

The Impact of Government Investment on Private Investment in Iran (1971-2005)

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ABSTRACT

The literature on the impact of government investment gives inconsistent results on whether it complements or crowds out private investment. Applying a standard investment model for Iran during 1973 to 2005, the empirical model is based on a flexible accelerator investment model, which is used in an important study of Blejer and Khan in 1984 for developing countries. The model suggests that private sector investment depends on government investment, GDP, availability of bank credit, economic freedom and microeconomic uncertainty. A simple univariate model of GARCH (1,1) is specified to obtain uncertainty measures.

This study finds that government investment complements private investment. The results also indicate that private investment is constrained by the availability of bank credit. Economic freedom index has a positive and significant impact on private investment and microeconomic uncertainty has a negative impact on private investment.

KEYWORDS: investment, flexible accelerator, uncertainty, GARCH, crowding out, credit.

I. INTRODUCTION

The relation between government financial operation and that of private section in general, and its investing fees in particular, is of high importance in economics. In fact, how to show this relation is a point of variation in economic points of view. Basically government investment can have two differentiated impact on private investment portion, considering the more government invests the more private activity range expands. This impacts shows itself when government investment decreases production costs of private section. Investment on economic infrastructures like transportation, education system and safety are the exemplifications of the costs which occur this relation. Moreover, some economists are of the opinion that resources limitation and their being used by government cause the private section limitation in using them resulting in replacement of private section by government. In other words, resources and production elements reduction in economics by government or governmental sections meddling with production issues causes price increase; so many projects will not have economic reasoning. Deployment of private section from economic activities is a consequence of this. Cooperation or inconsistency of the two effects defines the level of final relation which based on each power reaches different results. Based on this, the answer to the question 'What impacts would government investment increase have on private investment?' is indefinite and practical to some extent.

Questions to be researched:

What relation does government investment have with private one?

What impact does uncertainty have on private investment?

What impact does connection availability have on private section investment?

Theories to be researched:

Government investment complements private investment.

Uncertainty has negative effect on private investment.

Credit availability has positive effect on private investment.

II. RESEARCHES DONE ABROAD

Luis Serven (1998)

He uses a lot of information about developing countries in his paper so that he can propose a complete assessment of economic uncertainty's effect on private investing based on them. He assesses the five major variables

of mass-economics (inflation, capital wares price, production development (on a GDP criterion basis), business stretches and foreign currency's real price) and its relation with private investing as well. His study's result emphasizes the power of the relation between investment and uncertainty.

H. Ahmad and S. M. Miller (2000)

They study crowding-out and crowding-in effects of the components of government expenditure on private investing. They have used the same regressive model to present budget inadequacy that Miller and Russik (1997) had used before. The result emphasizes both traditional view (focusing on crowding-in effect) and non-traditional view (focusing on crowding-out effect). In fact, they have found that government expenditure multiple components, results in crowding-in effects on private investment, while transportation and communication fees causes crowding-out effects in developing countries.

L. Erden and R. G. Holcombe (2005)

Using the flexible acceleration model suggested by Beljero Khan (1984), they studied complementary and replacement relation between government and private investment in 18 developing countries from different parts of the world from 1997 to 1980 then compared the results with that of the research on 12 developed countries. The results of the comparison offers an interesting view for politicians because researchers have shown that general investment's effects on private investment's variables depends on economies' level of development. They found that general investment in developing countries has a positive effect on private investment; while having a negative effect in developed countries. Their results for a sample group of developed countries showed that a 10% increase in governmental investment would result in a n about 2% increase in private section. Profit rate was not statistically meaningful in private investment definition, and bank credit availability shows a permanent positive effect on private investment while having a negative effect in developed countries.

III. RESEARCHES DONE IN IRAN

Ghahramaan Abdoli (2001)

He studies government building expenditure effects on private investment from 1961 to 1995 in Iran. The researcher uses four regressive equations used by Beljero Khan. The results contain:

- 1- Real income changes as acceleration representative, has a positive meaningful effect on private investment.
- 2- Changes in bank credits given to private section, as money policies representative, has most effects on private investment.
- 3- Government building real budget as infrastructure projects' representative in public section, has a strong positive effect on private investment.
- 4- Government non-infrastructure investment has a positive effect on private investment, but it is relatively half as strong as that of infrastructure investment on private section.
- 5- General persistent investment effect on private section is more powerful and meaningful than that of non-persistent investment.

