The Dynamics of Relationship between Exports and Economic Growth in Saudi Arabia

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Abstract

The objective of this study is to find the dynamics of relationship between the growth rate of real export (RX) and the growth rate of real gross domestic product (RGDP) in one side and between the growth rate of (RX) and the growth rate of non-oil real gross domestic product (NORGDP) in Saudi Arabia in the other side. The study uses annual data for the period 1970 to 2013. The estimation methodology procedure consists of cointegration test, the error correction model estimation, and VAR Granger Causality. This paper confirms a positive long run relationship between the growth rate of RX and the growth rate of RGDP. The findings indicate that the RGDP and RX are cointegrated. The long run bidirectional causality between the RX and the growth rate of RGDP has been also proved. On the other hand, the study indicates that the NORGDP and RX are not cointegrated but there is short run bidirectional causality between the RX and the growth rate of NORGDP. The implication of the study indicates that the export promotion policy not only contributes to the economic growth of RGDP in Saudi Arabia but also contributes to the economic growth of NORGDP. The export promotion policy tends to participate in the process of diversifying the economic base of Saudi Arabia.

Keywords: Export-Led Growth Hypothesis, RGDP, NORGDP, Economic Growth, Granger Causality, Cointegration, Error Correction, Diversifying the Economic Base, Saudi Arabia

1. Introduction

Macro-economic prosperity increases the quality of life of citizens which mainly comes from the increasing real growth rate of Gross domestic Product (RGDP). There are different ways to achieve the target of rapid growth RGDP. One possibility is to promote exports to achieve higher standards of living. Exports of goods and services represent one of the most important sources of foreign exchange income that ease the pressure on the balance of payments and create employment opportunities. An export led growth strategy aims to provide producers with incentives to export their goods through various economic and governmental policies. It also aims to increase 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. Exports can increase intra-industry trade, help the country to integrate in the world economy and reduce the impact of external shocks on the domestic economy. Experiences of Asian and Latin American economies provide good examples of the importance of the export sector to economic growth and development, which led economists to stress the vital role of exports as the engine of economic growth.

Economists are concerning whether export promotion leads to higher economic growth or economic growth promotes exports growth. Thus, economists have came up with different views and the literature puts forward a debate for researchers and policy makers since the last few decades. One school of thought argues in favour of export-led growth hypothesis. According to this school causality comes from export to GDP. Second school advocates for growth-driven export hypothesis which indicates that causality come from GDP to export. Third school of thought has came from the existing literature which provides the evidence that export promotion leads to economic growth and economic growth leads to export promotion, i.e., the bi-directional causality between exports and economic growth.

Thus, Saudi Arabia can be an interesting case study of the export and economic growth relationship because Saudi Arabia depends totally on Oil as an engine of economic growth. Therefore, the most important point in this regard is the concern of whether the growth of oil export participate in economic diversification or not. This paper attempts to go over the empirical issue of the relationship between growth of exports and economic growth in deferent countries and to take Saudi Arabia as a case study for the period 1970 to 2013. The concentration of this paper not only on the causality between growth of exports and economic growth of the RGDP but also on the causality between growth of exports and economic growth of the NORGDP. The rest of the paper is organized as follows: Section II studies the theoretical model; Section III go over the literature review; Section IV discusses the data and methodology; Section V makes the empirical analysis; and section VI concludes.

2. Theoretical Model

The argument concerning the role of exports as one of the main deterministic factors of economic growth is not new. It goes back to the classical economic theories by Adam Smith and David Ricardo, who argued that international trade plays an important role in economic growth, and that there are economic gains from trade and specialization. It was also recognized that exports provide the economy with foreign exchange needed for imports that cannot be produced domestically. The theoretical discussion is focused on whether a developing country would be better served by trade policies oriented toward import substitution or export promotion (Irwin, 2002, Shafaeddin, Pizarro, 2007, Jayanthakumaran, 1994, etc). The Export-led growth hypothesis generally reflects the relationship between export sand economic growths. The proponents of such hypothesis argue that export promotion through policies such as export subsidies or exchange rate depreciation will increase total factor productivity because of their impact on economics of scale and other externalities such as technology transfer, improving skills of workers, improving managerial skills, and increasing productive capacity of the economy. The other advantage of export-led growth (ELG) is that it allows for a better utilization of resources, which reflects the true opportunity cost of limited resources and does not discriminate against the domestic market. (Helpman, Krugman, 1985, Boomstrom, 1986 Grossman and Helpman ,1990). Thus, ELG leads to re-allocation of resources from the inefficient non-trade sector to the trade sector and disseminating of the new management styles and production techniques through the whole economy (Feder, 1982, Lucas, 1988, Edwards, 1992). The entire economy would benefit due to the dynamic spill over of the export sector growth. These positive externalities promote economic growth (Bhagwati, 1978; Balassa, 1978; Krueger, 1978; Feder, 1982; Krueger, 1990; Vohra, 2001; Ullah et al., 2009). Also, countries with high growth rates and relatively low absorption rates must necessarily export the excess output (Arnade and Vasavada, 1995; Fosu, 1996; Thornton, 1996; Henriques and Sadorsky, 1996; Sharma and Panagiotidis, 2005).

