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# TRADE AND GROWTH NEXUS IN IRAN: AN APPLICATION OF BOUNDS TEST APPROACH TO LEVEL RELATIONSHIP

***Abstract:*** *This paper investigates the long-run relationship between exports, imports and economic growth in the Iranian economy using annual data over the period of 1960-2007. We extend the Feder's model (1982) by entering a proxy for human capital. The Bounds Test approach to level relationship developed by Pesaran et, al. (2001) has been adapted in the present study where it can be applied irrespective of order of integration of the variables. Results reveal that while there is significant and positive relationship between exports and economic growth, the effect of imports is insignificant and also human capital has a negative effect on growth both in short and long term periods.*

***Keywords:*** *Exports; Imports; Growth; ARDL Bounds Test approach; Iran.*

**JEL Classification: C22; F14**

## 1. Introduction

Discussion about the relationship between exports and economic growth can be traced to about over two centuries, but arguments over this issue still continue, and results are mixed across the countries. Earlier studies such as Syron and Walsh (1968), Michaely (1977), Bhagwati (1978), and Krueger (1978) by using bivariate correlation between exports and growth in cross-country format found evidence of the ELG (export-led growth) hypothesis. Balassa (1978 and 1985), Tyler (1981), Feder (1983), and Ram (1985) find a positive effect of exports on growth using the production function. Most of the studies based on cross-sectional countries claim that these positive effects appear only after countries achieve a certain level of economic development. All these cross-sectional investigations have some objections: The first objection is the limitation of sample size (see, e.g. Krueger, 1978; Bhagwati, 1978; Balassa, 1985, among others); second objection is that these studies do not generally consider country specific investigations that might be important to policy makers. Furthermore, many studies assume the same production function and ignore the level of technology. Third, even in spite of large samples, researchers generally try to choose middle-income countries. (see, e.g. Feder, 1983; Kavoussi, 1984). These limitations led economists to use time series analysis to investigate the ELG hypothesis in individual countries. The results of time series studies are also mixed, at best. While Ahmad and Kwan (1991) for 41 African countries, and also Ahmad and Harnihirum (1996) for all of ASEAN countries, Al-Yousif (1997) for Persian Gulf countries, Chang et al (2000) for Taiwan during the fast growth period, Panayiotis et al. (2005) for 22 African and Asian countries, using panel level relationship, found no support for the Export-led Growth (ELG) hypothesis, Ahmad et al. (2000) in estimating the relationship between exports, growth and foreign debt for Bangladesh, India, Pakistan, Sri Lanka and East Asian countries, reject hypothesis for all countries except Bangladesh. Some time series studies, like Sengupta (1991) for South–East Asia, Ghartey (1993)'s investigation for Taiwan, USA and Japan, Al-Yousif (1997) for Malaysia, Emiliu (2001) for Costarica, Vohra (2001) for countries like Pakistan, India, Philippines, Malaysia, and Tayland, Hatami (2002) for Japan, Al-mavali (2004) for Egypt, Awokuse and Christopoulos (2009) for Canada, Italy, Japan, UK, and US, give some evidence of existing the relationship between exports and growth.

