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The Impact of Government Size on Economic Growth: A Case Study in Italy

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Abstract: The present study according to importance discuss the impact of government spending on economic growth, has attempted to using Smooth Transition Regression (STR) and annual data for the period of 1960-2009 to investigate nonlinear government size effects (Government consumption spending as a percentage of GDP) on economic growth of Italy. Results the confirmation nonlinear effects of government size on economic growth showed that in both regimes, government size has had a significant negative effect on economic growth in the case study. Note it is essential that a threshold value of government size is determined to 20.608 percent. In addition, the results showed that investment and population growth have a significant positive effect on economic growth.

Key words: Smooth Transition Regression (STR), Government Size, Economic Growth.

INTRODUCTION

Nowadays, governments have a crucial role in the path growth and economic development countries so that, "Development-Oriented Government" was presented as one of the basic concepts in economic development literature. In this regard, extensive studies were done about how much impact (cost) in government size on economic growth. For example, landau (1986) in review impact government consumption expenditures on economic growth, he concluded that government consumption expenditures have significant and negative effect on economic growth. Ram (1986) with providing a theoretical framework shows that the total effect of government spending on economic growth has been positive in all cases (Except a few countries). Barro (1989, 1990, 1991) in him studies concluded that large state lead to reduce output growth. Diamond (1990) using data from 42 developing countries concludes that total expenditure and capital positively related to current expenditures and negative relationship with economic growth. Bairam (1990) use time series data 1960-1975 for 20 African countries tested government size on economic growth.

In eleven countries, increase government spending has negative effect and in nine countries increase in government spending has positive effect on economic growth. Guseh (1997) concluded that government size in developing countries had the opposite effect on economic growth so that this effect in countries where are with undemocratic socialist system, three times than countries that are with open system and democratic. Knoop (1999) use analysis - The time series showed that reduce the size of government in America has a negative effect on economic growth. Albatel (2000), Alexiou (2007) and Hakro (2009) in separate studies concluded the positive effect of government spending on economic growth. While abu-bader & abu-gharn (2003) and roy (2009) respectively, showed that government spending has had a negative effect on economic growth countries Egypt, Syria and America. Chen & lee (2005) by using time series data 2003-1979 Taiwan showed between government size and economic growth there is nonlinear relationship. Meanwhile the study has been approved hypothesis exist curve armey in Taiwan. In a similar study, Jafari Samimi *et al* (2010) confirmed these results using time-series data 1980-2007 in several Islamic countries and TAR technique.

Gupta (2005) and ghosh and Gregoriou (2008) examined the impact of capital expenditure and current state on economic growth that in each study, have reported similar results. The results of these studies showed that in developing countries in the study, the positive effect of government capital expenditure and current government spending negative effect has on economic growth these countries. Based on studies done it can be inferred that each of these studies according to default research, time period studied, have reported different results model variables, Countries studied etc . Based on the impact of government spending on economic growth different theories have been proposed by economists. One of the most famous views has been by armey. Armey implies that size (cost) of government as nonlinear and as an inverted U effect - does on economic growth.

In the discussion optimality considered by armey, when the government size is small in an economy, development in government size leads to increased production and economic growth. In contrast, when the size of government is big so, increasing in government size leads to economic growth and productivity. In an economy without government lawlessness, lack of infrastructure and lack of property rights protection leads to low productivity resulting in lower levels of well-being. Also, in an economic that all the production decisions will take by government, production levels is bottom. However, the economic decisions about resource allocation the mixed will take government and private sector more production (Vedder and Gallway, 1998, P. 1-

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2). The same argument has been proposed a different way by lizardo and Mollick. lizardo and Mollick total government spending divide two section as productive and non -productive. Productive sector government spending been like effective Investment in human capital, infrastructure, and legislation and ...non-productive government spending is like excessive bureaucracy, financial corruption, planning and ineffective etc. Accordingly, the government spending when there the optimum conditions that, non-productive government spending is equal to zero (Lizardo and Mollick, 2009, P.252 and 253). Also the present paper by focusing on discussion of nonlinear effects of government spending on economic growth, STR model based on growth theory checks impact on consumer spending, the Italian government on economic growth.

Three basic characteristics STR models than conventional models, makes to research hypothesis are examined more accurately. These three features are folloing:

1) How effective government size on economic growth depends on system status and the relationship between them can be no fixed and it depend on the regime and condition that it is located economy.

2) In the STR model, changing in regimes or structural breaks as endogenous is characterized by the model. So, it is not required to import dummy variable or separate study in structural failure.

