Approaches to External Balance Assessment at the IMF

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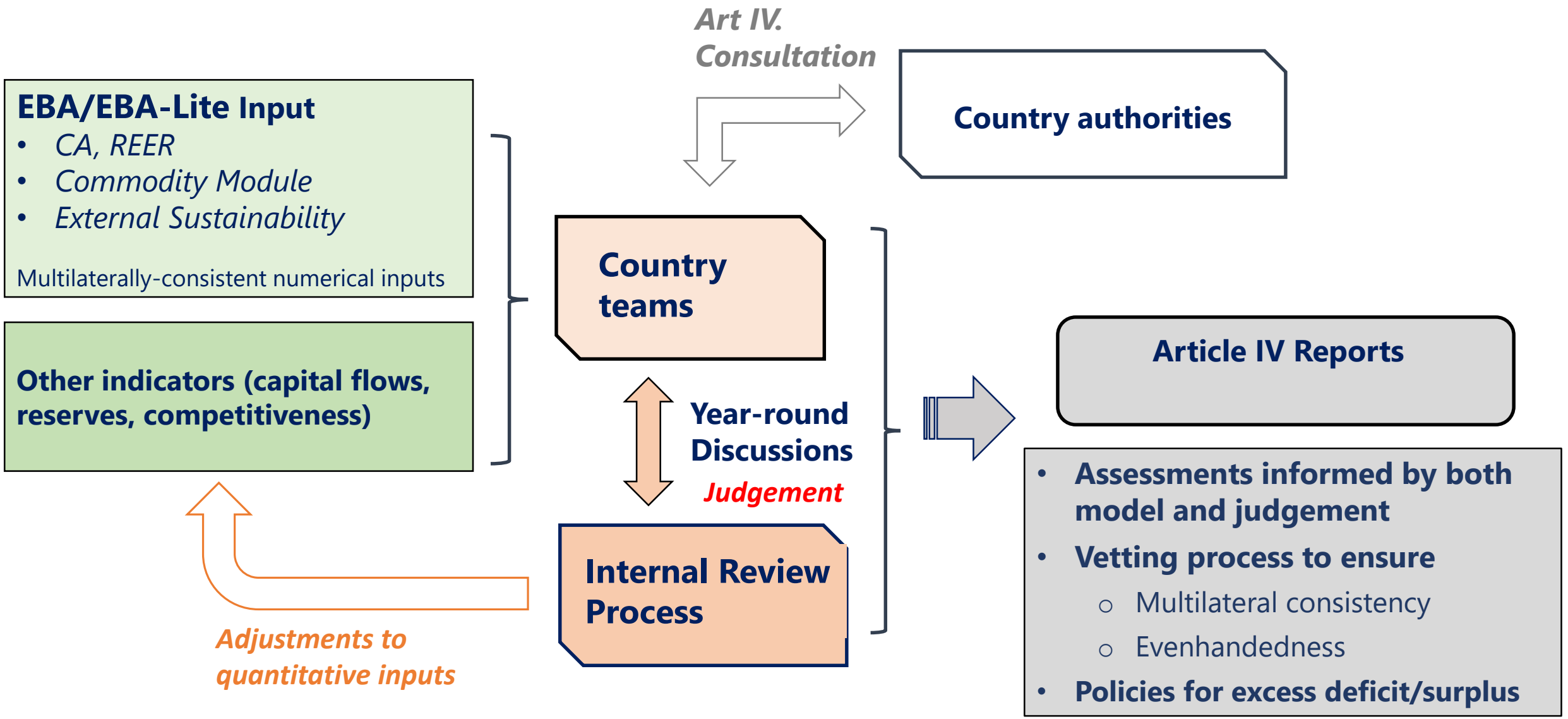
External Assessments: Overview of the IMF Process



IMF and external sector assessment

IMF Articles of Agreement

- External stability and the IMF's mandate
- Members' obligations

Article IV Consultations

- Orderly growth, effective BOP adjustment
- External assessments: Article IV Reports, ESR

Surveillance & Policy Discussions

- External Sector Policies
- Macroeconomic, Financial, Social and Structural Policies

External Balance Assessment at the IMF: Origins and Evolution

Origins

- 2011 Triennial Surveillance Review (TSR), "…..*publish a multilaterally-consistent assessment of external balances and exchange rates*"
- 2014 TSR. *To extend the EBA methodology to a broader set of countries and phase out the CGER*

Evolution

- 2012 External Balance Assessment (EBA): 50 economies, CGER in place for the139 economies not covered by the EBA
- 2013 EBA methodology revised
- 2015 EBA Methodology revised; EBA-Lite introduced for 139 countries not in the EBA methodology. CGER discontinued.
- 2018 EBA Methodology revised, EBA-Lite Methodology revised

External Balance Assessment at the IMF: Parallel Tracks

Conceptual Framework:
The External Balance Assessment (EBA) Methodology (2013) Philipps et. al.

EBA METHODOLOGY Revised (2015)
- Level RER model (new)
- Demographics:
- Robustness of Capital Control measures

EBA METHODOLOGY Revised (2018)
- Demographics
- Institutional Index
- Financial excesses
- FX intervention

EBA-LITE METHODOLOGY Introduced (2015)
- CA, REER (index), ES models
- EBA covariates, plus remittances

EBA-LITE METHODOLOGY Revised (2019)
- Role of remittances
- Shocks
- Financial excesses v. Financial deepening
- Commodity module (new)
- External Sustainability module (revised)

Parallel EBA Frameworks: Origins, Implications

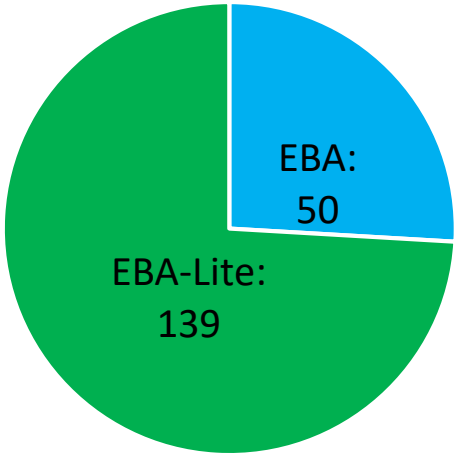
Origins

- Extension of the CGER. Role of policies
- Heterogeneity across countries
  - External balance, Drivers, Impacts

Implications

- EBA: 50 economies, EBA-Lite 139 economies
- Composition: Income, Economic Diversification, External Obligations
- Parallel methodologies
  - Different regression covariates; specialized modules (commodity, external sustainability)

