

The Estimation of the Private Investment Function A Case Study of Iran

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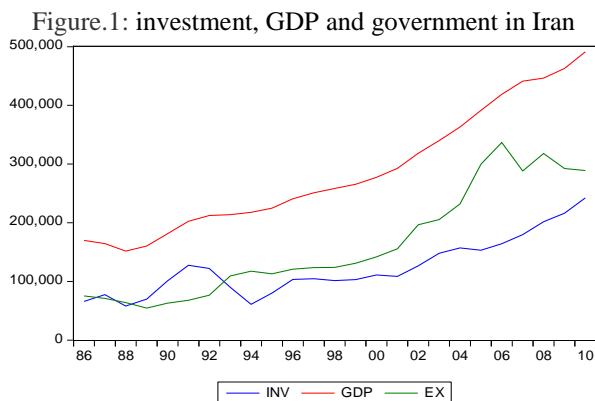
Abstract: This study estimates the relationship between the private sector investment as dependent variable with GDP and the government current expenditures as independent variables in Iran Country covering data 1986 to 2110. The survey uses the annual time series data which is obtained from the website of Central Bank. The Cobb-Douglas function is applied to estimate the relationship between the variables using EVIEWS8 and SPSS software which it involves OLS method. The findings of the paper show in the short run during the years of the study the coefficients of the natural logarithm of the real Gross National Product without oil and the natural logarithm of the government current expenditures in Iran are 2.485588 and -0.957794, respectively. Hence the government current expenditures play a main determining for the private sector investment but this role is negative means that the government current expenditures is a substitution for the private sector investment in Iran. It is possible to take a better decision for management of the society in order to increasing of economics growth rate using the survey results by the decision makers in Iran.

Key words: the government expenditures, Cobb-Douglas function, GDP, investment, and Iran.

I. Introduction

One of the most fluctuations of the components of aggregate demand is the private sector investment. Investment and capital accumulation is considered as a main factor to achieve economic development in every country. The investment comprises producers' durable equipment, residential and nonresidential construction and changes in inventories. In fact, the investment is an asset which is purchased in order to generate profit in the future and it doesn't use at the purchased time but is used to create profit and wealth in the future. There is a difference between an investment and a speculating. Speculating is a zero-sum game which does not create wealth whereas investing usually involves the creation of wealth. Non-residential fixed investment, in macroeconomics theory, means that the amount buying of goods in each period of time which are not consumed at the purchased time but are used for future to create profit and wealth using production. Investment depends on so many variables like interest rate, income, tax laws, rate of exchange, economical and political security and so on. It often explains as a function of the interest rates and the income, using the equation $I = f(r, Y)$.

To take a good decision and to improve their societies, the governments need to design the budget. To do its functions a government uses budget as a planning and financial tool. There is a budget deficit while the government revenues are less than the government expenditures. Vice versa, when the government expenditures less than its revenues it is said that the government has budget surplus. There are always the budget deficit all of years during all of years of this study. In other words, the budget deficit is a characteristic of Iran economics. Another important point is whether increasing of the government expenditures which maybe make is a budget deficit has a positive or negative effect. In other words, the increasing of the government expenditures is as a multiplier of the private sector investment or it is a reducer of the investment. One of the most important topics which have not been done enough research is the relationship between the private sector investment and the government expenditures. Developing of the country, it is necessary to find the relationship between the private and public sectors investment. In the following figure is shown the process of the statistical data related to the private sector investment, the real gross national product without oil and the government current expenditures in Iran at the period of the study.



Where

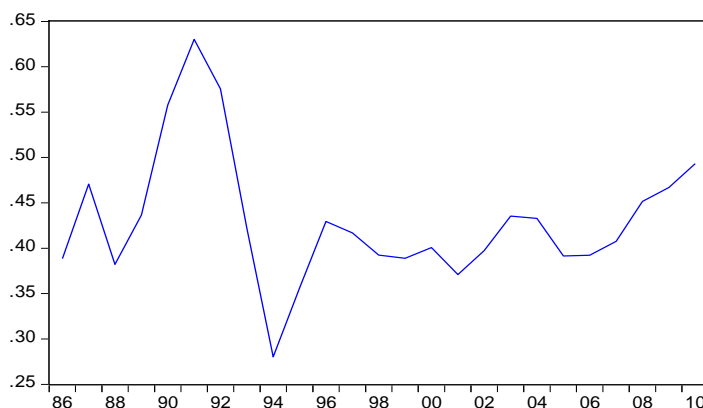
INV = the private sector investment in Iran