In this paper, we investigate the ELG hypothesis for the Iranian economy by considering the role of imports and using bounds test approach to level relationships introduced by Pesaran et al. (2001). Our paper is different from the others in the following ways: First, some researches like Edwards (1993) and Chang et al. (2000) believe that most of the earlier studies did not take the important factors for growth into account which may lead to biased results. For example, most of the previous studies neglect the role of imports in testing the ELG hypothesis. Second, Holder and Williams (1997) show that an oil-export boom has a direct impact on the import demand function. Higher oil prices lead to improve trade and increase the level of consumption through higher level of imports. Moreover, endogenous growth models also emphasize the role of imports. They argue that knowledge from advanced economies spills another country through imports. In turn this knowledge spillover enables the economy to achieve increasing returns (See e.g. Sengupta, 1993). On the other hand, as most of the developing countries suffer from a foreign exchange constraint, exports relieve this constraint and allow these countries to import essential intermediates and capital goods that embody sophisticated technology which are not produced in domestic markets (See e.g. Serletis, 1992). Third, as standard unit root tests, such as Augmented Dickey Fuller (ADF) and Philips and Perron (PP) tests are biased towards the null of a unit root in the presence of structural breaks, we use Lee and Strazicich (2004) test to address this issue and test the null of unit root in the presence of possible structural break. This is since the existence of structural breaks may cause the series to be integrated of different orders; therefore, investigation of long-run relationship between variables should be addressed by alternative approaches such as bounds tests to level relationships developed by Pesaran et al. (2001) that can be applied irrespective of the order of integration of the variables. We believe that the results of the present paper will be important in the case of such an important oil exporting country, Iran.

The paper proceeds as follows: Section 2 defines theoretical background; in section 3, the data and econometric methodology of the study are presented; section 4 presents empirical results and discussions; and finally, section 5 concludes the paper.

## 2. Theoretical Background

In order to investigate the long run relationship between exports, imports, and economic growth, we use the Feder's (1982) model that divides the economy into an export sector and a non-export sector and specifies the production function of the export sector as follow:

$$Y_X = G(K_X, L_X, M_X) \quad (1)$$

Where, $Y_X$ stands for output in the export sector, K is the capital stock, and L is the labor force in the export sector. Feder (1982) assumes that the export sector generates positive externalities for the rest of the economy, and therefore specifies the non-export sector production function as follow:

$$Y_D = F(K_D, L_D, M_D, Y_X) \quad (2)$$

Moreover, adopting an endogenous growth model mentioned in previous section, we include imports $(M_X, M_D)$ as a new factor in equations (1) and (2).

By definition gross domestic production, Y, follows:

$$Y = Y_X + Y_D$$

(3)

A total differentiation of equations (1) to (3) yields:

$$\mathrm{dY_X} = \mathrm{G_K.dY_X} + \mathrm{G_L.dL_X} + \mathrm{G_M.dM_X} \quad (4)$$

$$dY_D = F_K.dK_D + F_L.dL_D + F_M.dM_D + F_X.dY_X \quad (5)$$

$$dY = dY_D + dY_X \quad (6)$$

where: $dK_X, dK_D$ introduce gross investment of each sector, and $dL_X, dL_D$ indicate changes in labor force of each sector. $F_X$ term in equation (5) describes marginal externality effect of export sector on $Y_D$ .

Then we get:

$$dY = F_K.dK_D + F_L.dL_D + F_M.dM_D + F_X.dY_X + G_K.dK_X + G_L.dL_X + G_M.dM_X \tag{7}$$

Feder (1982) assumes that the ratio of respective marginal factor productivities in the two sectors deviates from unity by a factor $\delta$, i.e.

$$G_K/F_K = G_L/F_L = 1 + \delta \tag{8}$$

By using equation (8) in equation (7), we will have:

$$dY = F_K.dK_D + F_L.dL_D + F_M.dM_D + F_X.dY_X + (1+\delta).F_K.dK_X + (1+\delta)F_L.dL_X + (1+\delta)F_M.dM_X = F_K(dK_D + dK_X) + F_L(dL_D + dL_X) + F_M.(dM_D + dM_X) + F_X.dY_X + \delta(F_K.dK_X + F_L.dL_X + F_M.dF_M) \tag{9}$$

Where $dK = (dK_D + dK_X)$, $dL = (dL_D + dL_X)$, and $(dM = dM_D + dM_X)$ defines total investment and total growth of labor and total imports respectively. Recall that equations (4) and (8) imply:

$$F_K.dK_X + F_L.dL_X + F_M.dM_X = \frac{1}{1+\delta}(G_K.dK_X + G_L.dL_x + G_M.dM_X) = \frac{DY_X}{1+\delta} \tag{10}$$

