The Efficacy of Export-led Growth among Six Pacific Island Countries

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Presentation Outline

• Introduction
• Literature review
• Stylish Facts
• Models
• Findings
• Conclusion
Introduction

Since last few decades, economic impact of export in less developed countries (LDCs) has been an important subject of extensive empirical studies.

There is no clear-cut prediction of direction of causation between export and economic growth

- the export-led growth (ELG) hypothesis
- the growth-led export (GLE) hypothesis
- No correlation between the two
Introduction (cont’d)

• Most of the PICs pursued protectionist trade policies following their independence in 1970s.

• In recent years, many PICs have experienced major macroeconomic and trade policy reforms with emphasis on market liberalization and trade openness.
Literature Review

• The ELG hypothesis
  – Export expansion benefits the domestic economy through potential positive externalities derived from access to larger foreign market
The GLE hypothesis

- A country with high growth rates may attract more investments in infrastructure, technology, and other benefits that may have a positive impact on the efficiency of a country, allowing it to have a larger export sector and to increase its exports.

- In reverse, it is equally plausible that countries with rapid growth rate may experience a lower export.
• Export expansion do not necessarily contribute to economic growth in developing countries focusing on primary commodity export.
  – Over investment in primary sector crowds out resources away from the externality-generating manufacturing sector (Sachs and Warner, 1995; Herzer, 2007; Herzer and Dreger, 2013)
  – Export of primary commodity is subject to large price and volume volatility (Dawe, 1996)
  – Primary commodity export comprise of low value export (Rodrik, 2006; Aditya & Acharyya, 2011)
Stylish Facts

Six PICs Total

Exports and non-exports (US$ Mill)


- 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000

Exports (US$ million) Non-exports (US$ million)
Fiji

Fiji

Exports and non-exports

Exports (US$ million)  Non-exports (US$ million)
Tonga

Exports and non-exports

Exports (US$ million)

Non-exports (US$ million)
Models (long-run relationships)

\[
\ln GDPNEX_{it} = \beta_{i,0} + \beta_1 \ln K_{it} + \beta_2 \ln EX_{it} + \varepsilon_{it}
\]

\[
\ln K_{it} = \phi_{i,0} + \phi_1 \ln GDPNEX_{it} + \phi_2 \ln EX_{it} + \omega_{it}
\]

\[
\ln EX_{it} = \gamma_{i,0} + \gamma_1 \ln GDPNEX_{it} + \gamma_2 \ln K_{it} + \omega_{it}
\]

where

\( GDPNEX \) = per capita GDP net of exports (US$, 2005 prices);

\( K \) = per capita capital stock (US$, 2005 prices), estimated using perpetual inventory method assuming 6 times GDP in 1980 as benchmark value and depreciation rate of 4% per annum;

\( EX \) = per capita exports of goods and services (US$, 2005 prices).
Models (short-run dynamics)

\[
\Delta \ln GDPNEX_{it} = \alpha_{i,0}^a + \sum_{j=1}^{J} \delta_j^a \Delta \ln GDPNEX_{i,t-j} + \sum_{j=1}^{J} \phi_j^a \Delta \ln K_{i,t-j} \\
+ \sum_{j=1}^{J} \eta_j^a \Delta \ln EX_{i,t-j} + \lambda^a \hat{e}_{i,t-1} + u_{it}
\]

\[
\Delta \ln K_{it} = \alpha_{i,0}^b + \sum_{j=1}^{J} \delta_j^b \Delta \ln GDPNEX_{i,t-j} + \sum_{j=1}^{J} \phi_j^b \Delta \ln K_{i,t-j} \\
+ \sum_{j=1}^{J} \eta_j^b \Delta \ln EX_{i,t-j} + \nu_{it}
\]

\[
\Delta \ln EX_{it} = \alpha_{i,0}^c + \sum_{j=1}^{J} \delta_j^c \Delta \ln GDPNEX_{i,t-j} + \sum_{j=1}^{J} \phi_j^c \Delta \ln K_{i,t-j} \\
+ \sum_{j=1}^{J} \eta_j^c \Delta \ln EX_{i,t-j} + \lambda^c \hat{e}_{i,t-1} + w_{it}
\]
Data

