. They also found that the financial constraints of a country are responsible for procyclicality as the government could not manage finance to use expansionary policy in the recessions. Moreover, IQ does matter for the fiscal policy performance as weak IQ was associated with a poor fiscal response to any economic cycle.

Oil-producing countries have lesser control over fiscal policy during economic cycles. Further, fiscal policy is majorly dependent on the oil price, rent, and revenues (Mahmood and Furqan, 2020). In a prosperous period of oil revenue, government expenditures rise to support economic growth. Conversely, a fall in oil revenue requires reducing public spending. Consequently, there will be lesser economic growth and public debt may rise. For a long term fiscal policy, in times of prosperity, the government must save some revenue to support the economic growth in the future and to spend on the important projects in a time of recession. This is also very important to support sustainable development in the country and to take care of its future generation as well (Medas and Zakharova, 2009). Murshed and Tanha (2020) argued that oil prices significantly affected the type of energy consumption which has consequences for government spending as well.

In GCC and Saudi Arabia, the testing fiscal cyclicality is absent. However, some studies tested the effect of oil price (OP) on different macroeconomic indicators. For instance, there are some studies on the effect of OP on energy depletion in GCC countries (Alkhateeb and Mahmood, 2020b), the effect of OP on stock markets of GCC countries (Siddiqui et al., 2019), the effect of OP on capital formation in GCC countries (Alkhateeb and Mahmood, 2021) the effect of OP on capital formation in GCC countries (Alkhateeb and Mahmood, 2020a), the effect of OP on consumption in Saudi Arabia (Mahmood and Zamil, 2019), the effect of OP on investments in Saudi Arabia (Mahmood and Alkhateeb, 2018) and the effect of OP on employment in Saudi Arabia (Alkhateeb et al., 2017a, 2017b). In the MENA region, Slimane et al. (2010) has corroborated a procyclicality of fiscal policy in the whole MENA region. But, this investigation for a giant oil exporter Saudi Arabia is missing in the literature. It also needs to test the role of oil price in the fiscal cyclicality function to test its role in the type of cyclicality. Therefore, this present research is motivated to test the role of trade and oil price in the fiscal cyclicality function of Saudi Arabia to verify the type of fiscal cyclicality in this economy.

3. METHODOLOGY

Fiscal policy cyclicality can be probed by testing a long-run relationship between any growth of fiscal variable and income growth. Moreover, the fiscal policy is depending on the oil price in the oil-exporting country. So, oil price growth can also be tested in the fiscal function of Saudi Arabia. Moreover, trade is mostly open and free in the Kingdom. Hence, it may have an impact on the cyclicality policy. Lastly, we cannot ignore government revenues which are a direct source of public spending. Considering these arguments and some control variables, we hypothesize the following model:

$$GCEG_{it} = f(GDPG_t, OPG_t, REVG_t, TO_t) \quad (1)$$

$GCEG_t$ is a growth rate of government consumption expenditures, $GDPG_t$ is a growth rate of Gross Domestic Product (GDP), OPG_t is a growth rate of oil price, $REVG_t$ is a growth rate of government revenues and TO_t is the total trade percentage of GDP. *t* is a period 1971-2018. All data are sourced from the Government of Saudi Arabia (2020). A relationship between $GCEG_t$ and $GDPG_t$ can prove the nature of the cyclicality of fiscal policy. For example, a positive relationship may corroborate the procyclical policy, a negative relationship would be countercyclical and no relationship indicates an acyclical policy. Before proceeding for analysis of the relationship, it is pertinent to check the stationarity of variables which may be tested with Augmented Dickey and Fuller (ADF) (1981) test in the following way:

$$\Delta y_t = \alpha_2 y_{t-1} + \sum_{i=0}^{k} \alpha_{3i} \Delta y_{t-1} + \zeta_t \quad (2)$$

$$\Delta y_t = \alpha_0 + \alpha_2 y_{t-1} + \sum_{i=0}^{k} \alpha_{3i} \Delta y_{t-1} + \zeta_t \quad (3)$$

$$\Delta y_t = \alpha_0 + \alpha_1 T + \alpha_2 y_{t-1} + \sum_{i=0}^{k} \alpha_{3i} \Delta y_{t-1} + \zeta_t \quad (4)$$

