How to Cope with Volatile Commodity Export Prices: Four Proposals

Jeffrey Frankel

Harpel Professor, Harvard University

HARVARD Kennedy School
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

BANCO CENTRAL
DE CHILE

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Minerals, hydrocarbons, & agricultural products have highly variable prices

Major Commodity Exports in Latin American countries and Standard Deviation of Prices on World Markets

	Leading Commodity Export*	Standard Deviation of Log of Dollar Price 1970-2008
ARG	Soybeans	0.2781
BOL	Natural Gas	1.8163
BRA	Steel	0.5900
CHL	Copper	0.4077
COL	Oil	0.7594
CRI	Bananas	0.4416
ECU	Oil	0.7594
GTM	Coffee	0.4792
GUY	Sugar	0.4749
HND	Coffee	0.4792
JAM	Aluminum	0.4176
MEX	Oil	0.7594
NIC	Coffee	0.4792
PAN	Bananas	0.4416
PER	Copper	0.4077
PRY	Beef	0.2298
SLV	Coffee	0.4792
TTO	Natural Gas	1.8163
URY	Beef	0.2298
VEN	Oil	0.7594

Frankel (2011)

* World Bank analysis (2007 data)

How can countries that export commodities cope with the high volatility in their terms of trade?

- Price controls
- Export controls
- Stockpiles
- Marketing boards

Not by policies that try to suppress price volatility:

- Producer subsidies
- Blaming derivatives
- Nationalization
- Banning foreign participation

How can countries that export commodities
cope with the high volatility in their terms of trade?

Four ideas that may help *manage* volatility

	Micro	Macro
Tried & tested:	**1. Hedging**	**3. Fiscal policy**
Untried:	**2. Debt denomination**	**4. Monetary policy**

1st idea. For financial hedging against fluctuations in $ price of the export commodity --

- Use options to hedge against downside fluctuations of the commodity price.
  - Mexico does it annually for oil.
    - thereby mitigating the 2009 downturn, for example.

- 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.

2nd idea for financial hedging against fluctuations in $ price of the export commodity --

- For those who borrow,
  - e.g., an African country developing offshore oil discoveries:
  - link the terms of the loan, not to $, nor to the local currency, but to the price of the export commodity.
  - Then debt service obligations match revenues.
  - Debt crises in Indonesia, Russia & Ecuador in 1998:
    - <= the $ prices of their oil exports had fallen,
      - and so their debt service ratios worsened.
    - Indexation of their debts to the oil price could have prevented it.
- 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.
- Presumably these firms don't want the credit risk.
- => The World Bank should intermediate.

