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Exports, Government Size and Economic growth: Evidence from Iran as a Developing Oil-based Economy

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Abstract

This paper investigates the short- run and long-run effects of government size and exports on the economic growth of Iran as a developing oil export based economy for the period of 1974 - 2008 using an autoregressive distributed lags (ARDL) framework. A modified form of Feder (1982) and subsequently Ram's (1986) model has been applied to include both government size and exports in growth equation. The findings show that in long run and short run the Armey curve (1995) is valid, indicating that both a very big size and a too small size of government are harmful for growth and government should adjust its size. The results also show that total exports, the amount of oil exports in terms of barrels and oil prices affect economic growth positively and significantly both in short-run and long-run. However, non-oil exports do not have a significant effect on growth in the long run.

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1. Introduction

Iran as an oil-based economy is inclined to an export promotion policy as the fundamental strategy for its economic growth. Oil revenues play strategic roles in the Iranian economy. Holding 10% of the world's total proven oil reserves and as the second largest producer (after Saudi Arabia) within the Organization of Petroleum Exporting Countries[1] (before the recent international sanctions against its oil industry), Iran both affects the international oil market and is broadly affected by it. Iran's economy relies heavily on crude oil export revenues, representing about 80% of total export earnings and, on average, 60% of government revenues in annual budgets[2].

The importance of increasing exports as an engine for economic growth has long been the subject of considerable interest in the economic development and growth literature. The economic growth is an important index for raising the standard of living and increasing the per capita GDP in a country. Export promotion can be considered as a strategy that enables an economy to grow.

Export promotion policy exposes domestic firms to foreign competition. Theoretically, domestic industry achieves better production technology and a higher quality of output. In addition, it tends to reduce its costs and increase its efficiency and competitiveness in the

1.OPEC, 2005

2.Central Bank of Iran, 2008

international market. This view suggests that an increase in productivity provides more efficient use of resources, increases specialization of export products, increases the level of skills in the export sector, and improves overall efficiency. In addition, increased productivity reallocates the economic resources from less productive sectors to more productive ones based on comparative advantage and increases the sales of export products in domestic and foreign markets. (Feder, 1982; Ram, 1985, 1987; Darrat, 1987; Moschos, 1989; Riezman, 1996; Xu, 1996; Giles and Williams, 2000; Abu-Qarn, 2004; AlKhuzaim, 2005).

The export-led growth (ELG) hypothesis has been commonly used to examine the impact of exports on economic growth. Numerous studies support this hypothesis and find evidence that exports have a significant positive relationship with economic growth. (e.g., Emery, 1967; Michalopoulos and Jay, 1973; Michaely, 1977; Balassa, 1978 and 1985; Bhagwati, 1978, Heller and Porter, 1978; Fajana, 1979; Tyler, 1981; Feder, 1982; Kavoussi, 1984, Krueger, 1985, Moschos, 1989; Grossman and Helpman, 1991; Giles and Williams, 2000, Abu-Qarn 2004).

It is highly likely that due to heavy reliance of the government on oil exports revenues in oil exporting economies, the changes in oil export revenues will endogenously affect the size of the government. Therefore, it will be useful we include the government size as a determinant variable in our growth model when we want to investigate the ELG hypothesis in developing oil export based economies, because the changes in government size can influence the process of economic growth in these economies as well. In theory, the relationship between government expenditures and economic growth is ambiguous. “One point of view suggests that a larger government size is likely to be detrimental to efficiency and economic growth because, for example, (i) government operations are often conducted inefficiently, (ii) the regulatory process imposes excessive burdens and costs on the economic system, and (iii) many of government's fiscal and monetary policies tend to distort economic incentives and lower the productivity of the system. At the other extreme, one can identify some points of view that assign to the government a critical role in the process of economic development, and can argue that a larger government size is likely to be a more powerful engine of economic development. This can be because of the (i) role of the government in harmonizing conflicts between private and social interests, (ii) prevention of the country by foreigners, and (iii) securing an increase in productive investment and providing a socially optimal direction for growth and development (Ram, 1986).

Unlike the 1980s, when economists studied whether government's expenditure has negative or positive effect upon economic growth, currently they focus on issues like the optimum size for government and minimizing government interference in the economy. The turning point of such studies is the Curve presented by Richard Armey (1995). This curve contains a nonlinear relationship and the growth equation has a maximum point for the optimal size of government. The Armey Curve shows that in a state of anarchy, output per capita is low. Similarly, where all input and output decisions are made by government, output per capita is likewise low. Where there is a mix of private and government decisions on the allocation of resources, however, output often is larger. The purpose of this paper is to examine the impact of exports and government size on Iran's long-term and short-term economic growth.

The paper modifies Ram's (1986) two sectors production model to include exports as a determinant of economic growth. Furthermore while most of the existing research on the relationship between exports and economic growth consider only total exports, this study will employ disaggregate exports (oil exports and non-oil exports) in addition to total exports. We include the government size in a quadratic form in the growth model to test the validity of Armey curve in Iranian economy and find the optimal size of the government. For the purpose of investigating the existence of long run and short run relationships among exports (both in aggregate and disaggregated forms), government size and economic growth, the bounds testing approach to co-integration and error correction models developed within an autoregressive distributed lags (ARDL) framework is applied to Iranian annual data for the period of 1974 to 2008. More specifically, we test for the ELG hypothesis for Iran as a developing oil export based economy where oil exports comprise the main part of the exports and the economy is heavily depended on oil export revenues. Therefore when oil prices or oil demand increases or decreases the entire economy will be affected.

Section 2 includes a brief review of the previous studies on the relationship between economic growth and both exports and government size. Section 3 reviews exports and government expenditures in Iran; Section 4 discusses about the models and methodologies that we have used in this paper; the empirical results and econometrics estimations are included in section 5, and finally section 6 will discuss the findings and provide some policy recommendations.

2. Literature Review

In this section, we briefly review studies on the relationship between economic growth and both exports and government size.

2.1. Exports and Economic Growth

The relationship between exports and economic growth for various countries has been analyzed theoretically and empirically. Feder (1982) in his study for a sample of 31 semi-industrialised countries finds that the marginal factor productivity in the export sector is higher than in the non-export sector due to international competition and foreign investment. This tends to shift economic resources from the less productive to the more productive sectors leading to higher economic growth. Ram (1985), using the data from 73 less developed countries (LDC) shows that export growth is important for economic growth, both for low-income LDC and middle-income LDC. In addition he concludes that while the importance of exports for economic growth increased everywhere during the 1970s, during the 1960s the impact of exports on growth was smaller in low income LDC than in the middle income LDC. In a subsequent study, Ram (1987) tested the relationship between exports and economic growth for 88 LDCs using both time series and cross-sectional data for two different time periods 1962-1972 and 1973-1982. For the cross sectional study, he sorted the countries by income into a low income group and a middle income group, and then added government size (expenditure) as an explanatory variable. One of the chief advantages of Ram's method was his use of the time series for a large sample size in order to estimate the export-growth linkage in each country. A positive relationship was found to exist between exports and economic growth in both the time series model and the cross-sectional one; additionally, this study showed the important influence of the government on economic growth.