Maryam Khodaa Moraadi and Kaambiz Hozhabr Kiaani (2002)

They studied long-term balanced relation between government and private investment in Iran. In this paper, requests for investing in Iran is an obedience to variables like gross domestic product changes, government expenditures, changes in bank credits given to private section, and inflation rate have been studied. Authors have shown the meaningfulness of the variables used in their research, and using a self-recursive method with distributional Intervals, approved the existence of a balanced positive long-term relation between government and private investment in Iran.

IV. RESEARCH METHOD

Theoretical fundamentals

To study government and private investment relation, investment theories and models will be studied. Regarding the country's economic features and the use of theories being studied, a model will be proposed for private investment so that the research theories could be studied in this way.

Flexible acceleration theory of investment

The theoretical frame of the model used in this research is a kind of balanced flexible acceleration theory which was used by Beljer and Khan in 1984 to study the effects of government investment on private investment in developing countries. In this model the desired amount of investment in private section is defined as below:

$$3-1 \quad kp_t^* = a y_t^e$$

In which kp_t^* is the desired amount of private investment and y_t^e is the expected product where 't' shows the duration of time.

As mentioned, the desired amount of private investment would be an obedience of the expected product of that section. The real private investment may be not desirably balanced to the ideal level, because there are technology limitations and a period of time is spent to choose an investment and put it in the production. Anyway, the real amount of money supply is balanced through the difference between desired rate at time 't' and real rate at time 't - 1'. This means:

$$3-2 \quad kp_t - kp_{t-1} = B(kp_t^* - kp_{t-1}^*), 0 \leq B \leq 1$$

In which 'B' is balance multiplier and 'kp_t' is the real amount of private investment at time 't'. Considering that the information on capital rate is not available for most developing countries, we can use the definition of gross private investment which is defined as below:

$$3-3 \quad pI_t = (kp_t - kp_{t-1}) + \mathcal{Z}kp_{t-1}$$

Where 'a' is private investment saving erosion rate and 'pI_t' is gross private investment. Reorientating the equation above, we will have:

$$3-4 \quad pI_t = [1 - (1 - \mathcal{Z})L] \cdot kp_t$$

'L' is interval operand.

For experiential uses, we can define minor balancing mechanism based on 'PI' as below:

$$3-5 \quad pI_t - pI_{t-1} = \beta (pI_t^* - pI_{t-1}^*)$$

Now, to inject other variables effective on private investment, attention is paid to balance multiplier 'B'. It is imagined that government investment and other variables influence the gap between gross private investment and its ideal rate. So, the linear definition of 'B' could be as below:

$$3-6 \quad \beta = a_0 + [1 / (pI_t^* - pI_{t-1}^*)] \cdot (y_1 GI_t + y_2 X_t)$$

In which 'a₀' is the beginning, 'GI' is government investment, and 'X_t' is the axis of other related variables. A tacit axiom in equation 3-6 is that delaying effects of these variables on private investment is also taken from balance multiplier. If government investment is the complement of private investment, it will increase the speed of private investment balancing and vice versa. Government investment, like building investment, can only be supportive to private investment when it is focused on infrastructural areas in which private section is not interested or able to handle. In contrary, whenever in an economy with limited resources, government agents involve in production processes, they may make production factors unavailable for private section, hence facing crowding-in effects. Combining equations 3-5 and 3-6, and reorientating them, we will have:

$$3-7 \quad pI_t - pI_{t-1} = a_0 (pI_t^* - pI_{t-1}^*) + y_1 GI_t + y_2 X_t$$

It should be considered that equation 3-4 will be as below in steady states:

$$3-8 \quad pI_t^* = [1 - (1 - a)L] kp_t^*$$

By putting equation 3-1 into 3-8, and then inserting the result into equation 3-7 and then sorting it, we will have the equation below for gross private investment which shows government investment and other factors effecting on private investment:

$$3-9 \quad pI_t = a a_0 [1 - (1 - \mathcal{Z})L] y_t^e + y_1 G I_t + y_2 X_t + (1 - a_0) pI_{t-1}$$

The only variable observable in equation 3-9 is the expected product y_t^e . To overcome this defect the matching expectations model is used which is as below:

$$3-10 \quad \Delta y_t^e = \lambda [y_{t-1} + (1 + g) y_{t-1}^e] \quad 0 \leq \lambda \leq 1$$