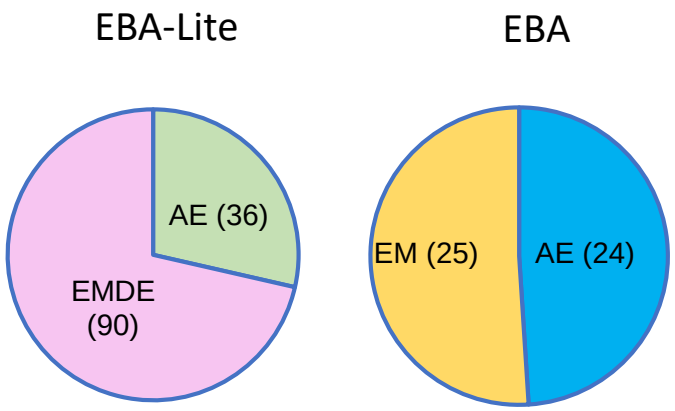
External Sector Assessments drawing on EBA and EBA-Lite



Country Composition

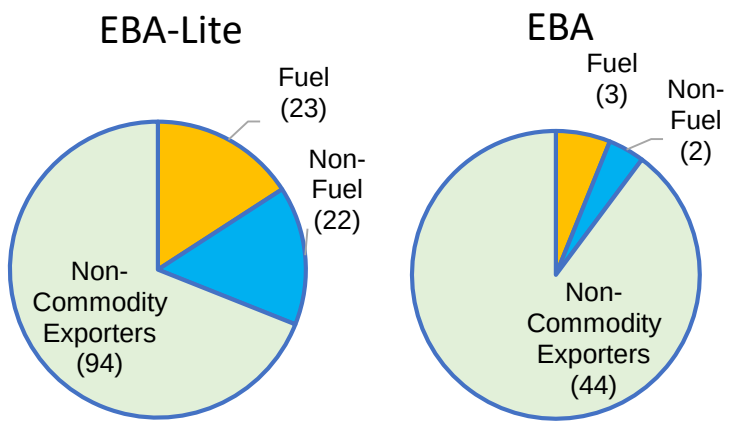
Income Levels

EBA-Lite: 76% LIC and EMDE



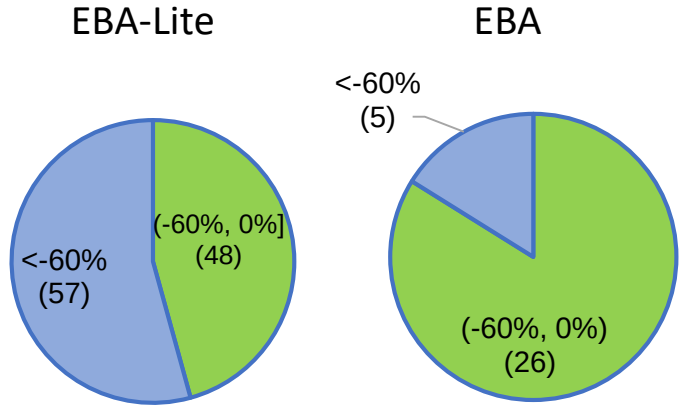
Commodity Exporters

EBA-Lite: 45 large commodity exporters



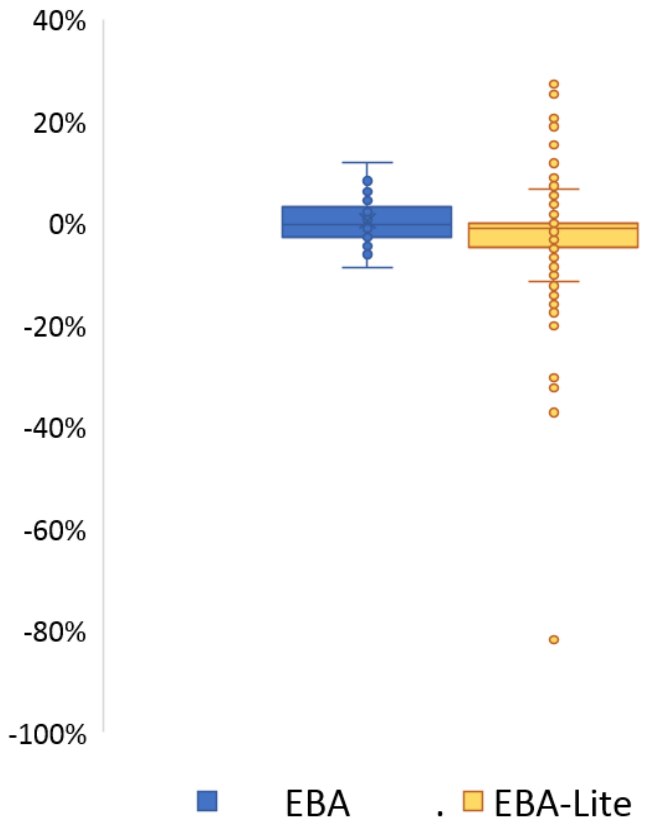
External Indebtedness

EBA-Lite: High incidence of large net debtors

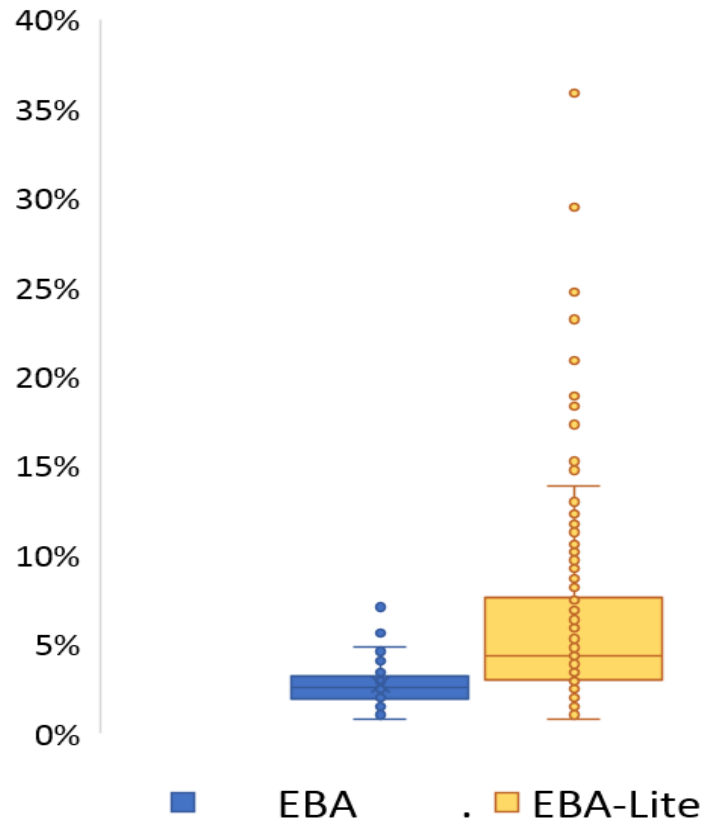


External Balance: Range and Volatility

CA/GDP in 2018



Country-specific Std. Deviation of CA/GDP (1995-2018)



Conceptual and Empirical Implications for the External Position

Income Levels

- High marginal utility of income in LIDCs
- Under-developed financial systems
- Limits to inter-temporal consumption smoothing

Large, Volatile Income Streams

- Primary commodity exporters: large terms of trade shocks
- Low economic diversification
- Precautionary saving; inter-generational distributional considerations