Abu-Qarn and Abu-Bader (2004) examine the relationship between export growth and economic growth for nine Middle East and North Africa (MENA) countries; Algeria, Egypt, Israel, and Morocco, Iran, Jordan, Sudan, Tunisia, Turkey. When they consider total exports, the unidirectional causality runs from exports to GDP only in the case of Iran. Yet when they consider manufactured exports, the results support the ELG hypothesis. The results show that not all exports contribute equally to the GDP. However, the results also support the importance of promoting manufactured exports to boost economic growth in the MENA countries. Alkhuzaim (2005) examines the export-led growth (ELG) hypothesis for the Persian Gulf Cooperation Council (GCC) countries using two models for the time period 1970-2001.The first model is based on Ram’s 1985 model, while the second model is based on Feder’s 1982 model. The results of causality test provide support for the ELG hypothesis in the long run only in the case of Oman, where aggregate exports Granger cause real GDP. The results obtained from investigating disaggregate exports showed that in regard to oil exports, a unidirectional causality from real GDP growth to oil exports was indicated in Kuwait, Saudi Arabia, and the United Arab Emirates while the reverse result was found in Oman. With regard to non-oil exports, the causality tests clearly indicate that causality runs from GDP growth to non-oil exports in the UAE, and reverse causality is found for Oman. Bidirectional causality was found in the long run in Saudi Arabia and Kuwait. Merza (2007), using annual time series data over the period 1970-2004 shows that there is a long-run relationship among oil exports, non-oil exports and economic growth in Kuwaiti economy. The Granger test shows bidirectional causality between oil exports and economic growth, and a unidirectional causality from non-oil exports to economic growth. The causality results are consistent with the results reported by the ECM. He argues that diversification of production and more focus on non-oil exports products may help the economy to benefit from comparative advantage.

2.2. Government Size and Economic Growth

There seems to be no conclusive evidence on the relationship between government size and economic growth. Some economists like, Landau (1983), Engen and Skinner (1991), F¨olster and Henrekson (2001), and Dar and AmirKhalkhali (2002) find a negative relationship between government size and economic growth. According to them, expansion of government size can decrease the return of government expenditure and over-expanding government size will cause a crowding out effect to private investment. When government expenditure is expanding, the government will need more taxes to support these expenditures, but increases in taxes can damage the economy. Moreover, government expenditures can turn into inefficient expenditures which will cause an inappropriate allocation of the resources.

Another group of economists like Ram (1986) and Kormendi and Meguire (1986) find a positive relationship between government size and economic growth. They indicate that government expenditure often provide for the investment of public goods that will make better the investment environment. Moreover, expanding government size provides an insurance function to private property, and public expenditure can encourage private investment, which will cause economic growth.

Vedder and Gallaway (1998) and Sheehey (1993) indicate that the existent inconsistency about the relationship between government size and economic growth is because of the non-linear relationship between government size and economic growth[1]. The existence of a non-linear relationship between government expenditure and economic growth has been first verified in endogenous growth models. Barro (1990) argues that different sizes of government can create two different effects on economic growth. In particular, an increase in taxes reduces growth rate through disincentive effects, but an increase in government spending raises marginal productivity of

1.Sheehey (1993) uses data of across countries and finds that when government size (government consumption expenditure/GDP) is smaller than 15%, government size and economic growth have a positive relationship, but when government size is larger than 15%, the relationship is negative. Giavazzi, Jappelli,&Pagano (2000) indicate the possibility that fiscal policy may have non-linear effects.

capital, which raises growth rate. He indicates that the second force is stronger when the government is small, and the first force becomes stronger when the government is large. Heitger (2001) views increases in government size arising from increased consumption as constraints on growth, while increases in size that arise from government investment should be positive in their effect on growth. He indicates that there are two important reasons for a negative impact of excessive government spending on economic growth. One is the fact that the necessary taxes reduce the incentives to work, to invest and to innovate, and the other fact is that government crowds out more efficient private suppliers.

Armey (1995) argues that without government, a state of anarchy and low levels of output per capita will prevail, because there is no rule of law, and no protection of property rights. Additionally, there is little incentive to save and invest, because the threat of expropriation exists. On the other hand, where all input and output decisions are made by government, output per capita is also low.[1] However, where there is a mix of private and government decisions on the allocation of resources, output should be larger. Armey infers that government size and economic growth have an inverse U shape as Fig. 1 shows.

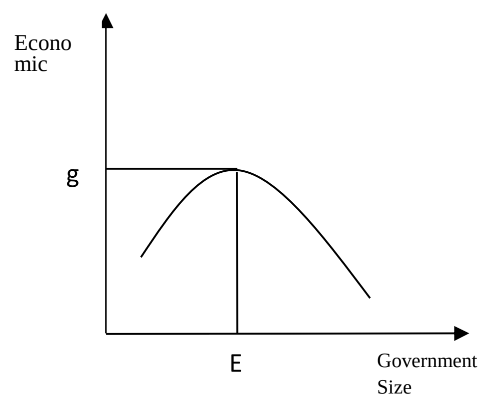

Fig.1 The Armey Curve (Armey, 1995).

1.As Vedder and Gallaway (1998) stress, the monopolisation of the allocation of resources and other economic decisions by government usually does not lead to sustained economic prosperity, as too much government stifles the spirit of enterprise and consequently lowers economic growth. In this context, the revealing evidence should be the experience of former socialist and communist countries in Europe.

Because of the inverse U shape, one can find the optimum government size that promotes the greatest economic growth rates (point E*).

Chao and Grubel (1998) indicate several reasons for the existence of the mentioned inverted U shape curve. First the law of diminishing returns to additional government expenditure exists and the additional withdrawal of resources from the private sector more and more occurs at the cost of projects with ever-higher returns. Second, in order to finance the government expenditure, taxes should be increased, which reduce the private sector's incentives to work, save, invest, and take risks. Third, some of the spending programes can also make disincentive effects if they lower the risk of economic life. [1]These effects change economic behavior of individuals, which decrease the effective supply of labor and entrepreneurship. As Chao and Grubel argue, all these forces reduce economic growth.

1.For instance, social security programes protecting workers from unemployment, illness, and retirement often cause them to change their behavior and reduce work-effort and savings as they are insured.

3. An Overview of Iran's Economy

In this section, we briefly review some features of Iranian exports and government expenditures as components of GDP.

3.1. Exports

Iran's economy relies heavily on crude oil export revenues, representing about 80% of total export earnings. In 2008, Iran exported 2.5 million barrels of oil per day. Iran's net revenues from oil exports totalled $73 billion in that year. Iran exports primarily to Asian and European countries that are a part of the OECD. Top export markets for Iran are Japan, China, India, South Korea, and Italy.

