How to Cope with Volatile Commodity Export Prices: Four Proposals

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Commodity prices over the last decade have been even more volatile than usual.
Prices of oil & gas are the most volatile of all.

The Real Price of Oil*  1970-2015

* Crude oil (WTI), global spot, close, USD/US CPI, all urban consumers, all items
Source: CEIC, GaveKal data

A New Ceiling for Oil Prices, Anatole Kaletsky, 1/14/2015
How can countries that export commodities 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
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.

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<th>Tried &amp; tested:</th>
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<td>4. Monetary policy</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.

• 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-cyclical, 
  – 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.

Frankel, Végh & Vuletin, 2013.
The comparison is statistically significant not only in cross-section, but also across time.

What *specific* institutions can help?

• Budget rules?
  – Budget deficit ceilings or debt brakes?
    • Have been tried by many countries:
      – 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>
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<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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<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>
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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),
  – Céspedes & Velasco (2012),
“Macroeconomic Performance During Commodity Price Booms & Busts”

Dependent variable: change in output gap

| Commodity price index change | 0.016  
|                             | (2.06)** |
| Exchange rate flexibility   | -0.002  
|                             | (-2.01)** |

R2: 0.08  
Number of observations: 107  
F test: 3.67**  
Constant term not reported.  
(t-statistics in parentheses.)

** Statistically significant at 5% level.

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.


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 target,
    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} \) € + \( \frac{1}{3} \) 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.

(336 KZT/$, May 2016)
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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<td>1. Use options.</td>
<td>3. Fiscal: protect independence of forecasts.</td>
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Appendices

• Appendix 1: Commodity bonds

• Appendix 2: Fiscal policy
  – Which countries achieved counter-cyclical policy?
  – The role of overoptimistic official forecasts.

• Appendix 3: Monetary policy
  – CPI-targeting (IT)
  – Other nominal targets that do allow accommodation of terms of trade shocks:
    • PPT
    • NGDPT.
Appendix 1: 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..
• 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.
Procyclical and countercyclical fiscal policy

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

Adapted from Kaminsky, Reinhart & Vegh (2004)

G always used to be pro-cyclical 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...
Correlations of Government spending & GDP: 2000-09

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

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.*
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.

Thanks to Guillermo Vuletin
The role of overoptimism in official forecasts: The private sector downgraded forecasts for Mexico in response to the 2008-09 global crisis, while government forecasters did not.
The private sector has also been less optimistic than government forecasters about Mexican budget prospects especially in the 2009 global crisis.
Appendix 3: Anchors for monetary policy

• Inflation targeting,
  – in terms of the CPI:
  – Why it prevents accommodation to trade shocks.

• Other nominal targets that do allow accommodation of terms of trade shocks:
  – PPT
  – NGDPT
  – and CCB.
Inflation Targeting (IT)

• If the exchange rate is not to be the anchor for middle-sized middle-income commodity-exporting countries, what is?

• The popular choice since the 1990s: IT, meaning targeting the CPI in some form.

• Variations include:
  – level vs. change,
  – headline vs. core,
  – forecasted inflation vs. actual.

• But they all fail to accommodate terms of trade shocks.
Not widely known: The CPI is a poor choice with respect to terms of trade shocks.

- If interpreted literally, a CPI target:
  - prevents the central bank from responding to a fall in the $ price of the export commodity with easy enough money to depreciate the currency;
  - And requires the central bank to respond to a rise in the $ price of import commodities by tightening enough to appreciate the currency.

- This is backwards...

A Currency + Commodity Basket gets it right.
Other nominal anchors that allow accommodation of terms of trade (PPT & NGDPT)

• If the authorities are to target inflation, the price index should be:
  – one that leaves the import commodity out of the basket,
  – but includes the price of the export commodity,
  – something producer-based like the GDP deflator (PPT),
    • rather than the CPI.

• If the central bank were to target the GDP deflator:
  – it would automatically respond when the $ price of oil falls with monetary policy easy enough to depreciate the currency, which is what one wants,
  – and not when the price of the import commodity falls, which is what a CPI target does.
My past proposal that countries with volatile terms of trade should target a product-oriented price index (PPT)...

• ...has been adopted nowhere.


Another proposal: NGDP Targeting

• Developing countries should target nominal GDP.

• It has the same advantage as targeting the GDP deflator
  – accommodating terms of trade shocks better than a CPI target,
• and some other advantages as well:
  – It also beats CPI-targeting in case of supply shocks.
  – Many prominent economists have supported NGDPT.

