Armey Curve Analysis for the Panel of Selected South Asian Economies

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Abstract

The present study is an attempt to analyze the role of government size for economic growth. A panel of selected South Asian Developing countries is used for analysis. Data from 1990 to 2016 is used for empirical investigation. Panel cointegartion is used for the analysis. The results indicated that there is a non linear relationship between the size of the government and economic growth. The study confirms the existence of ARMEY CURVE relationship in the selected panel.

Introduction

The relationship between government expenditure and economic growth has continued to generate intense debate among scholars. To date, policymakers are still divided as to whether government expansion helps or hinders economic growth. Proponents of bigger governments are usually of the view that increase in government expenditure, especially on socio-economic and physical infrastructures, encourages economic growth. For example, government expenditure on health and education are presumed to raise the productivity of labour and increase the growth of national output. Similarly, expenditure on infrastructure such as roads, communications, power, etc. are theoretically expected to reduce production costs, increases private sector investment and profitability of firms, thus fostering economic growth. Thus, some scholars concluded that expansion of government expenditure contributes positively to economic growth.

On the other hand, advocates of smaller government argued that higher government spending could undermine economic growth (Mitchell, 2005). For instance, it is argued that in an attempt to finance rising expenditure, government may increase taxes and/or borrowing. Higher income tax discourages individual from working for long hours or even searching for jobs. This in turn reduces income and aggregate demand. In the same vein, higher profit tax tends to increase production costs and reduce investment expenditure as well as profitability of firms. Moreover, if government increases borrowing (especially from the banks) in order to finance its expenditure; this by extension could crowds out private sector and therefore private investment by transferring resources from the productive sector of the economy to government.

The actual effect of public spending on economic growth is both theoretically and empirically debated. The empirical literature investigated the possibility of a non-linear relationship, assuming that government size has a positive effect on growth but only to a certain extent. Similarly, to the Laffer curve, this literature emphasized the existence of an inverted U-shaped curve between government size and GDP growth, sometimes called the Armey Curve (Armey et al. 1995),

Literature Review

There are many studies which discussed the relationship between public spending and economics growth theoretically or empirically. Some of them are discussed as follows.

Theoretical Review

Public expenditure represents one of the key fiscal policy instruments for governments. Theoretically, public expenditure is believed to generate wide range of short-

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term and long run influences on economic growth. Economic theories have offered some explanations on how government expenditure may either spur or retard economic growth. Prominent among such theories is the traditional Keynesian macroeconomic theorizing. Standard Keynesian analysis suggests that government spending could play a stabilizing role in the economy. It is argued that by increasing its spending, governments can offset a slower pace of economic activities.

Proponents of this school of thought often anchored their argument on the presumed positive multiplier effect of government spending on aggregate demand. In this connection, government spending is viewed as a powerful stabilizing policy instrument that can be used to mitigate short-run fluctuations in output and employments (Zagler and Durnecker, 2003).

Empirical Review

Many empirical studies have been conducted to determine the relationship between government expenditure and economic growth in an economy. Landau (1983) explained the relationship between government expenditure in 96 developed countries using the Ordinary Least Square methods. His result showed that negative relationship exists between government expenditure and economic growth. Also, Folster and Henrekson (2001) studied the trend between government expenditure and economic growth using data from 23 OECD countries and 7 developing countries, with the government size indicator as the average growth rate of total government expenditure/total private consumption expenditure in their study. The results showed a negative relationship exist between them. Magazzino (2008) estimated the "BARS curve" for Italy in two different periods: in the first instance, using time-series which refer to the years between 1862 and 1998, the Government size maximizing the Italian economic growth is given by a ratio between public expenditure and GDP equal to 23.06%.

Chobanov and Mladenova (2009) examined the optimal size of Government (defined as the share of the total public expenditure on GDP) able to maximize economic growth for a set of 28 countries adhering to the OECD in the period 1970-2007. The empirical results showed that the ratio between public expenditure and optimal GDP equals to 25%. Moreover, all the countries in the sample were situated in the right descending part of the curve.

Hearth (2009) has concluded a non linear relationship between government expenditure and economic growth over the period 1959-2003 for Sri Lanka. The Armey curve was used for the analysis which had shown that the government expenditure and economic growth are positively related up to the threshold level but negatively related beyond that level. Barro (1991) has used panel data to highlight the impact of economic growth. The analysis was conducted using the average annual rate of growth of real GDP per capita and the ratio of real government consumption expenditure to real GDP as a measure of the government size. The findings have concluded that government consumption expenditure affect negatively and significantly economic growth.