While oil export revenues have grown in past years due to increases in oil prices, Iran's crude oil output has remained almost flat, Iran faces with some problems for expanding her oil production. The oil industry faces a high rate of natural decline of mature oil fields and low oil recovery rates. It is believed that millions of barrels of oil are lost annually because of damage to reservoirs and these natural declines. Iran also has been plagued by aging infrastructure and old technology. Structural upgrades and access to new technologies, such as natural gas injections and other enhanced oil recovery efforts, have been limited by a lack of investment partly due to U.S. sanctions.[1] Despite its vast gas resources, Iran was a net importer of natural gas as late as 2005.

Non-oil exports peaked in 1994/95, but, at US$4.5bn, they still amounted to only 30% of the value of oil revenue. The imposition of the overvalued "exchange rate" in 1995 undermined the competitive position of nonoil exporters, whose productive capacity was also damaged by tight controls on imports. As a result, non-oil export earnings fell over the following years, reaching a low of just US$2.9bn in 1997/98. Earnings have since picked up as the exchange rate regime has been reformed, reaching US$6.8bn in 2003/04. The sector is expected to show further steady growth, particularly as petrochemicals and other industrial exports grow, displacing traditional goods, such as carpets, as the main non-oil revenue earners. This will add some stability to overall export earnings, although crude oil revenue

1. EIA, "Country Analysis Briefs: Iran," updated January 2010.

Table1 Main Composition of Exports (% of Total Exports)

Year	2003	2004	2005	2006	2007
Exports fob					
Oil & gas	80.74	82.86	83.38	82.23	83.94
Petrochemicals	4.08	3.95	4.24	3.76	3.03
Carpets	1.58	1.11	0.72	0.54	0.44
Fresh & dried fruits	2.44	1.63	1.86	2.06	2.13
Others	11.40	10.48	9.83	11.38	10.44

Source: Central Bank of Iran and Author's Calculations

will remain the key component, and therefore volatility will remain a feature of Iran's export profile.[1]

3.2. Government Expenditures

The petrodollars are the main source of financing government expenditures and imports of products. Oil revenue provides between 40% and 80% of government revenue. Fig. 2 shows the proportions of government revenues from oil, taxes and other resources with respect to total government revenue.

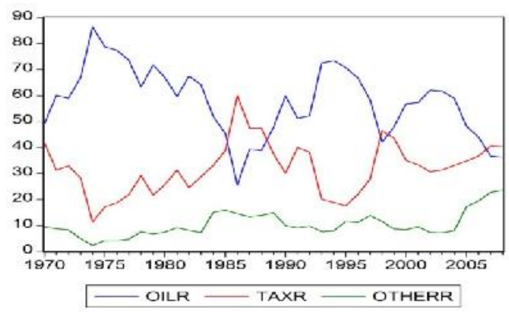

Fig.2. Proportions of Government Revenues from Oil (OILR), Taxes (TAXR) and Other Resources (OTHERR). (**Source:** CBI (2011) and Author's Calculations)

The Iranian government spending can be divided into current and capital expenditures. The current expenditures are for maintaining the current capacities of government administration while the capital expenditures aim to expand the current capacities of the government. Current expenditures themselves are

[1]Economist Intelligence Unit, 2008, country profile.

divided into expenditures on goods and services such as wage bills of government employees, employer contribution including social security and pensions, interest payment, subsidies and all other payments which relate to the management of government functions in military, health, education, cultural, and social activities.

The current expenditures are inflexible and sticky downward, because they are needed to manage and maintain new investments which are financed by capital expenditures. In the case of positive oil markets, the current expenditures also go up because of the larger size of government. When oil prices go down, however, the government is not able to reduce the size of its activities immediately, leading to a significant budget deficit. By contrast, capital or development expenditures are sensitive to fluctuation of oil export revenues. The Iranian government in development plans wanted to reduce the dependence of current expenditures to oil revenues by financing these costs through nonoil sources such as taxes. But because of the windfall oil revenues, there were not sufficient incentives for doing that (Farzanegan, 2011). Fig. 3 shows total, current and capital expenditures of the Iranian government divided by GDP.

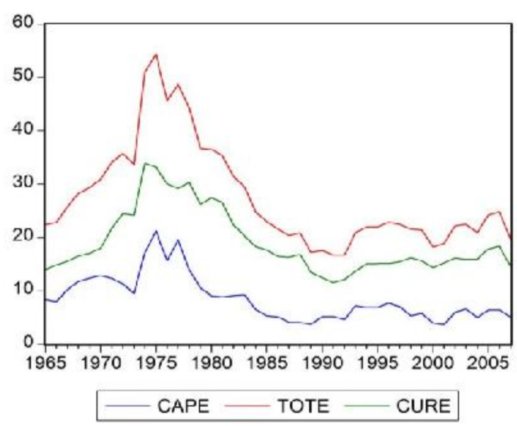

Fig.3. Ratios of Total (TOTE), Current (CURE) and Capital (CAPE) Expenditures with Respect to GDP. (**Source**: CBI (2011) and Author's Calculations).

4. Methodology and Modeling

4.1. Model Specification

Following Feder (1982) and subsequently to Ram (1986), we assume that the economy consists of two broad sectors, the government sector (G) and the non-government sector(C). Moreover according to another study from Ram (1985), we take the most popular model of the time and apply it to the relationship between exports and economic growth. Like him we treat exports as a type of indirect input.

If output in each sector of the economy depends on the inputs of labor (L), capital (K), and exports(X) and if, in addition, output ("size") of the government sector exercises an "externality" effect on output in the other sector(C), production functions for these two sectors can be written as

$$C=C(L_c,K_c,X_c,G), \quad (1)$$

$$G=G(L_g,K_g,X_g), \quad (2)$$

Where subscripts denote sectoral inputs. If the total inputs are given,

$$L_c+L_g=L, \quad (3a)$$

$$K_c+K_g=K, \quad (3b)$$

$$X_c+X_g=X. \quad (3c)$$

The total output (Y) is just the sum of outputs in the two sectors, and thus

$$C+G=Y. \quad (3d)$$

Following Ram (1986), we assume that the relative factor productivity in the two sectors differ; in particular,

$$G_L/C_L= G_K/C_K= G_X/C_X= (1 +\delta) \quad (4)$$

where uppercase subscripts denote partial derivatives of the functions with respect to subscripted input. The sign of δ shows which sector has higher marginal factor productivity, and a positive δ implies higher input productivity in the government sector. By manipulating the production functions, and using

(3) and (4), the following approximation for an aggregate growth equation can be derived:

$$\dot{Y} = \alpha \dot{L} + \beta \dot{K} + \gamma \dot{X} + [(\delta/(1+\delta)) - \theta]\dot{G}(G/Y) + \theta \dot{G}, \quad (5)$$

or, writing δ' for δ/(1 + δ),

$$\dot{Y} = \alpha \dot{L} + \beta \dot{K} + \gamma \dot{X} + (\delta' - \theta)\dot{G}(G/Y) + \theta \dot{G}, \quad (5')$$

where a dot over the variable indicates its rate of growth. In this case, α is the elasticity of nongovernment output C with respect to L; β is the elasticity of non-government output C with respect to K, γ is the elasticity of non-government output C with respect to X; and θ equals $C_G(G/C)$, and is the elasticity of non-government output with respect to G.[1]

If θ is believed to be a constant parameter across the sample observations, equation (5) provides an econometric specification that can easily yield estimates of δ and θ. As in Ram (1986) and for the purpose of this study, we assume δ'=θ, so (5) changes to

$$\dot{Y} = \alpha \dot{L} + \beta \dot{K} + \gamma \dot{X} + \theta \dot{G} \quad (6)$$

In (6), as in (5), θ gives only the externality effect of government size, and not the total effect. However, since (6) is premised on δ'=θ, estimate of θ also yields an estimate of δ'(and of δ), and therefore of the total effect, provided the constraint δ'=θ is valid. An important point to note is that collinearity between G and $\dot{G}(G/Y)$ might lower precision in the estimation of (5), so it is important that (6) does not have that drawback.[2]

Moreover, as the studies by Rubinson (1977) and Landau (1983)

1. More details about the derivations, and the interpretation of the models and the parameters, are in Feder (pp. 61-67).