An increase in exports improves the balance of payment and enlarges the foreign monetary reserves, which consequently enables the increase of investment goods import and facilities necessary for the domestic production growth (Chenery, Strout, 1966). On the contrary, the argument that economic growth promotes export growth stands on the idea that the import substitution strategies seek to promote rapid industrialization of the local production in order to substitute the imports needed to further economic development. Therefore, the government involves import trade barriers as tariffs, import quotas, etc. As a result of import barriers, import will be decreased which causes the import substitution sectors to expand. This kind of strategies will increase the demand for unemployed labor in the economy causing rabid increase in the growth rate of GDP. Whether the original export sector shrinks or not depends on some important factors. One of these factors is the level of unemployment in the economy. If the expansion in the import substitution sector uses the unemployed labors and does not cause higher wage rate in the economy, then the original export sector will not be hurt by the growth of the import substitution sector. As import substitution sector expands, gains in productivity give rise to comparative advantages that lead naturally to export growth. In addition, some studies demonstrate that there exists a bi-directional relationship between these variables such that export causes economic growth and economic growth causes export (Dutt and Ghosh, 1994; Thornton, 1997; Shan and Sun, 1998a; Shan and Sun, 1998b; Khalafalla and Webb, 2001). It is due to such contradicting evidences about the dynamic relation between exports and economic growth that many developing countries are still in dilemma whether to open up their economies to promote international trade or whether they should concentrate on economic activities that will promote economic growth. A good number of researchers and policy makers believe that developing countries can achieve economic growth through free market while others believe that developing countries should protect their industries from imported goods and promote their economic activities which will lead to the economic growth. Exports imply access to the global market and permit increased production. While trade encourages efficient allocation of resources, it contributes to economic growth by generating long-run gains (Easterly, 2007).

3. Literature Review

The argument concerning the role of exports as one of the main deterministic factors of economic growth is not new. It goes back to the classical economic theories by Adam Smith and David Ricardo, who argued that international trade plays an important role in economic growth and that there are economic gains from specialization. The argument of the neo-classical economists is that competition in international market promotes economies of scale and increases efficiency by concentrating resources in sectors in which the country has a comparative advantage. These positive externalities promote economic growth. These theoretical arguments regarding exports-economic growth nexus have been empirically verified by economists and researchers at different times. A number of studies including Jung and Marshall (1985), Chow (1987), Darrat (1987), Hsiao (1987), Bahmani-Oskooee et al (1991), Kugler (1991), Dodaro (1993), Van den Berg and Schmidt (1994), Greenaway and Sapsford (1994), and Islam (1998) have had adopted time series analysis for exploring the causal liaison between exports growth and output growth. Using the Granger (1969), Sims (1972) and Hsiao (1987) causality procedures, these studies failed to provide an unvarying conclusion about the export-led growth hypothesis. However, these time series studies were not free from disparagement. Although standard Granger or Sims tests are only valid if the original time series are not cointegrated, none of these studies checked the cointegrating properties of the time-series variables involved. When two or more time series variables are cointegrated, inferences based on traditional time-series modelling techniques will be misleading, as pointed out by Granger (1988). This is because traditional causality tests would miss some of the "forecastability", hence, reach incorrect conclusions about causality. Moreover, all the studies reviewed above used growth of

Gross Domestic Product (GDP) and that of exports which are akin to first differencing and filter out long-run information.

