The Export-Led Growth: A Case Study of Costa Rica

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Abstract

This paper empirically investigates the export-led growth hypothesis for Costa Rica. Johansen co-integration and Granger Causality tests are employed to investigate the long-run relationship and causality between exports and economic growth respectively. The results of Johansen co-integration indicate a long-run equilibrium relationship between exports and economic growth. Granger causality test results show an unidirectional causality from economic growth to export growth of Costa Rica.

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Keywords: Export-led Growth; Granger causality; Johansen co-integration; Costa Rica.

1. Introduction

The sources of the economic growth have been widely debated in the literature. Economic growth is affected from several factors. Export is one of the most important economic activities for a country (Medina-Smith, 2000). Export contributes to the balance of payments and increases the employment opportunities of a country. The export-led growth hypothesis claims that export is capable of affecting economic growth by encouraging the domestic producers to use better production techniques and to be more competitive in the world market. The intra-industry trade is raised by exports which helps the country to integrate the global market and causes to reduce the effects of any external shocks on the domestic economy (Abou-Stait, 2005).

Trade theory claims that export boosts the domestic economy via several channels. An increase in the exports of a country also leads to an increase in the real output. Additionally, growth in export encourages the domestic firms to specialize on the production of export goods which will lead to an increase in productivity level. Also, more
skilled labor is employed in the export oriented sectors of the country. As a result of these developments, the industry will be divided into two groups as more productive sector and inefficient non-trade sector.

Trade enables a country to access more advanced production techniques in order to improve its production and to accelerate its growth rate. Therefore, country will develop its production in accordance with its comparative advantage and will achieve economies of scale to reach foreign markets (Giles & Williams, 2000). Consequently, the greater output of a country is achieved by export-led growth and international trade may lead the country to adopt technological change more rapidly for efficient production (Jung & Marshall, 1983). The real GDP (Gross Domestic Product) growth of the export-oriented country will be higher than the less export-oriented one (Dadora, 1991). The theoretical discussions emphasize that trade is an engine that accelerates economic growth (Fajana, 1979).

The export growth is considered as an important instrument for economic growth of developing countries (Gabrielle, 2004). According to Dollar and Kraay (2007), trade causes economic growth for developing countries to reduce their poverty and they gave the most encouraging examples of the China, Bangladesh, Malaysia and Costa Rica.

Costa Rica is a small open developing economy which reached the political stability after the end of civil war in 1948 (Veillette, 2005). In 1980, Costa Rica made several reforms including current and capital account liberalization which increased the exports and foreign direct investments. Export growth had positive effect on the economic growth of the country (Clare et. al., 2002). The implementation of export and outward-oriented strategies in 1980 triggered the economy of Costa Rica and caused steady expansion (World Bank, 2014). The production and export sector were hindered by the strong currency of Costa Rica. In order to make the currency of Costa Rica more competitive in the external sector of the economy (especially exports and tourism), The Central Bank of Costa Rica (BCCR) was adopted the crawling peg exchange rate regime. This strategy was changed to crawling band regime, which allowed the currency to float between fixed bands in 2006. The liberalization process of Costa Rica resembled to mercantilist approach over 30 years, because all policies including the tax, trade, monetary were applied to encourage the export oriented sectors even it cost to its citizens (Hidalgo, 2014). At the end of January 2015, BCCR allowed the Costa Rican Colon to float against US Dollar for targeting the economic expansion and improving inflation targeting policies (Bloomberg, 2015).

Even though it was affected from 2008 Financial Crisis; Costa Rica has become more competitive in the world market in the recent years. The economy of Costa Rica is specialized in export of manufactured and processed goods. The biggest export market for Costa Rica is the United States (Deutsche Bank, 2012). Costa Rica has stable GDP growth related to its tourism and exports of the electrical machinery and agricultural products (Republic of Turkey Ministry of Foreign Affairs, 2015). The investment and trade regulations, the stable political and social environment, high sensitiveness to investing on education and health care system, and geographical location of country are the most important factors which make Costa Rica to be more competitive country for exporting (Monge-Arino, 2011).

These properties of Costa Rica make it an ideal country to investigate the validity of export-led growth hypothesis. However, to our best knowledge, the export-led growth of Costa Rica hasn’t been investigated for many years. The last study on this topic was carried out by Medina-Smith (2000). To fill this gap, the aim of our paper is to examine the validity of the export-led growth hypothesis for Costa Rica.

The rest of the paper is organized as follows: The following section provides literature review which explains the historical background of export-led growth studies. The third part provides the data and methodology of the study. The empirical findings are discussed in section 4. Finally, section 5 concludes.