Using equation (10) in to equation (9), it changes to:

$$dY = F_K.dK + F_L.dL + F_M.dM + \left(\frac{\delta}{1+\delta} + F_X\right)dY_X \tag{11}$$

Finally, by applying some assumption that Feder applied, we will have the following equation:

$$\dot{Y} = \alpha\dot{K} + \beta\dot{L} + \gamma\dot{M} + \left(\frac{\delta}{1+\delta} + F_X\right)\frac{X}{Y}.\dot{X} \tag{12}$$

Equation (12) will be the basis of our empirical work in the next sections.

## 3. Data, and Econometric Methodology

### *3.1. Data*

The paper uses real GDP, oil-exports (oilexp) and nonoil-exports (nonoilexp), gross capital formation (K), and hi-educated labor force (hu) for the empirical analysis. We only use capital goods imports (mc) and intermediate goods imports (mi) instead of total imports. In view of the fact that the Iranian economy is based on oil exports, we augment a production function by including oil-exports and nonoil-exports separately (not total exports). In addition, because of the presence of the foreign exchange constraint faced by developing countries, we focus on capital goods imports and intermediate goods imports separately. The data covers the period of 1960-2007 and gathered from the Central Bank of Iran and the International Monetary Fund's CD ROM.

### *3.2. Standard unit root tests*

We employ different unit root tests to investigate stationarity properties of the series under consideration, such as Augmented Dickey and Fuller (ADF), Phillips and Perron (PP), Kwiatkowski, Phillips, Schmidt, and Shin (KPSS), and Ng-Perron (NP) tests. We present results of these tests in Tables 1 and 2. As we see in these tables, results are not the same and are uncertain. In fact, the general conclusion about the order of integration of data through these tests is difficult and the non-confidence is high.

***Table 1: Unit root tests***

| Statistics (Level) | gdp | k | hu | exp | Imp |
|---|---|---|---|---|---|
| $\tau_T$(ADF) | 0.752144 | -2.6835 | -3.4457 | -2.1901 | -1.8872 |
| $\tau_\mu$(ADF) | -0.7726 | -0.69621 | 2.57 | -2.157 | -1.8913 |
| $\tau$(ADF) | 2.1477 | 1.069 | 1.149 | -0.2297 | 0.050 |
| $\tau_T$(PP) | -0.2489 | -1.887 | -3.59 | -1.903687 | -2.11 |
| $\tau_\mu$(PP) | 1.1515 | -0.66 | 2.64 | -1.880811 | -2.08 |
| $\tau$(PP) | 3.58 | 1.435 | 7.76 | -0.080817 | -0.12 |
| $\tau_\mu$(KPSS) | 0.7341 | 0.644 | 0.793 | 0.143170 | 0.146 |
| $\tau_T$(KPSS) | 0.1486 | 0.102 | 0.19 | 0.08632 | 0.096 |
| $MZ_{a\mu}$ (ng-p) | 2.2972 | 0.361 | -69.69 | -6.475 | -2.94 |
| $MZ_{t\mu}$ (ng-p) | 1.028 | 0.123 | -59.02 | -1.6533 | -0.98 |
| $MZ_{aT}$ (ng-p) | -10.39 | -19.82 | -2.79 | -9.2646 | -5.157 |
| $MZ_{tT}$ (ng-p) | -2.05 | -3.05 | -0.97 | -2.1434 | -1.582 |

*Note: $\tau_T$ represents the most general model with a drift and trend; $\tau_\mu$ is the model with a drift and without trend; $\tau$ is the most restricted model without a drift and trend. in ADF and PP tests, unit root tests were performed from the most general to the least specific model by eliminating trend and intercept across the models (See Enders, 1995: 254-255). The critical values are obtained from Mackinnon (1991) for the ADF and PP test and from Kwiatkowski et al.. (1992) and Ng-Perron(2001) for the KPSS and Ng-Perron tests, respectively.*