Exposure to shocks

- Natural Disasters, Militarized conflicts
- Triggers for large capital transfers; large impacts over short horizons
- Intertemporal consumption smoothing, to the extent possible

Overview of the Differences in EBA-Lite from EBA

***Regression* Module: CA and REER Regressions**

- Aid and Remittances
- Shocks: Natural Disasters, Militarized Conflicts
- Policies: Social Insurance, Financial

***Commodity Module*: Non-Regression Approaches for Exporters of Exhaustible Commodities**

- Consumption Rules
- Investment Needs

External Sustainability Module

- Deterministic Approach
- Probabilistic Approach

EBA/EBA-Lite Regression Model Specifications

EBA

Fundamentals
- NFA (+)
- Oil and gas balance (+)
- Income per capita (+)
- Projected growth (-)
- Reserve currency status (-)
- Institutional quality (-)
- Prime saving share (+)
- Life exp. prime age (-)
- Life exp. prime age * future OADR (-)
- Population growth (-)
- OADR (-)

Policies
- Fiscal Balance (-)
- Public health (-)
- BIS Credit gap (-)
- FX reserves/cap controls (+)

Cyclical
- Output gap (-)
- Commodity TOT gap (+)
- VIX (+)

EBA-Lite

Fundamentals
- NFA (+)
- Oil and gas balance (+)
- Income per capita (+)
- Projected growth (-)
- Reserve currency status (-)
- Institutional quality (-)
- Prime saving share (+)
- Life exp. prime age (-)
- Life exp. prime age * future OADR (-)
- Population growth (-)
- OADR (-)
- Outward migrant share (-)

Policies
- Fiscal Balance (-)
- Public health (-)
- Private Credit/GDP (+)
- Change in Credit/GDP (-)
- FX reserves/cap controls (+)

Cyclical
- Output gap (-)
- Commodity TOT gap (+)
- VIX (+)

Shocks
- Natural Disasters (+/-)
- Armed conflicts (+)

I. Differences in the EBA and EBA-Lite Regression Models

Fundamentals. Aid and Remittances

Shocks. Natural Disasters, Militarized Conflicts

Policies. Social Insurance, Financial

Aid and Remittances

Background

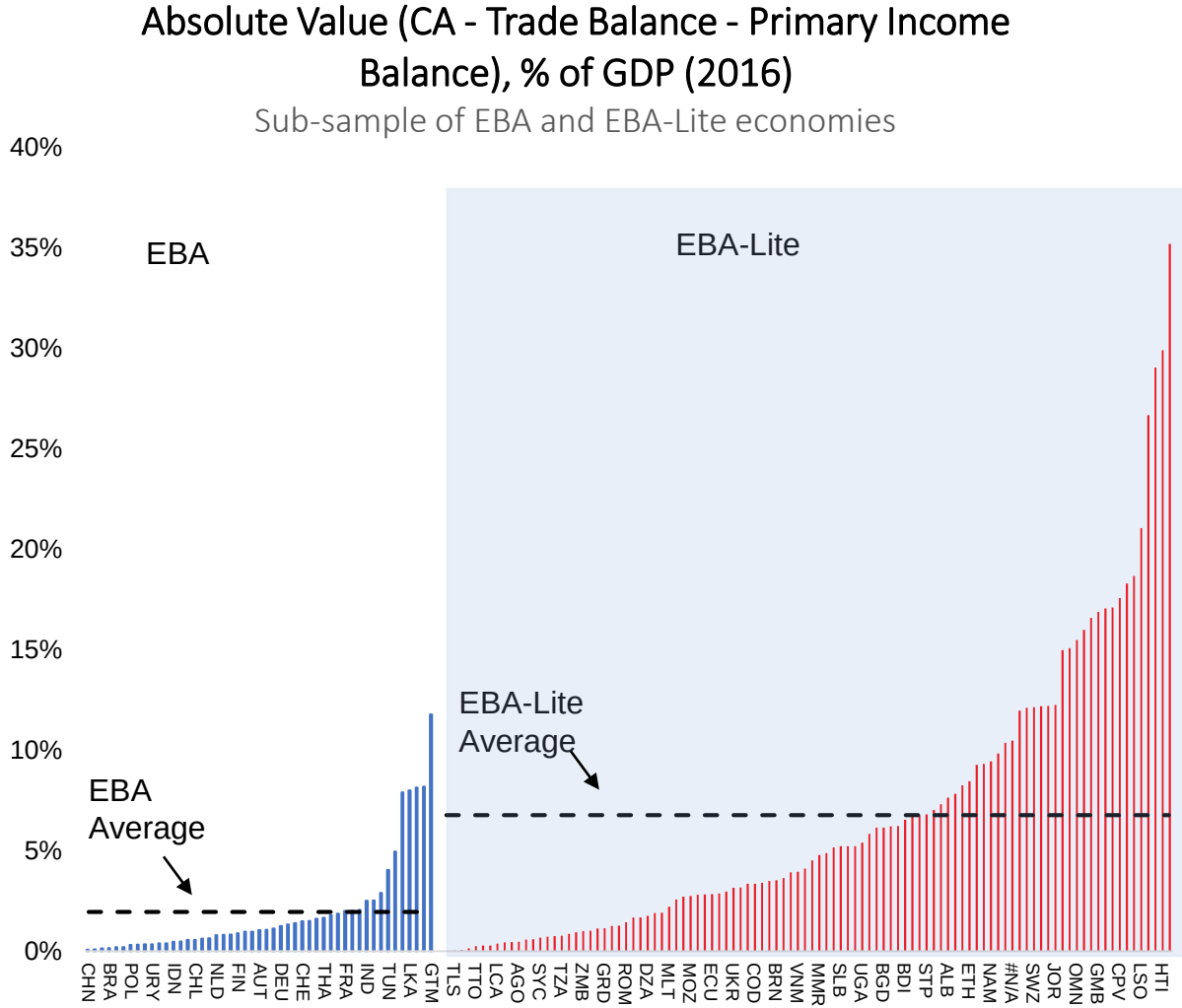
- Components of the secondary income balance of the CA
- Aid, Remittances: regressors in previous EBA-Lite models

Key Issues

- Propensities to save, invest from transfers different from that out of other income
- Does not identify or estimate CA gap
- Account for lower propensity to save, higher propensity to invest

EBA vs. EBA-Lite

- Weak relevance for EBA sample



Aid and Remittances

Revised EBA-Lite Models

- Aid and Remittances dropped from CA regression model
- Outward Migrant Shares introduced as covariate in the CA model

Conceptual Underpinning

- Outward migrant shares proportional to current transfers
- Higher migrant shares imply higher remittances, higher propensity to consume and invest
- Exploits compositional differences across populations to identify different propensities to save and invest