2. Literature Review

The discussions about the relationship between export and economic growth rose after 1970s. We can divide the export-led growth studies into two groups. The first group of studies found supportive results for export-led growth. Balassa (1978) tested the relationships between exports and economic growth by considering 11 developing countries. This study concluded that exports affect economic growth. According to this study, export-oriented policies are more beneficial than import substitution in supporting economic growth. Tyler (1981) examined the
export-led growth theory for 55 countries for 1960-1977 period. This study found positive correlation between exports and economic growth as well. Dodaro (1991) also emphasized the importance of export-led growth for 41 developing countries indicating comparative advantage theory. For the countries under the investigation, a strong correlation between economic growth and manufactured products was found. Dodaro argued that the comparative advantage theory is valid, and the development level of a country affects the exported products and exports helps the countries to grow. Wacziarg (2000) analyzed the trade openness and economic growth for 57 countries for 1970-1989 periods. The result of the study showed that trade openness affects the economic growth. In last decade, there have been many studies those support the export-led growth hypothesis including Parikh and Stirbu (2004), Mamun and Nath (2005), Maneschiold (2008), Herreras and Orts (2010) also found export-led growth supportive results. The second group of studies did not find supportive results for export-led growth. Among others; Jung and Marshall (1983), Hsiao (1987), Ahmed and Kwan (1991), Sengupta and Espana (1994), Akbar and Naqvi (2000), Ahmed et. al. (2000), Panas and Vamvoukas (2002) could not find any evidence for the positive effect of export on economic growth, so did not support export-led growth theory.

There are few studies which investigate export-led growth for Costa Rica. Van den Berg and Schmidt (1994) supported the export-led growth for Costa Rica. Medina-Smith (2000) examined the export-led growth for Costa Rica by analyzing the investment, fixed capital formation, exports, population and GDP of the country for 1950 to 1997 period. The results of this study showed that the variables are co-integrated and they are moving on common trend in the long term and exports of Costa Rica affected the economic growth of the country.

3. Methodology

Time series analysis is used for annual data for 1980-2013 periods. The annual data of real GDP (NY.GDP.MKTP.KD) and real exports (NE.EXP.GNFS.KD) are taken from the World Bank database and variables are all constant at 2005 USD prices. The natural logarithms of variables are taken.

3.1 Unit Root Testing

To determine the order of integration of series, unit root tests are used. Dickey-Fuller unit root test (DF) (Dickey & Fuller, 1981) is one of the most widely used tests to determine whether a variable is stationary. The Dickey-Fuller unit root test is shown below:

\[ y_t = \alpha y_{t-1} + u_t \]  

(1)

The value of \( \alpha \) shows the stationarity of series. \(|\alpha| < 1 \) and \( \alpha = 1 \) indicate stationary and nonstationary series respectively.

It was observed that there are some biases in the results of the DF. The Augmented Dickey-Fuller test (ADF) was developed to ensure that the error terms are not correlated (Mahadeva & Robinson, 2004). The hypothesis testing of ADF is the same as that Dickey-Fuller test and the test critical values are the same as Dickey-Fuller test (Hill et. al., 2012).

The Philips Perron (1988) unit root test is developed as an alternative to ADF and has some superior properties than ADF. Philips Perron unit root test is recommended to be used in the presence of the high serial correlation. The Philips Perron (PP) test makes a correction in the t-statistics of the coefficient from the AR (1) regression to deal with the serial correlation in the error term. One of the methods that are used is the Newey-West heteroscedasticity autocorrelation consistent estimate as given below:

\[ \hat{\lambda}^2_n = \hat{\gamma}_{0,n} + 2 \sum_{i=1}^{q} (1 - \frac{1}{q+1}) \hat{\gamma}_{i,n} \]  

(2)

\[ \hat{\gamma}_{j,n} = \frac{1}{n} \sum_{i=j+1}^{n} \hat{\mu}_i \hat{u}_i - j \]  

(3)
Where; $\hat{u}_t$ is the ordinary least square residual, $q$ is the number of Newey-West lags used for measuring $\hat{\lambda}_{n}$, $\hat{\gamma}_j$ is the covariance of estimated residuals $j$-lag apart and $n$ is the sample size.

