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The Effects of Government Expenditures on the Growth of Iranian Economic Sectors

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The purpose of this paper is to examine and evaluate the effects of government intervention on the Iranian economy over the last few decades. It is shown that public expenditures affect the value added of each economic sector not only simultaneously, but lagged over several periods. Regression results show that the value added from the agricultural sector has never been affected by government expenditures during the period of study. Estimation of both the linear and logarithmic models concerning the industrial sector leads to the same results. These results do not imply that we should reduce the level of government expenditures, instead we should strive to find reasons behind the inefficient performance of the public sector.

1. Introduction

Following world economic liberalization during the 1980s, a large number of Third World countries have reduced the number of their budgetary intervention policies. There exist two opposing views among economists regarding this change in policy (Diamond,1990). First, some believe that government disbursements, regardless of whether they are for consumption or investment purposes, reduce economic growth.

Centralized macroeconomic policy-making, lack of profit incentives, and an atmosphere in which competitive conditions are non-existent, all help reduce the efficiency of government production operations.

A second opposing view favors and supports government economic interference, arguing that it could solve the problems resulting from the economic actions of the private sector, the most destructive of which are notably the creation of monopolistic firms and inequalities in income distribution.

The Iranian economy has only recently experienced this economic liberalization. The main goal of such a policy is to reduce economic regulations imposed by the government with the hope of motivating the private sector in pursuing more profitable economic activities. It is clear that in order to achieve this reconstruction successfully, the inefficiencies of the current structure should be exposed and appropriate policies should be designed and implemented in order to stabilize this new economic system.

To evaluate the competency of a centralized economic system, the framework and limits of state activities should be determined and the fullfilment of its promises should be examined. The purpose of this research is to examine and evaluate the various effects of government economic intervention on output over the last few decades. Growth of output can be broken into four sources: growth in physical capital, growth in human capital, technical improvements, and changes in the efficiency of resource use (Diamond,1990).

It is not difficult to identify government's potential to affect each of the four sources of growth in output. The most important factor emphasized in the literature is the effect of government investment spending on the country's physical capital. It must be stressed, however, that this will occur only if the net effect on total capital formation is positive.

One of the most important characteristics of the Iranian economy

during the last three decades has been a recession in the agricultural sector and rapid growth in the service sector, namely in commerce, restaurant, and hotelling. On the one hand, the industrial sector which is highly dependent on foreign incomes, has been the most vulnerable sector of the economy. Any reduction in foreign incomes, and consequently that of government expenditures, would lower the industrial value added by a substantial amount. (Plan & Budget Organization of Iran (PBO),1990) On the other hand, the agricultural sector which is independent of government expenditures and with little fluctuations in its value added, makes it clear why state charges should be considered as the key variable.

The model in this paper uses data obtained from government planning and development expenditures. Two different data sources exist, the National Accounts and the Government General Budget Statistics. It is discovered that expenditure data collected from the General Budget is not reliable for a quantitative study. For example, data on current development expenditures from the General Budget is not capable of distinguishing between the consumption and investment nature of expenditures. To be more specific, some current expenses are capital-oriented in nature, and current expenditure items are included in development expenses. (PBO, various issues) Therefore, the data related to consumption and investment expenditures of government, prepared in the National Accounts Statistics are used in this research as proxy variables for current and development expenditures of government.

2. Theoretical Framework

A wide range of growth models that are used to study Third World economies are based on the familiar neo-classical growth model of

Solow (1956). This model begins with a collective production function:

$$Y = A \cdot f(K,L,Z) \quad (1)$$

where Y is the potential production level, K is the physical capital reserves, L is the labor force, and Z represents other factors affecting growth. A is an external factor indicating the efficiency of input use. This model assumes that the partial derivatives of all inputs including A are positive. Taking total derivatives of equation 1 shows the following relation:

$$dY/Y = [A\ (\partial Y/\partial K)] + [A\ (\partial Y/\partial L)(L/Y)]\ (dL/L) + [A\ (\partial Y/\partial Z)(Z/Y)]\ (dZ/Z) + dA/A \quad (2)$$