Empirical Findings

- Outward migration associated with lower CA

Shocks. Natural Disasters and Armed Conflicts

Background

- Previously no role for shocks in EBA/EBA-Lite

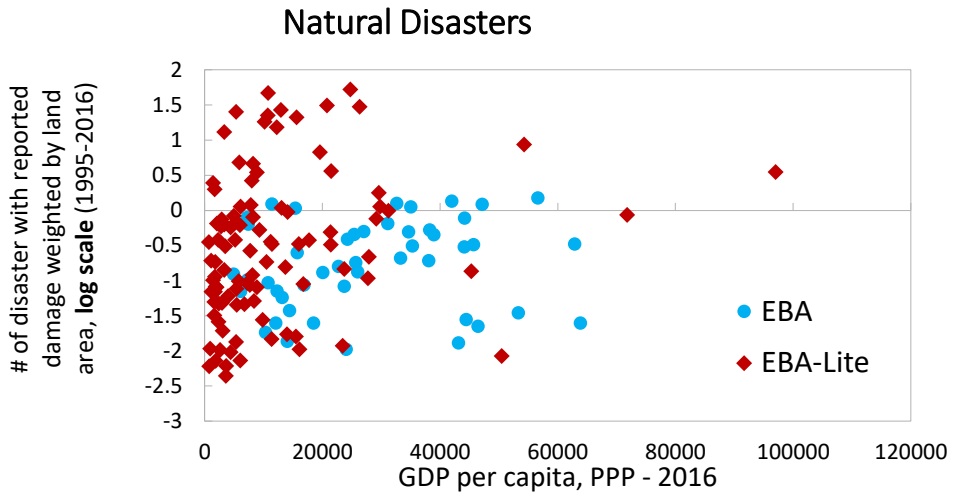
Conceptual Issues

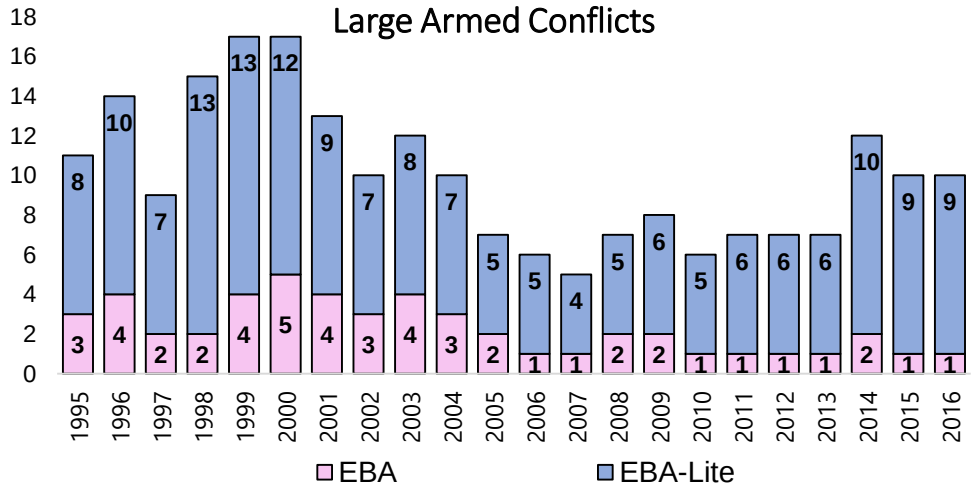
- Negative income shocks affect inter-temporal decisions
- Consumption falls more than income ⇨ **CA rises**; consumption smoothed by borrowing on global financial markets ⇨ **CA falls**
- CA impact ambiguous; dependent on financial account openness, and access to external financing

EBA vs. EBA-Lite

- Low incidence in EBA

Natural Disasters and Armed Conflicts: Incidence





Shocks in the EBA-Lite

Revised EBA-Lite Regression Models

- Introduces indicator of Natural Disasters, and its interaction with financial openness
- Introduces indicator of Militarized Conflicts

Empirical Findings

- Impact of natural disasters: CA falls (rises) by 1 ppt (0.9 ppt) of GDP if financial account fully open (closed)
- Impact of militarized conflicts: CA rises by about 1 ppt of GDP in year in which conflict occurs

Implications for External Assessments

- Natural disasters and conflicts do not affect CA norm
- Lowers residuals; estimated impacts can be used to measure the underlying CA

Policy Norms: Social Insurance Policies

Background

- No previous role for Social Insurance Policies in EBA-Lite

Key Issues

- Social insurance lowers precautionary saving, ↑CA
- Proxy by health expenditures (same as EBA)

EBA vs. EBA-Lite

- Precautionary motives arguably stronger in EBA-Lite
  - Lower public health expenditures
  - Higher exposure to health risks

Revised EBA-Lite Models

- Adds public health expenditures/GDP (proxy)

Norms for Public Health Expenditures

- LICs: (a) numerous demands for social expenditures; (b) smaller fiscal envelope
- EBA-Lite: provides an indicative norm
- Norm: function of old-age dep. ratio, GDP per capita, income inequality (all as in EBA) + fiscal revenue/GDP (not in EBA)

Policy Norms: Financial Policy

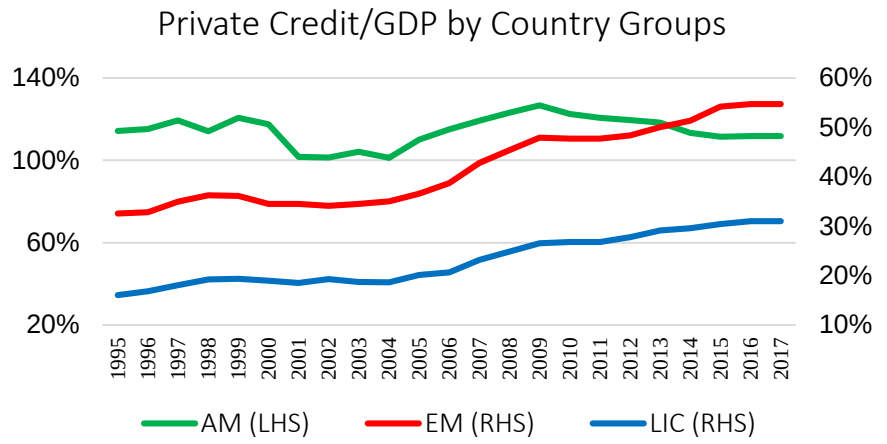
Previous Model

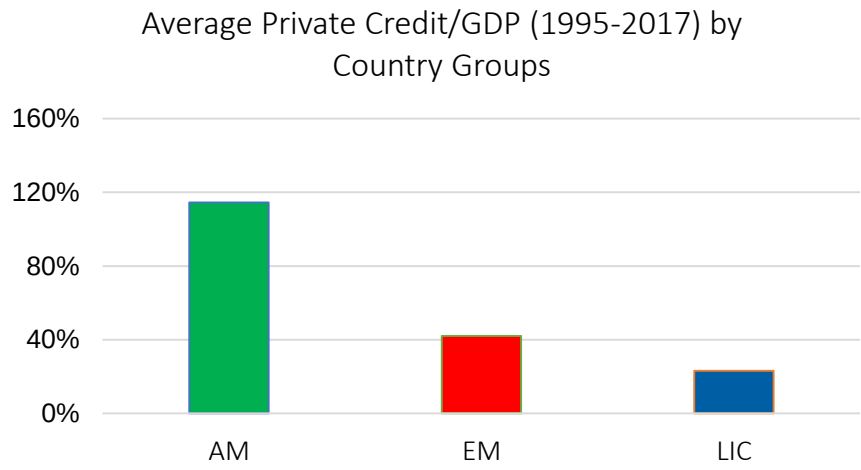
- Private Credit/GDP: cyclical and structural financial policies