'g' is product development rate. Equation 3-10 is rewritten as below:

$$3-11 \quad y_t^e = \frac{\lambda y_{t-1}^e}{[1 - (1 - \lambda)(1 + g)L]}$$

By putting 3-11 into 3-9 and reorganizing it the final equation would be as below:

$$3-12 \quad pI_t = \Theta y_{t-1} + y_1 G I_t + y_2 X_t + (1 - a_0) pI_{t-1}$$

In which:

$$3-13 \quad \Theta = \frac{\lambda a_0 [1 - (1 - \mathcal{Z}_0)L]}{[1 - (1 - \lambda)(1 + g)L]} \quad 0 \leq \Theta \leq 1$$

The effects of government policies on private investment 'y₁', depending on whether the relation between government and private investment is crowding-out or crowding-in, could be positive or negative.

Reckoning Model Presentation

Considering the mentioned equations the calculable equation will be as below:

$$3-14 \quad pI_t = C + \Theta y_{t-1} + y_1 G I_t + y_2 U N C_t + y_3 M_t + y_4 F R_t + (1 - a_0) pI_{t-1} + \mu_t$$

In which 'C' is deviation from the center, 'Unc' is investing environment uncertainty index, 'M_t' is final bank credit given to private section, 'FR_t' is economic freeing index, and 'u_t' is disruption minor. The major variable in other variables' vector for Iran, which has resources limitations in private investing like most developing countries,

is financial resources availability. Therefore, private investors are bounded due to bank resources limitations. The other major variable which will be inserted into other variables' vector is investment environment uncertainty. In similar researches on Iran's economy, not much attention has been paid to uncertainty and its impacts on private investment, while one of the most important and effective factors on whether an investor invests in an environment is the level of certainty.

Uncertainty Index

Several models have been recommended in the subject literature. Anyway, as Dehn and Serven discuss, assessing uncertainty by any sample variance methods, or assessments gained through autoregressive, has their own defects. Generally, former methods do not allow the predictable and unpredictable components of the variable get separated.

Regarding these subjects, the generalized autoregressive conditional heteroscedasticity specification or Garch has become a famous method for assessing uncertainty, because this model not only separated predictable and unpredictable components, but also allows heterogeneity among uncertainty components. Following Dehn, Simon Price and Luis Serven's work, a simple univariate Garch model with 1,1 grade have been used to gain usable uncertainty assessment.

$$\begin{aligned}
 15-3 \quad & x_t = \varphi_0 + \varphi_1 t + \varphi_2 x_{t-1} + v_t \quad ; \quad t = 1, \dots, T \\
 16-3 \quad & \sigma_t^2 = \zeta_0 + \zeta_1 v_{t-1}^2 + \zeta_2 \sigma_{t-1}^2
 \end{aligned}$$

In which σ_t^2 and $v_t \sim N(0, \sigma_t)$ show v_t variance is dependent on information at time 't'. Fitted values make an uncertainty index out of conditional variance. Here, one more issue is still left in defining, and that is which variables should be used as representatives to gain uncertainty. Many of mass-economy variables may be taken as uncertainty source. But in this study, inflation rate, economy growth, and foreign currency rate have been chosen as the major uncertainty variables. First, conditional variances of these variables have been accessed through Garch method. In the next step by following Erden and Holcombe's work (2005), an evaluation has been calculated for uncertainty. To reach this goal, using principal components analysis, which allows components composition, a unique index for uncertainty has been achieved. To assess GARCH we use a software called Eviews and in principal components analysis we use a software called SPSS.

Investment Path Study

During 1973– 1976, oil incomes growth increase improved the country economy and government and private investment. During revolution days and imposed war, due to increasing strikes and the Islamic Revolution, beside insecurity in the country and risk and uncertainty increase, disorganized action of bureaus especially banks, and their bankruptcy declaration during the revolution, and foreign currency incomes decrease, private and government investment decreased. During that period, besides economy recession, due to constant government tight budget, private section savings were increasing, while from another side, because of economy recession, investment request limitations and bank credit limited usage, loans growth was slow while savings were increasing.

Right after war, the government started to edit the first development plan and started it from 2007 and continued it until 1993. Starting the first development plan, private investment started and it reached its peak in 1991. Government investment grew a lot because of the intense damage done to the infrastructures during the war. In 1993 due to foreign currency balancing, private investment reduced because industry section was much dependant on importing capital goods.

