How Commodity Exporters Can Cope with Price Volatility: Four Proposals

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Commodity prices over the last decade have been even more volatile than usual.
How can countries that export commodities cope with the high volatility in their terms of trade?

Ideas that may help *manage* volatility, in four areas.

<table>
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<th>Tried &amp; tested:</th>
<th>Micro</th>
<th>Macro</th>
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<tbody>
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<td>1. Hedging</td>
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<td>3. Fiscal policy</td>
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<td>2. Debt denomination</td>
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<td>4. Monetary policy</td>
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<td>Untried:</td>
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Idea 1: Commodity options

• Use options to hedge against downside fluctuations of the $ price of the export commodity.
  – Mexico does it annually for oil.
    • thereby mitigating, e.g., the 2009 & 2015 downturns.

• Why not use the futures or forward market?
  – Ghana has tried it successfully, for cocoa.
  – But: The minister who sells forward may get:
    • meager credit if the $ price of the commodity goes down,
    • and lots of blame if the price goes up.
For some commodities, derivatives contracts are unavailable at long horizons.

Chicago Mercantile Exchange

Data source: Bloomberg

Idea 2: Commodity bonds

• To hedge against long-term fluctuations in $ commodity price.

• For those who borrow,
  – e.g., an African country developing oil discoveries --
  – link the terms of the loan, not to $ or €, nor to the local currency, but to the price of the export commodity.
  – Then debt service obligations will match revenues.

  – Consider debt crises
    • in 1998: Indonesia, Russia & Ecuador, and
    • in 2015: Ghana, Ecuador, Nigeria & Venezuela.
    • <= the $ prices of their oil exports fell,
      – and so their debt service ratios worsened.
    • Indexation of debts to oil prices might have prevented the crises.

• An old idea. Why has it hardly been tried?
“Who would buy bonds linked to commodity prices?”

• Answer -- There are natural customers:
  – Power utilities & airlines, for oil;
  – Steelmakers, for iron ore;
  – Millers & bakers, for wheat;
  – Etc.

• These firms want the commodity exposure,
• but not the credit risk.

• => The World Bank could intermediate:
  – Link client-country loans to the oil price;
  – then lay off the oil risk by selling precisely that amount of oil-linked World Bank bonds to the private sector.
Everyone gets what they want.

Niger: wants to borrow, but to be protected against a fall in the $ price of oil.

Airline or utility: wants to be protected against a rise in the $ price of oil; but doesn’t want to take on African country credit risk.

World Bank: wants to lend to Niger; but doesn’t want to take on oil price risk.

Bank issues oil-linked loan to Niger.

Bank sells oil-linked bond to corporate investors.
Idea 3: Adopt institutions to achieve counter-cyclical fiscal policy

• Developing countries, historically, have had notoriously pro-cyclical spending, especially commodity-exporters
  
  
  – Tax policy tends to be procyclical as well: Vegh & Vuletin (2015).

• But after 2000 some achieved counter-cyclicality,
  
  – running surpluses 2002-08, then easing in 2009.
  
  
Who achieves counter-cyclical fiscal policy?

Countries with “good institutions”

“On Graduation from Fiscal Procyclicality,” 2013, Frankel with Carlos Végh & Guillermo Vuletin; J.Dev.Ec.
The quality of institutions varies, not just across countries, but also across time.

1984-2009

Worsened institutions; More-cyclical spending.

Improved institutions; Less-cyclical spending.

Notes: The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. Country correlations between the cyclical components of real government expenditure and real GDP (i.e., Corr(G, GDP)) are calculated as 20-year rolling windows for the period 1960-2009. Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). The index is calculated as the average of four components: investment profile, corruption, law and order, and bureaucratic quality. Actual institutional quality (i.e., for each year) is used. Institutional quality is shown on the right axis and the correlation between the cyclical components of real government expenditure and real GDP is shown on the left.

The comparison is statistically significant not only in cross-section, but also across time.


Table 1. Institutional quality statistics by graduating class

<table>
<thead>
<tr>
<th>Dependent variable is:</th>
<th>IQ (1)</th>
<th>IQ(_{\text{initial}}) (2)</th>
<th>ΔIQ (3)</th>
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<tbody>
<tr>
<td><strong>Group means</strong></td>
<td></td>
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<tr>
<td>Established graduate (EG)</td>
<td>0.82</td>
<td>0.84</td>
<td>-0.02</td>
</tr>
<tr>
<td>Still in school (SS)</td>
<td>0.48</td>
<td>0.43</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>Recent graduate (RG)</strong></td>
<td><strong>0.55</strong></td>
<td><strong>0.47</strong></td>
<td><strong>0.07</strong></td>
</tr>
<tr>
<td>Back to School (BS)</td>
<td>0.60</td>
<td>0.56</td>
<td>0.04</td>
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</table>