Conceptual Considerations

- Disentangle cyclical from structural financial policies
- Distinct policy distortions. E.g.:
  - Cyclical: relaxation in credit standards
  - Structural: poor financial intermediation
- **EBA vs. EBA-Lite**
  - Three-fourths DE and EM. Large financial deepening needs; low financial development
  - Trending in private credit/GDP suggests structural not cyclical
  - Large financial centers (e.g. Luxembourg and Hong Kong)

Structural Financial Needs: LIC and EM





Financial Policies in the Revised EBA-Lite

Positive Analysis

Two measures of financial policies

- Structural : private credit-to-GDP, proxy for financial development
- Cyclical : growth rate of credit in ratio to GDP, proxy for cyclical excesses

Normative Analysis

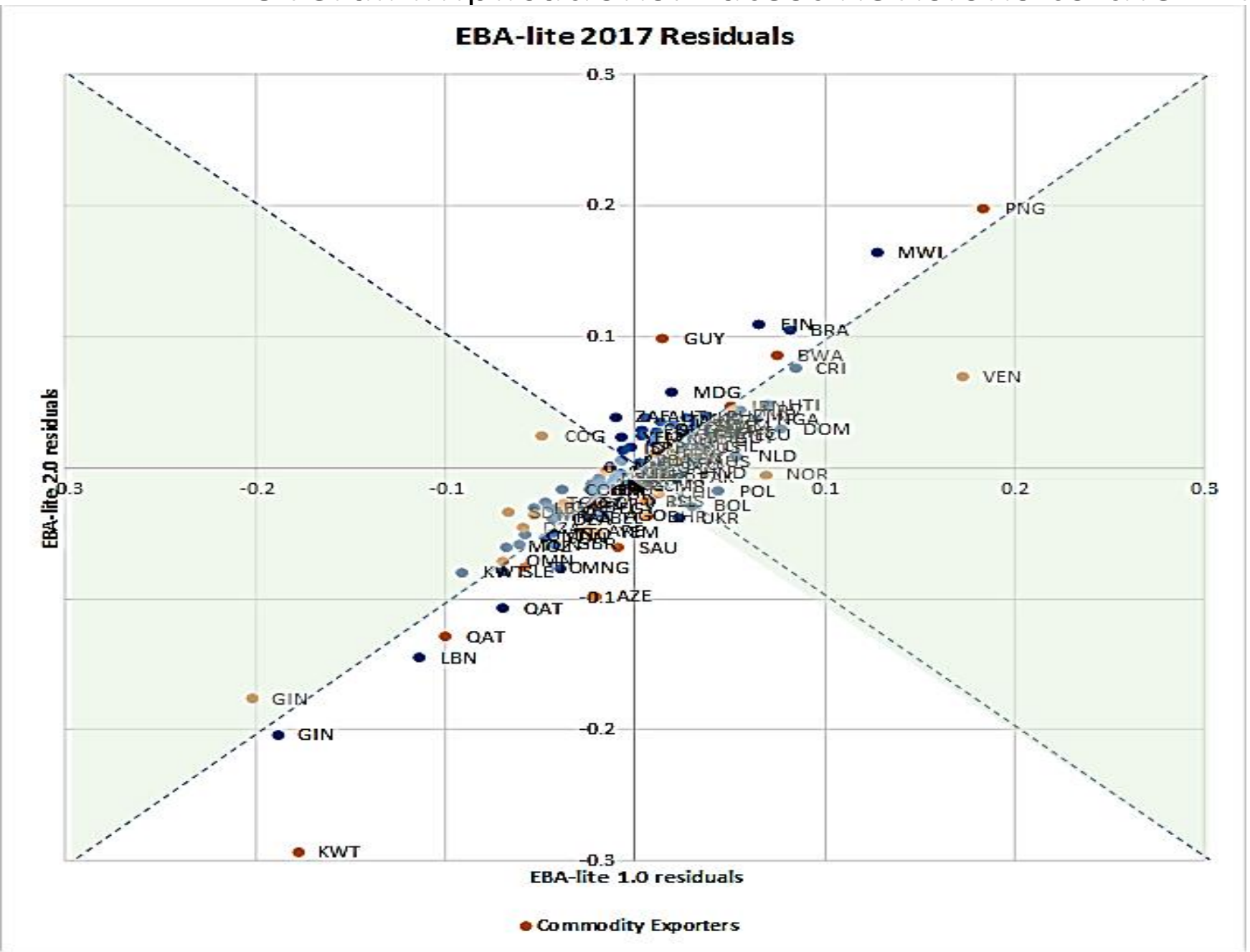
- Structural norm: level of private credit/GDP consistent with fundamentals and policies
  - Regression of private credit/GDP on fundamentals (e.g. population growth) and cyclical variables (e.g. inflation)
- Cyclical norm: annual rate of growth consistent with attaining the *structural norm* over a specified horizon

Distinct treatment from EBA. BIS credit-gap (cyclical deviations from trend)

CA Regression Estimates: EBA vs. EBA-Lite

	EBA-Lite	EBA
Cyclical adjusted Fiscal Balance, instrumented	0.441***	0.329***
L. NFA/Y	0.023***	0.023***
L. NFA/Y* (dummy if NFA/Y < -60%)	-0.001	-0.006
L. Output per worker, relative to top 3 economies	0.104***	0.023
L. Relative output per worker*K openness	-0.032***	0.041*
Oil and Natural Gas Trade Balance * resource temporariness	0.073***	0.310***
GDP growth, forecast in 5 years	-0.81***	-0.302***
Output Gap	-0.182***	-0.356***
Population Growth	-0.813***	-0.692*
Old-age Dependency Ratio	-0.118***	-0.069
Commodity ToT gap*Trade Openness	0.403***	0.161***
(Δ Reserves)/GDP* K controls	0.856***	0.754***
Institutional/Political Environment (ICRG-5)	-0.034**	-0.047**
Demeaned Private Credit/GDP	-0.030***	
Credit growth	-0.077***	
De-trended Credit gap		-0.104*
L.demeaned VIX*K openness	-0.002***	0.020
L.demeaned VIX*K openness*share in world reserves	0.002**	0.002
Life Expectancy at Prime Age	-0.001***	-0.005***
Life Expectancy at Prime Age * Future OADR	0.002***	0.013***
Prime Savers Share	0.127***	0.138**
L.Public Health Spending/GDP	-0.81***	-0.399***
Own currency's share in world reserves	-0.072***	-0.030***
Migrant share	-0.001***	
Natural disasters indicator	-0.013***	
Natural disasters Indicator * K openness	0.029***	
Armed conflicts indicator	0.008***	
Number of observations	2,313	1,367
Number of countries	86	49
Adjusted R-squared	0.56	0.55