The lowest rate of investment is seen during post-revolution years, during the second development plan (1995– 1999). In 1995 high inflation rate limited private investment. Government started bank credit limiting policies to control inflation, and government investment on infrastructural sections reduced, therefore, following contraction policies, government expenditures reduced. In 1997, following eastern- west Asian countries crisis, recession dominated the world's markets and reduced oil price. In this year, the government faced intense budget deficiency and its investment reduced, but private section continued its growth along with all those impediments. In the year 1999 which was the last year of second development plan, oil price increase affected the country's economy and investment continued its growth and government investment got better in comparison with 1998.

During the third development plan (2000– 2004) and the beginning of the fourth development plan, due to unprecedented oil price growth and non-oil goods export growth policy, both private and government investment index took a turn to the better.

Uncertainty Index Assessment

In this part, to assess the conjecturally model below:

$$pI_t = C + \Theta y_{t-1} + y_1 G I_t + y_2 U N C_t + y_3 M_t + y_4 F R_t + (1 - a_0) pI_{t-1} + \mu_t$$

Uncertainty index will be reviewed first.

Auto-Regressive Moving Average Process (ARMA)

Table 1-4: ARMA and ARIMA tests results

ARMA or ARIMA rank	Shwartz Beisen criterion	abbreviation	variable	row
ARMA (4,4)	5/37	RGDP	Growth rate	1
ARIMA (6, 1, 5)	5/76	RCPI	Inflation rate	2
ARIMA (3, 2, 5)	15/19	RE	Foreign currency rate	3

Reference: the research's findings

After this step, using ARMA and ARIMA rank, GARCH process will be done on the three variables.

Generalized Auto-Regressive Conditional Heterostipulation or GARCH

In this research to find the appropriate rank of GARCH, SBC and a 6 by 6 matrix in which 'p' and 'q' are the rows and columns, are used. With any change of 'p' and 'q', note the value of SBC that the model gives back. Finally the minimum value of them defines the appropriate GARCH rank for any variable. The results are shown in table 2-4.

Table 2-4: GARCH estimation results

GARCH rank	SBC component	Abbreviation	Variable	Row
GARCH (1, 1)	7/39	RGDP	Growth rate	1
GARCH (1, 1)	7/59	RCPI	Inflation rate	2
GARCH (1, 1)	17/71	RE	Foreign currency rate	3

Reference: the research's findings

ARCH Test

In this step to approve the results of GARCH, ARCH test is done. The 'H₀' presumption of this test is homoskedasticity and the 'H₁' is heteroskedasticity. The results of ARCH claim that 'H₀' is not accepted for all three variables, so univariate GARCH is usable and appropriate for uncertainty estimation.

The results of these tests are shown in table 3-4.

Table 3-4: ARCH test results

H ₀ presumption (homoskedasticity)	Definition multiplier meaning level	'F' meaning level	Calculation 'F' sign	Abbreviation	variable	row
Unacceptable	0/02	0/06	5/78	RGDP	Growth rate	1
Unacceptable	0/0000	0/0000	833/24	RCPI	Inflation rate	2
Unacceptable	0/02	0/0000	338/59	RE	Foreign currency rate	3

Reference: the research's findings

Principal Components Analysis

In this step using principal component analysis, which defines variables' multiplier and their affectivity according to the number of combinations, variables' conditional variances are combined and are known as uncertainty index. The results of these tests are shown in the table 4-4.

Table 4-4: PCA results

Affectivity of combinations quantity	Variable multiplier	Abbreviation	Variable	Row
%99/97	- 1/00	RGDP	Growth rate conditional variance	1
%100	1/00	RCPI	Inflation rate conditional variance	2
%100	1/00	RE	Foreign currency conditional variance	3
Uncertainty index equation: $UNC = RCPI + RE - RGDP$				

Reference: the research's findings

Stability Test

To prevent a pseudo-regression and a unique root, stability test of the variables have been done with the help of Diki-Fooler generalized test (ADF). This test will be revised once more by deviation from center and time line.