***Table 2: Summary Results of statistics in Table 1:***

| | *ADF* | *PP* | *KPSS* | *Ng-Perron* |
|---|---|---|---|---|
| GDP | I(1) | I(1) | I(1) | I(1) |
| K | I(1) | I(1) | I(0) | I(0) |
| HU | I(1) | I(1) | I(1) | I(1) |
| EXP | I(1) | I(1) | I(0) | I(1) |
| IMP | I(1) | I(1) | I(0) | I(1) |

One of the most possible reasons of these mixed results can be attributed to the existence of some structural breaks in the data. According to Perron (1990), ignoring the effects of structural breaks can lead to spurious unit root results and improper policy implications.

The Iranian economy has been experienced numerous shocks and regime shifts such as the 1973-75 oil shock, the upheavals consequential to the 1979 Islamic Revolution, the destructive eight-year (1980-1988) war with Iraq. The frozen of the country's foreign assets, a volatile international oil market, economic sanctions, and international economic isolation. Most of these events and/or external shocks lead to structural breaks in macroeconomic variables. (See e.g., Heidari and Parvin, 2008). Hence, we need to determine endogenously the appropriate structural breaks in data. Bai and Perron (1998, and 2003) developed two tests of null hypothesis of no structural break against an unknown number of breaks. These tests are called double maximum tests ($D_{max}$): the first is an equal weighted labeled by $UD_{max}$. The second test, $WD_{max}$, applies weights to the individual tests such that the marginal P-values are equal across the value of breaks. In both of these tests, break points are estimated by using the global minimization of the sum of squared residuals. Employing Bai and Perron's $D_{max}$ test as well as $SupF_{T(m)}$ test of Andrews (1993) lead us to conclude that, there is at least one break for exports data, moreover, conditional SupF test have found 3 breaks for exports that are happened in 1973, 1979, and 1989. For imports, one break is confirmed in 1973. We have also found one break in 1986 for human capital. As Heidari and Hashemi Pourvaladi(forthcoming) pointed out, in the presence of structural break, the standard unit root tests are biased toward the non-rejection of the null hypothesis.

### *3.3. Unit Root Test with Endogenous Structural Breaks*

To decrease uncertainty of results reported in Table (1), we continue our investigation by applying some unit root tests with presence of possible structural breaks. One of them with one exogenous break point which has been done by Perron (1990), and the other one with two endogenous break points introduced by Lee and Strazicich (2003).

Perron (1990) proposed allowing for a known or exogenous structural break when carrying out unit root tests. Based on Perron (1990), three equations are estimated to test for unit root: The equation which allows for a break in the intercept of series, the equation which allows for a break in the slope, and finally, one that allows both effects to occur simultaneously. We have Perron (1990)'s test results in Table 3. These results reveal that export is stationary, while the other variables are nonstationary.

***Table 3: Perron (1990) unit root test results (level):***

| *Series* | *Model* | *Break Point* | *Dummy variable* | *Test Statistic* | *Critical Value* | *Result* |
|---|---|---|---|---|---|---|
| ***TEXP*** | 1 | 1357 | DU57,D(TB)57 | -3.85 | -3.76 | I(0) |
| ***K*** | 1 | 1372 | DU72,D(TB)72 | -1.82 | -3.76 | I(1) |
| ***Hu*** | 2 | 1365 | DU65,DT65 | -0.3631 | -3.96 | I(1) |
| ***IMP*** | 1 | 1352 | DU52, D(TB)52 | -1.52 | -3.76 | I(1) |

*Notes: Models (1) and (2) refer to the models specified in Perron (1990).*
*The dummy variables are specified as follows: D (TB) $_{57}$, D (TB) 72 and D (TB) $_{52}$ are impulse dummy variables with zeros everywhere except for a one in 1979, 1993. DU57, DU72 and DU52 are 1 from 1979, 1993 onwards and 0 otherwise. Critical values for the*

*levels are provided by Perron (1997). Critical values for the first differences are from MacKinnon (1996). For the first differences only impulse dummy variables were included in the regression. Impulse dummy variables, that is those with no long-run effect, do not affect the distribution of the MacKinnon (1996) test statistics.*

Subsequent papers modified the test to allow for one or two unknown break point that is determined endogenously from the data like Zivot and Andrews (1992) for one endogenous break and Lumsdaine and Papell (1997) for two endogenous breaks.