GNP = the real Gross National Product without oil in Iran

EX = the government current expenditures in Iran

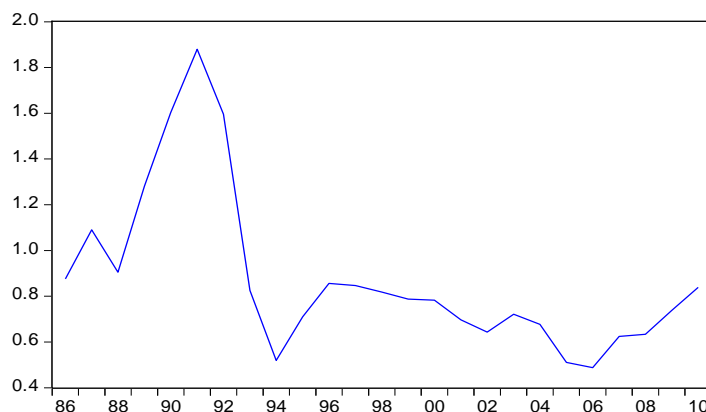
The ratio of the private sector investment to the real gross national product without oil is shown in the following figure. As we can see this ratio is reduced at the some years.

Figure.2: the ratio of the investment to GDP in Iran
The Ratio of the Investment to GDP



However, the ratio of the private sector investment to the government current expenditures has been less than one. You can see this matter at the following graph:

Figure.3: the ratio of the investment to the government expenditure in Iran
The Ratio of the Investment to the Government Expenditure



The main objective of this research is to determine the relationship between the private sector investment and the government current expenditures in Iran in order to increasing of economics development rate. Determination of this relationship will help the government make a good decision to reduce or remove their expenditures.

The main hypotheses in the study are as follow:

1. There is a significant relationship between the private sector investment and the real Gross National Product without oil in Iran.
2. There is a significant relationship between the private sector investment and the government current expenditures in Iran.

II. Materials and Methods

The descriptive and analytical methods are applied in this research. Achieving the goal theoretical discussions and empirical studies was conducted using library methods. The required data, the related background information on empirical studies and literature was collected by internet and library ways. The statistical data are taken from statistical data of Central Bank of Iran. After collecting the secondary data, it is necessary to determine to be or not to be the stationary for the data. Unit root test of Augmented Dickey-Fuller (ADF) is applied for it. Then is used the Cobb Douglas function representing the relationship between the private sector investment as a dependent variable and the real Gross National Product without oil and the natural logarithm of the government current expenditures as the independents variables in Iran.

To representing the model is applied the Cobb Douglas function as the following:

$$INV = A GNP^{\alpha_1} EX^{\alpha_2}$$

Now, the paper takes the natural logarithm of INV above, so it gets a liner function as follow:

$$\ln(INV) = \alpha_0 + \alpha_1 \ln(GNP) + \alpha_2 \ln(EX)$$

Where

α_0 = the natural logarithm of A as a constant amount

$\ln(INV)$ = the natural logarithm of the private sector investment in Iran

$\ln(GNP)$ = the natural logarithm of the real Gross National Product without oil in Iran

$\ln(EX)$ = the natural logarithm of the government current expenditures in Iran

Hence, the linear regression model can be used to estimate the investment function in this research. The statistical population limits to Iran economy. The studied variables in this study are annual time series data mainly from 1986 to 2010. The study applies EIEWS8 and SPSS Software. Then significant of the model and coefficients investigates using appropriate statistical analyzes.

III. Results and Discussion

First step, it is necessary to check the time series data is stationary or not which it can be provided in some ways using EIEWS8 or other software. One of all is Unit root test of Augmented Dickey-Fuller (ADF) which is used by this survey. Due to the results of the ADF test, at 5% confidence level, all of the data are not stationary at the level but all of them in the natural logarithm of the variables are stationary at the level. In other words, however the variables have unit root test at the level but have not unit root test while the natural logarithm of the variables are used in the Cobb Douglas function.

