Foreign exchange shortage in Papua New Guinea: Is devaluation an option?

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Outline

- Research significance
- Literature review
- Data and methodology
- Results
- Policy Implications
- Conclusion
Background

- The FX market of PNG has been in persistent shortage of foreign currency since 2013.
  - No interbank FX trading- central bank is the only seller of FX
  - Growing backlog of import orders (~30% of FX reserves)
- Since 2013, BPNG has exhausted one-third of FX reserves in intervention, but could not eliminate the backlog.
Why FX shortage?

- PNG is a small open resource dependent economy with:
  - export/GDP=40%
  - mineral/total export=80%
  - LNG/total export=30%

- Higher **growth** periods had been associated with periods of higher mineral exports.

- Commodity prices are on downward trends since 2014.

- The largest mineral sector project could not bring in desired foreign exchange-PDAs.
Consequence

- Significant import compression - total import in 2016Q2 was only half of the 2014Q2 level; Non-mineral import was only 1/3rd of that level.

- Faster depletion of FX reserves from intervention - by 75% from 2014Q2 level.

- 10% reduction in government revenue.

- FX shortage is believed to be the most important constraint to doing business and growth outlook (IMF 2017; PwC 2016).
Policy response

- BPNG responded to the shortage with its FX intervention strategy along with other quantity-based measures:
  - Cessation of Vostro accounts and new FC accounts (2015).
  - Banning of trade finance loans (2016).
Research Question

• Quantity-based measures could not eliminate FX shortage.

• What about price-based measures?

• Specifically,
  
  o Can exchange rate depreciation improve FX inflows?
  
  o How depreciation affects output? Is it inflationary?
Literature Review

• Real exchange rate depreciation leads to higher trade balance and output in developing countries- Bussirere et al. (2017); Gervais et al. (2016).

Trade Balance Effect

Real Depreciation $\rightarrow$ $\Delta$ Relative price $\rightarrow$ Export $+$ $\rightarrow$ Trade Balance $+$ $\rightarrow$ GDP $+$ $\rightarrow$ Price Level $+$

Import $-$ $\downarrow$

Price Level $+$

PNG Context:

○ Marshall-Lerner condition holds for PNG (Nakatani 2018)
○ Kina is overvalued (Fox & Schroder 2017)

Both studies do not evaluate the impact on output and price level.
Model

• **Estimation Technique**: Vector Autoregression (VAR)

• **Identification Strategy**: Recursive (Cholesky decomposition)

• A 6-variable VAR model with (lag order 2) is estimated with the following **short-run restriction**:

\[
\begin{bmatrix}
  u_{\text{com\_index}} \\
  u_{\text{gdp\_t}} \\
  u_{\text{cpi}} \\
  u_{\text{reer}} \\
  u_{\text{export\_t}} \\
  u_{\text{import\_t}}
\end{bmatrix} =
\begin{bmatrix}
  t_{11} & 0 & 0 & 0 & 0 & 0 \\
  t_{21} & t_{22} & 0 & 0 & 0 & 0 \\
  t_{31} & t_{32} & t_{33} & 0 & 0 & 0 \\
  t_{41} & t_{42} & t_{43} & t_{44} & 0 & 0 \\
  t_{51} & t_{52} & t_{53} & t_{54} & t_{55} & 0 \\
  t_{61} & t_{62} & t_{63} & t_{64} & t_{65} & t_{66}
\end{bmatrix}
\begin{bmatrix}
  \varepsilon_{\text{com\_index}} \\
  \varepsilon_{\text{gdp\_t}} \\
  \varepsilon_{\text{cpi}} \\
  \varepsilon_{\text{reer}} \\
  \varepsilon_{\text{export\_t}} \\
  \varepsilon_{\text{import\_t}}
\end{bmatrix}
\]

- \text{com\_index} : Export weighted international commodity index (2010=100)
- \text{gdp\_t} : Total real GDP (million US$)
- \text{cpi} : Consumer Price Index (2010=100)
- \text{reer} : Real Effective Exchange Rate (2010=100)
- \text{export\_t} : Real export (million US$)
- \text{import\_t} : Real import (million US$)

• **Variables** enter VAR in logs. All variables (except reer) are seasonally adjusted.
• All variables are I(1); **stationary** at their first differences.
Data

• **Sample period**: 1996-2017 (floating exchange rate regime)

• **Data frequency**: Quarterly

• Annual Real GDP of PNG converted into quarterly frequency using Chow-Lin (1971) method.