2.More details about this discussion, and the interpretation of the models and the parameters, are in Ram(1986). Also Hosseini-Nasab (2003) in another study develops a framework, which provides the formal justification for the need to include higher education variables among the sources of economic growth.

indicate, specifications that include a regressor like G/ Y seem to be widely used for assessing the impact of government size on economic growth or development. Therefore, we use the following equation

$$\dot{Y} = \sim \dot{L} + \quad \dot{K} + \text{¥} \dot{X} + \text{ª}(G/Y) \qquad (7)$$

Or writing (g) for (G/Y);

$$\dot{Y} = \sim \dot{L} + \quad \dot{K} + \text{¥} \dot{X} + \text{ª} g \qquad (7')$$

According to the previous discussions, we include the government size (g=G/Y) inside the equation (7) in a quadratic form (as suggested by Armey (1995) and others). So, we use the following equation instead of equation $(7')$:

$$\dot{Y} = \sim_0 + \sim_1 \dot{L} + \sim_2 \dot{K} + \sim_3 \dot{X} + \sim_4 g + \sim_5 g^2 \qquad (8)$$

where α_0 is the intercept; (g=G/Y) is the relative size of government defined as the ratio of government expenditures to gross domestic product, and (g^2) is the square of g.

The positive sign on the linear term, g, is for displaying the beneficial effects of government spending on output, while the negative sign for the squared term, g^2 ,indicates that the variable measures any adverse effects which is caused by increases in government size.

According to Alkhuzaim (2005), both aggregate exports and disaggregated exports will be examined in this study. We will analyze the effect of disaggregate exports on the GDP by dividing exports into two categories: oil and non-oil exports. The following equations will be used:

$$\dot{Y} = {}_0 + {}_1 \dot{L} + {}_2 \dot{K} + {}_3 \dot{OX} + {}_4 g + {}_5 g^2 \qquad (9)$$

$$\dot{Y} = \text{¥}_0 + \text{¥}_1 \dot{L} + \text{¥}_2 \dot{K} + \text{¥}_3 \dot{NX} + \text{¥}_4 g + \text{¥}_5 g^2 \qquad (10)$$

where (OX) represents the export of oil products and (NX) represents the export of non-oil products. Oil export growth rate $(\dot{OX})$ is a function of the oil price growth rate $(\dot{OP})$ and the growth rate of the amount of oil exports in terms of barrels $(B\dot{O}X)$. Therefore:

$$\dot{O}X = B\dot{O}X + \dot{O}P \qquad (11)$$

By substituting equation (11) in equation (10), we may write the following equation:

$$\dot{Y} = a_0 + a_1 \dot{L} + a_2 \dot{K} + a_3 B\dot{O}X + a_4 \dot{O}P + a_5 g + a_6 g^2 \qquad (12)$$

4.2.The ARDL Cointegration Approach

In this paper the autoregressive distributed lags (ARDL) method developed by Pesaran, Shin, and mith (2001) will be used to establish cointegration relationships among the variables using the Microfit 4.0 for Windows software (Pesaran & Pesaran, 1997).

The ARDL method involves two steps. First, the existence of a long-run relationship among the variables in the model is determined. At this stage, the calculated F-statistic is compared with the critical value tabulated by Pesaran et al. (2001). The null hypothesis of no cointegration will be rejected if the calculated F-statistic is greater than the upper bound. If the computed F-statistic falls below the lower bound, then the null hypothesis of no cointegration can not be rejected. Finally, the result is inclusive if it is between the lower and the upper bound.

Next we estimate the long-run coefficients of the ARDL model. One of the more important issues in applying ARDL is choosing the order of the distributed lag function. Pesaran and Smith (1998) argue that the Schwarz–Bayesian criterion (SBC) should be used in preference to other model specification criteria because it often is more parsimonious: our small data sample in the current study further supports this point.

The determination of an appropriate and correctly specified

ARDL model is based on test criteria such as the Schwarz–Bayesian criterion (SBC), adjusted R^2 and various diagnostic tests for econometric problems. The unrestricted error correction model is directly derived from the ARDL model. The ARDL model is a vector autoregressive (VAR) model. Hence, the unrestricted error correction model is a re-parameterisation of the VAR model (Lewis & MacDonald, 2002; Pesaran et al., 2001).

In addition, we use the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of the recursive residuals (CUSUMQ) tests to consider the stability of the models.

4.3. Data, Model Forms and Hypo theses

We use data from 1973 to 2008. The data has been compiled from the Central Bank of Iran (CBI), and the Energy Information Administration (EIA). In this paper, instead of a growth rate of the variables, the logarithms of level of the variables have been used. The regression coefficient on a logarithmic variable can be interpreted as the elasticity. Finally, we estimate the following equations separately (L represents the Log):

Model (I): (13)

$$LY = \beta_0 + \beta_1 LL + \beta_2 LK + \beta_3 LTX + \beta_4 Lg + \beta_5 (Lg)^2 + \beta_6 D80 + \beta_7 D88$$

Model (II): (14)

$$LY = \alpha_0 + \alpha_1 LL + \alpha_2 LK + \alpha_3 LBOX + \alpha_4 LOP + \alpha_5 Lg + \alpha_6 (Lg)^2 + \alpha_7 D80 + \alpha_8 D88$$

Model (III): (15)

$$LY = \gamma_0 + \gamma_1 LL + \gamma_2 LK + \gamma_3 LNX + \gamma_4 Lg + \gamma_5 (Lg)^2 + \gamma_6 D80 + \gamma_7 D88$$

In the first equation, we have used the log of total exports (LTX), while in the second equation the log of oil prices (LOP) and the log of oil exports in terms of barrels (LBOX) have been used, and finally in the third equation, we have applied the log of non-oil exports LNX. The dependent variable is logarithm of real gross domestic product (LY) as a proxy for economic growth.

Export is said to be an important catalyst in improving the economic growth. Balassa (1985) argued that in general the production of export goods is focused on those economic sectors which are already more efficient. Therefore, export expansion helps to concentrate investment in these sectors, which in turn increase the overall total productivity of the economy. Thus, export growth may also release the foreign exchange restriction, allowing capital goods to be imported to boost economic growth. So a positive relationship between exports and economic growth in each of the three models is expected, (α_3 ,λ_3,γ_3>0).