The ADF test results are as come at the following table:

Table1. The results of ADF test

The names of variables	ADF statistics	The Critical Value at 5%	The Stationary at	Prob.
Ln(INV)	-3.72487	-3.622033	Level	0.0409
ln(GDP)	-4.847614	-3.622033	Level	0.0040
Ln(EX)	-3.785079	-3.644963	Level	0.0384

In order to estimate the relationship between the private sector investment and the effectives variables in Iran are applied the linear regression model. The function coefficients can be found from the below table:

Table2. Coefficients of Model

Dependent Variable: ln(INV)
 Method: Least Squares
 Date: 12/09/13 Time: 12:41
 Sample: 1986 2010
 Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.087689	1.614665	-5.008895	0.0001
ln(GDP)	2.485588	0.290232	8.564144	0.0000
ln(EX)	-0.957794	0.180386	-5.309691	0.0000

R-squared	0.923462	Mean dependent var	11.64562
Adjusted R-squared	0.916504	S.D. dependent var	0.392803
S.E. of regression	0.113503	Akaike info criterion	-1.401803
Sum squared resid	0.283426	Schwarz criterion	-1.255538
Log likelihood	20.52253	Hannan-Quinn criter.	-1.361235
F-statistic	132.7188	Durbin-Watson stat	1.531168
Prob(F-statistic)	0.000000		

Hence, the model for this study can be illustrated as follow:

$$\text{INV} = -8.087689 + 2.485588 \ln \text{GDP} + -0.957794 \ln(\text{EX})$$

(-5.008895) (8.564144) (-5.309691)

$\bar{R}^2=0.916$

The results of the study show, in the model, the coefficients of the natural logarithm of the real Gross National Product without oil and the natural logarithm of the government current expenditures in Iran are 2.485588 and -0.957794, respectively. Due to the information of above table all of the coefficients are significant at %5 confidence level.

The results of the survey illustrate the real Gross National Product is one the most important factor to determine the private sector investment in Iran. The results also show the government current expenditures always had been as a substitution for the private sector investment in Iran in the period of the study. The model coefficients are also statistically significant due to ANOVA test (see the ANOVA table as the follow):

Table 3. ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.420	2	1.710	132.719	.000 ^b
	Residual	.283	22	.013		
	Total	3.703	24			

a. Dependent Variable: ln(INV)

b. Predictors: (Constant), ln(EX), ln(GDP)

Due to the ANOVA data in table 3, the Sig is near to zero so the correlations are significant among the private sector investment and the independent variables also the t-test statistic confirms it and also the value of R-Square is enough big which indicates the contribution of ln(GDP) and ln(EX) on the natural logarithm of the private sector investment in Iran is 0.923%. The closeness of R2 and Adj-R2, 0.916%, shows the Goodness of fit of data. Therefore, the lack of the correlation among the investment and GDP, the null hypothesis, is rejected and so the alternate hypothesis is accepted. In other words, there are the correlations among the investment and the independent variables. But we must be notice there is a negative relationship between the government current expenditures and the private sector investment in Iran. Generally, all of hypotheses are accepted means that:

1. There is a significant relationship between the private sector investment and the real Gross National Product without oil in Iran.
2. There is a significant relationship between the private sector investment and the government current expenditures in Iran.

So the government current expenditures play a main determining for the private sector investment but unfortunately, this role is negative means that the government current expenditures is a substitution for the private sector investment in Iran. Due to the private sector investment is one of the most important factors of

economics development; the government should spend in a way that makes increasing of investment in order to provide the economic development.

IV. Conclusions

This study estimates the investment function using the Cobb Douglas function in Iran during 1986 to 2110. This survey investigates how the real Gross National Product without oil and the government current expenditures changing affect on the private sector investment in Iran at the period of the study. The results of the study show the government current expenditures play as a substitution factor for the private sector investment in Iran. So the research findings can enrich the literature and they will be useful for Iranian decision makers.

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