In order to alleviate such occurrences, cointegration and error correction models have been recommended to combine the short-term as well as long run information. Bahmani-Oskooee and Alse (1993) took all these issues into account and employed quarterly instead of annual data for the nine countries studied. They found strong empirical support for two-way causality between exports growth and GDP growth in eight out of nine countries. Darrat (1986) worked on four Asian countries, (Hong Kong, South Korea, Singapore, and Taiwan) and found no evidence of unidirectional causality from exports to economic growth in all the four economies. In the case of Taiwan, however, the study detected unidirectional causality from economic growth to export growth. Nandi and Biswas (1991) found the evidence of unidirectional causality from growth of exports to economic growth in India. This study does not test for stationarity and conduct Sims causality test on the levels of the income and export variables. Given that the levels of the income and export variables are usually non-stationary, the results are unreliable. Kim (1993) has examined the major trends of key macroeconomic variables in South Korea and Chile and correlated them to export performance. Kim identified exports as a major source of economic growth and provided the evidence of the validity of the claim that an open and trade-oriented economy is not only the best guarantee for long-term economic growth, but it lightens the initial impacts of external shocks. Kim, further, mentioned that there are factors other than trade which increase economic growth. Sharma and Dhakal (1994) offer some evidence of the export-led growth hypothesis for India. The study concludes that the income and export series for India are non-stationary using the Phillip-Perron test. It tests for causality, but does not test for cointegration. However, the correct application of Granger tests requires the identification of a possible cointegrating relationship. Bhat (1995) re-examines the exports-economic growth nexus for India, and finds evidence of bi-directional causality between growth of exports and economic growth. Erfani (1999) examined the causal relationship between economic performance and exports over the period of 1965 to 1995 for several developing countries in Asia and Latin America.

The results showed the significant positive relationship between exports and economic growth. Erfani's study provides the evidence of export-led growth hypothesis. Ghatak and Price (1997) studied the case of India and concluded that growth of exports is caused by output growth in India. Dhawan and Biswal (1999) examine the same issue for the period 1961 to 1993, and find that growth in GDP causes growth in exports while causality from exports to GDP appears to be a short run phenomenon. Nidugala (2000) finds that exports had a crucial role in influencing GDP growth in the 1980s. Anwar and Sampath (2000) examine the export-led growth hypothesis for 97 countries (including India, Pakistan and Sri Lanka) for the period 1960 to 1992. They found the evidence of unidirectional causality in the case of Pakistan and Sri Lanka, and no causality in the case of India. Vohra (2001) showed the relationship between the exports and economic growth in India, Pakistan, Philippines, Malaysia, and Thailand for the period 1973 to 1993. The empirical results indicated that when a country has achieved some level of economic development then the exports have a positive and significant impact on economic growth. The study also showed the importance of liberal market policies by pursuing export expansion strategies, and by attracting foreign investments. However, Kemal et al (2002) finds a positive association between exports and economic growth for India as well as for other economies of South Asia. Chandra (2000; 2002) found bi-directional short-run causal relationship between growth of exports of India and GDP growth.

However, since the cointegration between growth of exports and GDP growth was not found, there was no long-run causal relationship. Subasat (2002) investigated the empirical linkages between exports and economic growth. The study suggested that the more export-oriented countries

like middle-income countries grow faster than the relatively less export-oriented countries. The study further showed that export promotion does not have any significant impact on economic growth for low and high income countries. Amavilah (2003) determined the role of exports in economic growth by analyzing Namibia's data from 1968 to 1992. Results explained the general importance of exports, but the study finds no discernible sign of accelerated growth due to exports. Lin (2003) stated that 10 per cent increase in exports cause 1 per cent increase in GDP in the 1990s in China on the basis of new proposed estimation method, when both direct and indirect contributions are considered. Shirazi et al (2004) studied the short-run and long-run relationship among real exports, real imports, and economic growth on the basis of co-integration and multivariate Granger causality test as developed by Toda and Yamamoto (1995) for the period 1960 to2003. This study showed a long-run relationship among imports, exports, and economic growth and found unidirectional causality from exports to output.