Idea 3:
To achieve counter-cyclical fiscal policy --

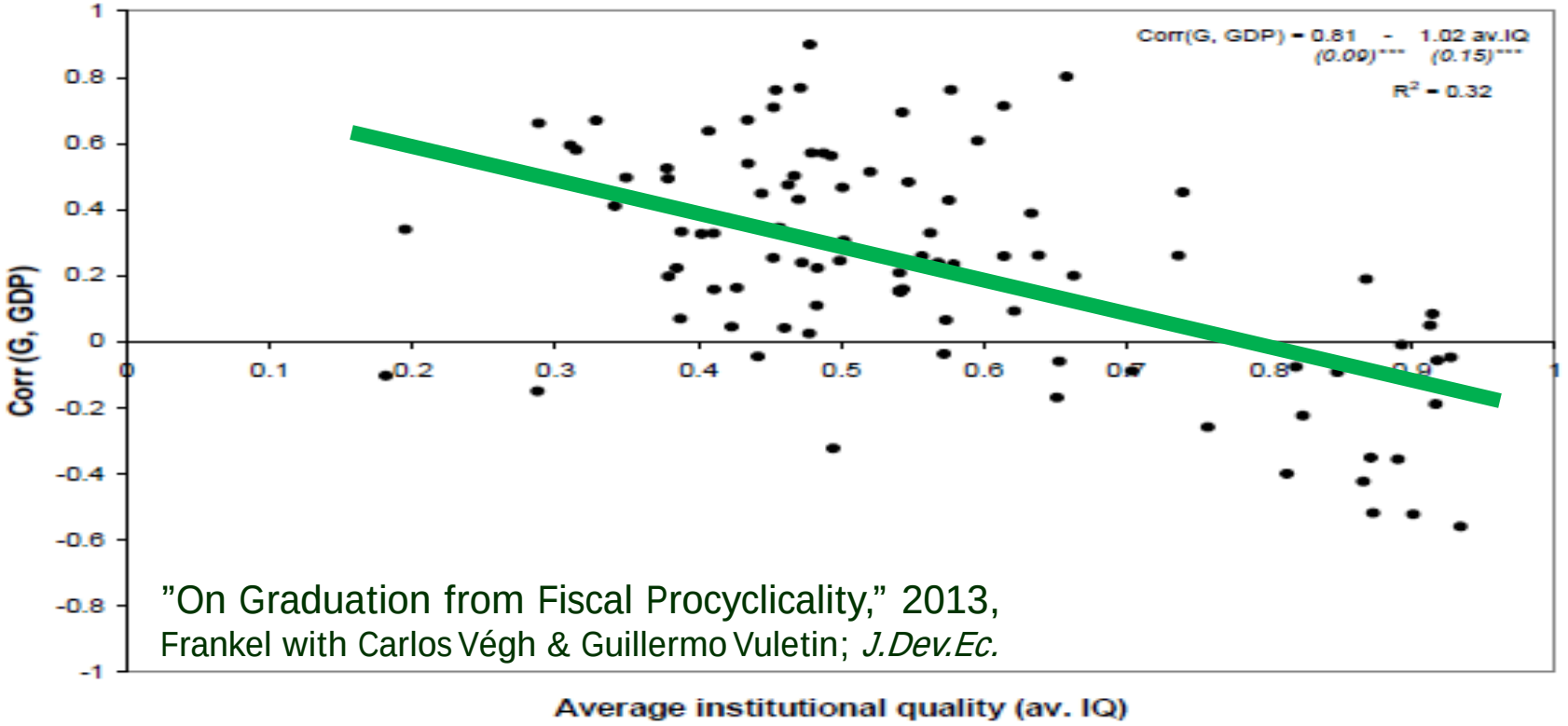
- Commodity-exporting countries, historically, have had notoriously pro-cyclical fiscal policy,
  - particularly in Latin America.
  - Cuddington (1989), Gavin & Perotti (1997), Tornell & Lane (1999), Kaminsky, Reinhart & Vegh (2004), Talvi & Végh (2005), Mendoza & Oviedo (2006), Alesina, Campante & Tabellini (2008), Ilzetski & Vegh (2008), Medas & Zakharova (2009), Medina (2010), Arezki, Hamilton & Kazimov (2011) and Erbil (2011).

- But after 2000 many achieved counter-cyclicality,
  - running surpluses 2002-08, then easing in 2009.
  - Frankel, Carlos Végh & Guillermo Vuletin, 2013, "On Graduation from Fiscal Procyclicality," *J.Dev.Ec.*
  - Luis Felipe Céspedes & Andrés Velasco, 2014, "Was this Time Different? Fiscal Policy in Commodity Republics," *J.Dev.Ec.*

Who achieves counter-cyclical fiscal policy?

Countries with "good institutions"

Figure 5. Country correlations between the cyclical components of the real government expenditure and real GDP (1960-2009) vs. average institutional quality (1984-2008)