The proxy used for oil prices is the price of light Iranian oil (LOP), which is expected to have positive effect on economic growth, (λ_4>0).

The relative size of government (g=G/Y) is defined as the ratio of government expenditures to gross domestic product. According to Armey (1995) and others, it is hypothesized that the impact of government size on economic growth follows a quadratic function with an inverted U-shape ;$(Lg)^2$ is the square of (Lg). Therefore it is expected that (Lg) to have positive impact on economic growth and $(Lg)^2$ to have negative impact on economic growth, (α_4,λ_5,γ_4>0, α_5,λ_6,γ_5<0).

Labor force (LL) is considered to play a vital role in export-growth relationship. According to the neoclassical theory, as inputs (labor and capital) increases, total output will increase. It is therefore expected that labor force will have a positive relationship with economic growth, (α_1,λ_1,γ_1>0)[1].

1. In this study active population has been used as a proxy for labor force. Using the number of employed persons may produce more precise results than active population. National Accounts of

Net capital stock (LK) has been used as a proxy for capital. The neoclassical theory specifies that an increase in capital as an input in production leads to increases in output, ($\alpha_2,\lambda_2,\gamma_2>0$).

To capture the effect of the Iraq /Iran war period (1980-1988) as an important structural break in Iran's economy two intercept shift dummy variables (D80) and (D88) have been included in the model with D80 equal to 1 if (t>1980) and zero otherwise. D88 is equal to 1 if (t>1988) and zero otherwise. After the Islamic revolution of Iran and specially after the starting of Iraq/Iran war, the Iranian economy was faced with some serious restrictions, which seem to have affected the economic growth negatively, ($\alpha_6,\lambda_7,\gamma_6<0$). On the other hand, after the end of the war, Iran started some programs to reconstruct the ruins which had remained from the war. We expect that they have affected the growth positively ($\alpha_7,\lambda_8,\gamma_7>0$).

Iran (produced by the Central Bank of Iran) only present figures on active population.

5. Empirical Results

5.1. Unit Root Test

Even though the ARDL framework does not require pre-testing variables to be done, the unit root test could convince us whether or not the ARDL model should be used. We use the ADF test (Dickey and Fuller, 1981) in order to establish the order of integration of the variables in our study. Our findings indicate that all of the variables are non-stationary in their level at ten percent, five percent and one percent significance levels. The null hypothesis of a unit root in first difference is rejected for these variables at 5% level of significance. Then they are integrated of order one, i.e. I (1).

Table 2 ADF Unit Root Test

Variables	Level	First difference
LY	-1.104	-3.47**
LL	-0.504	-3.047**
LK	0.396	-3.106**
LTX	-1.044	-7.34***
LBOX	-2.49	-4.57***
LNX	0.656	-4.53***
LOP	-2.244	-6.37***
Lg	-1.01	-5.35***
$(Lg)^2$	1.01	-5.35***

***: Null hypothesis rejection at 1%

**: Null hypothesis rejection at 5%

5.2. Estimation of the Model (I)

We use the total exports (LTX) in growth equation. In order to obtain robust results, the ARDL approach has been utilized to establish the existence of long-run and short-run relationships. The maximum order of the lags in the ARDL model (I) has been chosen 1. The error correction version of the ARDL model (I) is given by

$$DLY = a_0 + b_1 DLY_{t-1} + b_2 DLL_{t-1} + b_3 DLK_{t-1} + b_4 DLTX_{t-1} + b_5 DLg_{t-1} + b_6 D(Lg)^2_{t-1} + \text{¢}_1 LY_{t-1} + \text{¢}_2 LL_{t-1} + \text{¢}_3 LK_{t-1} + \text{¢}_4 LTX_{t-1} + \text{¢}_5 Lg_{t-1} + \text{¢}_6 (Lg)^2_{t-1} + u_t \quad (16)$$

The hypothesis that we are testing is 'non-existence of the long-run relationship 'defined by

$$H_0 : \text{¢}_1 = \text{¢}_2 = \text{¢}_3 = \text{¢}_4 = \text{¢}_5 = \text{¢}_6 = 0$$

Against

$$H_1 : \text{¢}_1 \neq 0, \text{¢}_2 \neq 0, \text{¢}_3 \neq 0, \text{¢}_4 \neq 0, \text{¢}_5 \neq 0, \text{¢}_6 \neq 0$$

The F-statistics for testing the joint null hypothesis that coefficients of these level variables are zero (namely there exists no long-run relationship between them) by assuming each of the variables as the dependent variable reveals that there exists a long-run relationship between our variables[1] and the variables LL, LK, LTX, Lg and $(Lg)^2$, can be treated as the long-run forcing variables for the explanation of LY.

The results of estimated optimal ARDL growth model are shown in Table3. The optimal number of lags for each of the variables is shown as

1. The results of bound tests are available upon request.

ARDL (1,0,1,1,0,0). Based on the various diagnostic tests, this model was good. There was absence of significant autocorrelation or heteroscedasticity based on various test results, which are also reported in Table 3. The error term was normally distributed based on the Jarque–Bera test thus making the standard t and F tests of the estimated equation theoretically valid. The power of the model was high given the very high values of the R^2, adjusted R^2, and F value.

Table 3 Results of Estimated Optimal ARDL Growth Model (I) Based on Schwarz–Bayesian Criterion

ARDL(1,0,1,1,0,0) Based on Schwarz Bayesian Criterion Dependent Variable:LY			
Regressor	**Coefficient**	**T-Ratio**	**Prob**
LY(-1)	0.507	3.88	0.001
LL LK	0.24 1.13	1.73 3.22	0.098 0.004
LK(-1)	-0.99	-3.83	0.001
LTX	0.054	2.48	0.021
LTX(-1)	0.040	1.71	0.102
Lg	1.3	2.06	0.051
$(Lg)^2$	-0.202	-2.07	0.05
Intercept	-1.21	-1.307	0.205
D80	-0.009	-0.28	0.78
D88	0.04	1.67	0.11
R^2	0.99	Adjusted R^2	0.99
F-stat	440.34		
Significance level of autocorrelation test based on Lagrange multiplier (LM) test Significance level of Ramsey's reset test of functional form			0.54 0.55
Significance level of Jarque-Bera test of normality of the error term			0.22
Significance level of the LM heteroscedasticity test			0.074

Estimated Optimal ARDL Growth Model (I) Based on Schwarz–Bayesian Criterion

The estimated long-run relationships derived from the optimal ARDL model are reported in Table 4. The results show that coefficients for all of the variables have the correct signs as predicted by theory and hypothesis. These results indicated that LL, LTX, Lg ,$(Lg)^2$, were statistically significant in influencing LY at the 10% level of significance. Economic growth has been influenced by total exports, strongly. The estimated coefficient of total export entails that 10 percent increase in total export will lead to 1.9 percent increase in real GDP in the long term.