Zareen and Qayyum (2014) analyzed the impact of government size on economic growth in Pakistan as government size is considered to be the core factor which causes economic growth. This study is carried out for Pakistan to examine relationship between government size and economic growth using a time series data over the period 1973-2012. We have followed the Vector Auto Regression (VAR) methodology and estimated the Vector Error Correction (ECM) Model. The findings concluded that the government size has negative and significant impact on economic growth in the long run.

Many others have found the said relation to be inconclusive for example, Yasin (2011), Ghali (1997), Lin (1994), Vedder & Gallaway (1998) and Hsieh & Lee (1994). After we have studied a vast literature, it is revealed that a lot of studies have been conducted by different people both in developed as well as developing countries to examine the impact of

government size on economic growth. We have found differences in the findings of the researchers across the world as some studies highlight that government size and economic growth are negatively related or equivalently large size of the governments reduces economic growth. In contrast, some other pinpoint that the said relationship is positive i-e a large size of the government is associated with high economic growth. As far as the panel studies are concerned, we have found no study which has relied on the examining the relation between government size and economic growth using panel of Pakistan, India, Bangladesh and Bhutan.

Data and Methodology

Data

The panel data is used for the analysis, selective South Asian countries Pakistan, Bangladesh, India and Bhutan are included in the panel. Data covered the time period from 1990 to 2016. All the series was procured from the world development indicator [WDI].

Model

Model used for the analysis is specified as under

$$\mathbf{GDP = \alpha 0 + \alpha 1\ INF + \alpha 2 GFCF + \alpha 3\ EMP + \alpha 4 Govt\ exp + \alpha 5 Govt\ exp^2 + \alpha 6 Trade} \quad \mathbf{(01)}$$

Where

GDP= Gross Domestic Product (Current US $)
INF= inflation as measured by CPI
GFCF= Gross Fixed Capital Formation (Current US $)
Empl= Total Number of Employed aged 15 and above
Govt exp=Total Govt Expenditures (Current US $)
$Govt\ exp^2$= Square of Govt Expenditure
Trade= Trade Openness measured as (Exports +Imports/GDP)

Methodology

In the present study, Pooled Mean Group (PMG) estimator is used; it involves both pooling and averaging. According to this estimator, the intercepts, short-run coefficients, and error variances differ across groups, whereas the long-run coefficients remain the same. That's why this estimator is preferred over the two extreme cases: Mean Group (MG) estimator (produce consistent estimates of average of parameters) and Dynamic Fixed Effect (DFE) estimator (allow intercepts to be different across group while all other coefficients and error variances are constrained to be the same) (Pesaran, Shin, and Smith 1997).

The ARDL model format of the equation (1) is as follow

$$\Delta \text{ GDP i, t} = \text{a} + \sum_{k=1}^{n} b_k \Delta\ \text{GDP}_{i,t-k} + \sum_{k=0}^{n} c_k\, \Delta\text{GFCF}_{\ i,t-k} + \sum_{k=0}^{n} d_k\, \Delta\text{CPI}_{i,t-k} + \sum_{k=0}^{n} d_k\, \Delta\text{Exp}_{\ i,t-k} + \sum_{k=0}^{n} d_k\, \Delta\text{Exp2}_{\ i,t-k} + \sum_{k=0}^{n} d_k\, \Delta\text{TO}_{\ i,t-k} + w\,\{\text{Ln GDP}_{i,\ t-1} - (\beta o + \beta 1\ \text{GFCF}_{i,\ t-1} + \beta 2\ \text{CPI}_{i,t-1} + \beta 3\ \text{Exp}_{i,t-1} + \beta 4\ \text{Exp2}_{i,t-1} + \beta 5\ \text{Ln TRADE}_{i,t-1})\} + \mu t \quad (2)$$

Here the term in bracket can be defined as the error occurred in earlier time period and the parameter "w" has two mode interpretations. Its sign displays convergence/divergence of the error term and its magnitude portrays speed of divergence/convergence. On the other hand the parameters of the variables exist in

differenced forms (having sign Δ delta) are short term estimates of the variables that describe short term impact on economic growth.

Now after replacing the in-bracket term by error term we get

$$\Delta \text{ GDP i, t} = \text{a} + \sum_{k=1}^{n} b_k \Delta \text{ GDP}_{i,t-k} + \sum_{k=0}^{n} c_k \Delta \text{GFCF}_{i,t-k} + \sum_{k=0}^{n} d_k \Delta \text{CPI}_{i,t-k} + \sum_{k=0}^{n} d_k \Delta \text{Exp}_{i,t-k} + \sum_{k=0}^{n} d_k \Delta \text{Exp2}_{i,t-k} + \sum_{k=0}^{n} d_k \Delta \text{Trade}_{i,t-k} + +\lambda \text{iECM}_{i,t-1} + \mu t \quad (3)$$

Where, ECM is named as Error correction term. Now by estimation of Eq. (2) using OLS,λ, will provide the key instance to identifying the coefficients of Eq. (3). We will estimate above ARDL model for panel of three developing countries.