**Mean tests (p-value)**

<table>
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<tr>
<th></th>
<th>EG vs. SS</th>
<th>EG vs. RG</th>
<th>EG vs. BS</th>
<th>SS vs. RG</th>
<th>SS vs. BS</th>
<th>RG vs. BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-value</td>
<td>1.9×10(^{-251})</td>
<td>1.8×10(^{-12})</td>
<td>2.3×10(^{-25})</td>
<td>3.1×10(^{-19})</td>
<td>0.346</td>
<td>1×10(^{4})</td>
</tr>
<tr>
<td></td>
<td>2.1×10(^{-120})</td>
<td>1.5×10(^{-8})</td>
<td>7.7×10(^{-33})</td>
<td>5.9×10(^{-20})</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.6×10(^{35})</td>
<td>0.009</td>
<td>5.9×10(^{-20})</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Institutional quality is a normalized index that ranges between 0 (lowest institutional quality) and 1 (highest institutional quality). The index is calculated as the average of four components: investment profile, corruption, law and order, and bureaucratic quality. IQ refers to the current institutional quality value. IQ\(_{\text{initial}}\) refers to earliest IQ value available for each country, in most cases it corresponds to the 1984 value. The only exceptions are Rep. of Congo (1985), Gambia (1985), Niger (1985), Sierra Leone (1985), Yemen (1990), and Azerbaijan (1998). ΔIQ=IQ-IQ\(_{\text{initial}}\). The mean test is a t-test on the equality of means for two groups; the null hypothesis is that both groups have the same mean.

What *specific* institutions can help?

- **Budget rules?**
  - Budget deficit ceilings or debt brakes?
    - Have been tried by many countries:
      - 97 IMF members, by 2013.
      - Usually fail.
    - Rigid Budget Deficit ceilings operate *pro*-cyclically.
    - Phrasing the target in cyclically adjusted terms helps solve that problem in theory. But...

- **Rules don’t address a major problem:**
  - Bias in official forecasts
    - of GDP growth rates, tax receipts & budgets.
  - In practice, overly optimistic forecasts by official agencies render rules ineffective.
Countries with Balanced Budget Rules frequently violate them.
An institution that others might emulate:

The Chile model


- I concluded that the key feature was the delegation to independent committees of the responsibility to estimate long-run trends in the copper price & GDP,
  - thus avoiding the systematic over-optimism that plagues official forecasts in 32 other countries.
Over-optimism in official forecasts

• Statistically significant bias among 33 countries
  – Worse in booms.
  – Worse at 3-year horizons than 1-year.
  – Frankel (2011, 2013); Frankel & Schreger (2016).

• Leads to pro-cyclical fiscal policy:
  – If the boom is forecast to last indefinitely, there is no apparent need to retrench.

• BD rules don’t help.
  – The SGP worsens forecast bias for euro countries.
  – Cyclically adjusted rules won’t help the bias either.

• Solution?
The example of Chile’s fiscal institutions

• 1\textsuperscript{st} rule – Governments must set a budget target,

• 2\textsuperscript{nd} rule – The target is structural: Deficits allowed only to the extent that
  – (1) output falls short of trend, in a recession, or
  – (2) the price of copper is below its trend.

• 3\textsuperscript{rd} rule – The trends are projected by 2 panels of independent experts, outside the political process.
  – Result: Chile avoided the pattern of 32 other governments, where forecasts in booms were biased toward optimism.
Chilean fiscal institutions

• In 2000 Chile instituted its structural budget rule.
• The institution was formalized into law in 2006.
• The structural budget surplus must be...
  – 0 as of 2008 (was higher before, lower after),
  – where “structural” is defined by output & copper price equal to their long-run trend values.
• I.e., in a boom the government can only spend increased revenues that are deemed permanent; any temporary copper bonanzas must be saved.
The Pay-off

• Chile’s fiscal position strengthened immediately:
  — Public saving rose from 3 % of GDP in 2000 to 8 % in 2005
  — allowing national saving to rise from 21 % to 24 %.

• Government debt fell sharply as a share of GDP and the sovereign spread gradually declined.

• By 2006, Chile achieved a sovereign debt rating of A,
  • several notches ahead of Latin American peers.

• By 2007 it had become a net creditor.

• By 2010, Chile’s sovereign rating had climbed to A+,
  • ahead of some advanced countries.

• => It was able to respond to the 2008-09 recession.
Idea 4: Adopt a monetary policy regime that can accommodate terms of trade shocks

Longstanding textbook wisdom: For a country subject to big terms of trade shocks, the exchange rate should be able to accommodate them.