Equation 2 may be expressed as follows:

$$\partial Y / Y_{-1} = a_0 + a_1 \cdot I / Y_{-1} + a_2 \cdot \partial L / L_{-1} + a_3 \cdot \partial Z / Z_{-1} \quad (3)$$

in which $a_0 = dA/A$, $a_1 = A \cdot \partial Y/\partial K$, $a_2 = A \cdot \partial Y/\partial L \cdot L/Y$, $a_3 = \partial Y/\partial Z \cdot Z/Y$, $I = \Delta K$ and "-1" refers to a one time lag in the related variables. a_0 is conceived to be a constant subject to the externality of productivity growth. Since most studies employ the cross-sectional data, a_1 (Marginal Product of Capital) is assumed to be fixed. a_2 and a_3 (labor as well as other factors' elasticity of production) are assumed fixed as well.

3. Application

Equation 3 is the essential framework of several growth models tested after Solow's work. For example, in a two-variable standard model, a_0 and a_3 are zero. In a more simple model used to examine the economic growth of developing countries, it is suggested that

$a_0=a_2=a_3=0$ which leads to the well-known relationship named Incremental Capital Output Ratio (ICOR) [Khan and Reinhart, 1990].

Equation 3 is also employed in a large number of applied studies as shown below:

1) In order to appreciate the efficiency of export-oriented as well as import-substitution policies, Balassa(1978) used Solow's model in which A is implied as the imported productive input and/or the total export.

2) Otani and Villanueva (1988) used the R&D (or the human capital) expenditures instead of Z.

3) Khan and Reinhart (1990) first divided the investment into public and private components and then replaced the export/import growth factor for Z.

4) In his study, Diamond (1990) analyzed the relation of real growth of GDP to the level of private investment, the increase in the labor force, and the various ratios of government expenditures to GDP. One aspect of his study that is more relevant to this paper, is estimating the effects of both current and investment expenditures on the performance of various economic sectors: infrastructure, social services, and the directly productive sectors. Tests are also carried out in order to assess the affect of various external factors such as the growth of exports, the ratio of exports to GDP, and the external interest rate, which are represented by the variable Z.

5) In their other work, Otani and Villanueva (1989), contrary to the general view, mentioned that some forms of public current expenditures (eg. human capital expenditures) could increase productivity of the input while indirectly influencing economic growth. They evaluated the consequences of human capital expenditures as a percentage of government budget in the growth of per capita income.

4. Analytical Models of the Iranian Economy

One of the main purposes of this research is to reveal whether the growth-producing effects characteristic of the oil sector occur in the remaining sectors of the economy. Accordingly, the null hypothesis is defined as the following: government consumption and investment expenditures have a considerable effect on the production of each sector of the Iranian economy. To test this hypothesis, the following model is considered. Public expenditures are assumed to affect the value added of each economic sector not only simultaneously but over several periods of time:

$$Y^i_t = \alpha^i + \beta^i_0 G_t + \beta^i_1 G_{t-1} + \beta^i_2 G_{t-2} + \ldots + u^i_t \qquad (4)$$

where y^i indicates the value added of the ith sector, G_{t-1} is total public expenditures and u^i_t is the error term in the ith equation. Using the Koyck transformation method (Gujarati,1988), equation (4) can be rewritten in the following autoregressive form:

$$Y^i_t = a^i + b^i G_t + c^i Y_{t-1} + V_t \qquad (5)$$

The model tested is divided into three equations each representing one sector of the economy (i.e., agriculture, industry and services) as shown below:

$$Y^i_t = f(G_{1t}, G_{2t}, Y_t, Y^i_{t-1}) \qquad (6)$$

where G1 and G2 are government consumption and investment expenditures, and Y represents non-oil GNP (i.e. GNP net of oil value added). Y appears in the equation because GDP is stimulated by more

investment which in turn affects the value added of each economic sector.

To examine the importance of oil revenues in determining the level of public expenditures, a model is designed in which government expenses are dependent on government revenue. (See Shahshahani,1978) To do so, the outcome of any shift in government tax or oil revenue and their effects on government expenditures are studied.