Lee and Strazicich (2003), however, extended Lumsdaine and Papell (1997) endogenous two breaks unit root test, and introduced a new procedure to capture two structural breaks. They proposed a two breaks unit root test in which the alternative hypothesis unambiguously implies trend stationarity. Their methodology is based on applying the Lagrange Multiplier (LM) test. In this method, the optimal lag length (K) is determined based on the general to specific approach suggested by Ng and Perron (1995). The results presented in Table 4 shows that by concerning two possible structural breaks, GDP, HU and TEXP will be stationary, while the other variables are nonstationary.

***Table 4: Lee and Strazicich (2003) unit root test with two endogenous breaks***

| variable | t-statistics | K | TB1 | TB2 | result |
|---|---|---|---|---|---|
| **GDP** | -7.0820* | 7 | 1352 | 1364 | I(0) |
| **hu** | -7.4917* | 7 | 1365 | 1369 | I(0) |
| **K** | -4.7352 | 1 | 1355 | 1362 | I(1) |
| **texp** | -8.3775* | 8 | 1357 | 1367 | I(0) |
| **mk** | -8.3051 | 7 | 1353 | 1369 | I(0) |
| **mi** | -5.5746 | 4 | 1362 | 1372 | I(1) |

*Note: 1) The critical values at 1, 5, and 10% are-5.823, -5.286and -4.989, respectively (Lee and Strazicich, 2002, p.22)*

*2)*indicates that the corresponding null is rejected at all levels.*

Although the results of performed tests, do not lead us to make a general and reliable conclusion, but results suggests that, in general, these series are not in the same order of integration. As most of the cointegration tests such as Engel-Granger (1987), and Johansen (1998) and Johansen and Juselius (1990) are confident when the series are in the same order of integration, these tests would not be suitable for our study. Thus, we continue our study by using bounds test approach introduced by Pesaran et al (2001), which can be applied irrespective of whether the underlying regressors are I(1) or I(0) or fractionally integrated.

### *3.4. Bounds Test Approach to Level Relationship*

Pesaran et al. (2001), proposed a new approach to testing for the existence of a long-run relationship which is applicable irrespective of whether the underlying regressors are purely I (0), purely I (1) or mutually integrated. This method has several advantages in comparison to other cointegration procedures: First this approach yields consistent estimates of the long run coefficients that are asymptotically normal irrespective of whether the underlying regressors are I (1) or I (0) or fractionally intergraded. Thus, the bounds test eliminates the uncertainty associated with pre-testing the order of integration. Second, this technique generally provides unbiased estimates of the long run model and valid t-statistics even when some of the regressors are endogenous. Third, it can be used in small sample size, where as the Engle-Granger and the Johansen procedures are not reliable for relatively small samples.

The error correction representation of ARDL model for our modified Feder's model introduced by Pesaran, et al. (2000), is given by the following equation:

$$\Delta Lny_t = \alpha_0 + \beta_1 \ln y_{t-1} + \beta_2 \ln k_{t-1} + \beta_3 \ln hu_{t-1} + \beta_4 \ln t\exp_{t-1} + \beta_5 \ln imp_{t-1} + \sum_{j=1}^{n} b_j \Delta \ln y_{t-j}$$
$$+ \sum_{j=0}^{n} c_j \Delta \ln k_{t-j} + \sum_{j=0}^{n} d_j \Delta \ln hu_{t-j} + \sum_{j=0}^{n} e_j \ln t\exp_{t-j} + \sum_{j=0}^{n} f_j \ln imp_{t-j} + \delta DU_{57} + \gamma D_{52} + \varepsilon_t \quad (13)$$