### 3.2. Johansen Co-Integration Test

Johansen co-integration methodology is used to test the co-integration between variables based on the Vector Auto Regression (VAR) model. The VAR model is given as follows (Johansen & Juselius, 1990);

$$Z_t = \Pi_1 Z_{t-1} + \cdots + \Pi_j Z_{t-j} + \Phi D_t + \varepsilon_t$$

The equation (4) can be reformulated again as Vector Correction model illustrated below (Johansen, 1992):

$$\Delta Z_t = \Pi Z_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \Delta Z_{t-j} + \Phi D_t + \varepsilon_t$$

Where;

$$\Pi = \sum_{l=1}^{p} \Pi - 1 \text{ and } \Gamma_j = - \sum_{j=1}^{p} \Pi_j$$

The results of the co-integration are related with the rank of $\Pi$. If the rank of $\Pi$ is zero; there is no linear combination related with $Z_t$. If the rank of $\Pi$ is 1 which means that there is a linear and independent combination among variables. If the rank of $\Pi$ is bigger than 1, it means there are co-integrating vectors between variables.

The co-integration relationship between variables can be tested by two tests which are Trace and Maximum Eigen-value Test. These tests examine the existence of co-integrated vectors. The Trace Test is illustrated below:

$$Trace = -T \sum_{i=q+1}^{n} \ln (1 - \tilde{\lambda}_i)$$

Where; $\tilde{\lambda}_{r+1}, \ldots, \tilde{\lambda}_n$ are $n$-$q$ of smallest squared conical between $Z_t$ and $\Delta Z_t$ series. On the other hand, the alternative test is Maximum Eigen-value test which is illustrated below;

$$L - \max = -T \ln (1 - \tilde{\lambda}_{q+1})$$

This test statistics compares the $q$ co-integrating vectors; $r \leq q$ and the alternative is $r \leq q+1$.

### 3.3. Granger Causality Test

The understanding of the trend properties of data requires causality orderings (Marin, 1992). According to Granger (1969), the simple causality model requires these assumptions are satisfied;

$$E(\varepsilon_t | \varepsilon_s) = 0 = E(\eta_t | \eta_s), s \neq t$$

The Granger causality model is given below;

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \varepsilon_t$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \eta_t$$
If \( b_j \) is different than zero; \( Y_t \) causes \( X_t \). On the other hand, if \( c_j \) is different than zero; \( X_t \) causes \( Y_t \).

The results of the Granger causality test can be interpreted in four different forms (Gujarati, 2004): If the coefficient of lagged variables \( X_t \) and \( Y_t \) are statistically insignificant, the independence will occur between variables. If the coefficient of lagged \( Y_t \) is statistically significant in equation 10 (e.g. \( a_j \neq 0 \)), while the coefficient of lagged \( X_t \) is statistically insignificant in equation 11 (e.g. \( d_j = 0 \)); there is unidirectional causality from \( X_t \) to \( Y_t \). On the other hand, if coefficient of lagged \( X_t \) is statistically insignificant (\( a_j=0 \)) in equation 10, while the coefficient of lagged \( Y_t \) is statistically significant in equation 11 (e.g. \( d_j \neq 0 \)); there is unidirectional causality from \( Y_t \) to \( X_t \). If both coefficients of lagged \( X_t \) and \( Y_t \) are significant, there is bilateral causality between both variables.

### 4. Empirical Findings

Table 4.1 Results for ADF and PP

<table>
<thead>
<tr>
<th>Statistics (Level)</th>
<th>lnRGDP</th>
<th>Lag</th>
<th>lnREX</th>
<th>Lag</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \tau_1 ) (ADF)</td>
<td>-6.19*</td>
<td>(1)</td>
<td>-1.23</td>
<td>(2)</td>
</tr>
<tr>
<td>( \tau_n ) (ADF)</td>
<td>-0.12</td>
<td>(2)</td>
<td>-1.03</td>
<td>(2)</td>
</tr>
<tr>
<td>( \tau ) (ADF)</td>
<td>6.15</td>
<td>(2)</td>
<td>3.54</td>
<td>(2)</td>
</tr>
<tr>
<td>( \tau_1 ) (PP)</td>
<td>-6.11*</td>
<td>(8)</td>
<td>-1.53</td>
<td>(0)</td>
</tr>
<tr>
<td>( \tau_n ) (PP)</td>
<td>0.90</td>
<td>(3)</td>
<td>-0.55</td>
<td>(3)</td>
</tr>
<tr>
<td>( \tau ) (PP)</td>
<td>5.94</td>
<td>(2)</td>
<td>4.71</td>
<td>(3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistics (First Difference)</th>
<th>( \Delta \ln \text{RGDP} )</th>
<th>Lag</th>
<th>( \Delta \ln \text{REX} )</th>
<th>Lag</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \tau_1 ) (ADF)</td>
<td>-6.39*</td>
<td>(1)</td>
<td>-4.68*</td>
<td>(1)</td>
</tr>
<tr>
<td>( \tau_n ) (ADF)</td>
<td>-6.77*</td>
<td>(1)</td>
<td>-4.67*</td>
<td>(1)</td>
</tr>
<tr>
<td>( \tau ) (ADF)</td>
<td>-2.05**</td>
<td>(0)</td>
<td>-2.87*</td>
<td>(0)</td>
</tr>
<tr>
<td>( \tau_1 ) (PP)</td>
<td>-4.03**</td>
<td>(12)</td>
<td>-3.82*</td>
<td>(5)</td>
</tr>
<tr>
<td>( \tau_n ) (PP)</td>
<td>-4.43*</td>
<td>(14)</td>
<td>-3.95*</td>
<td>(4)</td>
</tr>
<tr>
<td>( \tau ) (PP)</td>
<td>-2.05**</td>
<td>(0)</td>
<td>-2.93*</td>
<td>(1)</td>
</tr>
</tbody>
</table>