To estimate the function of public consumption expenditures with an emphasis on oil and tax revenues, the following model is considered:

$$G_{1t} = f(OR_t , TR_t , G_{1,t-1}) \qquad (7)$$

where OR and TR indicate oil and tax revenue, respectively.

The relationship between capital charges and oil and tax revenues are considered in the following equation:

$$G_{2t} = f(OR_t , TR_t) \qquad (8)$$

5. Estimation Process

Using the Ordinary Least Squares (OLS) method, equations 6 through 8 are estimated with annual data from 1959 to 1988. The results are presented in Tables 2 to 4. Since the Durbin-Watson statistic cannot be used to detect the autocorrelation in autoregressive models, an h-Durbin statistic is computed for the above equations. Models with autocorrelation are modified using the Cochrane-Orcutt procedure.

Here, contrary to most other empirical research done on the Iranian economy, no dummy variables have been used to examine the growth fluctuations due to events such as oil shocks, the Eight-Year War, and the economic blockades following the 1979 Islamic Revolution. The

reason is very simple: when large fluctuations in dependent variables can be measured using fluctuations in one or more explanatory variables, the use of dummy variables becomes redundant. In order to prove this, two dummy variables are used: one for the 1973 and 1979 oil shocks and one for the Islamic Revolution. The estimation results are presented in Table 5. As evident, the estimated coefficients of both dummy variables are statistically insignificant. Therefore, it is concluded that government expenditures can fully explain changes in the value added of each sector with no need to use dummy variables.

6. Results

The results presented in Table 2 imply that government expenditures (both consumption and capital) are highly influenced by public incomes. Tables 3 and 4 display the results of estimating equation 6 for three economic sectors in the form of linear and logarithmic functions. All elasticity coefficients from the estimated logarithmic equations are presented in Table 1.

Table 1

Expenditure Elasticity of Value Added

Economic Sectors	Expenditures			
	Consumption	Investment	Machinery Investment	Construction Investment
Agriculture	—	—	—	—
Industries	—	0.108	—	0.102
Services	0.1	—	—	—

Some explanations of the results are the following:

1. The agricultural value added has never been affected by any kind of state expenses during the time period selected in this study.

2. Estimation of both the linear and logarithmic models concerning the industrial sector leads to the same results. Therefore, it can be concluded that government expenditures have no considerable affect on the industrial value added. Obviously, government investments as a whole, affect the value added as shown in Table 3, but it is not clear whether the construction or the machinery component of investment had a greater effect on value added.

3. Only consumption expenditures had an effect on the value added of the service sector. The size of the t-statistics in both the linear and logarithmic equations reduces the chance of finding robust results. Thus, it seems that investment expenditures have no effect on the value added of the service sector.

7. Conclusion and Suggestions

The results show that government economic intervention over the last few decades had no significant effect on the various economic sectors under review. However, suspending all intervention policies may have significant harmful effects on the Iranian economy. For example, Gounard believes that the problems relating to any one of the liberal or

centralized economic systems have directed theoreticians to the opposite system without designing proper executive policies. (For the citation please refer to Lajugie, 1969)

Since the Iranian economy has not attained the goals of the fifth pre-revolutionary five-year plan (1972-78) and especially because of the problems resulting from the economic blockades and the Eight-Year War, it is widely believed that the government should reduce its economic intervention. Despite the exogenous shocks, it is generally agreed that inappropriate policy is the main cause of Iran's economic woes. Yet, this does not imply that we should reduce the level of government expenditures by any drastic measure. Instead, it is more prudent to examine the public sector's poor performance in order to redesign more efficient government policy.

Implementing a successful liberalization policy is a long-term goal. Undoubtedly, market forces extend the inequality of income distribution during the initial period of liberalization. The question which arises is whether the foregoing problem conflicts with social contracts (i.e. the Constitution) which emphasizes the equal distribution of resources between all segments of society. This leaves policy makers with two viable alternatives as follows:

1. Some rules of social contracts must be altered and conflicting targets such as the efficient allocation of resources, equal distribution of income, and economic stabilization should be reevaluated. However, such a policy may not be readily implementable by the authorities.