However, it did not find any significant causality between imports and exports. Sharma and Panagiotidis (2004) test the export-led growth hypothesis in the context of India, and the results strengthen the arguments against the export-led growth hypothesis for the case of India. Raju and Kurien (2005) analyzed the relationship between exports and economic growth in India over the pre-liberalization period 1960-1992, and found strong support for unidirectional causality from exports to economic growth using Granger causality regressions based on stationary variables, with and without an error-correction term. Mah (2005) studied the long-run causality between exports and economic growth for China with the help of the significance of error correction term. This study indicates that export expansion is insufficient to explain the patterns of real economic growth. Tang (2006) stated that there is no long-run relationship among exports, real Gross Domestic product, and imports in China. This study further shows no short- and long-run causality between export expansion and economic growth on the basis of Granger causality test while economic growth does Granger-cause imports in the short-run. It is believed that the rapid growth of China and India is mainly due to the expansion of their exports. "The success of China and India largely caused by both the export-led growth and access to technology through globalization" (Stiglitz, 2007). Jordaan (2007) analyzed the causality between exports and GDP of Namibia for the period 1970 to 2005. The export-led growth hypothesis is tested through Granger causality and cointegration models. The study tests whether there is unidirectional or bi-directional causality between exports and GDP. The results revealed that exports Granger-cause GDP and GDP per capita, and suggested that the export-led growth strategy through various incentives has a positive influence on growth.

Rangasamy (2008) examined the exports and economic growth relationship for South Africa, and provides the evidence that the unidirectional Granger causality runs from exports to economic growth. Pazim (2009) tested the validity of export-led growth hypothesis in three countries by using panel data analysis. The conclusion of Pazim was that there exists no significant relationship between the size on national income and amount of exports for these countries on the basis of one-way random effect model. The panel unit root test shows that the process for both GDP and exports at first glance is not stationary, while the panel co-integration test indicates that there is no co-integration relationship between the exports and economic growth for these countries. Ullah et al (2009) re-investigated the export-led growth hypothesis using time series econometric techniques over the period of 1970 to 2008 for Pakistan. The results reveal that export expansion leads to economic growth. Dash (2009) analyzes the causal relationship between growth of exports and economic growth in India for the post-liberalization period 1992-2007, and the results indicate that there exists a long-run relationship between output and exports, and it is unidirectional, running from growth of exports to output growth. Elbeydi, Hamuda and Gazda (2010) investigated the relationship between exports and economic growth for Libya for the period 1980 to 2007. The findings indicate

that there exists a long-run bi-directional causality between exports and income growth, and thus, the export promotion policy contributes to the economic growth of Libya.

It is, therefore, clear from the above literature review that the evidence regarding exports-economic growth nexus is rather ambiguous and mixed. Also, most of literature lacks studies including the period of recent global financial crisis. With regard to Saudi Arabia, up to my knowledge, the only study I found is Thurayia (2004) who studied the relationship between exports and economic growth experience in Saudi Arabia and Sudan. Results showed that the growth rate in total exports in Saudi Arabia had an active role in achieving economic growth while it had a weak influence in Sudan. The results of cointegration and error correction models showed a positive effect of exports on GDP which confirms the validity of the hypothesis of export-led growth in Saudi Arabia, and Sudan. The study of Thurayia (2004) used short time period covering 33 years from 1970 to 2002 while this study uses longer time period covering 44 years from 1970 to 2013. The longer the time period is the better the econometric result will be. Most importantly, the study of Thurayia (2004) did not touch the effect of total export on the growth rate of NORGDP which is very important especially for the case of economic diversification. Therefore, this paper is an attempt to re-investigate the exports-economic growth nexus for Saudi Arabia considering the period of recent global financial downsizing. This study shall provide the useful information helpful to policy makers. It can serve as a reference to subsequent research works on the issue 'exports-economic growth nexus' in the context of Saudi Arabia.

4. Data and Methodology

Data

The objective of this paper is to investigate the dynamics of the relationship between exports and economic growth in Saudi Arabia using the annual data for the period 1970 to 2013. In this study, the variables are real total Exports by Saudi Arabia (EX), the Real Gross Domestic Product (GDP) and Real Non-Oil Gross Domestic Product (NOGDP). Total Exports by Saudi Arabia is the sum of oil, and non-oil exports expressed in Saudi Riyal. Data for the sample period are obtained from the SAMA Annual Report 2014. All the variables are in real term and taken in their natural logarithms to avoid the problems of heteroscedasticity. The estimation methodology employed in this study is the cointegration and error correction modeling technique. The entire estimation procedure consists of three steps: first, unit root test; second, cointegration test; third, the error correction model estimation.