• “Nominal GDP Targeting for Developing Countries,” *VoxEU*, Aug. 2014.
• "Nominal GDP Targeting for Developing Countries," with Pranjul Bhandari. NBER WP 20898, 2015.
NGDP Targeting proposals

• NGDP targeting was first proposed in the 1980s
  – The point of a target was to lower expectations of inflation.

• The proposal has been revived in recent years
  – The point nowadays has been to raise expected inflation.

• Either way, the argument for phrasing the monetary stance in terms of Nominal GDP is robustness with respect to supply shocks.

• But proponents focus only on big industrialized countries.
• Mid-size, mid-income, commodity exporters are better candidates.
EM economies differ from industrialized economies

• More exposed to terms of trade shocks
  – especially volatile commodity export prices.

• And more exposed to supply shocks
  a) such as natural disasters
     (hurricanes, cyclones, earthquakes, tsunamis...)
  b) other weather events (droughts...),
  c) social unrest (strikes...),
  d) productivity shocks (“Are we the next Tiger economy?”).
Price volatility of commodities matters even for developing countries that don’t export them: food & energy have a much larger weight in EM consumption baskets than in Advanced Countries’

Source: Haver Analytics, Goldman Sachs Global Investment Research.
Price volatility of commodities matters even for developing countries that don’t export them: Food & energy have much larger weights in EM consumption baskets than in Advanced Countries’.

Source: Haver Analytics, Goldman Sachs Global Investment Research.
Trade & Supply Shocks are More Common in Emerging Markets & Developing Countries

Probability of Shocks, 1970-2007
(In percent of country years)

- Terms of Trade Shock
- Disaster


Supply shock is split between output & inflation objectives rather than falling exclusively on output as under IT (at B).
...if the Aggregate Supply curve is steep 
(b is low, relative to a, the weight on the price stability objective)
Mathematical analysis: Which regime best achieves objectives of price stability and output stability?

• The goal is to minimize a quadratic loss function:

\[ \Lambda = a p^2 + (y - \hat{y})^2 \]

where \( p \equiv \) the inflation rate,
\( y \equiv \) the log of real output,
\( \hat{y} \equiv \) the preferred level of output;
\( a \equiv \) the weight assigned to the price stability objective.
Any nominal rule, provided it is credible, can set expected inflation at the desired level (say, 0),

- e.g., eliminating the inflation bias that comes with discretion

\[ p^e = Ep = (\hat{y} - \bar{y})b/a \]

in Barro-Gordon (1982) model of dynamic inconsistency,

- where the Aggregate Supply relationship is

\[ y = \bar{y} + b(p - p^e) + u, \]

- and \( \bar{y} \equiv \) potential output.

Which regime best achieves objectives of price & output stability? continued
But different rules => different outcomes, when shocks hit

IT & NGDPT both neutralize AD shocks.

That leaves AS shocks.

NGDP rule dominates IT, if...

\[ a < (2 + b)b; \]

- Example 1: holds if \( b > a \) (AS flat, vs. loss-function lines).
- Example 2: holds if \( a = 1 \) (as in Taylor rule)
  and AS slope \( 1/b < (1+\sqrt{2}) = 2.414 \).

Under these conditions, the economy looks more like Figure 2 than like Figure 3:
- If inflation were not allowed to rise in response to an AS shock, the resulting GDP loss could be severe. => NGDPT dominates IT.
Estimating AS equation

• I have estimated the AS slope for a few EMs.

• E.g., Kazakhstan, over the period 1993-2012.
  – Exogenous terms of trade shocks: oil price fluctuations.
  – Exogenous demand shocks: changes in military spending and income of major trading partners.
  – The estimated AS slope is 1.66, statistically < 2.41.

• Supports the condition needed for NGDPT to dominate IT.

• Conclusion: middle-size middle-income commodity-exporting countries should consider using nominal GDP as their target, in place of the exchange rate or the CPI.
Nominal GDP Targeting

• NGDPT is more robust with respect to supply shocks & terms of trade shocks, compared to the alternatives of IT or exchange rate targets.

• The logic holds whether the immediate aim is
  – disinflation (as in 1980s, and again today among many EM & developing countries);
  – monetary stimulus (as among big Advanced Cs recently);
  – or just staying the course.
Further references by the author

• For Currency+Commodity Basket:
  – "UAE & Other Gulf Countries Urged to Switch Currency Peg from the Dollar to a Basket That Includes Oil," *VoxEU*, July 2008.

• For Commodity bonds: