The Effect of Fiscal Policy Tools on Economic Growth: Empirical Evidences Based Time Series Data From Algeria. The ARDL Model

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Abstract:
The purpose of this study is to examine the dynamic effect of fiscal policy instruments on economic growth in algeria over the period 1990-2015.ADF and PP test are applied to test the unit root hypothesis.Using the ARDL Co-intergration technique ,the study found that there is a significant negative long run relationship between economic growth and government expenditure,and a significant positive long run relationship between economic growth and total public revenues.
Finally ,the study recommends that the gouvernment should reduce its budget deficit and get rid of the circle of debt over hanging problems.
Keywords:Economic Growth,Government Expenditures,Public revenues,ARDL.

I. Introduction:

Fiscal policy refers to the government´s efforts to influence the direction of economy throught changes in taxes or expenditures.Optimal fiscal policy in Algeria plays a important rôle in growth process ,it serves as a vital instrument for economic growth ,wich has still been the area of interest for the academicians as well as for the policy makers.The current study examine the link between

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fiscal policy tools and economic growth for Algeria´s economy over the period 1990-2015 using a dynamic model and differents economitrics techniques.

II. Literatures Reviews:

Several studies have been carried out to examine the impact of fiscal policy variables on economic growth as[1]:

(Hoopner,2003)[2],(Castro&all,2006)[3],(Esau,2006)[4]wich have examine the effect of government spending ,tax reveues and budget dificit as variables of fiscal policy on economic growth ,the results show a positively effect of government spending on economic growth ,whereas shocks to taxes revenues inversely affect economic growth.In oder hand ,(Balassa,1988)[5],(Iqbal&Zahid,1998)[6],(Jafri &all,2006)[7]find that economic growth rate responds negatively to budget dificit as variable of fiscal policy in the long run.(Mulumb,2009) eaxmine the wagner law and the long run relationship between government spending and economic growth for (13) countries in south africa during the period (1988-2004) using pedroni panel co-integration test and kao panel co-intergration test ,the results show the long run relationship between the government spending and economic growth,and the presence of mono relationship trend from economic growth to government spending wich is compatible with wagner law.

III. Research Methodology:

3.1 Data collection:

Time series data from1990-2015 of the related variables were collected from world bank data(2014).The variables are:GDP Per Capita(Gross Doestic Product Per Capita)as indicator of economic growth ,government expenditure and total public revenues as variables of fiscal policy.

1:Shahid,A,Naved,A.(2010)."The effect of fiscal policy on economic growth:empirical evidence based on time series data from Pakistan",the Pakistan development review,49:4,part2,p498.

2: Hoeppner, F. (2003) Business Cycle Effects of Fiscal Policy: Empirical Evidence from Germany. dissertation.de.

3: Castro, D. F., F. and Hernández D. C., P. (2006) The Economic Effects of Exogenous Fiscal Shocks in Spain: A SVAR Approach. (ECB Working Paper No. 647).

4: Kaakuga, Esau (2006) The Impact of Fiscal Policy on Economic Growth in Namibia. *South African Journal of Economic Growth and Management Sciences*, 102–112.

5 : Balassa, Bela (1988) Public Finance and Economic Growth. Policy, Planning and Research Department. (Working Papers; Vol. 1, No. WPS 31).

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3.2 Model Specification:

In order to examine the effect of fiscal policy tools on economic growth,we estimate the following equation:

$$GDPPC_t=\alpha_0+ \alpha_1GE+ \alpha_2TR+U_t\text{……..(1)}$$

where:GDPPC:Gross domestic product

GE:Government Expenditure.

TR:Total public Revenues.

The study based on ADF and PP test for stationarity of time series ,and to test the long run relationship,we have used the robust economitrics techniques,Autoregressive Distrubuted Lag Model(ARDL) popularisedby (Pearson & shin,1998)[1],and (Pearson &all,2001)[2].The error correction version of ARDL model is given as:

$$\Delta GDPPC_t=ß_0+ß_1\sum\Delta GDPPC_{t-\ i}+ß\ _2\sum\Delta GE_{t-i+}+ß\ _3\sum\Delta TR_{t-i}+\eta EC_{t-I}\text{……(2)}$$

Where:η:error correction term in the model indicates.

The pace of adjustment reverse to long run equilibruim following a short run shock.

In order to cope up with the endogeneity of explanatory variables,and in order to avoid inconsistent results,we use two-stage least square(2SLS) instruments variables techniques.

IV. Results Discussions:

4.1 Stationarity of time series(Unit Root test):

In order to examine the stationarity of time series ,we have used the ADF* and PP** test ,the following table summaryze the results:

1:Pesaran, H. M. and Y. Shin (1998) ,An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis, In S. Storm (ed.) *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. Cambridge University Press.

2: Pesaran, M. H., Y. Shin, and R. Smith (2001) Bound Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics* 16, 289–326.

*:Augmented Dickey Fuller test

**:Philips Perron test.

TABLE1:Unit Root Test

variables	ADF(intercept &trend)		PP(intercept&trend)		Result
	level	1st Diff	level	1st Diff	
GDPPC	-2.1042	-4.8783*	-2.8628	-8.6193	I(1)
GE	-5.0883*	/	-3.6483**	/	I(0)
TR	-5.3053*	/	-4.8201	/	I(0)

Source: Eviews 7 output.
Notes: *,** Significant at 1%,5% level.

