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ORIGINAL ARTICLES

The Optimum Government Size in Iran Agricultural Sector

[1]Majid Nassiri, [2]Yousof Mohajerani Rad and [2]Nasim Babaee

[1]Department of Management and Accounting, Ali Abad Katool Branch, Islamic Azad University, Ali Abad Katool, Iran.
[2]Department of Economics, Allame Tabatabai University, Tehran Iran

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ABSTRACT

We apply the two-sector production function developed by Ram (1986) to estimate the threshold regression model for Iran, concerning the effect of government size in agricultural sector on economic growth. The results show a non-linear relationship of the Armey curve in agricultural sector in Iran, in which the threshold effect corresponding to government expenditure in agricultural sector divided by GDP of about 0.02. We find that over-expanding government expenditure does not promote economic growth, but may cause damage to economy, because of crowding effects or due to tax increase. Thus, a government should investigate whether government size is over-expanding or not when designing its public finance policy. If the government size is over-expanding, then a country should shrink its government size to increase the efficiency of government expenditures and promote economic growth.

Key words: Government size, Agricultural Sector, Economic growth, Threshold regression model.

Introduction

In theory, Iranian agricultural policy is intended to support farmers and encourage the production of strategically important crops. The policy is twofold: first, to purchase certain crops at guaranteed prices and second, to encourage the production of specific crops through farm subsidies. The policy of purchasing agricultural crops from farmers at guaranteed prices was put in place in the 1989 crop year. On average, the guaranteed prices increased at the rate of inflation over the past 15 years. Individual subsidy levels for major crops, however, vary annually. In the 1990s and early 2000s, government agricultural planning was only marginally successful. According to government figures, during the 1990s-coincident with the first two Islamic Republic economic plans - only 40.5 percent of the agricultural modernization projected by those plans was accomplished, and only 40.2 percent of government and private-sector financial commitments materialized. Because wheat is considered Iran's most strategically important crop, it received the largest subsidies, and its production grew at the fastest rate between 1990 and 2005. From FY 2003 to FY 2004, wheat subsidies increased by 17.2 percent, reaching a record of US$1.5 billion. Between 1981 and 2004, the area cultivated with wheat remained stable at 5 million hectares, but wheat production increased from 5.7 million to more than 11 million tons. Beginning in 1990, the government expanded its agricultural support programs to include a guaranteed purchase price for major agricultural crops, subsidies, favorable interest rates, government investment, and favorable foreign-trade policies. Primarily because of government support

Corresponding Author: Majid Nasiri, Department of Management and Accounting, Ali Abad Katool Branch, Islamic Azad University, Ali Abad Katool, Iran.
E-mail: <mailto:mnasiri64@yahoo.com>

for domestic agriculture, between 1989 and 2003 the import volumes of wheat, sugar, and red meat declined by 77.7 percent, 39.6 percent, and 88.2 percent, respectively. Concurrently, the value of agricultural exports increased from US$461.5 million in 1989 to US$1.7 billion in 2004. However, over the same period total food and live animal imports increased from US$1.37 billion to US$2.65 billion.

Government role in economics has increased in Iran since the discovery of oil and influx of the revenue. This paper modifies Ram (1986) two-sector production model in order to estimate the threshold government size in agricultural sector. The threshold government size is a point at which any rise in government spending lower than this threshold value will have positive effects, while more than that will have negative effects on economic growth. Figure 1 represents the Armey curve and t* is the threshold value.

