Role of Non-oil Exports in Enhancing Iran’s Economic Capacities

Mohammad Bakhshoodeh, bakhshoodeh@hotmail.com
College of Agriculture, Shiraz University, Iran
Naser Shahnoush, naser.shahnoushi@gmail.com
Farshad Mohammadian, far1637@yahoo.com
College of Agriculture, Ferdowsi University, Iran

Abstract

Applying Johansson’s multivariate procedure and vector error correction model to historical data of 1967-2003, this study investigates the role of export in Iran economy. Results of this study showed that in the short run, causality direction is from non-oil export growth to non-oil GDP and in the long run this is expected to be reverse. Therefore, in the short run, non oil export growth has a positive influence on non oil GDP growth, whilst in the long run, non-oil GDP growth has a positive influence on non-oil export growth and not vice versa. Thus, export supporting policies are expected to lead to increased export and GDP only in the short run. Keywords: export-led growth, Johansson’s procedure, short and long run causality, Iran

Introduction

Since 1970, export growth strategies have been undertaken by many countries as one of the most efficient tools for growth and development. As stated by Abou-Stait (2005), such strategies aim to improve the capability of producing goods and services that are able to compete in the world market, to use advanced technology, and to provide foreign exchange needed to import capital goods. Analyzing the role of exports in the economic growth and the causality directions between them have been of economists’ interests specifically for developing countries. According to the literature, there are several studies (e.g. Bahmani-Oskooee and Alse, 1993; and Levin and Raut, 1997) revealing that export growth promotes overall economic growth. Investigating the causality between export growth and output growth has been the focus of many studies in recent years. Combining Granger causality with Akaike’s Final Prediction error (FPE), Bahmani-Oskooee, et al (1991) obtained some support for the export-led growth hypothesis. Dodaro (1993) investigated the issue of causality by employing Granger’s approach to a set of 87 countries. He found a very weak support for the contention that export growth promotes GDP growth or the opposite that GDP growth promotes export growth. Bahmani-Oskooee and Alse (1993) using Engle and Granger (1987) two-step approach for co-integration and error correction modeling and employing quarterly data instead of annual data for the eight countries, find that there is a strong empirical support for two-way causality between export growths in eight out of nine countries. Love and Chandra (2005) utilized Johansson’s multivariate approach and found that long and short run causality directions run from GDP growth to export growth and reverse relationship is insignificant. Motavaseli (1998) applied a Granger causality procedure to annual data of 1967-1995 and recognized two-side causality between export growth and GDP growth in Iran.

This short review refers to the fact that a unique causality direction does not exist between the variables our interest and therefore further studies are needed to clarify dominant relationships in transition economies such as Iran. The rest of this paper is structured as follows: a background of Iran export is discussed following by methodology specifications and findings are discussed afterward. At the end, some policy implications are provided.

Background on Iran Exports

As the fourth largest oil producer in the world, Iran is slowly integrating into the global economy and financial markets. The Fourth Five-Year Economic Development Plan (2005-10) focuses on expanding trade interaction with the global community and pursuing an active presence in international markets. This would require to increase exports substantially. Petroleum constitutes the bulk of Iran's exports, valued at USD 46.9 billion in 2006. However, non-oil exports play a significant role in Iranian export and enjoyed a growing share in total foreign earnings in recent years. Exports
resulted in easing the pressure on the balance of payments and creating employment opportunities. According to the Iranian Ministry of Trade, total exports of non-oil commodities were at USD 4 billion in 2001 and more than USD 4.4 billion in 2002. The figure reached USD 6 billion in 2003, surpassed USD 10.5 billion in 2005 and rose to USD 12 billion in 2006. The figure hit USD 16.3 billion in the year ending March 20, 2007, which was an increase of 47.2 percent from the previous period. The rapid growth in Iran's non-oil exports in recent years was due to a policy of non-dependence on oil income and diversification of goods and services exported.

By 2003, a quarter of Iran's non-oil exports were agricultural based. Iran's agricultural sector contributed 11 percent of the GDP in 2004 and employed 23 percent (1996) of the labor force. Since 1979 commercial farming has replaced subsistence farming as the dominant mode of agricultural production.