Table 5-4: the results of stability test on variables on surface

Test result	Suitable interval	Calculative ADF	Abbreviation	variable	Determinate factors	Row
Unstable	0	-2/41	FR	Freeing index	DFC	1
Unstable	0	-2/95			DFC & TL	
Unstable	1	0/66	GDP	Gross domestic production	DFC	2
Unstable	1	-1/18			DFC & TL	
Unstable	0	-2/34	GI	Government investment	DFC	3
Unstable	0	-2/43			DFC & TL	
Stable	0	-5/08	UNC	Uncertainty index	DFC	4
Stable	0	-5/53			DFC & TL	
Unstable	1	1/88	M	Bank credits given	DFC	5
Unstable	1	0/977			DFC & TL	
Unstable	1	-2/02	PI	Private investment	DFC	6
Unstable	1	-2/45			DFC & TL	
Unstable	0	-2/56	RCPI	Inflation rate	DFC	7
Unstable	0	-3/15			DFC & TL	
Unstable	8	9/54	RE	Foreign currency rate	DFC	8
Unstable	8	10/65			DFC & TL	
Stable	2	-4/18	RGDP	Growth rate	DFC	9
Stable	4	-5/28			DFC & TL	
<p>Crucial value at %1 with DFC = -3/67 Crucial value at %1 with DFC & TL = -4/30 Crucial value at %5 with DFC = -2/95 Crucial value at %5 with DFC & TL = -3/55 Crucial value at %10 with DFC = -2/62 Crucial value at %10 with DFC & TL = -3/22</p>						

*DFC = Deviation From Center , *TL = Time Line
 Reference: the research's findings

Table 6-4: the results of the variables' stability test at first over plus.

Test result	Suitable interval	Calculative ADF	Abbreviation	Variable	Determinate factors	Row
Stable	0	-3/70	FR	Freeing index	DFC	1
Stable	0	-4/06			DFC & TL	
Stable	0	-3/24	GDP	Gross domestic production	DFC	2
Stable	0	-3/59			DFC & TL	
Stable	0	-7/14	GI	Government investment	DFC	3
Stable	0	-7/02			DFC & TL	
Unstable	0	-3/02	M	C	DFC	4
Unstable	0	-1/13			DFC & TL	
Stable	1	-4/96	PI	Private investment	DFC	5
Stable	1	-4/99			DFC & TL	
Stable	0	-6/16	RCPI	Inflation rate	DFC	6
Stable	0	-6/07			DFC & TL	
Unstable	8	5/69	RE	Foreign currency rate	DFC	7
Unstable	8	2/49			DFC & TL	

*DFC = Deviation From Center , *TL = Time Line
 Reference: the research's findings

Table 7-4: the results of the variables' stability test at second over plus.

Test result	Suitable interval	Calculative ADF	Abbreviation	Variable	Determinate factors	Row
Stable	0	-6/05	M	Bank credits given	DFC	4
Stable	0	-6/44			DFC & TL	
Unstable	8	-1/48	RE	Foreign currency rate	DFC	7
Stable	7	-19/5			DFC & TL	

*DFC = Deviation From Center , *TL = Time Line
 Reference: the research's findings

Structural Breakdown Test

This test is done on the variables which have not been stable. Because the reason why a unique root exists, may be a doubt in the series. In other words, it is a breakdown or fault that has been occurred in the structure of the series. Structural breakdown may change the DFC of the time line function, it may change the inclination of the time line function or it may change both.

Table 8-4: Structural form of the variables considering the *DFC change

Test result	Crucial amount	Calculative τ	λ	Equation	Variable	Row
Unstable	3/8 -	-1/58	/7 0	FR=-1.6-6.5DU70+2.6D70+0.42T+0.89FR(-1)	Freeing	1
Unstable	3/68 -	-1/7	/1 0	GDP=39187-41249DU55+18061D55+1999T+0.8GDP(-1)	Gross domestic production	2
Unstable	3/77 -	-2/23	/2 0	GI=15325.9-13463.7DU57-13154.6D57+384.3T+0.6GI(-1)	Government investment	3
Unstable	3/8 -	-2/08	/7 0	PI=18072+19754.9DU74-8495.2D74-368.8T+0.7PI(-1)	Private investment	4
Unstable	3/75 -	4/42	/8 0	M=15682.8-959.6DU72-18916.6D72+170.8t+2.1M(-1)	Bank credits given	5
Unstable	3/75 -	-2/80	/8 0	RCPI=5.8-12.8DU74-3.5D74+0.5T+0.4RCPI(-1)	Inflation rate	6
Unstable	3/75 -	-0/91	/8 0	RE=-413.3+287.8DU71+909.3D71+38.2T+0.9RE(-1)	Foreign currency rate	7
Unstable	3/8 -	-3/32	/7 0	RGDP=-0.5-1.9DU69+0.1T+0.4RGDP(-1)	Growth rate	8