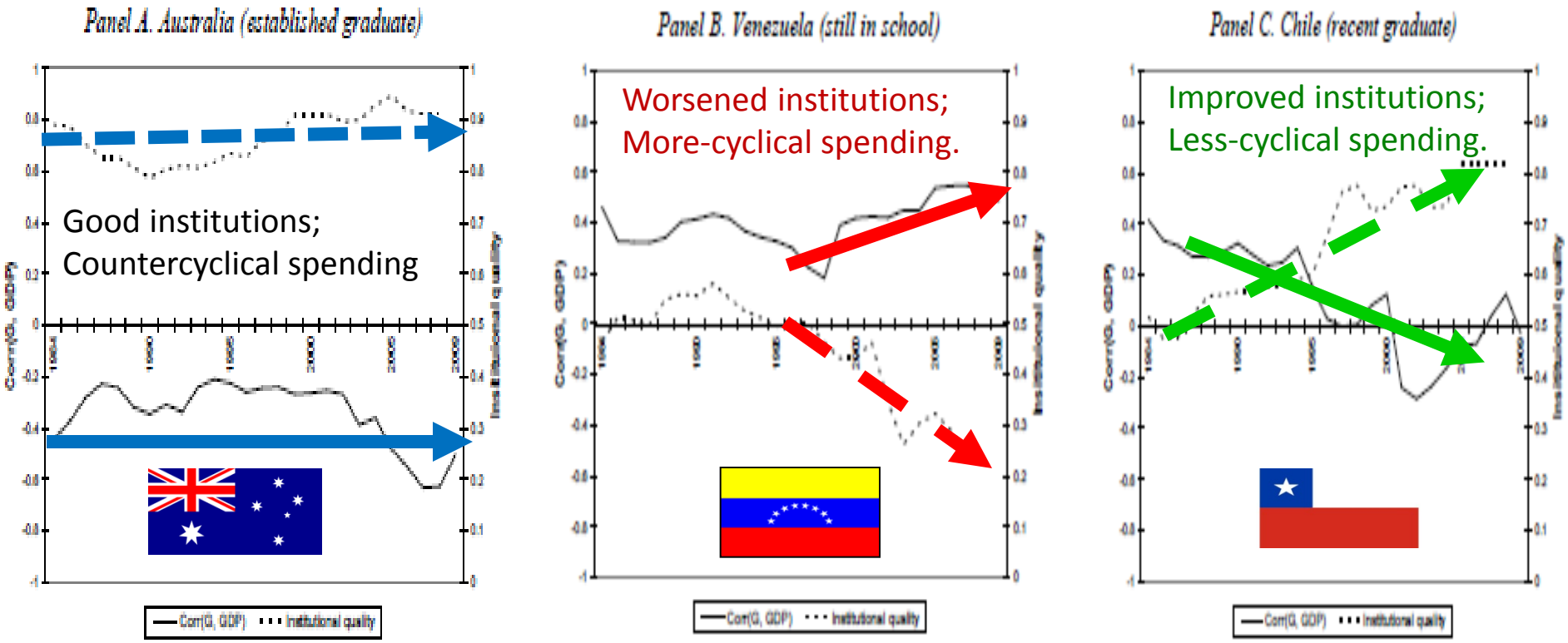
"On Graduation from Fiscal Procyclicality," 2013,
Frankel with Carlos Végh & Guillermo Vuletin; *J.Dev.Ec.*

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 the real government expenditure and real GDP (i.e., Corr(G, GDP)) are calculated 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, bureaucracy quality. Country average institutional quality (i.e., av. IQ) is calculated for each country for the period 1984-2008. See Appendix 2 for correlation value and average institutional quality for each country.
Source: International Country Risk Guide (ICRG), World Economic Outlook and International Financial Statistics (IMF).

The quality of institutions varies, not just across countries, but also across time.

Figure 6. Graduation examples. Country correlations between the cyclical components of real government expenditure and real GDP (20-year rolling windows) vs. institutional quality