2. The government should execute liberalization policies with more precaution.

The estimated results show that government expenses are determined in large part by oil revenues, which account for 80 to 90 percent of export revenue. (PBO,1990). Even if it is accepted that large fluctuations in expenditures resulting from changes in oil income are the source of changes in value added of the non-oil sectors, there is still no distinction between public and private sectors in changing such incomes. Therefore, tendencies towards the private sector do not necessarily solve the problem.

The coefficients show that the agricultural value added was never affected by any kind of public expenditures. On the other hand, the value added concerning the industries and the service sector is explained by investment and consumption expenditures respectively. The above results prove the importance of reducing government expenditures, especially on pure consumption items.

Finally, it is implied by the results of this research that the government should decrease its expenditures. However, considering the existence of large excess capacity in Iran, it is not wise for the government to decrease expenditures which may lead to the utilization of such excess capacity.

Table 2

Estimation Results of Linear Models

No	Est Proc.	Dependent Variable	Intercept	Explanatory Variables ..... Oil Rev.	Tax Rev.	Lag of Consump. Expend.	R^2	Adj.	DW	h	F
1	OLS	Consump. Expend.	25.5 (1.55)	0.171 (5.13)	0.675 (2.36)	0.548 (5.93)	0.974	0.971	2.1	-0.317	315
2	OLS	Capital Expend.	-13.37 (0.65)	0.171 (4.08)	1.302 (7.46)		0.912	0.905	1.77		134

Absolute Value of "t" statistic in parentheses.

Equation (2) is not an autoregressive one. Therefore, DW statistic is used to recognize the autocorrelation. Since for n=29, k=2 and a confidence interval of 95 percent, d_L=1.56 and d_U=1.27, it can be concluded that the estimated model is not faced with autocorrelation.

Table 3

Estimation Results of Linear Models

No	Est Proc.	Value Added (Dep. Var.)	Intercept	Explanatory Variables ..... Non Oil GDP	Consu. Expen.	Total Invest.	Mach. Invest.	Const. Invest.	Lag of Dep. Var.	R^2	Adj. R^2	DW	h	F
3	OLS	Agric.	45.3	0.054	0.001	-0.063			0.642	0.979	0.976	1.55	1.59	286
			(2.9)	(2.72)	(0.011)	(0.91)			(5.35)					
4	OLS	Agric.	47.7	0.065	-0.005		-0.17	-0.035	0.596	0.98	0.975	1.56	1.9	224
			(2.95)	(2.28)	(0.08)		(0.79)	(0.37)	(4.11)					
5	OLS	Indust.	-44.1	0.27	0.032	0.19			-0.242	0.995	0.994	1.36	2.08	1156
			(5.11)	(10.2)	(0.57)	(3.22)			(2.36)					
6	AR(1)	Indust.	-40.1	0.261	0.023	0.183			-0.2	0.995	0.994			890
			(3.32)	(8.79)	(0.36)	(2.91)			(1.77)					

Table 3

Estimation Results of Linear Models

No	Est Proc.	Value Added (Dep. Var.)	Intercept	Explanatory Variables ..... Non Oil GDP	Consu. Expen.	Total Invest.	Mach. Invest.	Const. Invest.	Lag of Dep. Var.	R^2	Adj. R^2	DW	h	F
7	OLS	Indust.	-38.5	0.266	0.567		0.39	0.085	-0.267	0.995	0.994	1.52	1.53	964
			(4.19)	(10.3)	(1.03)		(2.49)	(0.99)	(0.62)					
8	OLS	Ser.	-68.5	0.491	0.165	0.232			0.16	0.998	0.997	1.77	0.65	2814
			(5.07)	(12.9)	(1.67)	(2.27)			(3.1)					
9	OLS	Ser.	-55.7	0.476	0.196		0.633	0.042	0.155	0.998	0.998	1.9	0.27	2532
			(3.82)	(12.9)	(2.1)		(2.55)	(0.29)	(3.17)					

Absolute Value of "t" statistic in parentheses.