*DFC = Deviation From Center
Reference: the research's findings

Table 9-4: variables' structural breakdown considering *DFC and inclination change

Test result	Crucial amount	Calculative τ	λ	Equation	Variable	Row
Unstable	3/8 -	-1/58	/7 0	FR=-4.3+1.3DU70+0.5D70-0.3DT70+0.5T+0.06D1FR(-1)+0.9FR(-1)	Freeing	1
Unstable	3/68 -	-1/7	/1 0	GDP=90081.4-89484.2DU64-3407.6D64+5478.5DT64-482T+0.5D1GDP(-1)+0.5GDP(-1)	Gross domestic production	2
Unstable	3/77 -	-2/23	/2 0	GI=6204.4-4065.4DU57-8063.9D57-2785.8DT57+3255.1T-0.1D1GI(-1)+0.6GI(-1)	Government investment	3
Unstable	3/8 -	-2/08	/7 0	PI=57746.7-183224DU74+6762.6D74+723.3DT74+1028.1T+0.6D1PI(-1)+0.07PI(-1)	Private investment	4
Unstable	4/04 -	-0/86	/8 0	M=4604-128482.7DU72+8841D72+4976.2DT72+92.4T+0.3D1M(-1)+0.9M(-1)	Bank credits given	5
Unstable	3/75 -	-2/80	/8 0	RCPI=7.2+33.7DU74-7.25D74-1.6DT74+0.7T+0.3D1RCPI(-1)+0.1RCPI(-1)	Inflation rate	6
Unstable	3/75 -	-0/91	/8 0	RE=39.3-9549.4DU71+2187.7D71+425.68DT71-0.1T+0.1D1RE(-1)+0.4RE(-1)	Foreign currency rate	7
Unstable	3/8 -	-3/32	/7 0	RGDP=-0.2-4.2DU69+6.8DT69+0.1T+0.2D1RGDP(-1)+0.2RGDP(-1)	Growth rate	8

*DFC = Deviation From Center
Reference: the research's findings

Cointegration Test

The economic meaning of cointegration is when two or more variables of a time series are related on a theoretical basis to form a long-term balancing relation. Although these time series can have accidental paths (unstable), they follow each other well over time in a way that the difference between them is stable (still). So, cointegration reminds us of a long-term balancing relation towards which economic system moves over time. Here we use two methods to analyze the time series' cointegration.

1- Engel – Granger Cointegration Test

This test (EG) is the stability test of the error statements, and it is used to prevent false regression. In EG and generalized EG (AEG) method, first we assess regression with ordinary least squares (OLS) method. Then with Diki-Fooler (DF) or generalized DF (ADF) method, we test the instability of the error statements. If the regression disruption component is stable, the variables of the model are cointegration and there is a long-term balancing relation among them, otherwise, the regression is false and there is no long-term relation among the variables of the model; therefore, using OLS will not be appropriate to assess the model. Considering the state of bank credits as I (2), its over plus has been used in this test. The results of assessing regression by OLS method is shown in table 10-4.

Table 10-4: The results of assessing regression by OLS method.

Meaningfulness level	't' sign	Multiplier	Abbreviation	Variable	Row
0/064	-1/93	- 49186/5	C	Deviation from center	1
0/009	-2/81	-0/78	GI	Government investment	2
0/038	2/18	7/78	FR	Economic freeing	3
0/915	0/10	0/02	DM	Bank credits given	4
0/0001	4/62	0/37	GDP	Groos domestic production	5
0/053	-2/02	-7/72	UNC3	Uncertainty index	6
R² = 0/84 R² = 0/91 F = 29/88 D.W = 1/98					

Reference: the research's findings

In the next step, unique root ADK is done on the regression disruption component of private investment and the results are shown in table 11-4.

Table 11-4: Unique root ADK test on the regression disruption component

Test result	Calculative ADF	Disruption component
Stable	- 5/32	Regression disruption component of private investment
The crucial value presented by EG at %10 = -5/03		

Reference: the research's findings

The results from tables 10-4 and 11-4 claim that there is a long-term balancing relation among the variables of the model.

2- Johansen – Juselius Cointegration Test

Using this test, we can check the existence of a cointegration relation among the model variables and show the long-term relations among variables. In EG we presume there is one cointegration vector, while in multi-variant models there may be more than one cointegration vector. To find the number of cointegration vectors with Johansen method, the length of optimized interval should be defined using Akaik (AIC) or SBC norm in Vector Auto-Regressive model (VAR) first, and then the number of cointegration vectors are defined according to optimized interval, effect tests, and maximum special amount, and in the next step the result of the vectors' estimation are shown.