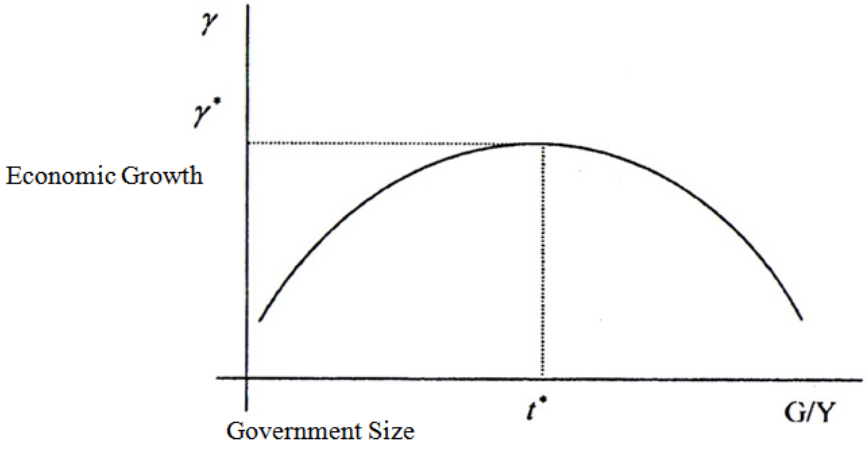

Fig. 1: Armey Curve.

The negative effects could be due to the crowding-out effect of government monopolistic activities and the positive effects may be due to providing substructures.

This paper is followed by section 2 that is devoted to a brief literature survey about government size and economic growth. Section 3 presents model specification and data description. Section 4 considers the empirical results and finally the conclusion will be provided in section 5.

A Brief Literature Survey about the Effect of Government Size on Economic Growth:

Engen and Skinner (1991), Fölster and Henrekson (2001), and Dar and Amirkhalkhali (2002) found a negative relationship between government size and economic growth. They believe that expanding government size has the effect of diminishing returns on government expenditure, and over-expanding government size will cause a crowded effect to private investment. In addition, government expenditure often turns into inefficient expenditure which will cause a distorted allocation of the resource. When expanding government expenditure, a government needs more taxes to support the expenditure, but expanding taxes will damage the economy.

There is another opinion which approves that expanding government size will promote economic growth. For instance, Ram (1986) and Kormendi and Meguire (1986) found a positive relationship between government size and economic growth. They write that expanding government size provides an insurance function to private property, and public expenditure can encourage private investment which will cause economic growth. Government expenditure provides the investment of public goods that will improve the investment environment.

Vedder and Gallaway (1998), Sheehey (1993) and Chen and Lee (2005) point out that the reason of inconsistency is that government size and economic growth exist under a non-linear relationship.

Armey (1995) implements the Laffer curve to present the relationship between government size and economic growth, from which Vedder and Gallaway (1998) empirically find that government size and economic growth is asymmetric. They indicate that this asymmetric relationship is an "Armey curve", which considers that a small government size has the function to protect private property and provide public goods. However, over-expanding on the government size will cause excessive investment which will create a crowded effect to private investment, as well as lead to an overweight on taxes and liability interest which will damage the economy, but a small government size will have the effect of promoting economic growth. Vedder and Gallaway (1998) infer that government size and economic growth have an inverse U shape as Figure 1 shows. Vedder and Gallaway (1998) use a single square regression function to estimate that the optimum government size of the U.S. was 17.45% during 1947-1997.

Methods and Data:

We have used the Ram (1986) model as following:

$$\beta_0 + \beta_1(\frac{I_t}{Y_t}) + \beta_2 g_{L_t} + \beta_3 g_{G_t}(\frac{G_t}{Y_t}) + e_t \quad (1)$$

Regression (1) shows that the variables which affect economic growth ($\dot{Y}$) include the investment rate

(1/Y), growth of labor force (gL), and the multiplication effects of government expenditure growth (g_{Gt}) times government size (G/Y).

We modify this model for entrance the agricultural sectors in this model. We have used the government size in agricultural sector (G_{at} / Y_t) instead of total government size and the government expenditure growth in agricultural sector (g_{GAt}) instead of total government expenditure growth. Government size in agricultural
sector is government spending in agricultural sector divided by GDP.

In addition, we identify the multiplication effects through the sign of β_3. This indicates that the government sector has a reciprocal effect on economic growth through two ways: one is the direct contribution of the government sector and the other is the indirect effect through the non-government sector (externality effect).