where $\beta_i$, i = 1, …, 5 is the coefficient of long-run parameters, and $b_j$, $c_j$, $d_j$, $e_j$, and $f_j$, are the short-run dynamic coefficients of the underlying ARDL model. In the case of existing a long-run relationship, the F-test indicates which variable should be normalized. In equation (13), when Y is the dependent variable, the null hypothesis of no level relationship is H0: $\beta_1=\beta_2=\beta_3=\beta_4=\beta_5=0$.

In hypothesis testing procedure, we use the critical values simulated in Narayan (2005) for a small sample. Table 5 presents critical values.

***Table 5: Critical value for bounds test***

| K=4 | 1% | | 5% | | 10% | |
|---|---|---|---|---|---|---|
| | I(0) | I(1) | I(0) | I(1) | I(0) | I(1) |
| $F_{IV}$ | 4.763 | 6.20 | 3.512 | 4.587 | 2.985 | 3.862 |
| $F_V$ | 5.376 | 7.092 | 3.958 | 5.226 | 3.334 | 4.438 |
| $F_{III}$ | 4.428 | 6.250 | 3.202 | 4.54 | 2.660 | 3.838 |

*Notes: 1) Critical values are from Narayan (2005, pp.1987:1990)*

*2) K is the number of regressors for dependent variable in ARDL models, $F_{IV}$ represents the F statistic of the model with unrestricted intercept and restricted trend, $F_V$ represents the F statistic of the model with unrestricted intercept and trend, and $F_{III}$ represents the F statistic of the model with unrestricted intercept and no trend.*

## 4. *Empirical Results of Level Relationship*

Since the result of different unit root tests for the variables under considerations are mixed and uncertain, we adopt Bounds test approach to address this issue. The lag length (p) is based on Schwarz Bayessian criteria (SBC). The best choice of lag order is P=1. The corresponding F-test statistics for joint null hypothesis, using the finite-sample critical values simulated in Narayan (2005) for T=45 corresponding to 3 different cases[1] in Pesaran et al. (2001), is reported in Table 6. (See also Katircioglu, 2009a). By concerning non-oil exports in the production function, F-statistic values falls below the lower critical values at all levels implying that there is no long-run relationship between non-oil exports and imports with economic growth, while results are consistent with the existence of a level relationship between oil-exports, and capital and intermediate goods imports separately with growth.

***Table 6: Bounds test for level relationship***

| Variables | with deterministic trend | | without deterministic trend |
|---|---|---|---|
| | $F_{IV}$ | $F_V$ | $F_{III}$ |
| $F_{gdp}$(gdp\|k,hu,vs,oilexp,du57,dt52) | 5.2011b* | 6.1734b* | 4.5962b* |
| $F_{gdp}$(gdp\|k,hu,sr,oilexp,du57,dt52) | 4.9711b* | 5.8920b* | 4.7555b* |
| $F_{gdp}$(gdp\|k,hu,vs,nonoil,du57,dt52) | 2.2035c* | 2.2575c* | 2.6555c* |
| $F_{gdp}$(gdp\|k,hu,sr,nonoil,du57,dt52) | 2.0314c* | 2.0268c* | 2.4246c* |

*Note: $H_0$: No existences long run.*
*a* indicates that the statistic falls inside the bounds at 5% level.*
*b* indicates that the statistic falls outside the upper bound at 5% level.*
*c* indicates that the statistic falls below the lower bound at 5% level*

Given existence of a long-run relationship between underline variables, the next step is to use the ARDL approach and ECM to estimate the long and short-run coefficients. The optimal number of lags for each of the variables using Schwarz-Bayessian information criteria is ARDL (1, 1, 0, 0, 1). As can be seen from Tables 7 and 8, oil-exports is an efficient variable in different equations, both in short and long-run and acts as the leading sector of the economy.