Defining the Length of the Optimized Interval of Vector Auto-Regressive Model

Paying attention to this test, the minimum value of AIC and SBC norms which occure at all intervals are regarded as optimized intervals. Their results areshown in table 12-4.

Table 12 – 4: The results of defining interval's length in VAR model.

SBC sign	AIC sign	Interval
133/30	133/02	0
128/43	126/49	1
127/83	124/22	2
127/56	*122/29	3
127/86	123/94	4

Reference: the research's findings

*' shows the accepted interval

The results shown in table 12 – 4 claim that optimized interval is 3 using AIC and SBC norms.

Defining the Number of Cointegration Vectors

The results of defining the number of cointegration vectors using effect test and AIC and SBC norms are shown in table 13 – 4.

Table 13 – 4: The results of cointegration vectors number defining test for a dependant variable

H ₁ presumption	H ₀ presumption	Effect test		Maximum special value test	
		Calculative sign	Table sign	Calculative sign	Table sign
r = 1	r = 0	408*	91/11	288*	37/27
r = 2	r ≤ 1	120*	65/81	60*	31/23
r = 3	r ≤ 2	60*	44/49	35*	25/12
r = 4	r ≤ 3	24/34	27/06	17/97	18/89

* shows that H₀ is rejected
Reference: the research’s findings

According to table 13 – 4, based on effect test and maximum special value test, three cointegration vectors are vivid among regression variables. When the two tests show different results, effect test is reliable.

The Results of Cointegration Vectors Estimation

Using Johansen test, three cointegration vectors are estimated for the variables collection, and the normalized vectors are shown in table 14 – 4.

Table 14 – 4: The results of the cointegration vectors Johansen estimation.

‘PI’ dependant variable					
3 rd vector	2 nd vector	1 st vector	abbreviation	Independent variable	Row
-1/52	-0/72	0/84	GI	Government investment	1
-0/86	1/45	0/91	FR	Freeing	2
-0/032	-1/97	-1/59	DM	Bank credits given	3
*-0/000002			M		
-0/49	0/21	0/03	GDP	Gross domestic production	4
0/000000028	0/00015	0/03	UNC	Uncertainty index	5
199/41**	5.86E + 08	2.05E + 09	Σ e _i ² or sum of error statements square root		

** shows the multiplier of variable M
*** shows the appropriate vector
Reference: the research’s findings

To define the most appropriate vector among cointegration vectors, Borook and Bahmani Oskooi norms is used and its diagram is shown in picture 15 – 4. Besides, according to the sum of error statements square root shown in table 14 – 4, both norms recommend the 3rd vector.

Table 15 – 4: Multipliers for the model variables, gained through Johansen cointegration.

Uncertainty index	Gross domestic production	Bank credits given	Economic freeing	Government investment	Private investment	Variable
-2/8e – 9	0/49	0/000002	0/86	1/52	1	Multiplier

Reference: the research’s findings

The results of Johansen cointegration vectors estimation show that there is a positive relation between the variables of government investment, freeing, the amount of bank credits given to private section, gross domestic production, and private investment variable, but the relation between uncertainty index and private investment is negative.

RESULTS INTERPRETATION

1- Considering that the resources in Iran are not at the complete level of use, increase in government investment, whether directly or indirectly, leads to income increase and private investment motivation.

2- Economic freeing decreases barriers of goods and services business, capital flow, and technology trades, and remembering the fact that a major portion of machinery and investment equipments are imported, easing importing, has its own effects on motivating private investment. So, as expected, the economy’s being open has a positive effect on private investment.

3- Positive effects of bank credits on private investment, is affected by Iran’s economy structure conditions. In fact, considering that there are not many financial markets (monetary and capital market), stock markets, and investing corporations to sponsor investment projects, as opposed to developed countries, the possibility of

supplying financial resources for economic communities through capital market and selling out bounds does not acceptably exist. Moreover, supplying these resources from unofficial capital markets is not possible due to the high profit rate; therefore, not only bigger organizations but also smaller ones do not receive the necessary resources for to invest through money market and bank credit.

4- As gross domestic production increase, leads to savings increase, it increases private investment. Furthermore, production growth shows good conditions of the country's economy, and it has left a positive effect on private investment expected outcome, and has increased private investment.