Overall Implications: Latest Revisions to the EBA-Lite CA Model



- Countries in shaded areas have **improved** fit in Revised EBA-Lite
- Improved fit for **majority** of countries
- Adjusted R-squared of CA model improves; absolute sum of squared error falls
- Residuals for many commodity exporters remain large in current and revised model

II. Non-Regression Approaches for Exporters of Exhaustible Commodities

Consumption-Based Rules

Investment Needs Model

External Assessments for Exporters of Exhaustible Commodities

Background

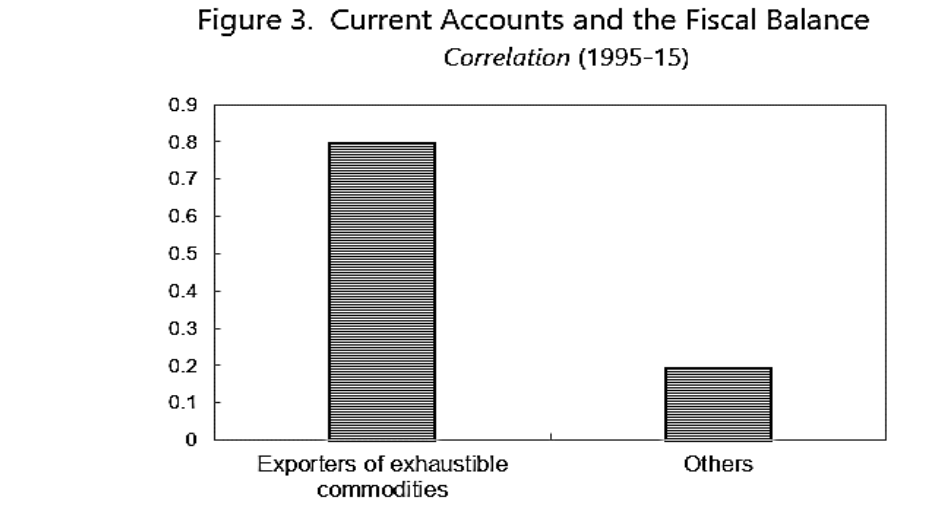
- EBA/EBA-Lite regressions includes measure of resource temporariness

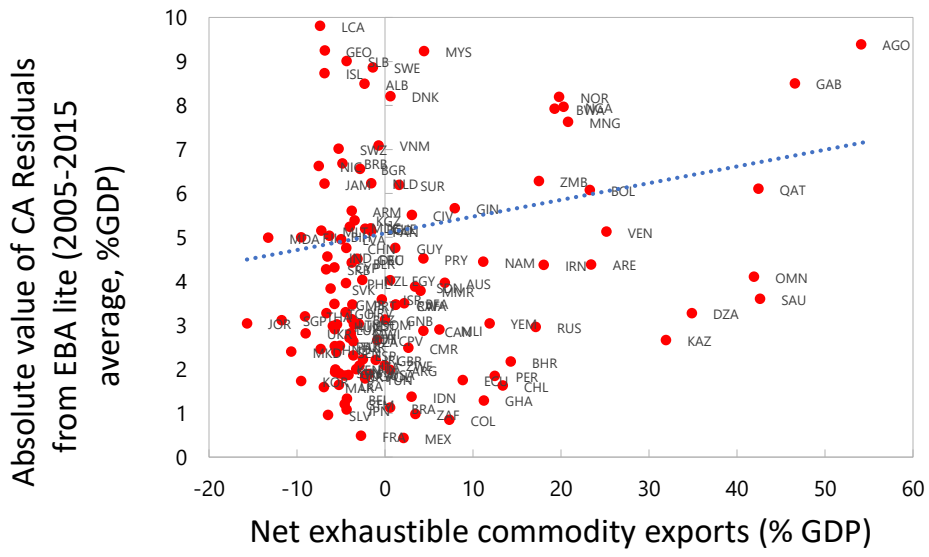
Limitations

- Weak connection to policies: exhaustible resources also generate fiscal revenues
- No explicit link between different aspects of countries' balance sheets (e.g. NFA and below-ground wealth)
- Accounts only for oil and gas
- Large residuals, increasing in size of commodity exports/GDP

EBA vs. EBA-Lite

- Higher incidence of commodity exporters in EBA-Lite (45) than in EBA (5); larger commodity share of GDP in EBA-Lite





Complementary Approaches

Commodity Module of the EBA-Lite

- Two **complementary**, balance-sheet approaches:
    1. **Consumption-Based Rules**
    2. **Investment Needs Approach**

- Both developed by Staff; intermittently considered in assessments of some large oil exporters

Table 1. Application of Alternative Approaches in Staff Reports

	Type of Natural Resources	Consumption allocation rules 1\	Investment inefficiencies 2\	EBA-lite
Low or Lower-Middle Income Countries				
Chad	Oil	2016	2016	
Congo, Rep. of	Oil	2015	2015	
Angola	Oil		2013 3\	Yes
Gabon	Oil	2017	2015 3\	Yes
Equatorial Guinea	Oil	2016	2016	
Upper-Middle Income Countries				
Ecuador	Oil		2015	Yes
Azerbaijan	Oil		2013 3\	Yes
High Income Countries				
Saudi Arabia	Oil	2017		Yes
United Arab Emirates	Oil	2017		Yes

1\ Bems and de Carvalho Filho (2009).

2\ Araujo et al. (2016).

3\ Not latest-available staff report.

Methodology behind the Balance-Sheet Approaches

Conceptual Framework

- Exhaustible resources generate large income streams: benefit from smoothing absorption
- Inter-temporal distribution → "Rules" to absorb resource wealth over time

Consumption Allocation Rules

- Assesses NPV of total wealth. PV of export/fiscal revenues, above ground wealth
- Specifies "allocation rule" to consume wealth, e.g. constant annuity per capita → consumption norm
- Yields saving (national, saving) norm → **CA gap**, **fiscal gap**

Methodology behind the Balance-Sheet Approaches

Investment Needs Model

- Where capital is scarce and investment needs large, allocating resource wealth toward investment
- Takes account of dynamic effects of investment, specifying a role for :
  - Investment inefficiencies
  - Absorptive capacity constraints (adjustment costs)
  - Credit constraints
- Investment needs naturally lead to lower S-I norms, especially if investment inefficiencies are small

Parameters: Consumption rules

Table A2.1. Parameter choices in Bems-Carvalho, for Ecuador and Nigeria

Assumptions	Ecuador	Nigeria
Oil production growth through 2030	1.3%	2.0%
Increase in domestic consumption of oil	2.7%	2.0%
Oil prices percentage increase beyond WEO projections	1.5%	2.0%
Deflator	2.0%	2.5%
Return on NFA	5.5%	6.0%
Population growth	1.8%	1.0%
Share of oil revenues to budget	87%	79%