Neither capital goods, nor intermediate goods imports have significant effect on growth in the short-run. The associated error term ($ECT_{t-1}$) in the presence of capital goods imports is 0.20, suggesting that nearly 20% of the disequilibria in GDP growth adjust back to the long-run equilibrium over the following year. This means that the adjustment takes place after 5 years that is a slow and sluggish procedure.

In the long-run, the (mc) and (mi) coefficients are 0.09 and 0.08 respectively, and they are significant as oil-exports is, but too inconsequential, implying that 1%

[1] These three different cases in pesaran et al. (2001) depends on whether the model contain a linear trend or not and whether the trend coefficients are restricted, intercept in these cases are all unrestricted.

increase in mc and mi will lead to 9% and 8% increase in GDP in the long-run, respectively.

This indicates that these variables in Iran don't have a substantial effect on GDP growth and are so less than expected. We see surprisingly the insignificant negative sign of human capital.

***Table 7a: long run coefficients of ARDL model***

| *variable* | *Coefficient* | *t-statistic* |
|---|---|---|
| Lhu | -.3858 | -4.2324 |
| Lk | .3045 | 8.4893 |
| Lmi | .0806 | 6.7114 |
| Loilexp | .2004 | 4.4330 |
| Constant | 10.045 | 11.4619 |

***Table 8a: ECM-ARDL, Dependent Variable: DLGDP***

| *Regressors* | *Coefficient* | *t-Ratio* |
|---|---|---|
| DLhu | -.1061 | -1.1674 |
| DLk | .1783 | 7.5532 |
| DLmi | .01186 | 1.6075 |
| DLmi(-1) | -.0202 | -2.0884 |
| DLoilexp | 0.1399 | 8.1754 |
| DDu57 | .0715 | 2.3504 |
| DD52 | -.0253 | -2.5276 |
| Constant | .0385 | 2.9325 |
| ECMT(-1) | -.5426 | -6.0431 |

***Table 8a: long run coefficients of ARDL model***

| *variable* | *Coefficient* | *t-statistic* |
|---|---|---|
| Lhu | -.3858 | -1.587 |
| Lk | .2328 | 1.7028 |
| Lmk | .0949 | .0691 |
| Loilexp | .5139 | .0473 |
| Constant | 9.2616 | 3.0913 |

***Table 8b: ECM-ARDL, Dependent variable: DLGDP***

| *Regressors* | *Coefficient* | *t-Ratio* |
|---|---|---|
| dLhu | -.0706 | -.91454 |
| dLk | .1348 | 5.7370 |
| dLmk | .0094 | 1.2415 |
| dLoilexp | .1824 | 9.8015 |
| dDu57 | .0594 | 1.9158 |
| dD52 | -.00569 | -.5035 |
| Constant | .0098 | 0.6606 |
| ECMT(-1) | -.20312 | -5.8346 |

## *5. Conclusion*

We investigate the long-run relationship between exports, imports and economic growth in Iran for the period of 1960-2007. Following endogenous growth theory, imports added to model in to different segments. Moreover, instead of labor's force, we use human capital as a proxy of labor's force. The results imply that the speed of adjustment of equation (13) is too slow, and human capital coefficient is insignificant. There are some reasons for getting this result: human capital is a quality related to labor force, and so in many studies it is used by measuring the number of educated people to labor market and basically, graduated labor force don't have enough productivity. Our results also show that capital and intermediate goods imports have inconsequential effect on economic growth and in the presence of capital goods imports in the model; the adjustment process takes 5 years. This can be contributed to the focus on intermediate goods imports and low portion of high-educated labor force in industrial for using capital goods imports and making their technologies indigenous. Indeed, another problem of such a country as an oil-exporting country would be rigorous dependence on oil sector. In such case, economy focuses on derivation and production of oil and investment in oil sector, thereby neglecting from other economic sectors.

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