Augmented Dick-Fuller (ADF) Test

This paper uses Augmented Dicky-Fuller (ADF) test to examine the presence of unit roots in the variables. ADF test is an extended version of the original test of Dicky and Fuller (1979) to control for the serial correlation of the error term (Dicky and Fuller, 1981). Cointegration in empirical methodology requires variables that are non-stationary in level but stationary after first-differencing. To test whether variables are stationary or not, unit root tests are performed. The time series properties of variables are examined by Dicky and Fuller (DF) or Augmented Dick-Fuller (ADF) unit root test. It is used to determine the order of integration of time series. The test is based on estimates of the following regression equations. For level:

$$\Delta x_t = \alpha_1 + \alpha_2 T + \alpha_3 x_{t-1} + \sum_{i=1}^{p} \alpha_{4i} \Delta x_{t-i} + \varepsilon_t \qquad (1)$$

And for first difference:

$$2_{\Delta}\ x_t = \propto_1 + \propto_2 T + \propto_3 \Delta x_{t-1} + \sum_{i=1}^{p} \propto_{4i} 2_{\Delta}\ x_{t-i} + \varepsilon_t \qquad (2)$$

Where variable x_t the variable is tested for unit root; Δ is the first difference operator; $\propto_1$ is the constant term; T is time trend; p is the number of the lag length which was selected. The null hypothesis is H_0: $\propto_3 = 0$ and the alternative hypothesis H_1: $\propto_3 < 0$. When the absolute value of the calculated t-test is greater than the critical value from Mackinnon (1991), the null hypothesis of the unit root (non-stationary) is rejected, indicating that the variable is stationary at level and integrated of degree zero [I~ (0)]. However, when the absolute value of the calculated t-test is smaller than the critical value, the null hypothesis of the unit root (non-stationary) is accepted, indicating that the variable is not stationary at their level form and we have to chick their stationary for the first difference.

Johansen Cointegration Test

In order to examine the cointegration relationship between the real export and the RGDP or NOGDP, this study employs widely used Johansen (1988, 1991) cointegration test which implement a maximum likelihood procedure. This is because our time series variables are non-stationary in level and stationary after first-differencing. If we find a cointegration between banks loans and the stock market price index variables, it implies that there is a long run relationship between stock market price index and banks loans. This methodology tests for the number of cointegration relationships and estimates the parameters of such cointegrating relationships. The cointegration is applied by using vector autoregressive (VAR) model. A general unrestricted VAR model can be represented as the following:

$$y_t = A_0 + A_1 y_{t-1} + \cdots + A_p\, y_{t-p} + \eta_t \qquad t = 1, 2, \ldots, T \qquad (3)$$

Where y_t(n x 1) vector of variables is, α is (n x 1) vector of constant terms and η_t is (n x1) vector of usual error term. Equation (3) could be rewritten in the following error correction form:

$$\Delta y_t = A_0 + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \Pi y_{t-1} + \eta_t \qquad (4)$$

Where

$$\Pi = \sum_{i=1}^{p} A_i - I \quad \text{and} \quad \Gamma_i = -\sum_{j=i+1}^{p} A_j$$

If coefficient matrix Π has reduced rank r < k, then there exist k x r matrices α and β each with rank r such that $\pi = \alpha\beta'$ and βy_t is stationary. Here r is the number of cointegrating relationships, the elements of α are defined as the adjustment parameters and each column of β is a cointegrating vector. The Johansen-Juselius test uses two test statistics through VAR model to identify the number of cointegrating vectors, namely the trace test statistic and the maximum eigen-value test statistic. The test statistic for the trace test is given by:

$$Trace = -T \sum_{i=r+1}^{n} Im(1 - \hat{\lambda}_i) \qquad (5)$$

The trace test's null hypothesis is r = 0, cointegrating vectors against the alternative hypothesis of n cointegrating vectors.

The maximum eigenvalue test is given by:

$$\lambda_{max} = -T\, In(1-\hat{\lambda}_{r+1}) \qquad (6)$$

This test, on the other hand, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of (r + 1) cointegrating vectors.