Parameters: Investment Needs

		Ecuador	Nigeria	Description	Real world equivalent, source
Parameters	theta_k	0.30	0.40	share of private capital to output	assume theta_k+theta_S=0.65 and multiply with shares of private and public capital in 2017
	theta_s	0.12	0.25	share of public capital to output	2007-2012 share of gov gross fixed CF, assume 0.6=theta_k+theta_S
	gamma	1.33	1.33	risk aversion rate	van der Ploeg (2012)
	delta_k	0.06	0.06	depreciation rate of private capital	van der Ploeg (2012)
	delta_s	0.06	0.06	depreciation rate of public capital	van der Ploeg (2012)
	rbar	0.06	0.06	world interest rate	world interest rate
	xi	0.75	0.75	Habit persistence parameter	
	g_n	0.02	0.03	population growth rate	average population growth 2002-2017
	g_a	0.02	0.03	technology growth rate	long-term growth rate (2005-2017) minus population growth
	e_k	0.50	0.30	efficiency of private capital	calibration
	e_s	0.50	0.30	efficiency of public capital	calibration
	dbar	0.30	0.14	steady state debt	gross external debt (SS)
	yoilvalue	0.00	0.00	steady state oil income	average Oil GDP as % of GDP
	y_0	1.00	1.00	Normalization constant	Normalization constant
	To	0.05	0.05	Exogenous tranfers including aid and remittances	
	rho1	1.40	1.40	interest rate-debt elasticity	CEMAC calibration
	beta	0.93	0.93		In this case we are setting the value for beta not for ; we want to make sure that beta is not a small value
	rho2	0.00	0.00	additional parameter on risk-premium	
	omega	0.00	0.00	leverage coefficient on oil reserves	as in initial calibration, adjust according to target moments and scenario; psi in the paper.
	Abarxx	0.98	0.98		
Initial values	c_0	0.62	0.87	NCP in % of GDP	In 2017, Private Consumption Exp.
	inv_0	0.22	0.13	Investment in % of GDP	gross fixed capital formation + CHANGE IN INVENTORIES as % of GDP in 2017
	gov_0	0.16	0.07	Gov consumption in % of GDP	in 2017
	gov_exp_0	0.39	0.10	Gov total expenditure in % of GDP	in 2017
	gov_inv_0	0.09	0.03	public investment in % of GDP	gov gross fixed capital formation in 2017
	ynon_0	0.90	0.91	non-oil GDP in % of GDP	In 2017
	yoil_0	0.10	0.09	oil output in % of overall GDP	In 2017
	d_0	0.32	0.14	debt in percent of GDP	NFPS external debt in percent of GDP in 2017
	ca_0	0.00	0.02	current account in % of GDP	In 2017
	vv_0	0.00	0.00		
	k_0	0.70	1.00	private capital to GDP ratio	In 2017; fixed capital formation plus change in inventories accumulated
	s_0	0.28	0.60	public capital in to GDP ratio	In 2017; gross fixed capital accumulation, assuming depreciation
	cost_k	0.40	0.40	cost overrun ratio private investments	in 2011; same as CEMAC application
	cost_s	0.40	0.40	cost overrun ratio public investments	in 2011; same as CEMAC application

Revised Framework for the Assessment of External Sustainability

Deterministic Approach

Probabilistic Approach

III. Assessment of External Sustainability

Earlier Approach

- "ES" approach (CGER). Depreciation required to equate debt with future income from trade flows

Key Issues

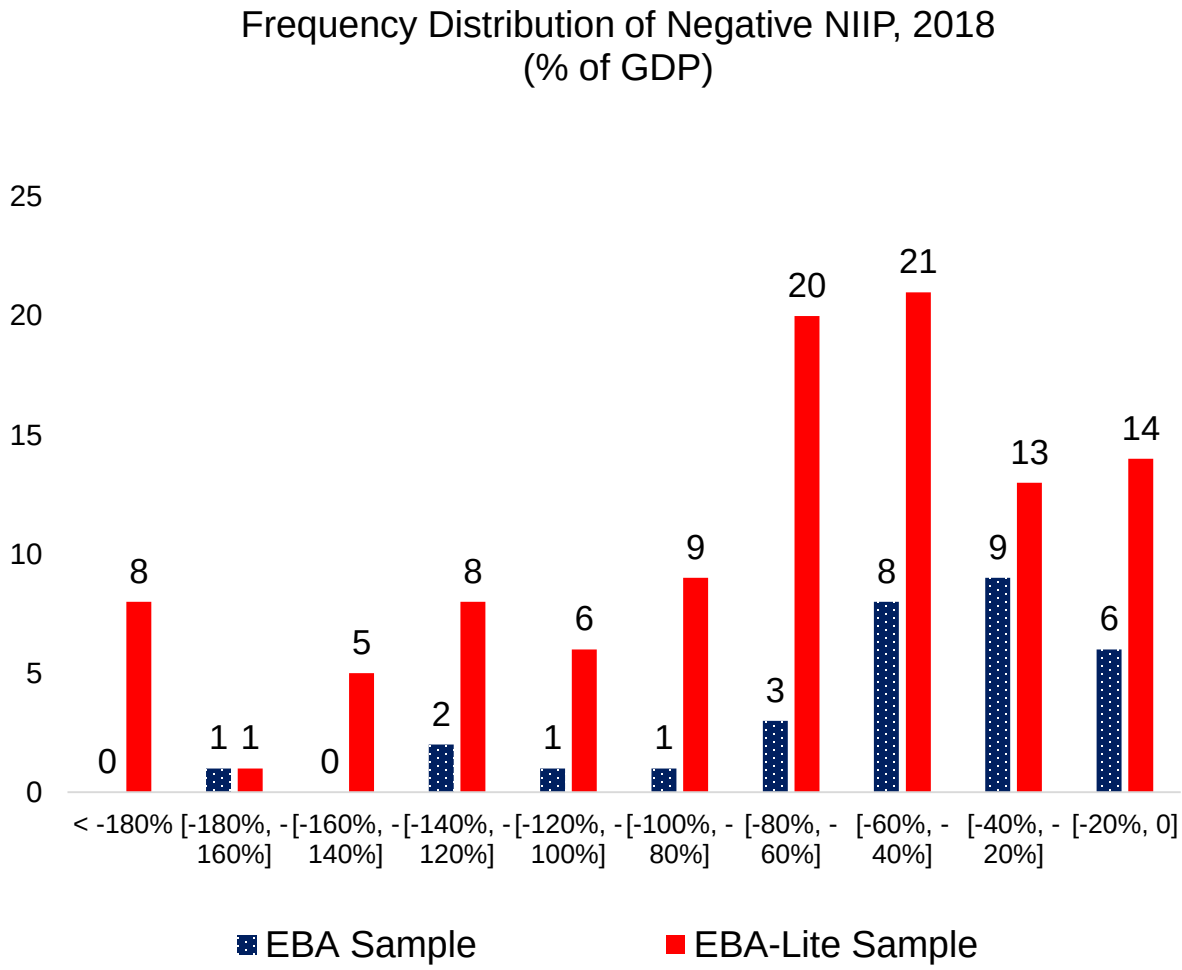
- Highly negative NIIP: abrupt increases in borrowing costs, capital flow reversals
- Growth and financial stability risks