3) On the one hand, STR model is ability to specify the frequency and time of regime change and on the other hand, it shows move quickly from one regime to another regime.

MATERIALS AND METHODS

Based on economic theory many time-series variables have nonlinear behavior, in other words, the variables depending on the state in which they have been self show different behaviors. So to study these variables shall use nonlinear methods. On the other hand suppose drastic changes around the threshold point set many economists doubt and claim that often assuming smooth transition between regimes is better and more realistic than assuming a sharp transition between regimes. Based on lately have developed smooth transition regression models (STR). These models using a continuous transfer logistic or exponential function provide allow smooth transition between regimes. Based on a standard STR model logistic transition function introduced by Terasvirta (2004) is as follows:

$$y_t = \phi' z_t + (\theta' z_t).G(\gamma, c, s_t) + u_t \tag{1}$$

$$G(\gamma, c, s_t) = \left(1 + \exp\left\{-\gamma \prod_{k=1}^{K} (s_t - c_k)\right\}\right)^{-1} \qquad \gamma \succ 0$$

Where $\phi' = (\phi_0, \phi_1, ..., \phi_p)'$ vector of linear parameters and $\theta' = (\theta_0, \theta_1, ..., \theta_p)'$ is vector of non-linear model parameters. Z_t is vector of exogenous variables in the model includes lags of the endogenous variable and exogenous variables namely $z_t = (1, z_{t1}, z_{t,2}, ..., z_{tp})' = (1, y_{t-1}, ..., y_{t-p,} x_{t1}, ..., x_{kt})'$ u_t is disruption of the equation which is assumed to be provides condition of the $u_t \approx iid(0, \sigma^2)$. Meanwhile, G function that is a logistic function, continuous and bounded between zero and one that shows smooth transition between regimes.

In this function S marker variable transmission parameter transfer rate and c is represents the threshold or place a regime change. The STR model discussed by Van Dijk & *et al* (2000) and Lin and Ter¨asvirta (1994) variable transmission S can interruption of endogenous and exogenous variables, the time of its exogenous variables or is function endogenous and exogenous variables. Parameter K shows visit the regime change. in order to features of Model LSTR, procedure and Van Dijk (1999), suppose the dependent variable y only is a function own significant amounts of lag. In this case, we have assuming a two-state transfer function:

$$y_t = (\theta_0 + \theta_1 y_{t-1} + ... + \theta_p y_{t-p}) + (\phi_0 + \phi_1 y_{t-1} + ... + \phi_p y_{t-p}) G(\gamma, c, s_t) + u_t \tag{2}$$

$$G(\gamma, c, s_t) = \frac{1}{1 + \exp\{-\gamma(s_t - c)\}}$$

This model is called a LSTR model two dietary the parameter c, show some point between the two regimes $G(\gamma, c, s_t) = 0$ and the $G(\gamma, c, s_t) = 1$ that is $G(\gamma, c, s_t) = 0.5$. y has been represents the transfer rate regimes higher values y is represents the change faster. Graph (1) examples show logistic transition function of two dietary with two different values. As is clear from the chart with $\gamma = 1$ the transition between the two

regimes slowly and it increases to 10 transfer rate is faster from one regime to another regime. When $\gamma \to \infty$ and $s_t > c$, then G = 1 and when $s_t < c$ be G = 0, Thus equation (2) becomes a model threshold (TR) .when $\gamma \to 0$ equation (2) becomes a linear regression model.

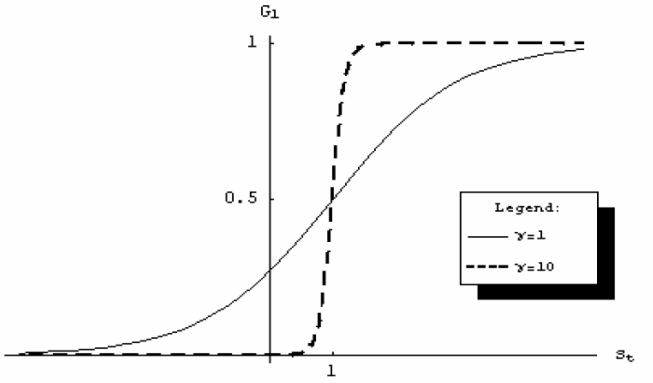

Fig. 1: Transfer function Lajestik two regimes with different values γ and a threshold value c=1.