Results and Discussion

Although there is no need to check the stationarity of the series for the ARDL Bound test, but this test is still conducted to check that none of the series is integrated of order 2 or higher, because inclusion of any variable, with I (2) complicates the F-statistics.

Table 1: Panel Unit Root Test ADF-Fisher Chi-square

Variable	*Test Statistics*	*Probability Test Statistics*	*Order of Integartion*
GFCF	30.1912	0.0002**	I(1)
CPI	16.1517	0.0403*	I(1)
EMPL	17.5425	0.0249*	I(1)
GDP	29.7214	0.0002**	I(1)
Govt EXP	31.0479	0.0001**	I(1)
$GOVT\ EXP^2$	31.3874	0.0001**	I(1)
Trade	65.7278	0.0000**	I(0)

*indicates significant at 5% level of significance
**indicates significant at 1% level of significance

The results of panel unit root indicate that CPI and CAP are level stationary while all other series are non stationary. So they become stationary at first difference.

Table 2: Pedroni Residual Cointegration Test

Group ADF statistics	
Statistics	**Prob**
-2.190704	0.0142

In ARDL approach, we apply bound test which confirms the presence of co-integration. The probability less than 0.05 indicate that the cointegration exists in the present model.

Table 3: Panel ARDL Estimates

Variable	Dependent Variable: GDP		
	Long run equation		
	Coefficient	T-statistic	Prob
Log(Govt Exp)	2.192278	2.423845	0.0159
$log(GOVT\ EXP)^2$	-19.31747	-2.012324	0.0315
Log (emp)	1.162914	2.439920	0.0174
Log(CPI)	0.499312	1.778357	0.0800
Log(GFCF)	0.598889	3.558091	0.0007
Log(TO)	-917864.8	-0.454724	0.6508
Short Run Equation			
Ecm	-0.24950	-0.261749	0.0794
D(LGE)	7.150019	9.566297	0.0000
D(LGE2)	-79.33763	-5.806059	0.0000
D(LEMP)	0.068654	1.140087	0.2584
D(LCPI)	0.128398	3.536416	0.0007
D(LGFCF)	0.148199	2.077940	0.0416
D(TO)	-47092385	-1.420788	0.1601
C	1.881582	0.260793	0.7951

Since there is evidence of cointegration in the model under study so it is possible to estimate the long-run impact of explanatory variables on economic growth. Long run estimates show that there is nonlinear relationship between govt expenditures and economic growth. Govt expenditures are positively and significantly related with economic growth. While the square form of Govt expenditures has negative and statistically significant impact on economic growth. These results confirm the existence of ARMEY curve relationship in the study panel. Results also indicate that the employment level, gross fixed capital formation and inflation have positive and statistically significant impact on economic growth, while trade openness has negative but insignificant effect on growth. The results of the present study are consistent with the finding of Zareen and Qayyum (2014) in which they analyzed the impact of government size on economic growth for Pakistan economy. The findings concluded that the government size has negative and significant impact on economic growth in the long run.

The ECM coefficient explained the adjustment speed from short run to long run span of time. Its coefficient should be less than one with negative sign and statistically significant (Bannarjeeet al. 1998). It provided the support to confirm earlier found co-integration between the variables. The existence of an error-correction term between the co-integrating variables implies that changes in dependent variable are a function of both the levels of disequilibrium in the co-integration relationship (ECM) and deviations in independent variable. This provides the evidence that if there is any type of deviation in the equilibrium from long run how much force is needed to bring it back towards equilibrium in long run (Masih and Mashi, 2002).

Conclusion

The present study was an attempt to check the impact of size of the govt on economic growth. Total govt expenditures were taken as the proxy of the size of the govt. the panel data for Pakistan, India, Bagladesh and Bhutan covering the period from 1990 to 2016 were used for analysis. The results indicated that govt expenditures are positive related with economic growth but the square form of Govt expenditures is negatively and statistically significantly related with economics growth for the panel of selected South Asian developing countries.

In this section we seek to provide an overview of the policy implications and recommendations on the basis of our empirical findings. On the basis of these finding, the study advances the policy implication that the increasing size of Govt expenditures discourage the economic growth in the long run. So Govt should promote private investment through monitoring and regulations for private sector investment rather than to act as investor by itself.

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