5- When constant expenditures of investing, such as buying capital goods, is done, the expenditure of decreasing or stopping the investment is higher than increasing investment. So, organizations lose their interest in investing due to the evading the risk of tangling with massive investments.

Estimating the Short-Term Relation between Variables Using Error Correction Model (ECM)

Cointegration among variables makes it possible to use ECM. This model relates the temporary fluctuations of the variables to the long-term interchangeable values. To estimate private investment regression short-term multiplier, first the disruption component of the equation is extracted over a long time, and then its stability is studied.

Table16-4: Estimating the Short-Term Relation between Variables Using Error Correction Model

Meaningfulness level	't' sign	Multiplier	Abbreviation	Variable	Row
0/46	-0/89	-0/032	C	Deviation from center	1
0/006	0/26	0/79	GI	Government investment	2
0/38	1/23	0/037	FR	Freeing	3
0/009	-3/35	-0/67	M	Bank credits given	4
0/0009	3/78	0/54	GDP	Gross domestic production	5
0/096	-1/72	E- -6/5605	UNC3	Uncertainty index	6
0/04	-2/51	-0.38	EMC(-1)	Error correction	7

Reference: the research's findings

According to the results in table 16 – 4, vector error correction multiplier ECM (-1) is meaningful and equals – 0/38, which shows 0/38 of uncertainty is removed every year, and balancing is done long-term.

V – CONCLUSION

Considering the economic literature, one of the most important issue that is discussed in the study of fiscal policy, the effect of government investment on private investment and discussions about this work is different. The researchers also are trying to answer this fundamental question is, what the relationship with the private investment is the investment? Find

This study has been designed according to the patterns of the impact of government investment on private investment for developing countries,

Good model for determining the effects of alternative government investment on private investment may be imposed on Iran and the Iranian economy using statistical data for the period 1973 - 2005 is examined.

Also study the relationship between the volume of credits granted by banks to private sector investment and private investment is uncertainty environment, suitable for this purpose subject to the following hypotheses are considered:

- Government investment with private investment is a substitute relationship.
- Uncertainty has a negative effect on private sector investment.
- The volume of credit has a positive effect on private investment.

In order to realize the dimensions of the hair and change the variables and determine the appropriate model, studies at home and abroad were studied. The indicator for the uncertainty created by the method of Garch model is proposed based on the flexible accelerator.

Static test coefficient and the surface was performed by subtracting variable and then test the structural failure

In the short term and long-term model to estimate the error correction model and method has been Hmjmy Johansen.

According to model estimation and presumptions test, the following results are presented:

1- Government investment has a complementary relation with private investment in Iran and helps easing private investment.

2- Credits given to private section by banks has a positive effect on this section and is one of the major financial supplement resources in Iran.

3- One of the other affective factors on private investment in Iran, is gross domestic production whose increase, increases private investment through increasing savings and as a form of acceleration.

4- Economic freeing increases private investment through easing importing and decreasing barriers in goods and services business.

5- Investment environment uncertainty has a negative effect on private investment; hence, decreases it.

VI – RECOMMENDATIONS

To increase production activities and capital formation in private section the recommendations below are presented: To motivate private section to invest more, it is possible to make an effort in government investment and gross domestic production, because government investment in Iran reduces the bottle necks of private investment. As according to economic theories and the results of this research gross domestic product has positive effects on private investment, it is possible to hope for an increase in private investment through increasing gross domestic product.

Considering the negative effect of uncertainty on private investment, creating a good environment for ensuring investment and decreasing the uncertainty of the investment environment to increase investment, seems essential. Moreover, paying attention to the effect of economic freeing, it is recommended that the government creates a good environment to ease importing and business and economic activities.

Based on this research findings, bank credits have a major effect on private investment and it is possible to use this effect in policies and economic planning. But in fact, this impact implies disorganization of money and capital market in our country, because in developed countries bank credits and loans are not regarded as an affective variable on private investment function. So, it is better to try to make money, financial and stock markets, develop active investment organizations and let the banks choose the projects on which they want to invest according to a real profit-expenditure analysis, to decrease the level to which private investors depend on bank credits, along with the efforts made to increase the credit banks give to the private section. Obviously, creating clear and expanded monetary and financial markets, is followed by the competition among most of the banks and organizations. As a result, rare resources are specified better and the country's economic growth and development would be assisted.

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