It should be noted that functions of degree 2 used in other studies are only special case of the LSTR and part of it. To prove this considers logistic nonlinear function of the following:

$$G(\gamma, c, y_t) = (1 + exp(-\gamma(y_t - c)))^{-1} \tag{3}$$

Expansion Taylor function first (4) around point is as follows:

$$G(\gamma, c, y_t) = G(0) + G_1'(0, c, y_t)y_t + R_1(0, c, y_t) \qquad \gamma = 0 \tag{4}$$

And on the other hand we have:

$$G(\gamma, c, y_t) = \beta_1 + \beta_2 y_t + R_1 \tag{5}$$

By placing (6) in relation LSTR following:

$$p_t = \phi_0 + \phi y_t + \theta y_t G(\gamma, c, y_t) + u_t \tag{6}$$

Equation (6) becomes as follows:

$$p_t = \phi_0 + (\phi + \theta\beta_1)y_t + (\theta\beta_2)y_t^2 + \theta y_t R_1 + u_t \tag{7}$$

By simplifying the equation (7) we have:

$$p_t = \phi_0 + \phi y_t + \theta y_t(\beta_1 + \beta_2 y_t + R_1) + u_t \tag{8}$$

Or can write:

$$p_t = \delta_0 + \delta_1 y_t + \delta_2 y_t^2 + u_t^* \tag{9}$$

We can see that the function (10) is function of degree 2.

To estimate LSTR models beginning should be tested nonlinear relationship between the variables and if confirmed the existence of a nonlinear relationship, be determined threshold values of the for fitting variables also variable transmission. Next according to nature of the model, it is nonlinear, it is estimated with proper initial values algorithm and Newton- Raphson and maximum likelihood model. Finally after estimating the model parameters are estimated, graphical analysis with different tests as constant parameters between different regimes, no linear relationship between residual wastes etc use for check accuracy of estimates.

RESULTS AND DISCUSSION

In order to check impact of government size on economic growth is assumed in this study, the growth of GDP (GY) function of the growth of fixed investment (GK), population growth (GL) and government consumption spending is as a percentage of GDP (GS). Meanwhile required data extracted from WDI 2010. To estimate the STR model first be determined optimal interval variables used in the model. Using a measure of Akaike, Schwarz and Hannan-Quinn criterion, in this study Schwarz criterion, the optimal lag is determined for variables under investigation one.

The next step is to estimate the STR model study is testing the nonlinear relationship between the variables that if confirmed nonlinear relationship, should be determined variable transmission, an appropriate and nonlinear models regime based on the test statistic F. the estimation results are presented in the in the study (Table 1). F test of the null hypothesis based on a linear model be rejected significant disruption to the current value and the size of government.

Based on although terms can be both current and interval size varies with the size of the as variable transmission but priority is variable F test of the null hypothesis that is rejected the stronger. Based on the gap between government size (GS_{t-1}) is selected as variable transmission. The proposed model fit for variable transmission (GS_{t-1}) is smooth transition regression models logistic transfer function between the two diets (LSTR1).

Table 1: The results of the linearity tests against the STR model.

Transition Variable	F	Suggested Model
GS_t	0.02	LSTR1
* GS_{t-1}	0.00	LSTR1
The figures show the p-values of F-test. The suggested transition variable is shown by an asterisk.		

Next section, it is estimated model parameters the results it has been reported in the form Table 2:

Table 2: The estimation results of the STR model.

Variables	Linear Part	Nonlinear Part
Constant	0.262 (1.84)	-
GY_{t-1}	-	-0.270 (-1.86)
GS_t	-0.023 (-3.79)	0.018 (1.89)
GS_{t-1}	0.009 (1.10)	-0.014 (-1.58)
GK_t	0.251 (7.85)	0.271 (2.84)
GK_{t-1}	-	-0.276 (-2.42)
GL_t	1.401 (1.93)	-
GL_{t-1}	-	3.951 (3.64)
Gamma	2.578	
C1	20.608	
Adjusted R^2	0.938	
The t-statistics are shown in the parentheses.		

As regards the final amount smoothing parameter (γ) 2.578 and threshold the size of government, (c) estimated equal to 20.608, as follows transfer function:

$$G\left(2.578,20.608,GS_{t-1}\right)=\left(1+exp\left\{-2.578\prod_{k=1}^{1}\left(GS_{t-1}-20.608\right)\right\}\right)^{-1} \quad (10)$$

Also based on the results reported Table (2) and given the fact that in the first regime G = 0 is in the second regime, G = 1, we have for the first:

$$GY_t = 0.262 + 1.401GL_t + 0.251GK_t - 0.023GS_t + 0.009GS_{t-1}$$

For the second regime will:

$$GY_t = 0.262 - 0.270GY_{t-1} + 1.401GL_t + 3.951GL_{t-1} + 0.522GK_t - 0.276GK_{t-1} - 0.005GS_t - 0.005GS_{t-1}$$

Sum of coefficients size of Government in the first is with -0.014 in the second equal to -0.010. It shows size of Government in both regimes has had a negative effect Italy's economic growth, during the study period. So according to results although the size of government the asymmetric and the effect of different coefficients affected Italy's economic growth but there is no evidence that positive impact on consumer spending government of Italy in both regimes.