Regression (1) is a traditional linear economic growth model, but we alter the linear model into the two regime TAR model of Hansen (1996, 2000). The model can be shown as follows:

$$\begin{cases} \dot{Y}_t = \delta_{10} + \delta_{11}(\frac{I_t}{Y_t}) + \delta_{12} g_{L_t} + \delta_{13} g_{G_{At}}(\frac{G_{At}}{Y_t}) + e_t & if \quad q_t \le \gamma \\ \dot{Y}_t = \delta_{20} + \delta_{21}(\frac{I_t}{Y_t}) + \delta_{22} g_{L_t} + \delta_{23} g_{G_{At}}(\frac{G_{At}}{Y_t}) + e_t & if \quad q_t > \gamma \end{cases} \quad (2)$$

Or as one nonlinear regression such as:

$$\begin{aligned} \dot{Y}_t = & \left(\delta_{10} + \delta_{11}(\frac{I_t}{Y_t}) + \delta_{12} g_{L_t} + \delta_{13} g_{G_{At}}(\frac{G_{At}}{Y_t})\right) I\left[q_t \le \gamma\right] \\ & + \left(\delta_{20} + \delta_{21}(\frac{I_t}{Y_t}) + \delta_{22} g_{L_t} + \delta_{23} g_{G_{At}}(\frac{G_{At}}{Y_t})\right) I\left[q_t > \gamma\right] + e_t \end{aligned} \quad (3)$$

The threshold value γ can be found by estimating the regression (3) through finding the minimum Error Sum of Squared in a re-order threshold variable. The threshold variable can be set by the exogenous variables out of the theoretical model. For example, in this paper we set government size in agricultural sector as the threshold variable. We can also apply the statistic coming from the threshold variable. For instance, we adopt the heteroskedasticity-consistent Lagrange multiplier (LM) of Hansen (1996) to test the null hypothesis of the linear assumption.

Once the estimator can be found, we then start with the statistical test, but the test procedure of Eq. (3) is different from the traditional test. Under the null hypothesis of no threshold effect, the threshold parameters will be unidentified. This will cause the traditional test statistic in a large sample distribution to not belong to the χ^2 distribution, but rather to a non-standard and non-similar distribution which is affected by nuisance parameters. This will cause the critical value of the distribution to not be estimated through simulation. In order to overcome the difficulty, Hansen (1996) uses a statistic of his own large sample distribution function to transfer and calculate the asymptotic p-value of a large sample. Under the null hypothesis, the distribution of the p-value statistic is uniform, and this kind of transformation can be calculated through bootstrap. The null hypothesis to test Eq. (3) is as follows:

$$H_0 : \delta_{1i} = \delta_{2i}; \quad i = 1,2,3. \tag{4}$$

If H_0 is not rejected then the relationships between economic growth and the government size would be the linear regression as the regression (1). This means there exists no threshold effect. Otherwise, if H_0 hypothesis is rejected, it means that there exist different effects between the two regimes of δ_{1i} and δ_{2i}. The F-test statistics is as follows:

$$F = \frac{RSS_0 - RSS_1(\hat{\gamma})}{\hat{\sigma}^2} \tag{5}$$

In which RSS_0 and RSS_1 are the residual sum of squares under the null hypothesis and the alternative, respectively.

Data:

The resent socio-economic history of Iran has been subject to the past and political-strategic volatility of the region. Iran has not experienced a relatively free market economy due to the share of oil revenue at large. We have intended to use the annual data from 1959 to 2007 available on the Website database of the Central Bank of Iran (CBI).

Empirical Results:

This paper uses Hansen (1996, 2000) threshold regression model to study whether a non-linear Armey curve in agricultural sector exists in Iran. As Table 1 shows, we adopt Hansen (1996, 2000) advice to use the bootstrapping model. While the threshold variable is "government expenditure in agricultural sector divided by GDP", we find that F-statistic is (7.99), which is significant at 1% level. The threshold value is 0.0224, and this means that the threshold exists.

Table 1- Threshold Tests.