Table 4

Estimation Results of Logarithmic Models (Dependent as well as Explanatory Variables in Logarithms)

No	Est Proc.	Value Added (Dep. Var.)	Intercept	Explanatory Variables ..... Non Oil GDP	Consu. Expen.	Total Invest.	Mach. Invest.	Const. Invest.	Lag of Dep. Var.	R^2	Adj. R^2	DW	h	F
10	OLS	Agric.	0.377	0.215	-0.049	0.007			0.707	0.988	0.986	1.53	1.96	512
			(1.74)	(1.801)	(0.78)	(0.14)			(5.01)					
11	OLS	Agric.	0.602	0.206	-0.034		0.026	0.034	0.681	0.989	0.986	1.68	1.26	410
			(2.11)	(1.78)	(0.51)		(0.92)	(0.67)	(5.01)					
12	OLS	Indust.	-1.61	0.702	0.123	0.108			0.168	0.996	0.996	0.99	4.23	1707
			(3.42)	(4.2)	(1.66)	(2.2)			(1.19)					
13	AR(1)	Indust.	-2.17	0.979	0.07	0.108			-0.029	0.998	0.997			2150
			(5.05)	(6.26)	(0.97)	(2.73)			(0.22)					
14	OLS	Indust.	-1.72	0.724	0.124		-0.003	0.102	0.174	0.996	0.996	0.92	4.72	1285
			(3.21)	(4.13)	(1.54)		(0.08)	(1.89	(1.19)					

Table 4

Estimation Results of Logarithmic Models (Dependent as well as Explanatory Variables in Logarithms)

No	Est Proc.	Value Added (Dep. Var.)	Intercept	Explanatory Variables ..... Non Oil GDP	Consu. Expen.	Total Invest.	Mach. Invest.	Const. Invest.	Lag of Dep. Var.	R^2	Adj. R^2	DW	h	F
15	AR(1)	Indust.	-2.18	0.976	0.068		0.008	0.094	-0.011	0.998	0.997			1712
			(4.7)	(6.13)	(0.92)		(0.23)	(2.29)	(0.08)					
16	OLS	Ser.	-0.906	0.834	0.101	0.024			0.133	0.999	0.999	1.36	1.8	6936
			(6.21)	(10.91)	(2.9)	(1.03)			(2.31)					
17	OLS	Ser.	-1.003	0.852	0.094		-0.009	0.035	0.131	0.999	0.999	1.47	1.52	5532
			(5.6)	(10.9)	(2.57)		(0.56)	(1.41	(2.28)					

Table 5

Estimation Results of Models Containing Dummy Variables

No	Est Proc.	Value Added (Dep. Var.)	Intercept	Explanatory Variables ..... Non Oil GDP	Consu. Expen.	Total Invest.	Dummy Var Oil Shocks	Dummy Var Rev	Lag of Dep. Var.	R^2	Adj. R^2	DW	h	F
18	OLS	Agric.	41.95	0.058	0.0006	-0.063	-5.803	-8.984	0.646	0.98	0.97	1.587	1.42	177
			(2.4)	(2.47)	(0.01)	(0.86)	(0.45	(0.46)	(5.17)					
19	OLS	Indust.	-43.14	0.251	0.011	0.144	12.183	-26.38	-0.085	0.996	0.995	1.264	1.97	856
			(4.08)	(7.9)	(0.21)	(2.4)	(0.89	(1.54)	(0.65)					
20	AR(1)	Indust.	-39.24	0.24	0.01	0.14	12.29	-29.94	-0.03	0.996	0.995			727
			(2.95)	(7.56)	(0.13)	(2.1)	(0.95)	(1.52)	(0.24)					
21	OLS	Ser.	-70.84	0.516	0.191	0.255	-15.86	20.211	-0.099	0.998	0.997	1.788	1	1767
			(4.21)	(9.8)	(1.78)	(2.33)	(0.6	(0.51)	(1.05)					

Absolute Value of "t" statistic in parentheses.

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