According to equation the first and second sum of coefficients population growth in the first is equal to 1.401 in the second equal to 5.352. The result consistent with theories of economic growth shows manpower has a positive impact on economic growth. Meanwhile total coefficients variable investment growth in the first and second order is equal to 0.251 and 0.246. This is represent two points. First investment in both regimes has significant positive effect on economic growth. Second, in the second the larger size of government has caused reduction positive impact investment on economic growth.

The third stage and words stage after estimated model, is evaluate the model. Before check errors the estimated Logistic function for regime change we have drawn Figure (2) that shows how smooth transition between the first and second models to estimate LSTR.

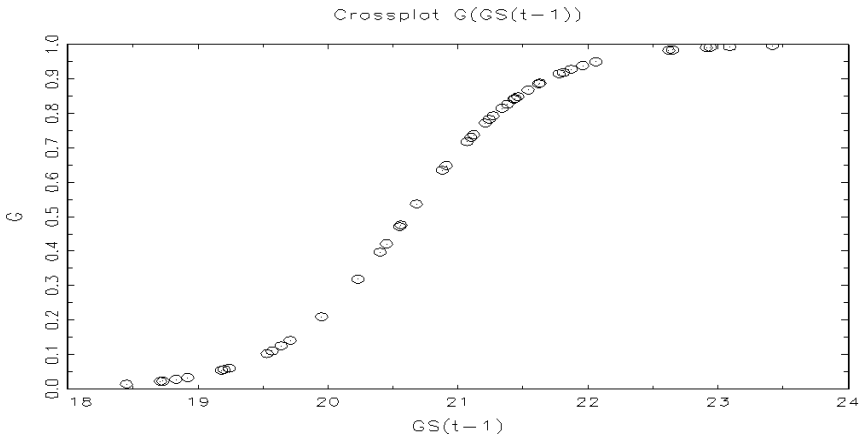

Fig. 2: Logistic function chart related to regime change, Resource: finding research.

Stage evaluation in addition graphical analysis taken above; also be checked errors estimation stage. Not staying test for nonlinear relationships model leftovers is one of these tests. According to the value of the test statistic F satisfied (0.80), the null hypothesis that no additional nonlinear relationship not rejected in good faith. The general model able not specified nonlinear relationship between the variables. Test reviewed other is related to constant parameters in different regimes. The value of the test statistic F for the transfer function, H_1, H_2 and H_3 respectively, 0.06, 0.07 and 0.02 estimated that based on the null hypothesis for this test be rejected that same coefficients the linear and nonlinear at the 90% probability level.

Other tests that examine possible errors in step estimated the STR model it can be noted to the ARCH-LM test and Jarque-Bera test to arrange for review there anisotropy error variances and non-normal residuals applied. The test ARCH-LM, the value of statistic the F and χ^2 it is estimated order 0.52 and 0.63 Based on value of both of these statistics the null hypothesis the test in good faith not rejected that the lack of difference its conditional variance, regression (ARCH). Meanwhile value of statistic χ^2, Jarque-Bera test, it is estimated 0.52 which the null hypothesis based on normality of residuals not rejected in the level confident appropriate. Briefly according assessment model tests non-linear model estimates be assessed in terms of qualitative acceptable.

Conclusion:

In this study, has been investigated non-linear effect of government size (Government consumption spending as a percentage of GDP) on economic growth. For this purpose has used annual time series data during 1961-2008 in Italy. The results estimated Smooth Transition Regression (STR) model in addition to confirming the non-linear relationship between government size and economic growth showed that during the period study government size in form of a two-regime structure affected on economic growth that threshold size of government it is estimated 20.608. It is important results so that government size in both regimes has had a

negative effect on economic growth. So reduction government spending in Italy with purpose create positive momentum in economic growth, can be used planners country as a policy tool. Also results are consistent with economic growth theories showed that human capital and investment are two factors crucial in economic growth. So, policies that will take with purpose promotion level of investment, it can cause to increasing economic growth.

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