Equation 2 is the ADF equation without intercept (C) and trend (T). H_0 of the unit root will be tested and rejection of H_0 could identify the stationary series y_t. Further, equation 3 with *C* and equation 4 with *C&T* may be tested in the same way as of equation 2. After the unit root test, we move toward Autoregressive Distributive Lag (ARDL) of Pesaran (2001) with the following equations:

$$\begin{aligned}\Delta GCEG_t &= \delta_0 + \delta_1 GCEG_{t-1} + \delta_2 GDPG_{t-1} + \delta_3 OPG_{t-1} \\ &+ \delta_4 REV_{t-1} + \delta_5 TO_{t-1} + \sum_{j=1}^{p} \varphi_{1j} \Delta GCEG_{t-j} \\ &+ \sum_{j=0}^{q} \varphi_{2j} \Delta GDPG_{t-j} + \sum_{j=0}^{r} \varphi_{3j} \Delta OPG_{t-j} \\ &+ \sum_{j=0}^{q} \varphi_{4j} \Delta REVG_{t-j} + \sum_{j=0}^{r} \varphi_{5j} \Delta TO_{t-j} + \omega_t \end{aligned} \quad (5)$$

$$\begin{aligned}\Delta GCEG_t &= \pi_0 ECT_{t-1} + \sum_{j=1}^{p} \varphi_{1j} \Delta GCEG_{t-j} \\ &+ \sum_{j=0}^{q} \varphi_{2j} \Delta GDPG_{t-j} + \sum_{j=0}^{r} \varphi_{3j} \Delta OPG_{t-j} \\ &+ \sum_{j=0}^{q} \varphi_{4j} \Delta REVG_{t-j} + \sum_{j=0}^{r} \varphi_{5j} \Delta TO_{t-j} + \omega_t \end{aligned} \quad (6)$$

Equation 5 can be tested for cointegration with H_0 of no-cointegration for long-run relationships and negative π_0 can validate the short-run relationship in equation 6. Moreover, long and short-run effects can be estimated from equations 5 and 6 respectively.

4. DATA ANALYSES

Table 1 provides ADF results and $GCEG_t$ and TO_t are level non-stationary and first differenced stationary. $GDPG_t$, OPG_t, and

$REVG_t$ are stationary at level and difference. Mixed order is found in unit root analysis. The bound testing procedure with lower and upper bounds allowed such kind of model to be regressed with the ARDL approach (Pesaran et al., 2001).

The bound test in Table 2 shows a very high value and is higher than augmented critical bound statistics developed by Kripfganz and Schneider (2019). So, cointegration is corroborated in the fiscal function of Saudi Arabia. During long-run, $GDPG_t$ has a positive effect on the $GCEG_t$ and it corroborates a procyclical fiscal policy. It means that government consumption expenditures are increasing with increasing economic growth rate and the boom is followed by further expansionary policy and government consumption expenditures are decreasing with decreasing income level and the recessions are followed by the contractionary policy which may further contract the income levels. But, it is pertinent to follow the countercyclical fiscal policy to smooth the economic cycle. As decreasing spending in the boom period may prolong the boom period and increasing spending in the recessions would gear up the economy toward recovery. The oil price growth is not affecting government expenditures. Moreover, trade openness also carries an insignificance effect on government expenditures. The government revenue growth has a positive influence on government expenditures. So, increasing government revenues are supporting to grow government expenditures and also enhancing the procyclicality of fiscal policy.