Vector Error Correction Model (VECM)

Once the cointegration established between variables, then there is a need for construction of error correction mechanism to model dynamic relationship. The aim of the error correction model is to indicate the speed of adjustment from the short run equilibrium to the long-run equilibrium. A Vector Error Correction Model (VECM) is a restricted VAR to be used with non-stationary series which are cointegrated. When the equilibrium conditions are imposed, the VECM describes how the model is adjusting in each time period towards its long-run equilibrium. Because of the variables are supposed to be cointegrated, then in the short-run, any deviations from long-run equilibrium will feedback on the changes in the dependent variables in order to make their movements towards the long-run equilibrium. According to Engle and Granger (1987), if two series are co-integrated of order one i.e. *I*(1), then there must exist a VECM representation in order to govern joint behavior of the series of the dynamic system. For this study VECM to be estimated as follows:

$$\Delta RX_t = \propto_1 + \sum_{i=1}^{p} \propto_{2i} \Delta RX_{t-i} + \sum_{i=1}^{n} \propto_{3i} \Delta \mathrm{RGDP}_{t-i} + \sum_{i=1}^{n} \propto_{4i} \Delta\pi + \propto_{5i} e_{t-1} + \delta_{1t} \quad (7)$$

$$\Delta \mathrm{RGDP}_t = \propto_1 + \sum_{i=1}^{p} \propto_{2i} \Delta \mathrm{RGDP}_{t-i} + \sum_{i=1}^{n} \propto_{3i} \Delta \mathrm{RX}_{t-i} + \sum_{i=1}^{n} \propto_{4i} \Delta\pi + \propto_{5i} e_{t-1} + \delta_{1t} \quad (8)$$

$$\Delta RX_t = \propto_1 + \sum_{i=1}^{p} \propto_{2i} \Delta RX_{t-i} + \sum_{i=1}^{n} \propto_{3i} \Delta \mathrm{RNOGDP}_{t-i} + \sum_{i=1}^{n} \propto_{4i} \Delta\pi + \propto_{5i} e_{t-1} + \delta_{1t} \quad (9)$$

$$\Delta \mathrm{RNOGDP}_t = \propto_1 + \sum_{i=1}^{p} \propto_{2i} \Delta \mathrm{RNOGDP}_{t-i} + \sum_{i=1}^{n} \propto_{3i} \Delta \mathrm{RX}_{t-i} + \sum_{i=1}^{n} \propto_{4i} \Delta\pi + \propto_{5i} e_{t-1} + \delta_{1t} \quad (10)$$

Where e_{t-1} the error correction term is lagged one period with coefficient $\propto_5$ measuring adjustment of the model from the short-run to the long-run and δ_t is the white noise. The estimation of equations 7 and 8 determines the nature of relationship between RX (real export of Saudi Arabia) and RGDP. The estimation of equations 9 and 10 determines the nature of relationship between RX and RNOGDP.

Whether a VAR in levels or a VECM for modeling cointegrated series is a better approach remains debatable. While the VECM conveniently combines long run behavior of the variables and their short run interactions and thus can better reflect the relationship among variables, the popularity of VAR in levels lies in its low computational burden. Moreover, it is still unclear whether the VECM outperforms the level VAR at all forecasting horizons (Naka and Tufte 1997). In the literature dealing with short-run dynamic interactions, estimating the level VAR for cointegrated variables seem to be a normal approach.

Granger (1986), states that in Granger representation theorem, if two variables are stationary of order (1) and cointegrated, then either the first variable causes the second or vice-versa. In this study, Granger causality test based on VECM is utilized. It provides an additional channel for long-run causality which is ignored by Sims and Granger causality tests. Long run causality is confirmed using the joint significance of the coefficients of lagged variables. Chi-squared test is employed to check the joint significance of the coefficients of the lagged variables and t-tests is used to check significance of the error term**.**

5. Empirical Results

Pearson's correlation coefficient

At the outset, the Pearson's correlation coefficient between exports and real GDP is calculated over the sample period, and its significance is tested by the t-test. The value of Pearson's correlation coefficient (r) between these two time series over the sample period is 0.97. It shows that exports and real GDP are positively related in Saudi Arabia and that a very high degree of correlation is evident between them. To test whether this value of r shows a significant relationship between the two time series, student's t-test is used. The null hypothesis of the test is r = 0 against the alternative of r ≠0. Since the t-statistic at 44 degrees of freedom is 26.5, and the critical t-value at 5 per cent level of significance is less than it, the null hypothesis is rejected. So, it can be said that the correlation between exports and real GDP is statistically significant. In the same manner the correlation coefficient between RX and NORGDP is 0.96. It shows that exports and RNOGDP are positively related in Saudi Arabia and that a high degree of correlation is evident between them. Since the t-statistic at 44 degrees of freedom is 22, and the critical t-value at 5 per cent level of significance is less than it, the null hypothesis is rejected. So, it can be said that the correlation between real exports and RNOGDP is statistically significant. Correlation, however, does not say anything about long-run relationship, and thus, leaves unsettled the debate concerning the long-run relationship between exports and real economic growth measured by real gross domestic product.