<table>
<thead>
<tr>
<th>When the $ price of commodities is:</th>
<th>we want the currency to</th>
<th>so as to avoid</th>
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</thead>
<tbody>
<tr>
<td>high,</td>
<td>appreciate</td>
<td>excessive money inflows, credit, debt, inflation &amp; asset bubbles.</td>
</tr>
<tr>
<td>low,</td>
<td>depreciate</td>
<td>trade deficit, fx reserve crisis, excessively tight money &amp; recession.</td>
</tr>
</tbody>
</table>
Should commodity exporters float?

• Of course some will continue to fix the exchange rate,
  – especially very small countries.

• But others need some degree of exchange rate flexibility.

• The long-time conventional wisdom that floating works better, for countries exposed to volatility in the prices of their export commodities, has been confirmed in empirical studies, including:
  – Broda (2004),
  – Edwards & Levy-Yeyati (2005),
  – Rafiq (2011),
Across 107 major commodity boom-bust cycles, output loss is bigger the bigger is the commodity price change & the smaller is exchange rate flexibility.
But if the exchange rate is not to be the nominal anchor for monetary policy, then what is?

• Is full discretion an option?
  – The Fed & some other major central banks, for now, have given up on attempts to communicate intentions in terms of a single variable,
    • even via forward guidance, let alone an explicit target (like IT).

• But the presumption is still in favor of transparency and clear communication.

• Many still feel the need to announce a simple target.
  – Most developing countries, in particular,
  – need the reinforcement to credibility.
Monetary policy-makers in developing countries may have more need for credibility.

a) due to high-inflation histories,
b) less-credible institutions, or
c) political pressure to monetize big budget deficits.

A. Fraga, I. Goldfajn & A. Minella (2003),
“Inflation Targeting in Emerging Market Economies.”

But it does not add to credibility to announce a target which the central bank is likely to miss subsequently.
What choice of monetary anchor or target?

- Of the variables that are candidates for nominal target, the traditional ones prevent accommodation of terms of trade shocks:
  1. Not just exchange rate targets,
  2. but also M1 (traditional monetarism)
  3. and the CPI (Inflation Targeting).

- But some novel candidates would *facilitate* accommodation of trade shocks:
  4. Target an index of product prices (PPT)
  5. Target Nominal GDP (NGDPT)
  6. Add the export commodity to a currency basket peg (CCB).
New proposal:
Target a Currency + Commodity Basket (CCB)

• Consider three commodity-exporters that, at times, have pegged to a basket of major foreign currencies:
  – Kuwaiti dinar (1975-2003, 2007-present), pegged to basket of $ + €,
  – Chilean peso (1992-1999) pegged to $ + DM + ¥,
  – Kazakh tenge (2013-2014) to $ + € + ₪.

• The proposal is to add the commodity to the basket.
  – E.g., oil for Kuwait & Kazakhstan,
  – copper for Chile.
CCB: Add the export commodity to the currency basket
Target a Currency + Commodity Basket (CCB)

• This target would give the best of both worlds:
  – It is precise and transparent on a daily basis,
    • Determined by observed mid-day or closing prices in London or the ICE.
  – while yet sustainable on a long-term basis:
    • The currency would automatically strengthen (vs. the $) when the $ price of oil rises,
    • and automatically fall when the price of oil falls.
Mechanics of the CCB target

• Compatible with IT: The country can pick a long-term inflation target.

• Once a year, the monetary authorities announce the parameters:
  – the weights in the basket on each foreign currency & commodity,
    • translated into coefficients on units of $, barrels of oil, etc.; and
  – the rate of crawl (if ≠0) to achieve the year’s inflation target in expected value.

• Once a day:
  – The central bank posts the $ exchange rate for the tenge implied arithmetically by the previously announced parameters and that day’s $ price of oil and $ exchange rate for the euro, etc.,
  – perhaps with a 1% band.

• Within the day:
  – The central bank stands ready to intervene in the foreign exchange market to keep the $ dollar exchange rate that has been posted for the day.
  – But often it would not have to intervene much,
    • because the regime’s credibility would motivate banks to trade at the day’s rate.
How would the weights be chosen?

3 possible approaches:

• For simplicity: $ \frac{1}{3} + \frac{1}{3} \, \varepsilon + \frac{1}{3} \text{ barrel of oil.}$

• Or scientifically:
  – turn Ph.D. students loose on estimating optimal weights.

• Or to rationalize past policies:
  – Estimate the weights that fit past history the best,
  – either
    • on the theory that true economic fundamentals reveal themselves,
    • or to salvage a bit of credibility for officials.
Last summer, NBK could have announced a CCB target with weights that fit past history.
Summary: How can countries that export commodities cope with the high volatility in their terms of trade?