Note: RGDP denotes real gross domestic product; REX is real export rate. The unit root tests are applied on the natural logarithms of series. \( \tau_1 \) denotes the model with a drift and trend. \( \tau_n \) denotes the model with a drift and without trend; \( \tau \) denotes without a drift and trend. The lag lengths are given on the table for both ADF and PP tests. (See Enders, 1995: 254-255). *, ** and *** denote the significance level at 1%, 5% and 10% respectively.

Table 4.2 Johansen Co-integration Test

<table>
<thead>
<tr>
<th># of CE(s)</th>
<th>Trace Statistics</th>
<th>5% Critical Value</th>
<th>1% Critical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>None*</td>
<td>15.82938</td>
<td>15.41</td>
<td>20.04</td>
</tr>
<tr>
<td>At most 1</td>
<td>0.548719</td>
<td>3.76</td>
<td>6.65</td>
</tr>
</tbody>
</table>

Notes: Critical values used are taken from Osterwald-Lenum. * denotes the rejection of hypothesis at the 5% level. Lags length is 5 in this estimation.

To test the long term relationship between variables in equation 1, Johansen co-integration test is employed. According to results of trace test the null hypothesis is rejected and alternative hypothesis which states there is at
least one co-integrating vector is accepted. The table 4.2 illustrates that; there is a long term relationship between real GDP and real exchange rate at 5 percent level.

After the detection of long term relationship between real GDP and real export rate of Costa Rica, Granger causality test is used to test the direction of the relationship between real GDP and export. The result of the Granger causality test is given in the table 4.3 below;

Table 4.3. Granger Causality Test

<table>
<thead>
<tr>
<th>H₀ Hypothesis</th>
<th>F-Statistics</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnREX does not Granger cause lnRGDP</td>
<td>2.01483</td>
<td>0.1368</td>
</tr>
<tr>
<td>lnRGDP does not granger cause lnREX</td>
<td>3.83475</td>
<td>0.0202</td>
</tr>
</tbody>
</table>

According to table 4.3, there is no causal relationship from growth of real export rate to real GDP. On the other hand, there is a unidirectional causal relationship from real GDP growth to real export rate growth. Real GDP is used as a proxy for economic growth of the country. As Granger Causality results reveal that a change in real GDP of Costa Rica leads to a change in its export growth. Results highlight the importance of economic stability for the export. A stable and sustainable economy in Costa Rica may affect the export growth substantially.

5. Conclusion

The aim of this paper is to empirically examine the validity of export-led growth hypothesis for the case of Costa Rica for the 1980-2013 period. The existence of a long term relationship between export and economic growth is examined by the Johansen co-integration test and the causality between these variables is investigated by the Granger causality test. According to the results of our study; for the period under investigation, exports and real GDP of Costa Rica have a log-run relationship and there is unidirectional causal relationship from economic growth to exports, which means the economic growth of Costa Rica Granger causes export growth of the country but the export growth is not a significant factor in determining the economic growth of Costa Rica. This finding is important for policy purposes. Our empirical findings reveal that economic stability of this country plays an important role for Costa Rica’s export growth; which implies that to enhance the export sector of the country, policies those support GDP growth should be followed. On the other hand export promotion policies such as application of a specific currency regime, supporting the export related sectors may not contribute to the economic growth of Costa Rica. So, the government of Costa Rica should give priority to the policies those lead to a stable economic system and maintain a fast and sustainable economic growth.

References