Unit Root Test

Table 1 Augmented Dickey-Fuller and Phillips-Perron Test Statistic

	Augmented Dickey-Fuller test statistic				Phillips-Perron test statistic			
variable	Level with Constant	Prob.	First difference with Constant	Prob.	Level with Constant	Prob.	First difference with Constant	Prob.
RGDP	-2.262307	0.1884	-3.683636***	0.0080	-1.888563	0.3344	-3.683636***	0.0080
NORGDP	-1.774617	0.3876	-2.683124*	0.0854	-1.907520	0.3259	-2.649289*	0.0915
RX	-2.572389	0.1065	-4.436680***	0.0010	-2.424915	0.1411	-4.458869***	0.0009

Note: * Statistically significant at the 10% significant level
*** Statistically significant at the 1% significant level

The results from Table 1 indicate that we cannot reject the presence of a unit root for any of the variables. All variable are not stationary at their levels but they are stationary at the first

difference. By using both root test: Augmented Dickey-Fuller test statistic and Phillips-Perron test statistic, all variables are integrated of order one, I~ (1).

Johansen Cointegration Test

Table 2 Cointegration Test

Panel A: Cointegration test: RGDP and RX

r	Trace Statistic	Prob.	Max-Eigen Statistic	Prob.
None*	18.40860	0.0177	18.26272	0.0111
At most 1	0.145878	0.7025	0.145878	0.7025

Panel B: Cointegration test: NORGDP and RX

r	Trace Statistic	Prob.	Max-Eigen Statistic	Prob.
None	12.48768	0.1350	11.10971	**0.1488**
At most 1	1.377972	0.2404	1.377972	**0.2404**

From table (2) panel A the Trace test indicates the existence of one cointegrating equation at 5 per cent level of significance. Also, the maximum eigenvalue test makes the confirmation of this result. Thus, RGDP and RX have long-run equilibrium relationship between them. Nonetheless, the study cannot confirm the long-run equilibrium relationship between NORGDP and RX since the cointegration does not exist between them at even ten percent level of significance. The last result has been drawn from table 2 Panel B because the null hypothesis of no cointegration has been accepted (Prob –value is greater than 0.10 for both Trace as well as maximum eigenvalue test).

Vector Error Correction Model

However, for RGDP and RX in the short-run there may be deviations from the equilibrium, and it is required to verify whether such disequilibrium converges on the long-run equilibrium or not. Thus, Vector Error Correction Model is used to generate such dynamics relation. Error correction mechanism provides a means whereby a proportion of the disequilibrium is corrected in the next period. So, error correction mechanism is a mean to reconcile the short-run and long-run behavior.

The estimation of a Vector Error Correction Model (VECM) requires selection of an appropriate lag length. The number of lags in the model is determined according to the Akaike information criterion (AIC), sequential modified LR test statistic (LR), Final prediction error (FPE), and Hannan-Quinn information criterion (HQ). All of these criterions suggested the selection of lag length 2. An error correction model with the computed t-values of the coefficients is estimated and the results are reported in Table (3). The estimated coefficient of error-correction term (EC) in the RX equation is statistically significant and has a negative sign, which confirms that there is a long-run equilibrium relation between the independent and dependent variables at 5 per cent level of significance. The magnitude of the error-correction term is (-0.57) which indicates that the rate of convergence of total real export to the equilibrium state per year for Saudi. Precisely, the speed of adjustment of any disequilibrium towards a long-run equilibrium is that about 57 per cent of the disequilibrium in exports is corrected each year. Furthermore, the negative and statistically significant value of error correction coefficient indicates the existence of a long-run causality between RGDP and RX. The existence of Cointegration implies the existence of Granger causality at least in one direction (Granger, 1988). This causality is running from the real GDP to exports. In

other words, the changes in exports can be explained by real GDP. Nonetheless, the equation of RGDP in Vector Error Correction Model (VECM) indicates that error-correction term is negative and significant. Since the value of error-correction term in the second equation is equal -0.067, the speed of adjustment of any disequilibrium towards a long-run equilibrium is about 6.7 percent of the disequilibrium in RGDP is corrected each year. This causality is running from real exports to RGDP.