• Six PICs: Fiji, Papua New Guinea, Samoa, Solomon Islands, Tonga, and Vanuatu
• Period: 1988-2012
• Data source: United Nations National Accounts Main Aggregates Database
Findings

Table 1: Pesaran panel unit root tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>Option</th>
<th>Level</th>
<th>5% critical</th>
<th>First difference</th>
<th>5% critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnGDPNEX_{it}</td>
<td>Constant</td>
<td>-1.552</td>
<td>-2.170</td>
<td>None</td>
<td>-3.881***</td>
</tr>
<tr>
<td>lnK_{it}</td>
<td>Constant, trend</td>
<td>-1.654</td>
<td>-2.700</td>
<td>None</td>
<td>-2.159***</td>
</tr>
<tr>
<td>lnEX_{it}</td>
<td>Constant, trend</td>
<td>-2.580</td>
<td>-2.700</td>
<td>None</td>
<td>-4.892***</td>
</tr>
<tr>
<td>e_{it}</td>
<td>None</td>
<td>-2.377***</td>
<td>-1.610</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o_{it}</td>
<td>None</td>
<td>-1.476</td>
<td>-1.610</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o_{it}</td>
<td>None</td>
<td>-1.906***</td>
<td>-1.610</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Findings (cont’d)

Table 1: Pesaran panel unit root tests (cont’d)

Note:
1. The null hypothesis in panels are not stationary.
2. Maximum number of lags specified is two. Actual number of lags is decided by Portmanteau (Q) test for white noise.
3. Second-order serial correlation is tested with the Breusch-Godfrey Lagrange multiplier test in each individual regression.
4. *** denotes significance at the 1% significance level.
Findings (cont’d)

Table 2: Pedroni's cointegration tests

<table>
<thead>
<tr>
<th>Test Stats</th>
<th>$v$</th>
<th>$rho$</th>
<th>$t$</th>
<th>$adf$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel</td>
<td>1.662*</td>
<td>-1.384</td>
<td>-2.362**</td>
<td>-2.804***</td>
</tr>
<tr>
<td>Group</td>
<td>-0.663</td>
<td></td>
<td>-2.368**</td>
<td>-2.507**</td>
</tr>
</tbody>
</table>

Note:
1) Under a null of no cointegration, all test statistics are distributed N(0,1).
2) Z critical values: 2.576 at the 1% level, 1.96 at 5% level, and 1.645 at 10% level.
Findings (cont’d)

Table 3: Long-run relationships between exports and GDP net of exports

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Estimator</th>
<th>(1) DOLS</th>
<th>(2) with D-K s.e</th>
<th>(3) MG</th>
<th>(4) GMM</th>
<th>(5) GMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnGDPNEX&lt;sub&gt;t&lt;/sub&gt;</td>
<td></td>
<td>(z)</td>
<td>(t)</td>
<td>(z)</td>
<td>(z)</td>
<td>(z)</td>
</tr>
<tr>
<td>lnK&lt;sub&gt;t&lt;/sub&gt;</td>
<td></td>
<td>.403</td>
<td>.417</td>
<td>.804</td>
<td>.309</td>
<td>1.122</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.72)**</td>
<td>(18.80)***</td>
<td>(9.66)**</td>
<td>(3.39)**</td>
<td>(12.25)*****</td>
</tr>
<tr>
<td>lnEX&lt;sub&gt;t&lt;/sub&gt;</td>
<td></td>
<td>.469</td>
<td>.475</td>
<td>.303</td>
<td>.630</td>
<td>-.131</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(7.20)**</td>
<td>(15.22)**</td>
<td>(3.64)**</td>
<td>(10.54)*****</td>
<td>(-1.02)</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td></td>
<td>2.267</td>
<td>-2.487</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(3.08)**</td>
<td>(-0.73)</td>
<td></td>
<td></td>
</tr>
<tr>
<td># countries</td>
<td></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td># years</td>
<td></td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Wald χ² or F [p]</td>
<td></td>
<td>83.93</td>
<td>329.39</td>
<td>106.62</td>
<td>127.14</td>
<td>89.27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[0.000]</td>
<td>[0.0000]</td>
<td>[0.0000]</td>
<td>[0.0000]</td>
<td>[0.0000]</td>
</tr>
<tr>
<td>R²</td>
<td></td>
<td>(adjusted) 0.4113</td>
<td>(within) 0.7247</td>
<td>-</td>
<td>(centered) 0.6888</td>
<td>(centered) 0.6428</td>
</tr>
<tr>
<td>Pesaran's test of cross sectional independence [p]</td>
<td>-</td>
<td>2.346 [0.0190]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Hansen J statistic χ² [p]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.774 [0.2869]</td>
<td>6.826 [0.3372]</td>
</tr>
<tr>
<td>Exogeneity test χ² [p]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14.987 [0.0001]</td>
<td>3.916 [0.0478]</td>
</tr>
</tbody>
</table>