The results show that each of the variables is integrated of different order:GDPPC stationary at first difference: I(1),each of GE andTR is stationary at level:I(0),wich means that there is no long run relationship between variables under study ,so we can´t apply any cointegration techniques.
In order to choose a robust model for estimation of growth equation ,we estimate differents growth equations and select three of them for comparison,these equation have been estimated via ARDL co-integration techniques.

4.2 Lag Selection of ARDL:

After determining the stationarity level of all variables ,the ARDL co-integration system is implemented for Algeria using annual time series over the period 1990-2015.

- **First Step:** we have to determine the lag lenght order obtained throught unrestricted vector autoregressive (VAR) via:Schwartz Creteria(SC),Akaike Information Creteria(AIC) and Hannan Quinn Creteria(HQ),as show in the following table:

TABLE2:Lag Lenght Selection

Order Lags	AIC	SC	HQ
0	04.4503	04.5975	04.4893
1	04.3268*	04.5232*	04.3789*
2	04.3858	04.6312	04.4509

Source:Eviews output
Notes:* indicate the lag order selected by the creterion.
AIC: Information Creteria
SC: Schwartz Creteria
HQ: Hannan Quinn Creteria

Throught the creterion values,the lag lenght order is(1) as the results show in the table above.

- **Second Step:**is to test if there is o long run relationship between variables under study throught the (UECM) model using the following equation:
  $\Delta GDPPC_t=\delta+ß_1GDPPC_{t-1}+ ß_2GE_{t-1}+ ß_3TR_{t-1}+\sum ɣ_{1i}\Delta GDPPC_{t-i}++\sum ɣ_{2i}\Delta GE_{t-i}++\sum ɣ_{3i}\Delta TR_{t-i}+U_t$…(4)

To ensure that there is a relationship ,we have determined (F –Statistics) throught "Wald test" wich test the null hypothesis(H_0):"that there is no co-integration between variables",wich means the absence of long run relationship"as:

H_0: $ß_1= ß_2 =ß_3=0$
H_1 : $ß_1\neq ß_2 \neq ß_3\neq 0$

TABLE3:Co-integration using Wald test

	Fcalculated	P Value	Result
Growth Model	6,622725	0,002182*	There is a equilibruim long run relationship
Critical value at K=2	Low Bound I(0)	High Bound I(1)	
1% significance	4.40	5.72	
5% significance	3.47	4.57	
10% significance	3.03	4.06	

Source: Microfit 4.0 output

Notes: * :significant at 1%.

K: the number of independant variables.

As show in the table (3),F calculated is higher than F critical for high bound at 1%,5% and 10% ,so we reject (H_0):"no ci-integration between variables",wich means the presence of equilibruim long run relationship between variables under study.

TABLE4:Estimated long run coefficoients using ARDL

Dependant Variable GDPPC	ARDL technique order (0,2,1,1,1)	
Regressors	Coeficients	Low Significat Level
GE	-0.087	0.007**
TR	0.397	0.007**

Source:Microfit 4.0 output

Note:** : significat at 1%

After ensuring the presence of long run relationship,we have measuring this relation as show in table(4),the result show:

- The presence of negative effect between GDPPC and GE , it is significant at 1%.
- the presence of positive effect between GDPPC and TR ,it is significant at 1%

- **Third Step:** for measuring the short run relationship ,we have using the error correction model(ECM)*:

TABLE5:Estimated Short run Coefficients using the (ECM)model

Dependent variable ΔGDPPC	**ARDL technique order (0,2,1,1,1)**	**Low significant level**	
Regressors;			
ΔGE	-0.018	0.13^{***}	
ΔTR	0.97	0.00^{*}	
EC_{t-I}	0.998	0.00^{*}	
	R^2=0.96	SE=0.005	DW=2.96

Source: Microfit 4.0 output

Note:*,**,*** : significant at 1%,5%,10%

As show the results above(table5),the error correction estimator is significant at 1%,wich support the presence of long run relationship between variables(EC_{t-I}=-0.99).this means that when the GDPPC deviates from his equilibruim value in the short period (t-I),it correct wich was equivalent to (99.8%) of this deviation in the period (t),the results also show the sign of estimators wich where compatible with long run period.

V. Conclusion:

In this study ,we have examined the dynamic effect of fiscal policy tools on economic growth in Algeria over the period 1900-2015.

5.1 Results:

We can summarize the econometrics results below:

1. The presence of long run relationship between economic growth , government expenditure and total public revenues in Algeria over the period 1990-2015.
2. a significant negative effect between economic growth and government spending.
3. a significant positive effect between economic growth and totatal public revenues.

5.2 Recommendation:

the study recommends that :

1. The gouvernement should reduce its budget deficit.

*: ECM model have two important properties:

- measure the short run relationship
- measure quickly the correction to re-balacing the relation in the dynamic model.

2. The gouvernement would get rid of the circle of debt over hanging problems because the debt-GDP ratio would increase only if the fiscal deficit (as percentage of GDP) exceeds the real GDP growth rate.
3. The reduction in fiscal deficit must due to reduction in public expenditure rather than an increase in ressources.

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1- Balassa, Bela (1988) **Public Finance and Economic Growth. Policy**, Planning and Research Department. (Working Papers; Vol. 1, No. WPS 31).

2- Castro, D. F., F. and Hernández D. C., P. (2006) **The Economic Effects of Exogenous Fiscal Shocks in Spain: A SVAR Approach**,*ECB Working Paper* No. 647.

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