Table 3 Vector Error Correction Estimates

Error Correction:	D(LOGRX)	D(LOGRGDP)
CointEq1	-0.573927	-0.067235
	(0.18959)	(0.02945)
	[-3.02718]	[-2.28323]
D(LOGRX(-1))	0.252713	0.044214
	(0.21665)	(0.03365)
	[1.16648]	[1.31395]
D(LOGRX(-2))	-0.144730	-0.020689
	(0.20524)	(0.03188)
	[-0.70518]	[-0.64901]
D(LOGRGDP(-1))	0.543741	0.008676
	(1.50126)	(0.23318)
	[0.36219]	[0.03721]
D(LOGRGDP(-2))	0.747159	0.258621
	(1.34847)	(0.20945)
	[0.55408]	[1.23479]
C	0.086886	0.024110
	(0.07045)	(0.01094)
	[1.23335]	[2.20347]
R-squared	0.508714	0.463207
Adj. R-squared	0.438530	0.386522
F-statistic	7.248310	6.040403

Thurayia (2004) found the speed of adjustment of any disequilibrium towards a long-run equilibrium is about 35 percent of the disequilibrium in GDP is corrected each year which is higher than the result of this study. Therefore, this study confirms the bidirectional causality between the RX and RGDP. Here, the Granger- causality conducted by the t-test of the lagged error-correction coefficient suggests statistically significant long-term bidirectional causation between RX and RGDP variables, i.e. export causes economic growth and economic growth also causes export. This finding of bidirectional causality between RX and RGDP variables differs from Thurayia (2004) who found unidirectional causality running from export to GDP. The coefficients of the first difference of RX and RGDP lagged one period in RX equation in Table 3 are statistically insignificant which indicate the absence of short-run causality from real GDP to exports based on VECM estimates.

As pointed out by Granger (1988) standard Granger tests are only valid if the original time series are not cointegrated**.** Since NORGDP and RX are not cointegrated**,** the direction of causality between them can be presented using Pairwise Granger Causality Tests. The result from table (4) indicates bi-directional short-run causalities between NORGDP and RX at 10 percent level of significant. The growth in real export of Saudi results in an a positive growth in NORGDP which in turn causes the export to grow once again. This causality is not as strong as the causality between RX and RGDP that has been derived from VECM. The results of this study suggest that promoting exports via export promotion policies will contribute to economic growth of not only RGDP but also NORGDP in Saudi Arabia. Since the growth of export contributes to the growth of NORGDP, the growth of export supports the economic diversification in Saudi Arabia.

Table 4 Pairwise Granger Causality Tests

Null Hypothesis	F-Statistic	Prob.	Result
RX does not Granger Cause NORGDP	2.98431	0.0629	Rejected at 10% only
NORGDP does not Granger Cause RX	2.85526	0.0703	Rejected at 10% only

6. Conclusion and policy implications

Using annual data on Saudi's exports and GDP over the time period 1970-2013, we have analyzed the time series properties of these variables in order to determine the appropriate functional form for testing the ELG hypothesis. The study finds that GDP, and exports are cointegrated. Based on the VECM results, the evidence suggests the strong support for long-run bidirectional causality between real export and RGDP. Moreover, the study concludes that both export and economic growth are related to past deviations (error-correction terms) from the empirical long-run relationship. It implies that all variables in the system have a tendency to quickly revert back to their equilibrium relationship. This fact means that any rise in export growth would have a positive influence on economic development in both the long- and short-runs. The results of this study also suggest that promoting exports via export promotion policies will contribute to economic growth in Saudi Arabia. However, the study finds that NORGDP, and real exports are not cointegrated which means there is no tendency to revert back to their long-run equilibrium relationship. The short-run causality results suggested by traditional Grenger causality test tends to support the bidirectional causality between them. The results of this study suggest that promoting exports via export promotion policies will contribute to economic growth of not only RGDP but also NORGDP in Saudi Arabia. The export promotion policy tends to participate in the process of diversifying the economic base of Saudi Arabia.

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