1984-2009



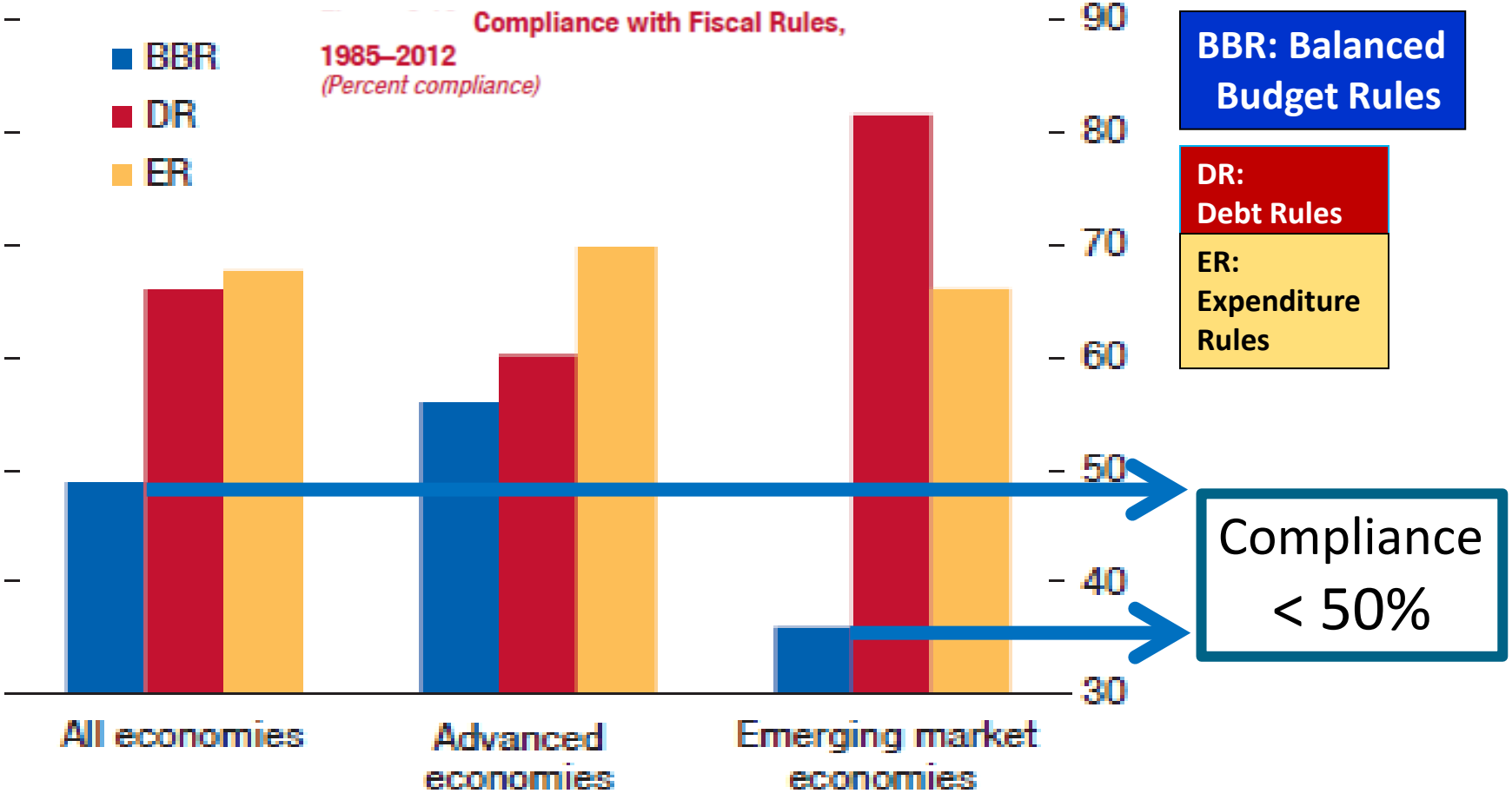
Notes: The cyclical components have been estimated using the Hodrick-Prescott Filter. A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy. Real government expenditure is defined as central government expenditure and net lending deflated by the GDP deflator. Country 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.
Source: International Country Risk Guide (ICRG), World Economic Outlook and International Financial Statistics (IMF).

Frankel, Végh & Vuletin, *2013.*

What *specific* institutions can help?

- Budget rules alone won't do it.
  - Rigid Budget Deficit ceilings operate *pro*-cyclically.
  - Phrasing the target in cyclically adjusted terms helps solves that problem in theory;
  - But in practice, overly optimistic forecasts by official agencies render rules ineffective.
    - Frankel & Schreger, 2013, "Over-optimistic Official Forecasts in the Eurozone and Fiscal Rules," *Rev. World Ec.*

Countries with Balanced Budget Rules frequently violate them.



FISCAL MONITOR
April 2014

Public Expenditure Reform
Making Difficult Choices

International Monetary Fund, 2014

Sources: IMF, Fiscal Rules Database; and IMF staff estimates.
Note: The y axis measures the average compliance rate with Balance Budget Rules (BBR), Expenditure Rules (ER), and Debt Rules (DR) in all years in which an assessment could be made. BBRs and DRs include both national and supranational rules.

The model I tell others to emulate: Chile

- For the annual Bank of Chile conference I attended in 2010, I examined Chile's successful fiscal institutions.
  - I concluded that the key feature is 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.