Table 1: ADF test

Variable	C	C&T	None
$GCEG_t$	−2.2128 (0.1550)	−3.0535 (0.1868)	−2.1725 (0.1186)
$GDPG_t$	−5.6474 (0.0000)	−5.9743 (0.0000)	−5.0275 (0.0000)
OPG_t	−6.2500 (0.0000)	−6.4409 (0.0000)	−5.8033 (0.0000)
$REVG_t$	−4.9747 (0.0002)	−5.0964 (0.0007)	−4.5248 (0.0000)
TO_t	−1.9313 (0.3155)	−2.1496 (0.5053)	−0.5303 (0.4818)
$\Delta GCEG_t$	−7.5817 (0.0000)	−7.4894 (0.0000)	−7.6674 (0.0000)
$\Delta GDPG_t$	−11.5425 (0.0000)	−11.4145 (0.0000)	−11.6714 (0.0000)
ΔOPG_t	−7.9955 (0.0000)	−7.9027 (0.0000)	−8.0902 (0.0000)
$\Delta REVG_t$	−8.2640 (0.0000)	−8.2886 (0.0000)	−8.3244 (0.0000)
ΔTO_t	−10.3386 (0.0000)	−10.2441 (0.0000)	−10.4460 (0.0000)

Table 2: ARDL results

Variable	Coefficient	Std. error	t-Statistic	Prob.
Long run				
$GDPG_t$	0.7122	0.1468	4.8511	0.0000
OPG_t	−0.0177	0.1032	−0.1718	0.8645
$REVG_t$	0.1688	0.0707	2.3880	0.0220
TO_t	0.0869	0.1516	0.5736	0.5696
C	−5.4220	11.0451	−0.4909	0.6263
Short run				
$\Delta GDPG_t$	0.1375	0.1485	0.9260	0.3603
$\Delta GDPG_{t-1}$	−0.21256	0.0643	−3.3063	0.0021
ΔOPG_t	−0.0163	0.0952	−0.1713	0.8649
$\Delta REVG_t$	0.1553	0.0532	2.9197	0.0059
ΔTO_t	0.0799	0.1426	0.5607	0.5783
ECT_{t-1}	−0.9199	0.1325	−6.9421	0.0000
Diagnostic tests				
Bound test	F-value=11.5285			
Heteroscedasticity	F-value=0.5769			0.7701
Serial correlation	F-value=0.5075			0.6062
Functional form	F-value=0.7308			0.4695
Normality	Chi-square=3.6924			0.1578

Table 2 also presents short-run effects and the parameter of ECT_{t-1} is corroborating a short-run relationship. $GDPG_t$ has an insignificant effect on government spending. However, a lag of $GDPG_t$ hurts government spending. Contrarily to the long-run result, economic growth in 1 year is reducing government spending in the next year. This result proofs the countercyclical fiscal policy in the short-run with a 1-year lag effect. However, $REVG_t$ has a positive effect on government spending like long run results. Hence, increasing government revenues help to increase spending both in the long and short run.

5. CONCLUSION AND RECOMMENDATION

This research investigates the nature of fiscal cyclicality in an oil-exporting country Saudi Arabia from 1971 to 2018. To test the hypothesis, the growth of government consumption expenditures is used for a fiscal policy variable and the economic growth rate is regressed to verify the cyclicality of policy. Moreover, the oil price is a substantial component of income and is also included in the model along with trade openness and government revenue. The cointegration is validated with the bound test. Economic growth has a positive relationship with government spending. Hence, fiscal policy is found as procyclical. But, the short-run effect of economic growth is found negative with a 1-year lag. So, the fiscal is proved as countercyclical in the short-run with a 1-year lag. The oil price has insignificant long and short-run effects. So, increasing or decreasing oil prices could not encourage or discourage the cyclicality of fiscal policy in Saudi Arabia. In the same way, trade openness could affect public expenditures neither in the long-run nor in the short-run. However, government revenues show a positive effect on both analyses.

Based on the results, we recommend the Saudi economy to follow the countercyclical policy which would help to smooth the economic cycles. For example, decreasing spending or tight fiscal policy in the boom period may prolong the prosperous period and may also save the revenue for the recession period. On the other hand, increasing spending or lax fiscal policy in the recessions would move the economy toward recovery. In this way, fiscal policy will be a solution in any economic cycle.

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