Four ideas may help

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<th>Tried &amp; tested:</th>
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<th>Macro: Counter-cyclical policy</th>
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<td>1. Use options.</td>
<td>3. Fiscal: protect independence of forecasts.</td>
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Tried & tested:
- Use options.
- Commodity bonds.

Untried:
- Fiscal: protect independence of forecasts.
- Monetary: target a Currency + Commodity Basket.
References by the author

- **On Commodity bonds:**

- **On counter-cyclical fiscal policy:**
  - ”On Graduation from Fiscal Procyclicality,” 2013, with Carlos Végh & Guillermo Vuletin; *Journal of Development Economics*.

- **On CCB proposal for monetary policy (Currency + Commodity Basket):**
  - "UAE & Other Gulf Countries Urged to Switch Currency Peg from the Dollar to a Basket That Includes Oil," *VoxEU*, July 2008.

- **On the “commodity curse” generally:**
Appendices

• Appendix 1: Some policies that *don’t* usually work.

• Appendix 2: Commodity bonds

• Appendix 2: Fiscal policy
  – Which countries have overcome fiscal pro-cyclicality?
Appendix 1: How can commodity-exporters cope with the high volatility in their terms of trade?

Not by policies that try to suppress price volatility:

- Price controls
- Export controls
- Stockpiles
- Marketing boards
- Producer subsidies
- Blaming derivatives
- Nationalization
- Banning foreign participation
Appendix 2: Commodity bonds

The problem:

• If an African oil-exporting country borrows in $, it is very vulnerable to future fluctuations in the $ price of oil on world markets:
  – If the $ price of oil falls in the future, the country may not have the foreign exchange it needs to service its debt.
  – It is then forced to cut spending, devalue, default, or go to the IMF for an emergency program.
• Borrowing in € or CFA francs doesn’t help much.
Insulation against the risk of future ups & downs in the $ price of oil

• In theory, the oil-exporting country could hedge against falls in the price of oil by selling on the forward market.
  – Problem #1: Transaction costs may be too high.
  – Problem #2: The maturities or horizons of forward/futures markets generally do not go out past 1 year.
    • This does not help much for the long-term horizon of oil exploration, drilling, pipeline investment, etc.
Insulation against the risk of future ups & downs in the $ price of oil

- If the country is borrowing anyway, e.g., a long-term loan from the World Bank, then express the loan in terms of oil rather than $.
  - This solves the problem.
  - The stream of foreign exchange proceeds from future oil exports corresponds to cost of debt service.
  - The country is protected/hedged/insulated/covered:
    - It need not worry about future fluctuations in oil prices.
Question: Who would take the other side of the transaction, buying the oil bonds?

• Answer: Airlines, electric power utilities, and other corporations in rich countries for whom oil is a cost rather than an income.
  – They want to hedge against oil price increases.
  – Thus they are natural customers for oil bonds.

• But they may not want to be in the business of evaluating creditworthiness of African borrowers.
Who would take the other side of the transaction, buying the oil bonds?

• **Solution:** The World Bank links the terms of a Niger loan to the price of oil.
  – E.g., the $ value of the principle might be $500 million if the price of oil stays at $50 per barrel,
  – but would go up or down 1% every time the $ price of oil goes up or down 1% relative to $50/barrel.

• The World Bank then lays off the oil risk (not the country risk) by selling the same amount of oil bonds to investors
  – where airlines and utilities would happily take the opportunity to “go long” in terms of oil.
Appendix 3: Procyclical vs. countercyclical fiscal policy

Correlations between Gov't Spending & GDP: 1960-99

Adapted from Kaminsky, Reinhart & Vegh (2004)

G always used to be procyclical for most developing countries.
An important development --

• Some developing countries were able to break the historic pattern after 2000:
  – taking advantage of the boom of 2002-2008
    • to run budget surpluses & build reserves,
  – thereby earning the ability to expand fiscally in the 2008-09 crisis.
  – Chile, Botswana, Malaysia, Indonesia, Korea...
DEVELOPING:
43% (or 32 out of 75) countercyclical. The figure was 17% (or 13 out of 75) in 1960-1999.

INDUSTRIAL:
86% (or 18 out of 21) countercyclical. The figure was 80% (or 16 out of 20) in 1960-1999.

In the decade 2000-2009, about 1/3 developing countries switched to countercyclical fiscal policy: Negative correlation of G & GDP.

Adapted from Frankel, Vegh & Vuletin (JDE, 2013)
Update of Correlation (G, GDP): 2010-14
Back-sliding among some countries.

DEVELOPING: 37% (or 29 out of 76) pursue counter-cyclical fiscal policy.
INDUSTRIAL: 63% (or 12 out of 19) pursue counter-cyclical fiscal policy.