- "A Solution to Fiscal Procyclicality: The Structural Budget Institutions Pioneered by Chile," 2013, in *Fiscal Policy and Macroeconomic Performance,* edited by Luis Felipe Céspedes & Jordi Galí, Series on Central Banking Analysis, and Economic Policies, vol.17.

Idea 4:
To achieve counter-cyclical monetary policy --

- Full discretion is an option.
  - The Fed & some other major central banks may, 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 EM countries, in particular, need the reinforcement to credibility.
  - Fraga, Goldfajn & Minella (2003), "Inflation Targeting in Emerging Market Economies."
  - But announcing a target that one can expect often to miss does not enhance credibility.
- What choice of target, then?

Choice of target: The exchange rate?

- Some will continue to fix the exchange rate,
  - e.g., very small countries.
- Widely known: terms of trade volatility suits a country to a floating exchange rate, more than toward a fixed rate,
  - so the exchange rate can accommodate terms of trade shocks.
  - When the global price of the export commodity falls, threatening trade balance difficulties & recession, the currency automatically depreciates to mitigate them.
  - When the global price of the export commodity rises, threatening overheating, the currency automatically appreciates to mitigate the problem.
- Empirical evidence that floating works better for countries exposed to volatility in the prices of their export commodities:
  - Broda (2004), Edwards & LevyYeyati (2005), Rafiq (2011), and Céspedes & Velasco (2012).

Céspedes & Velasco, 2012, *IMF Economic Review*

"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.

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.

IT

- 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 copper with easy enough money to depreciate the currency; and
  - requires the central bank to respond to a rise in the $ price of import commodities (say, oil) by tightening enough to appreciate the currency.
  - *This is backwards….*

Alternative to the CPI

- 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,
    - rather than the CPI.
- If the Bank of Chile were to target the GDP deflator:
  - it would automatically respond when the $ price of copper falls with monetary policy easy enough to depreciate the peso, 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…

- …has been adopted nowhere.

- "Product Price Targeting -- A New Improved Way of Inflation Targeting," *MAS Monetary Review,* 2012.
- "A Comparison of Product Price Targeting and Other Monetary Anchor Options, for Commodity-Exporters in Latin America," *Economia*, 2011.

My current proposal: NGDP Targeting

- Commodity-producing 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 Middle-Income Countries," *Central Bank Review*, September 2014 (CBRT).
- "Nominal GDP Targeting for Developing Countries," *VoxEU,* Aug. 2014.

NGDP Targeting proposals

- NGDP targeting was first proposed in the 1980s
  - by Meade (1978), Tobin (1980) & others.
  - The point of a target was to lower expectations of inflation.
- The proposal has been revived in recent years
  - by Woodford (2012) & others.
  - 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.