Both government size variables Lg and $(Lg)^2$ are significant and have the correct signs (according to Armey curve) confirming the hypothesised averted U-shape of government size impact on economic growth. Very high government sizes lead to lower economic growth while moderate government sizes leads to increased growth. Differentiating the equation with respect to Lg, the optimal government size based on maximizing economic growth, was determined as 24.41. Total government expenditures of the order of 24.41% of GDP maximize economic growth, ceteris paribus.

$$\left(\frac{\partial LY}{\partial Lg}\right)_{long-run} = 0 \Rightarrow Lg = 3.195 \Rightarrow g = (G/Y) = 24.41$$

This figure is a little bigger than the size of government in some ending years of the period of this study, but it is smaller than the average amount of government size over the period of my study which is equal to 27.65. According to the figure 3, Iranian government has experienced larger sizes in 1970’s and 1980’s but after that there were some attempts to reduce the government size.

The labor force and net-capital account variables influenced economic growth in the expected positive direction. However, parameter estimate of LK was not statistically significant in the long-run, may be due to the limited sample size of the data.

Table 4. Results of Estimated Long-run Relationship Derived from Optimal ARDL Growth Model (I)

Regressor	Coefficient	T-Ratio	Prob
LL	0.48	1.95	0.06
LK	0.29	1.083	0.29
LTX	0.19	2.52	0.019*
Lg	2.62	1.86	0.076
$(Lg)^2$	-0.41	-1.85	0.078
Intercept	-2.47	-1.54	0.137
D80	-0.018	-0.29	0.77
D88	0.085	1.51	0.144

For D80 and D88 the coefficients have their expected signs but they are not significant. The estimated error correction model selected using SBC is given in table 5. With the exception of the coefficients of D80 all the other coefficients are statistically significant or closely to be significant (coefficients of (dLL) and (dD88)). Unlike the long-run in the short- run, the capital (LK) has significantly affected the economic growth. The magnitude of impacts of the variables which are related to government size (Lg and $(Lg)^2$) and also total exports(LTX),in the long-run are much higher than those of the short-run impacts, indicating that the impacts of change in government size and total exports are much stronger in the long-run.

The error correction term indicates the speed of the equilibrium restoring adjustment in the dynamic model. Bannerjee et al (1998) hold that a highly significant error correction term is further proof of the existence of a stable long-term relationship.

The error correction coefficient, estimated at -0.49 is statistically highly significant, has a correct sign and suggests a relatively high speed of convergence to equilibrium (suggesting that deviation from the long-term GDP path is corrected by 0.49 percent over the following year).

Table 5 Error Correction Representation for Selected ARDL-Model(I)

ARDL (1,0,1,1,0,0) Based on Schwarz Bayesian Criterion Dependent Variable: dLY			
Variables	**Coefficients**	**t-Values**	**Prob-Values**
dLL	0.24	1.73	0.097
dLK	1.13	3.22	0.004
dLTX	0.054	2.48	0.021
dLg	1.3	2.06	0.05
$d(Lg)^2$	-0.202	-2.07	0.049
d(INTP)	-1.21	-1.31	0.204
dD80	-0.009	-0.28	0.78
dD88	0.042	1.67	0.107
ecm(-1)	-0.49	-3.76	0.001
R-Squared= 0.85		Akaike Info Criterion= 16.446	
Adjusted R^2= 0.78		Schwarz Bayesian Criterion=58.54	
Durbin-Watson Stat= 1.84		F- Statistic = 15.38	

The underlying ARDL equation also passes all the diagnostic tests that are automatically computed by Microfit. The optimum government size in the short run for the model(I) can be calculated as following:

$$(\frac{\partial LY}{\partial Lg})_{short-run} = 0 \Rightarrow Lg = 3.2178 \Rightarrow g = (G/Y) = 24.97$$

The comparison of short-run and long-run results for the optimum size of the government indicates that in the long run the size of the government should be reduced.

The cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of the recursive residuals (CUSUMSQ) tests indicate the absence of any instability of the coefficients during the investigated period[1].

5.3. Estimation of the Model (II)

In the model (II), we use the oil prices (LOP) and the amount of oil exports in terms of barrels (LBOX). We choose 2 as the maximum order of lags in the ARDL model. The error correction version of the ARDL model in our variables is given by

$$DLY_t = a_0 + \sum_{i=1}^{2} b_i DLY_{t-i} + \sum_{i=1}^{2} c_i DLL_{t-i} + \sum_{i=1}^{2} d_i DLK_{t-i} + \sum_{i=1}^{2} e_i DLBOX_{t-i} + \sum_{i=1}^{2} f_i DLOP_{t-i} + \sum_{i=1}^{2} h_i DLg_{t-i} + \sum_{i=1}^{2} m_i D(Lg)^2_{t-i} + ¢_1 LY_{t-1} + ¢_2 LL_{t-1} + ¢_3 LK_{t-1} + ¢_4 LBOX_{t-1} + ¢_5 LOP_{t-1} + ¢_6 Lg_{t-1} + ¢_7 (Lg)^2_{t-1} + u_t \quad (17)$$

At the first step the null hypothesis of 'non-existence of the long-run relationship' will be tested which is defined by

$$H_0 : ¢_1 = ¢_2 = ¢_3 = ¢_4 = ¢_5 = ¢_6 = ¢_7 = 0$$

Against

$$H_1 : ¢_1 \neq 0, ¢_2 \neq 0, ¢_3 \neq 0, ¢_4 \neq 0, ¢_5 \neq 0, ¢_6 \neq 0, ¢_7 \neq 0$$

The calculated F-statistics for the cointegration test with considering each of the variables as the dependent variable rejects the null hypothesis of no cointegration at 5% significance level[2].

The optimal number of lags for each of the variables, based on the Schwarz–Bayesian criterion is determined as ARDL (1,0,1,0,0,0,0). Based on various diagnostic tests, this model is good[3].

Table 6 shows the long-run coefficients of the variables under investigation. All of the variables have their expected signs. The variables LK, LBOX, LOP, Lg, $(Lg)^2$, D80 and D88 are statistically significant in influencing LY in 5%

1. The related plots are available upon request.

2. The results are available upon request.

3. The results of estimated optimal ARDL for model (II) are available upon request.

level of significance. As expected for Iran, economic growth is strongly influenced by oil prices and real amount of oil exports in terms of barrels. The estimated coefficient of oil prices and oil exports in terms of barrels entail that 10 percent increase in oil prices and oil-exports in terms of barrels will respectively lead to 1.06 and 1.27 percent increase in real GDP in long term. These imply that both increases in oil prices and improvement of the ability of economy for exporting more oil barrels can cause positive and significant effects on Iranian economic growth.

Table 6 Results of Estimated Long-run Relationship Derived from the Optimal ARDL Growth Model (II)

Regressor	**Coefficient**	**T-Ratio**	**Prob**
LL	0.068	0.233	0.817
LK	0.79	3.34	0.003*
LBOX	0.127	2.83	0.01*
LOP	0.106	2.49	0.021*
Lg	3.66	2.83	0.01*
(Lg)2	-0.58	-2.82	0.01*
Intercept	-6.24	-3.94	0.001*
D80	-0.13	-2.25	0.035*
D88	0.15	2.75	0.012*

Lg has positive sign and $(Lg)^2$ has negative sign, confirming the hypothesis averted U-shape form impact of government size on economic growth. It implies that very high government sizes and very small government sizes lead to negative economic growth while moderate government sizes lead to positive growth. Optimal government size based on maximizing economic growth is determined as 23.44, which is very close to the figure we calculated for model (I). Probably this is because the oil exports comprise a big portion of Iranian total exports, so by using oil exports instead of total exports, we could obtain close amounts for the optimal size of government. Therefore total government expenditures of the order of 23.44% of GDP in the model (II) maximizes economic growth, ceteris paribus.

$$(\frac{\partial LY}{\partial Lg})_{long-run} = 0 \Rightarrow Lg = 3.15 \Rightarrow g = (G/Y) = 23.441$$

The labor force and net-capital stock variables influenced economic growth in the expected positive direction. The parameter estimate of LL was not statistically significant in the long-run, and regarding to very small amount of its coefficient, maybe this can be attributed to the low productivity of labor force in Iran or the limited sample size of the data. According to the long-run results, 10% increase in net-capital stock has led to 7.9 percent increase in real GDP. It implies that attracting both foreign and domestic investment for developing the key industries can be an important factor for fuelling the economic growth in Iran. The negative coefficient of D80 and positive coefficient of D88 are strongly significant. This implies that the 8 year's war with Iraq has hampered economic growth, while stopping the war and starting some economic programs to revive the economy have affected the growth positively.

The results of the error correction model in table 11 show that all of the coefficients have the expected signs. Moreover, except dLL, other variables are statistically significant. The magnitude of impacts of Lg, $(Lg)^2$ and also oil price(LOP) and oil exports amount (LBOX), in the long-run are much higher than those of the short-run impacts, indicating that the impacts of change in government size, oil prices and mount of oil exports are much stronger in the long-run.

We apply a number of diagnostic tests to the ECM, finding no evidence of serial correlation, heteroskedasticity and ARCH (Autoregressive Conditional Heteroskedasticity) effect in the disturbances. The model also passes the Jarque-Bera normality test which suggests that the errors are normally distributed.

Table 7. Error Correction Representation for Selected ARDL-Model (II)

ARDL (1,0,1,0,0,0,0) based on Schwarz Bayesian Criterion Dependent ariable: dLY

Variables	Coefficients	t-Values	Prob-Values
dLL	0.037	0.23	0.82
dLK	1.6	5.183	0.000
dLBOX	0.07	3.34	0.003
dLOP	0.057	2.93	0.008
dLg	1.97	3.24	0.004
$d(Lg)^2$	-0.31	-3.27	0.004
d(INTP)	-3.36	-3.56	0.002
dD80	-0.068	-2.17	0.041
dD88	0.08	3.39	0.003
ecm(-1)	-0.54	-5.06	0.000
R-Squared= 0.87		Akaike Info Criterion= 68.39	
Adjusted R2= 0.81		Schwarz Bayesian Criterion=60.34	
Durbin-Watson Stat= 2.4		F- Statistic= 15.58	

The error correction coefficient in our results is negative and highly significant. The coefficient of -0.54 indicates a relatively high rate of convergence to equilibrium, which implies that deviation from the long-term equilibrium is corrected by 54% over each year.

In addition, the optimum government size for the model (II) in the short run obtains as following:

$$\left(\frac{\partial LY}{\partial Lg}\right)_{short-run} = 0 \Rightarrow Lg = 3.177 \Rightarrow g = (G/Y) = 23.984$$

The comparison of the optimum government size in short run and long run for model (II), shows that in the long run the size of government should be reduced. Moreover, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMQ) are within the 5% significance lines, which imply to the in-sample stability of the model[1].

5.4. Estimation of the Model (III)

In the model (III), we use the non-oil exports as discussed before. The maximum order of lags in the ARDL model has been selected 2. The error correction version of the ARDL model in our variables is given by

$$DLY = a_0 + \sum_{i=1}^{2} b_i DLY_{t-i} + \sum_{i=1}^{2} c_i DLL_{t-i} + \sum_{i=1}^{2} d_i DLK_{t-i} + \sum_{i=1}^{2} e_i DLNX_{t-i} + \sum_{i=1}^{2} h_i DLg_{t-i} + \sum_{i=1}^{2} m_i D(Lg)^2_{t-i} +$$
$$\text{¢}_1 LY_{t-1} + \text{¢}_2 LL_{t-1} + \text{¢}_3 LK_{t-1} + \text{¢}_4 LBOX_{t-1} + \text{¢}_5 LOP_{t-1} + \text{¢}_6 Lg_{t-1} + \text{¢}_7 (Lg)^2_{t-1} + u_t$$

(18)

The calculated F-statistics for the cointegration test with considering each of the variables as the dependent variable indicate that the null hypothesis of no cointegration is rejected at 5%.[2]

The results of estimated optimal ARDL growth model show that the optimal number of lags for each of the variables is shown as ARDL (1,0,1,1,2,0). Based on the various diagnostic tests, this model was better[3].

The long-run coefficients of the variables are shown in table 8. Except D80 which has a positive but insignificant coefficient all variables have their expected signs. These results indicated that LK, Lg ,$(Lg)^2$ and D88 were statistically significant in influencing LY in 5% level of significance. The coefficient of non-oil exports is both small and insignificant and it can attributed to this fact that the amount of Iranian

1 The plots are available upon request.

[2] The results are available upon request.

[3] The results of estimated optimal ARDL for model (III) are available upon request.

non-oil exports are negligible in comparison with its oil exports and non-oil exports could not affect the growth significantly in long run.

Table 8. Results of Estimated Long-run Relationship Derived from Optimal ARDL Growth Model (III)

Regressor	Coefficient	T-Ratio	Prob
LL	0.031	0.104	0.918
LK	0.84	4.15	0.001*
LNX	0.035	0.84	0.41
Lg	2.71	2.25	0.036*
$(Lg)^2$	-0.39	-2.08	0.051
Intercept	-4.65	-2.55	0.02*
D80	0.059	0.78	0.44
D88	0.173	2.55	0.019*

The coefficients for Lg and $(Lg)^2$, have correct signs as has been hypothesized by Armey and others. Moreover they are statistically significant. In the model (III), the optimal amount of government size has been obtained equal to

$$\left(\frac{\partial LY}{\partial Lg}\right)_{long-run} = 0 \Rightarrow Lg = 3.45 \Rightarrow g = (G/Y) = 31.5$$

This amount is bigger than the average amount of the government size over the period of our study which was equal to 27.65.

This relatively high level for the optimal government size can imply that without oil revenues, Iranian government will need to increase its expenditures to compensate the negative effects of the lack of oil exports on GDP. Without the oil revenues the Iranian government should invest in other sectors of the economy to create new resources for its revenues and this can lead to the larger size of the government.