• Real exports and imports are obtained by adjusting nominal US$ values by US CPI.

• A time dummy is used to capture the post **Trading Margin** period (1 if 2014q2 onwards).

• **Data Source:**

  International Financial Statistics (IFS) Database 2018, International Monetary Fund; World Bank; Bank of Papua New Guinea.

• **Software**: EViews 10
Results

Response to a positive REER shock
(3.8% Depreciation shock)

One SD positive (Depreciation) shock to reer
Result 1 (overall economy)

- A real depreciation shock leads to higher level of total exports and output.
- Import goes up with currency depreciation (but insignificantly).
- While depreciation is slightly inflationary, net impact on output is positive.
- Results hold for alternative ordering.
Result 2 (non-mineral economy)

- Non-mineral economy behaves in the same direction as the overall economy to a depreciation shock to the real exchange rate.
- Non-mineral export reacts more than the overall export.
Result 3 (Overall economy)

- Trade balance improves with currency depreciation.
Policy Implications

• Empirical results suggest that BPNG can employ exchange rate policy to address the ongoing FX shortage- prolonged intervention is not feasible with limited FX reserves.

• A sudden real depreciation shock improves trade balance and output- addresses trade elasticity pessimism for PNG.

• While depreciation is slightly inflationary, its net impact on the economy is positive- addresses the fear of inflation.

• Non-mineral exports react more to depreciation than the overall exports to the same size of depreciation shock.
Conclusion

- This study provides evidence of FX shortage and its impact on the PNG economy.

- Not a single factor, rather a combination of domestic and external factors contributed to the shortage.

- While quantity-based measures could not eliminate the shortage, price-based measures offer a possible solution.

- How much devaluation would clear the market?
  - Will depend on BPNG’s monetary policy objectives
  - Future research
Thank you...

Q&A
Appendix
Variables

External variables (Base year 2010)
- Trade-weighted foreign real GDP (million USD, RHS)
- International commodity price index (LHS)

Real GDP (million USD)
- Total
- Non-mineral

CPI (2010=100)
- PNG
- US

Total real exports and imports
- Total exports
- Total imports

Non-mineral real exports and imports
- Real non-mineral exports
- Real non-mineral imports

Exchange rate
- REER (RHS)
- USD per kina (LHS)
## Stationarity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test statistics</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADF</td>
<td>Phillips-Perron</td>
</tr>
<tr>
<td></td>
<td>Level</td>
<td>First difference</td>
</tr>
<tr>
<td>com_index</td>
<td>-1.664</td>
<td>-7.243***</td>
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<tr>
<td>gdp_t</td>
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<td>-2.528***</td>
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<td>cpi</td>
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<td>import_t</td>
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<td>import_nm</td>
<td>-2.108</td>
<td>-12.128***</td>
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<td>-10.386***</td>
</tr>
<tr>
<td>gdp_f</td>
<td>-2.315</td>
<td>-4.105***</td>
</tr>
</tbody>
</table>

All variables are in logarithms except tb_t.
Test include individual trend. Schwarz Information Criterion was used in the test with maxim lags of 11.
*** indicates significance at 1% level.
Stability - Result 3

\[
\begin{bmatrix}
\varepsilon_{\text{com}_\text{index}} \\
\varepsilon_{\text{cpi}} \\
\varepsilon_{\text{gdp}_\text{t}} \\
\varepsilon_{\text{reer}} \\
\varepsilon_{\text{export}_\text{t}} \\
\varepsilon_{\text{import}_\text{t}}
\end{bmatrix}
\]
Stability - Result 4

\[
\begin{bmatrix}
\varepsilon_{\text{com_index}} \\
\varepsilon_{\text{reer}} \\
\varepsilon_{\text{gdp}_t} \\
\varepsilon_{\text{cpi}} \\
\varepsilon_{\text{export}_t} \\
\varepsilon_{\text{import}_t}
\end{bmatrix}
\]

\[
\begin{bmatrix}
\varepsilon_{\text{gdp}_t} \\
\varepsilon_{\text{cpi}} \\
\varepsilon_{\text{reer}} \\
\varepsilon_{\text{export}_t} \\
\varepsilon_{\text{import}_t}
\end{bmatrix}
\]
PNG’s economic growth is sensitive to its external sector’s performance.

Trends in Real GDP and Export Growth, 1996-2016

- Higher commodity price
- LNG construction
- LNG exports

Export (Total) | Export (Mineral) | Real GDP (RHS)
Response to a 10% REER depreciation shock

Overall Economy

Non-mineral Economy