- And more exposed to supply shocks

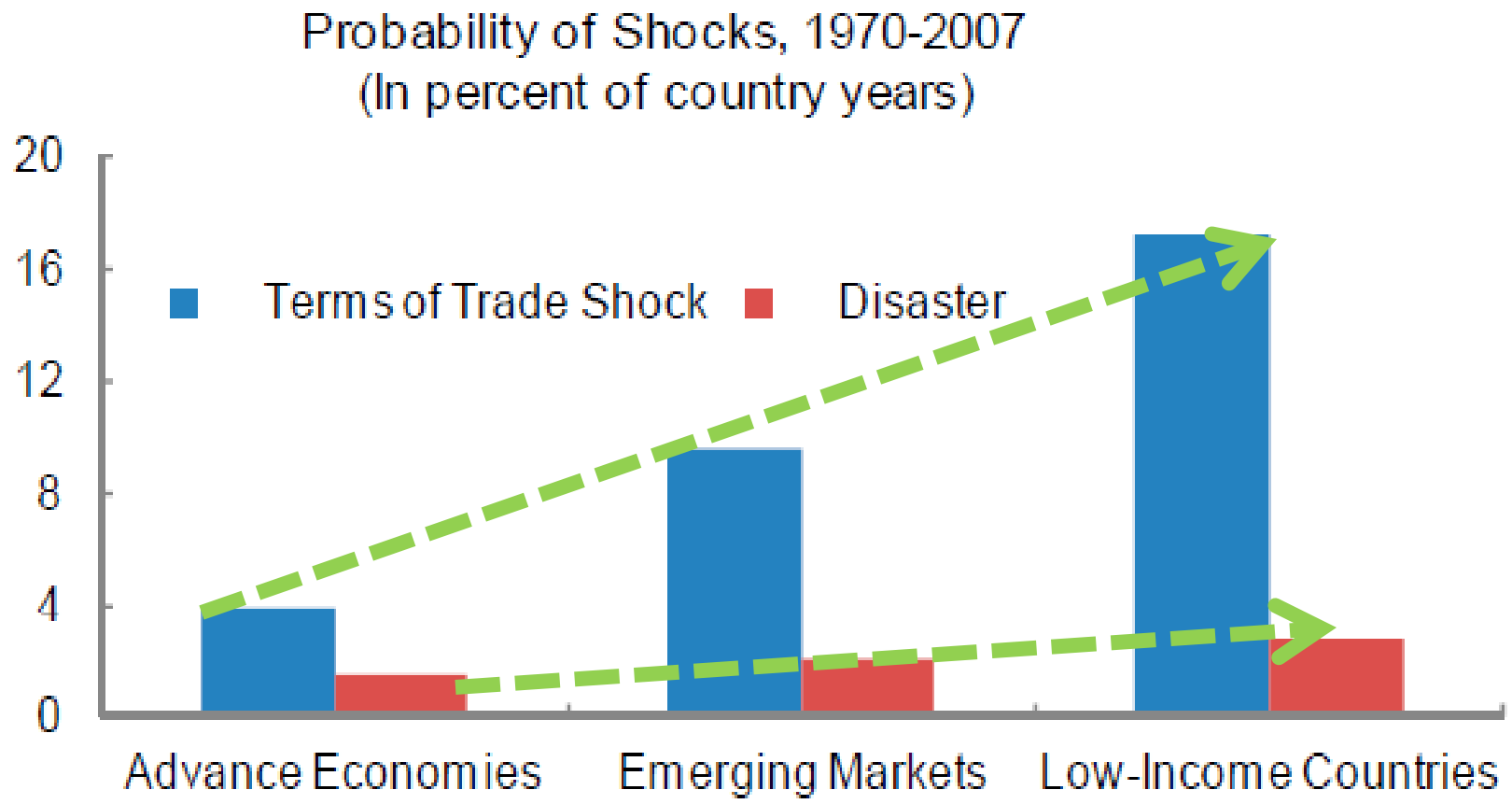
  a) such as natural disasters
  (hurricanes, cyclones, earthquakes, tsunamis…)

  b) other weather events (droughts…),

  c) social unrest (strikes…),

  d) productivity shocks ("Are we the next Tiger economy?").