Agricultural products as a whole have been an important contributor to the country's non-oil exports that has been of the Iranian government interest in recent decades. However, the agricultural export potential has not been fully tapped.

The Iranian government has made significant progress in implementing trade reforms and intends to do more according to the ambitious plan outlined in the Five-Year Development Plans. Many non-tariff barriers on imports have been replaced by their tariff equivalents. During the year 2000, restrictive import licensing requirements were lifted on 895 products. At the same time, import taxes on many of these items were increased in an attempt to compensate domestic producers for loss of protection. Despite the important reforms conducted as part of the recent Government’s trade liberalization agenda, important areas were additional substantial steps to use market mechanisms as means of regulating foreign trade remain.

Implementing successful non-oil trade intensification and a shift from import substitution to export-oriented activities will require a new set of policies that affect agricultural trade beyond the ratification process carried recently.

The upward trend in value of non-oil exports in recent years is consistent with the trend of development largely due to the government's policies, particularly its policy of weaning the country from its dependence on oil exports. This may be attributed to the redirection of general policy in Iran. Yet, a study is required to investigate the impacts of such policy switching to economic growth.

This study investigates relationship between non-oil exports and non-oil GDP growths, direction long and short run causality these variables are from export growth to GDP growth, reverse or two-way causality and the end exhibit commendation policy.

Methodology

Johansen’s multivariate framework and vector error correction model are used in this study to investigate short run and long run causality between non-oil exports and growth. The first step is to determine whether the variables in the model are stationary. If they are non stationary, then the issue is to what degree they are integrated. This can be addressed by Augmented Dickey-Fuller (ADF) tests. In this study Microfit 4.0 is used to perform computations.

The next step is to find out whether the variables are co-integrated. Within the Johansson’s framework, an unrestricted VAR model is defined by (1):

\[ x_t = \mu + \pi_1 x_{t-1} + \ldots + \pi_k x_{t-k} + \varepsilon_t, \quad t = 1, 2, \ldots, T \]

Where \( \varepsilon_t \) is i.i.d (independently and identically distributed) p-dimensional Gaussian error term and white noise, \( X_t \) is a Vector of I (1) variable and \( \mu \) is a vector of constants. Since \( X_t \) is non stationary, the above equation can be expressed in first differenced error correction (2) that is expressed as a traditional first difference VAR model except the term \( \pi x_{t-k} \):

\[ \Delta x_t = \mu + \Gamma_1 \Delta x_{t-1} + \ldots + \Gamma_{k-1} \Delta x_{t-k+1} + \pi x_{t-k} + \varepsilon_t \]

Where \( \pi = -(I - \pi_1 - \ldots - \pi_k) \), \( i = 1, \ldots, k-1 \), \( \Gamma_i = -(I - \pi_1 - \ldots - \pi_i) \).
The coefficient matrix $\pi$ contains information about long run relationships between the variables, and $\pi = \alpha \beta'$. The co-integrating vectors $\beta$ have the property that $\beta'x_t$ is stationary even though $x_t$ itself is non stationary. In this case, equation (2) can be interpreted as an error correction model. Johansen (1988) and Johansen and Juseselius (1990) derived the likelihood ratio test for the hypothesis of $r$ cointegrating vectors or $\pi = \alpha \beta'$. The co-integrating rank, $r$, can be tested with two statistics, namely Trace and Maximal Eigen value. The likelihood ratio test statistics for the null hypothesis that are at most $r$ cointegrating vectors against the alternative of more than $r$ cointegrating vectors is the Trace test and is computed as:

$$\lambda_{\text{trace}} = -T \sum_{i=r+1}^{P} \ln(1 - \hat{\lambda}_i)$$

Where $\hat{\lambda}_{r+1}, \ldots, \hat{\lambda}_P$ illustrate $P - r$ smallest estimated Eigen values. The likelihood ratio test statistic for the null hypothesis of $r$ co-integrating vectors against the alternative $r+1$ co-integrating vectors are the maximal Eigen value test and are given by:

$$\lambda_{\text{max}} = -T \ln(1 - \hat{\lambda}_{r+1})$$

The numbers of co-integrating vectors after the model was find out by Trace and Eigen value test statistics are determinates. In this way, where the first is to test null hypothesis that there is zero cointegrating vector by use of Trace and Eigen value tests and if it is rejected, the next step, null hypothesis of one cointegrating vector is tests and stop while the first time the null hypothesis is not rejected. After having established the number of cointegrating vectors, the next step is to determine the direction of both, long and short run Granger causality. Vector error correction model for three variables can be written as:

$$\Delta \text{LRGDP} = \alpha_1 + (\Delta \text{LRGDP}, \Delta \text{LRX}, \Delta \text{LTOT})_{-1} + \lambda_1 e(-1)$$

$$\Delta \text{LRX} = \alpha_2 + (\Delta \text{LRGDP}, \Delta \text{LRX}, \Delta \text{LTOT})_{-1} + \lambda_2 e(-1)$$

$$\Delta \text{LTOT} = \alpha_3 + (\Delta \text{LRGDP}, \Delta \text{LRX}, \Delta \text{LTOT})_{-1} + \lambda_3 e(-1)$$

Where LRGDP denotes log of real non-oil GDP, LRX is log of real non-oil exports, and LTOT represents log of terms of trade and $e(-1)$ is the lagged value of the error correction term. While error correction term captures the long run relationship, short run dynamics are provided by the lagged values of different terms. This study uses historical annual data for the period 1959-2003 and applies the above described methods to non-oil real gross domestic production, non-oil real export rand terms of trade in Iran.

### Results

As the first step, all three variables and their first difference were tested for stationary and the results are given in Table 1. It appears that for none of level variables is the calculated ADF statistic less than its 90% critical value and for the first differences of all variables, the ADF statistics are less than their corresponding 90% critical values and thus, all level variables are I(1) since their first differences are I(0).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test statistic</th>
<th>95% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>levels</td>
<td>First difference</td>
</tr>
<tr>
<td>LRGDP (log of real non-oil GDP)</td>
<td>-1.847(1)</td>
<td>-3.424(0)</td>
</tr>
<tr>
<td>LRX (log of real non-oil exports)</td>
<td>-1.115(0)</td>
<td>-6.176(0)</td>
</tr>
<tr>
<td>LTOT (log of terms of trade)</td>
<td>-1.854(0)</td>
<td>-6.652(0)</td>
</tr>
</tbody>
</table>
TOT is defined as proportion value index of exports upon value index of imports; terms in the parenthesis show the number of augmentations or lags (k) in ADF regressions; k is chosen with the help of a model selection criterion such as Akaike information (ADF), Schwarz Bayesian Criterion and Hannan _Quinn criterion (HQC).

As shown in Table 2, the null hypothesis of zero cointegrating vector by use of Trace and Eigen value statistics is rejected and the null hypothesis of one cointegrating vector is not rejected. Thus, the number of cointegrating is one.

After having established the number of cointegrating vectors and model where intercept is presented in the cointegration relation, the restricted co integration vector (-LRGDP+0.377LRX+1.341LTOT+1.257) is obtained after Normalization. It can be seen that both real non-oil exports and terms of trade have positive influences over real non-oil GDP.

### Table 2: Cointegration Rank Selection

<table>
<thead>
<tr>
<th>$H_0$</th>
<th>$H_1$</th>
<th>Test statistic</th>
<th>90% critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r = 0$</td>
<td>$r \geq 1$</td>
<td>33.95</td>
<td>31.93</td>
</tr>
<tr>
<td>$r \leq 1$</td>
<td>$r \geq 2$</td>
<td>12.33</td>
<td>17.88</td>
</tr>
<tr>
<td>$r \leq 2$</td>
<td>$r = 3$</td>
<td>3.08</td>
<td>7.53</td>
</tr>
</tbody>
</table>

Table 2: Cointegration Rank Selection

$r$ is the cointegration rank of the cointegrating vectors.