Note:
Findings (cont’d)

Table 3: Long-run relationships between exports and GDP net of exports (cont’d)

Note:
1. Regression (1) performs dynamic ordinary least squares (DOLS) for cointegrated panel data with homogeneous covariance structure.
2. Regression (2) produces Driscoll-Kraay (D-K) standard errors, which are robust for panel regressions with cross-sectional dependence.
4. Regressions (4) and (5) use the two-step generalized method of moments (GMM) estimator, with exports in (4) and GDP net of exports in (5) respectively instrumented by their respective lags of second and third orders and lags of imports of same orders.
Findings (cont’d)

Table 4: Short-run dynamics (fixed-effects estimator)

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>(1) ΔlnGDPNEX&lt;sub&gt;t&lt;/sub&gt;</th>
<th>(2) ΔlnK&lt;sub&gt;t&lt;/sub&gt;</th>
<th>(3) ΔlnEX&lt;sub&gt;t&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff.</td>
<td>(t)</td>
<td>Coeff.</td>
</tr>
<tr>
<td>ECT</td>
<td>-.062</td>
<td>(-2.01)**</td>
<td></td>
</tr>
<tr>
<td>ΔlnGDPNEX&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>.270</td>
<td>(2.92)***</td>
<td>.031</td>
</tr>
<tr>
<td>ΔlnGDPNEX&lt;sub&gt;i,t-2&lt;/sub&gt;</td>
<td>.073</td>
<td>(0.79)</td>
<td>.020</td>
</tr>
<tr>
<td>ΔlnK&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>.338</td>
<td>(1.21)</td>
<td>.842</td>
</tr>
<tr>
<td>ΔlnK&lt;sub&gt;i,t-2&lt;/sub&gt;</td>
<td>-.322</td>
<td>(-0.89)</td>
<td>-.075</td>
</tr>
<tr>
<td>ΔlnEX&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-.032</td>
<td>(-1.19)</td>
<td>-.009</td>
</tr>
<tr>
<td>ΔlnEX&lt;sub&gt;i,t-2&lt;/sub&gt;</td>
<td>-.055</td>
<td>(-2.09)**</td>
<td>-.001</td>
</tr>
<tr>
<td>Constant</td>
<td>.024</td>
<td>(4.61)***</td>
<td>.003</td>
</tr>
<tr>
<td># countries</td>
<td>6</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td># years</td>
<td>24</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>F [p]</td>
<td>2.37 [0.0130]</td>
<td></td>
<td>35.56 [0.0000]</td>
</tr>
<tr>
<td>R² (within)</td>
<td>0.1502</td>
<td></td>
<td>0.6072</td>
</tr>
</tbody>
</table>
Conclusion

- There is bi-directional long-run causality between exports and non-exports sectors.
- In the short-run, increase in exports reduces non-exports sector’s output; there lacks evidence of such causality the other way around.