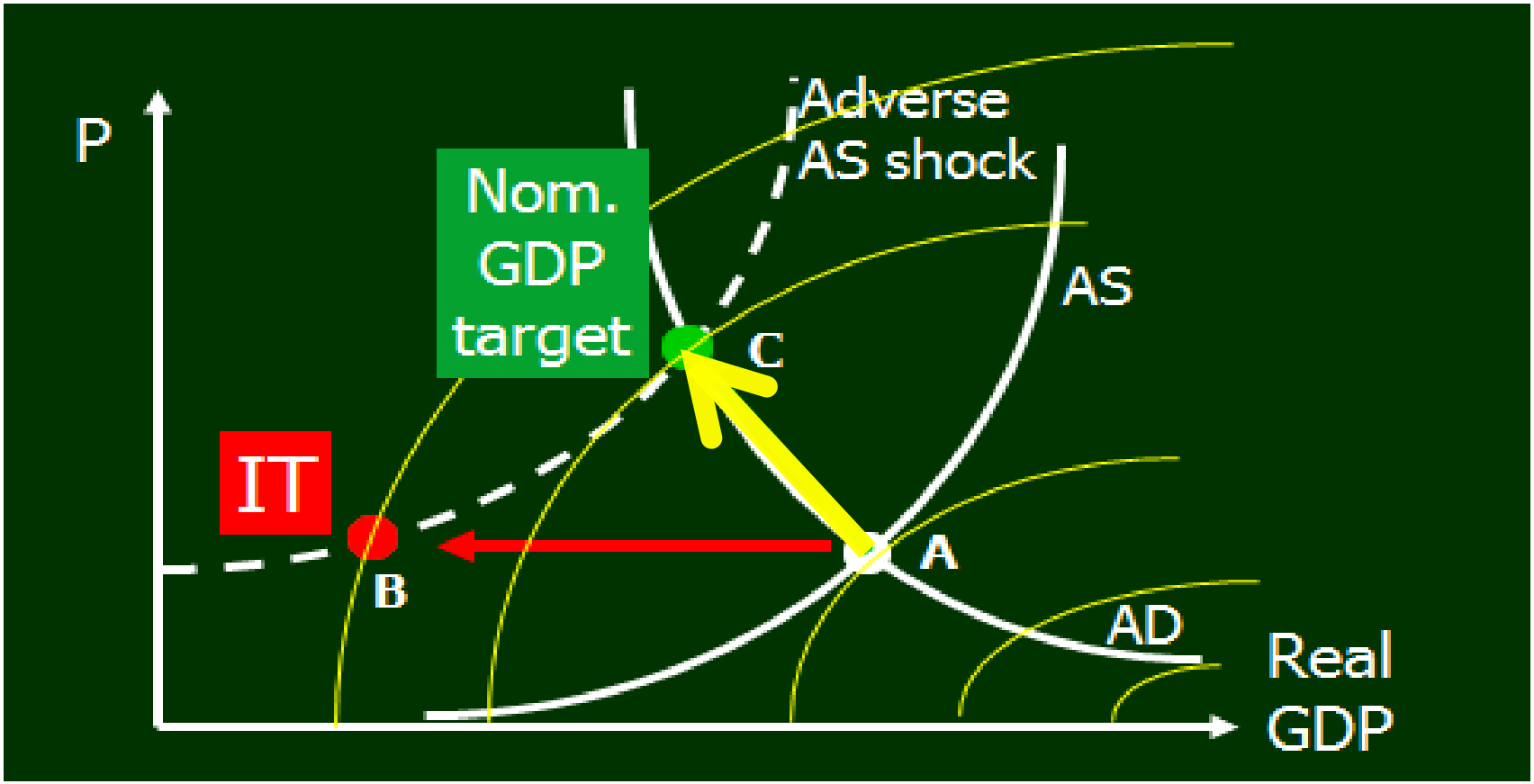
Trade & Supply Shocks are More Common
in Emerging Markets & Developing Countries



Sources: IMF(2011a): Managing Volatility: A Vulnerability Exercise for LICs.