The calculated optimal size of government in model (III) (without oil exports) cannot be reliable for the Iranian oil based economy, although the estimations for the third model still confirm the hypothesized quadratic effect of government size on economic growth.

The results of the ECM for the third model are presented in table 9. Except for dD80, all of the other coefficients have their correct expected signs. Most of the coefficients in the short run are significant, except for dLL and dD80. Unlike the long-run, in the short-run non-oil exports have affected the economic growth significantly. The magnitude of impacts of the variables which are related to government size (Lg and $(Lg)^2$) in the short-run are much smaller than that of the long-run impact, indicating that the impact of change in government size is much stronger in the long-run.

Table 9 Error Correction Representation for Selected ARDL-Model (III)

ARDL (1,0,1,1,2,0) Based on Schwarz Bayesian Criterion Depende			
Variables	**Coefficients**	**t-Values**	**Prob-Values**
dLL	0.018	0.104	0.92
dLK	1.93	5.64	0.000
dLNX	0.083	2.57	0.017
dLg	1.49	2.29	0.032
dLg1	-0.16	-2.03	0.054
$d(Lg)^2$	-0.23	-2.27	0.033
d(INTP)	-2.77	-2.72	0.012
dD80	0.035	0.78	0.44
dD88	0.102	3.63	0.001
ecm(-1)	-0.59	-4.28	0.000
R-Squared = 0.86		Akaike Info Criterion = 65.29	
Adjusted R^2 = 0.77		Schwarz Bayesian Criterion = 55.76	
Durbin-Watson Stat = 2.4		F- Statistic = 13.019	

Also the lagged error term (ecm(-1)) in model(III) is negative and highly significant. The coefficient of -0.59 indicates a high rate of convergence to equilibrium.

The optimum size of the government in short run for the model(III) is as following:

$$(\frac{\partial LY}{\partial Lg})_{short-run} = 0 \Rightarrow Lg = 3.239 \Rightarrow g = (G/Y) = 25.508$$

The small optimal size of the government in short run compared with long-run for model(III), indicates that without oil exports, Iranian government has to develop the other sources of revenues (such as taxes) to finance its expenditures and this can lead to a bigger size of the government in long-run.

In addition the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMQ) point to the in-sample stability of the model[1].

6. Discussion and Conclusion

In this study, we use an ARDL framework to investigate the impacts of exports and government size (in addition to labor and capital) on the long-run and short-run growth of Iranian economy. In particular considering the special characteristics of developing oil export based economies, which make them heavily dependent on oil export revenues, we include both government size and exports in our growth model. We also include government size in a quadratic form in growth model to test the validity of Armey curve in Iranian economy.

Moreover we want to investigate the effects of aggregate exports and disaggregated exports (oil exports and non-oil exports) on economic growth. As a result we have three models to examine. The differences of these models are due to the proxies which we have used for

1. The plots are available upon request.

exports in each model. Total exports, oil exports and non-oil exports have been used respectively in the first, second and third models.

The predictions of Armey curve in Iranian economy both in long run and short run is verified. According to the coefficients which are related to government size, all of the models show that the effects of government size on Iranian economic growth in long-run are stronger than short-run. The optimum sizes of government in long run are smaller than those in short-run (for the first and second models), implying that in long-run the size of the government should be reduced. Moreover in both models the calculated optimum sizes for government in both short-run and long-run are bigger than the average size of the government over the period of this study. Results show that government size in Iran had too big sizes in 1970's and 1980's, but has become somewhat smaller in the more recent years. In contrast, the third model shows a bigger optimum government size in long run compared with short run, maybe implying that without the oil exports the government should increase its expenditures to compensate the negative effects of the lack of the oil exports on GDP.

Our findings show that total exports in first model and oil prices and amounts of oil exports in terms of barrels in second model have significant and positive effects on Iranian growth in both long run and short run. Total exports, oil exports and oil prices have affected the growth in the long run stronger than short run. Moreover with the third model, we could find the positive significant effect of non-oil exports on economic growth in short-run.

Labor force and net capital stock have their correct positive sign in all of the models. Nonetheless, the labor force does not show significant effect in the second and third models, and maybe this is due to the less productivity of labor force in Iranian oil dependent economy.

The dummy variables D80 and D88 which we have used for capturing the structural breaks of war with Iraq and restructure of the economy after war show their expected signs in first and second model, indicating that the war has damaged the economic growth while ending the war and starting some positive programs for developing the economy have improved the economic growth.

Applying the ECM version of the ARDL approach for each of the models shows that the error correction coefficient, which determines the speed of adjustment, has the expected and highly significant negative sign.

Our result indicate that Iranian economy should adjust its size in long run to improve its economic growth, for creating a more stable and healthy economy, the government should be released from strong dependence on oil revenues. Also shifting the composition of the government expenditures from consumption expenditures to more investment expenditures can provide more credits to finance some projects for improving the structure of the economy and expanding the key industries, which can have determinant effects on the long run growth. In a short run Iran should try to attract more foreign investment and new technologies to improve its aging oil infrastructure to strengthen its ability to compete in oil markets. Moreover Iran should use the oil revenues to develop the other sectors of its economy to reduce her deeply reliance on oil revenues in the future.

The diversification of non-oil exports can reduce the adverse effects of oil price fluctuations. Moreover, the oil resources finishing and problems caused by single-product economy makes it necessary for Iranian economy to regard to non-oil exports.

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صادرات، اندازه دولت و رشد اقتصادی: شواهدی از ایران به عنوان اقتصاد در حال توسعه متکی به نفت

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این مقاله به بررسی اثرات کوتاه مدت و بلند مدت اندازه دولت و صادرات بر روی رشد اقتصادی ایران به عنوان کشوری متکی به صادرات نفت می‌پردازد. در این مطالعه از تکنیک خود توضیح با وقفه‌های توزیعی برای دوره ۱۳۸۷-۱۳۵۳ استفاده شده است. یک فرم تعدیل شده از مدلهای فدر (۱۹۸۲) و رم (۱۹۸٦) را مورد استفاده قرار داده‌ایم بطوریکه بتوانیم متغیرهای اندازه دولت و صادرات را بطور همزمان در معادله رشد وارد کنیم. نتایج تحقیق اعتبار منحنی آرمی (۱۹۹۵) برای اقتصاد ایران را نشان می دهد، بدین معنی که اندازه بسیار کوچک و اندازه بسیار بزرگ دولت تأثیر نامطلوب بر رشد اقتصادی دارند. همچنین صادرات کل، تعداد بشکه‌های نفتی صادر شده و قیمت نفت تأثیر مثبت بر رشد اقتصادی کوتاه مدت و بلند مدت دارند. تأثیر صادرات غیر نفتی بر رشد بلند مدت بی معنی بوده است.

واژگان کلیدی: ایران، رشد اقتصادی، صادرات نفت، صادرات غیر نفتی، اندازه دولت، قیمت

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با تشکر ویژه از دکتر رضا نجارزاده برای همکاری مؤثر خود در این مقاله .

نفت.