The next step is to determine both the long and short run Granger causality. The presence of one cointegrating vector allows using Engle and Granger error correction to test for Granger causality. Since the error correction model are written in the first difference form and with justification order of VAR, which is 2, the optimal lag length in them gets reduced by one. The results of the causality analysis are presented in Table 3. It can be seen that the error correction term with $\Delta$LRGDP as the dependent variable is insignificant at even 10% level of significance. Therefore, in the long run, non-oil export and terms of trade do not Granger causes the non-oil GDP. The error correction term with $\Delta$LRX as the dependent variable is significant; therefore, non-oil GDP and terms of trade Granger cause non-oil export in the long run. So, it can be concluded that there is long run one-way causality between real non-oil export and real non-oil GDP, which the direction being from real non-oil GDP to real non-oil export.

### Table 3: Results of Granger Causality in a Multivariate Framework

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Coefficients of lagged $\Delta$LRGDP</th>
<th>Coefficients of lagged $\Delta$LRX</th>
<th>Coefficients of lagged $\Delta$TOT</th>
<th>Joint significance</th>
<th>Error correction term (Prob)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta$LRGDP</td>
<td>—</td>
<td>(0.047)$^S$</td>
<td>(0.01)$^S$</td>
<td>(0.004)$^S$</td>
<td>-.52(0.37)</td>
</tr>
<tr>
<td>$\Delta$LRX</td>
<td>(0.403)$^{NS}$</td>
<td>—</td>
<td>(0.001)$^S$</td>
<td>(0.001)$^S$</td>
<td>-1.868(0.00)</td>
</tr>
<tr>
<td>$\Delta$TOT</td>
<td>(0.275)$^{NS}$</td>
<td>(0.473)$^{NS}$</td>
<td>—</td>
<td>(0.541)$^{NS}$</td>
<td>-0.194(0.847)</td>
</tr>
</tbody>
</table>

NS: not significance; $S$: significance

Note: (1) figures in the parenthesis are the probability values showing the exact level of significance; (2) the positive sign of the error correction term with $\Delta$LRGDP as the dependent variable is incorrect but the coefficient itself is insignificant.
The short run dynamics can be seen by looking at the coefficients of lagged differenced terms. Coefficients of lagged $\Delta LRX$ and $\Delta LTOT$ with $\Delta LRGDP$ as the dependent variable are significant. This implies that growth of real non-oil export and terms of trade in short run does exercise a significant influence on real non-oil GDP. Coefficients lagged $\Delta LRGDP$ and $\Delta LTOT$ with $\Delta LRX$ as the dependent variable, respectively are insignificant and significant, implying growth of non-oil GDP in the short run does not have a significant influence on growth of non-oil export, and growth terms of trade significantly affects the growth of non-oil export in the short run. In same way, non-oil export and non-oil GDP do not significantly influence on the terms of trade neither in the short run nor in the long run. It may also be noted that non-oil GDP on their own may exercise insignificant influence on non-oil export in short run, but conjunction with other variables they become important as the tests of joint significance show.

Concluding Remarks

Based on the findings of this study, the direction of short run causality is from real non-oil export growth to real non-oil GDP growth in Iran whilst the long run causality direction is reversed. Furthermore, the hypothesis of export-led growth is to be existed in the short run. This result implies that support policies such as export subsides lead to increase export and GDP only in the short run, whereas in the long run export may be increased via well-being infrastructure economic and increasing production in the country. In other words, expanding export as one of the long run purposes of macro programming in the country can be achieved through increasing capacity utilization, improving productivity, and greater product variety. This can provide the opportunity to compete in the international markets that leads to technology transfer and improvement in managerial skills. Although protection policies in foreign trade has conflict with the WTO agreements, implementing strategies that increase productivity and production are corresponding with principals of this organization. Therefore, utilizing convenient strategies that improve Iran’s infra-structure of production, it is expected that joining Iran to WTO can increase its non-oil exports. Although Iran has made significant progress in implementing trade reforms and intends to do more in the future in accordance with the WTO requirements, it should be noted that, as reviewed by Gunter, et. al. (2005), any gains from trade liberalization are often associated with external effects that are dynamic in nature.

References