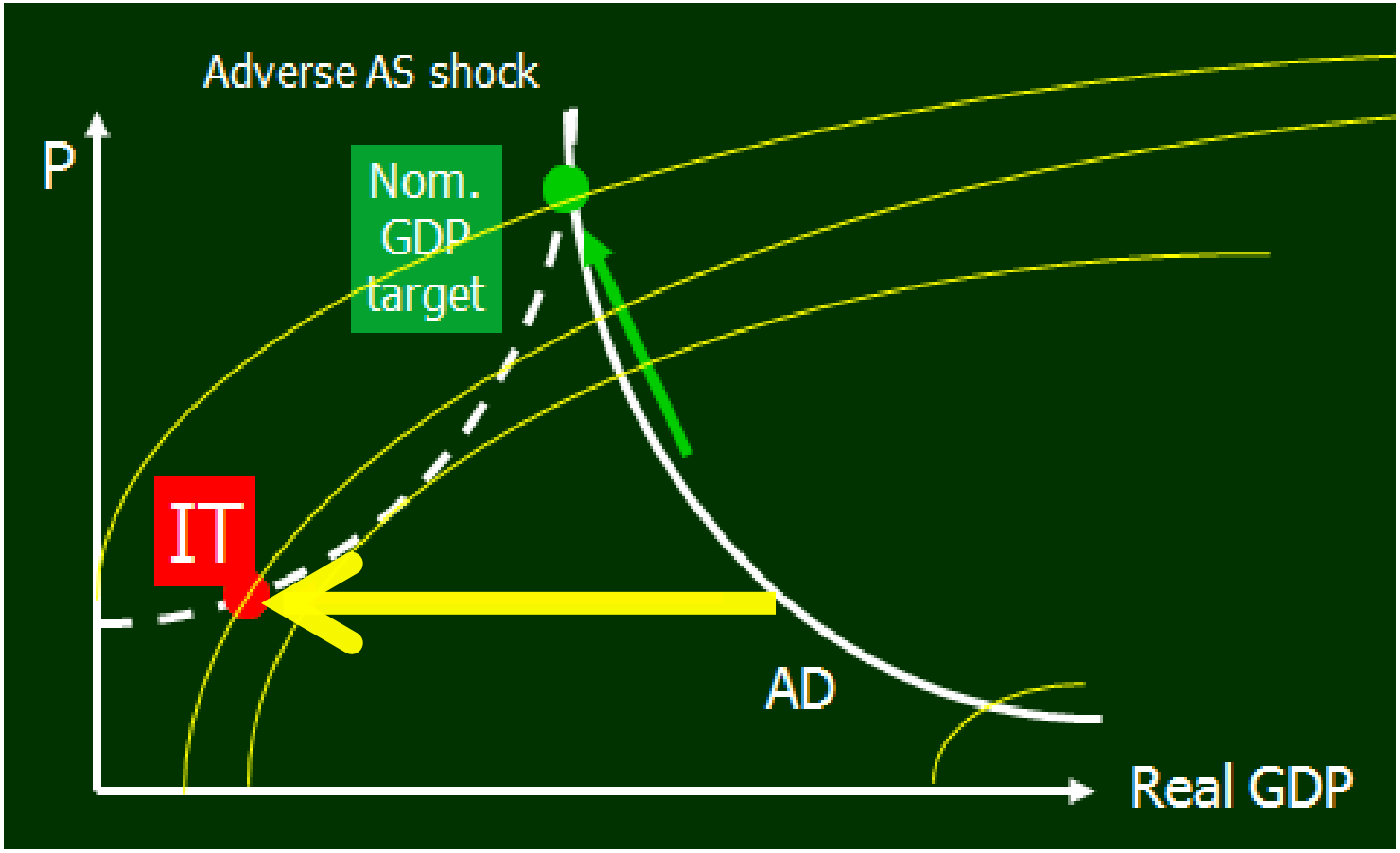
IMF SPRD & World Bank PREM, 2011, "Managing Volatility in Low-Income Countries: The Role and Potential for Contingent Financial Instruments," approved by R.Moghadam & O.Canuto

Figure 2: When a Nominal GDP Target Delivers a Better Outcome than IT



Supply shock is split between output & inflation objectives **rather than falling exclusively on output as under IT (at B).**

Figure 3: When IT Delivers a Better Outcome than a Nominal GDP Target



…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:

$$\Lambda = ap^2 + (y - \hat{y})^2$$

where p ≡ the inflation rate,

y ≡ the log of real output,

$\hat{y}$ ≡ the preferred level of output;

a ≡ the weight assigned to the price stability objective.

Which regime best achieves objectives of price & output stability? continued

- *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 $\bar{y}$ ≡ potential output.

Which regime best achieves objectives of price & output stability? continued

- But different rules => different outcomes, when shocks hit
  - Rogoff (1985) & Fischer (1990).
- IT & NGDPT both neutralize AD shocks.
- That leaves AS shocks.
- NGDP rule dominates IT, if… $\boldsymbol{a < (2 + b)b}$;
- Example 1: holds if $\boldsymbol{b > a}$ (AS flat, vs. loss-function lines).
- Example 2: holds if $\boldsymbol{a} = 1$ (as in Taylor rule)
  and AS slope $1/\boldsymbol{b} < (1+\sqrt{2}) = 2.414$.
- 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.

How can countries that export commodities
cope with the high volatility in their terms of trade?

Four ideas that may help

	Micro: Hedge	Macro: Counter-cyclical policy
Tried & tested:	**1. Use options (Mexico).**	**3. Fiscal: protect independence of forecasts (Chile).**
Untried:	**2. Link debt to commodity price.**	**4. Monetary: target NGDP.**

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.