Threshold Variables	Value
F_1 value of one threshold test	9.99
Threshold regime(%)	0.0224

After making sure that the government size in agricultural sector has the threshold effect and achieve the threshold regimes, we analyze the non-linear government expenditure effects and discuss how the government expenditure affects the economic growth in different threshold regimes.

Table 2: Economic Growth and Government size in agricultural sector.

Variables	coefficient	p-value
Threshold value (%)	0.0224	0.00
Interception	-0.335	0.08
I/ Y	0.602	0.05
g_L	2.329	0.20
(g_G)(GS) for GS $\leq$0.0224	9.706	0.01
(g_G)(GS) for GS >0.0224	-9.610	0.00
R^2	0.50	

As table 2 shows, while "government expenditure in agricultural sector divided by GDP" is the threshold variable, government expenditure in small government size regime (the threshold value is less than 0.0224) in two-regime model, government expenditure and economic growth have a significantly positive relationship, but when the government size is large (the threshold value is larger than 0.0224), government expenditure and economic growth have a significantly negative relationship. Thus, we can make sure that the non-linear situation of the Armey curve exists in Iran when "total government expenditure in agricultural sector divided by GDP" is the threshold variable. Moreover, the investment ratio also has a significantly positive impact on economic growth concerning both of the two regimes.

Conclusion:

This paper adopts the non-linear theory of Armey (1995) and Vedder and Gallaway (1998) to test whether a non-linear Armey curve exists in agricultural sector in Iran or not. We modify Ram (1986) two-sector production model into a threshold regression model and apply Hansen (1996, 2000) method to test the threshold effect. The empirical results indicate that threshold effect exist between government size in agricultural sector and economic growth in Iran when we set "government expenditure in agricultural sector divided by GDP" as the threshold variable. The threshold regime is 0.0224. This indicates that there is a non-linear relationship of the Armey curve. When the government size in agricultural sector is smaller than the regime, economic growth is promoted under expanding government expenditure, but if the government size is larger than the regime, then the economic growth decreases.

We find that over-expanding government expenditure does not promote economic growth, but may cause damage to economy, because of crowding effects or due to tax increase. Thus, a government should investigate whether government size is over-expanding or not when designing its public finance policy. If the government size is over-expanding, then a country should shrink its government size to increase the efficiency of government expenditures and promote economic growth.

References

Armey, R., 1995. *the Freedom Revolution*, Washington DC: Rognery Publishing Co.

Dar, A. and S. Amirkhalkhali, 2002. "Government size, factor accumulation, and economic growth: evidence from OECD countries", Journal of policy modeling, 24: 679-692.

Engen, E. and J. Skinner, 1991. Fiscal policy and economic growth.In paper presented at NBER conference on taxation.

Folster, S. and M. Henrekson, 2001. Growth effects of Government Expenditure and Taxation in rich countries. European Economic Review, 45(8): 1501-1520.

Gwartney, J., R. Lawson and R . Holcombe, 1998. The size and functions of government and economic growth. Joint Economic Committee.

Hsieh, E. and K. Lai, 1994. Government spending and Economic growth; The G-7 experience.Applied Economics, 26: 535-542.

Kormendi, R.C. and p. Meguire, 1986. Government Dept, Government spending, and private sector behavior; Reply .American Economic Review, 76(1): 191-203.

Landau, D., 1983. "Government expenditure and economic growth; A cross-country study", Southern Economic Journal, 49(3): 783-792.

Lin, S., 1994. "Government spending and economic growth", Applied Economics, 26(1): 83-94.

Ram, R., 1996. "Government size and economic growth; A new framework and some evidence from cross section and time-series data", American Economic Review, 76(1): 191-203.

Sheehey, E., 1993. "The effect of government size on economic growth", Eastern Economic Journal, 19(3): 321-328.

Sheng Tung, Chen and Chien Chiang Lee, 2005. "Government size and economic growth in Taiwan: A threshold regression approach", Journal of Policy Modeling, 27(2005): 1051-1066.

Vedder, R.K. and L.E. Gallaway, 1998. Government size and Economic growth, paper prepared for the Joint Economic Committee of the US Congress, pp: 1-15.