Conceptual Framework

- Classical inter-temporal budget constraint
- Role for trade, and financial factors

EBA vs. EBA-Lite

- Incidence of negative NIIP in EBA-Lite: 58 countries with NIIP/GDP less than -60% (2018)



External Sustainability Assessment

- **Quantification:** *Exchange rate depreciation to equate debt with the PV of income from future trade and income flows*
- Standard law of motion on net external debt, Dt (liabilities less assets)

$$D_t = (1 + r_t)D_{t-1} - NX_t$$

- Solving forward, imposing a no-Ponzi game condition, stabilize debt at d* *n* periods ahead:

$$d_t - \left(\prod_{i=0}^{n} \frac{(1+g_{t+j})}{(1+r_{Lt+j})}\right) d^* \leq \sum_{j=0}^{n} \prod_{i=0}^{j} \frac{(1+g_{t+j})}{(1+r_{Lt+j})} ((nx_{t+j} + (r_{At+j} - r_{Lt+j})a_{t+j}))$$

- NIIP sustainable? Discounted debt $\leq$ PV of net exports plus the return differential times the gross position
- Relevant Issues. Lane and Milesi-Ferretti 2005; Gourinchas and Rey 2007; Evans 2012; Blanchard and Das 2017

  (1) returns on foreign assets and liabilities

  (2) discount factors;

  (3) Both *d* and *nx* functions of the exchange rate; PV depends on a sequence;

  (4) Uncertainty

Simplifications in Earlier ES Approach

Some simplifications can materially affect assessment of sustainability

- Exchange rate adjustment affects net exports for a given trade elasticity, but not revaluation of the NIIP
- Did not take into account rates of return differentials except for 5 countries

Implications of Previous Approach

Implications of simplifications

- Revaluation If FX-denominated liabilities > FX-denominated assets, disregarding weakening of NIIP from a depreciation could result in **overstating sustainability** of NIIP
- Return differentials Disregarding return differentials → can **overstate sustainability** when returns on external liabilities high relative to return on external assets

Revised Framework for Assessment of External Sustainability

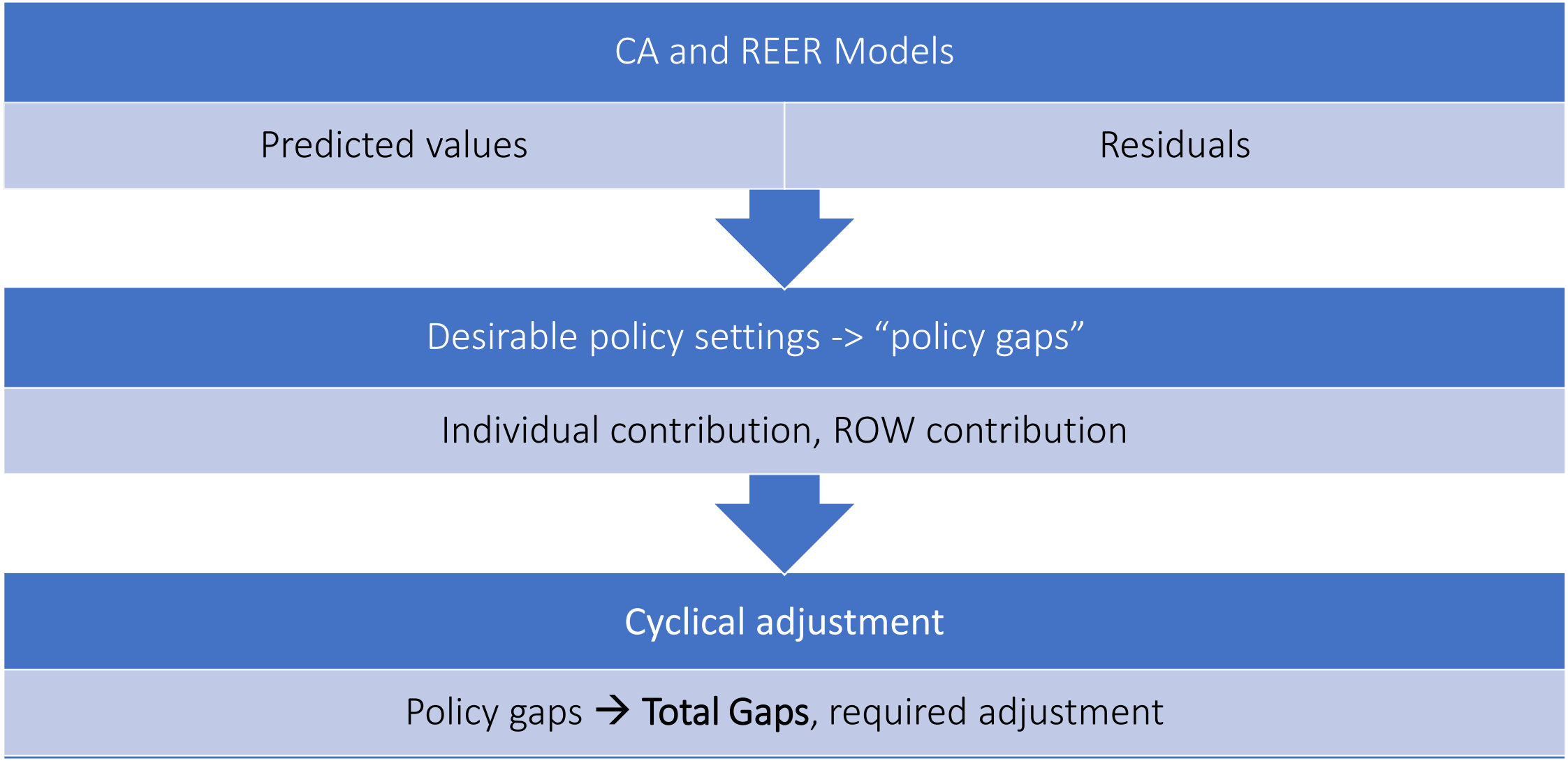
Deterministic Approach

- Use **currency composition** of external assets and liabilities to compute revaluation of NIIP
- Generates more intuitive REER adjustment (sign, magnitude) than previous approach
- Flexible: external adjustment over a longer period than WEO horizon

Probabilistic Approach

- Probabilistic approach optional in-depth analysis (e.g. Portugal 2018 Article 4)
- Further assessment of sustainability, e.g. REER depreciation implied by deterministic approach very large
- Data requirements larger, but does not pose widespread limitations
  - Of 58 EBA-Lite economies with NIIP below -60%, **40** have at least 25 years of BOP and NFA

Quantitative Inputs to Assessment. Regression Inputs



Other Quantitative Inputs into the External Assessment

REER Models

- Analogous to the CA Regression Model: REER gap
- Key differences in some policy variable

External Sustainability, as applicable

- A deeply negative NIIP makes external sustainability the overriding objective

Commodity Module, as applicable

- For large exporters of exhaustible commodities
- Complementary input to the regression models

Additional inputs essential for an assessment

Reserves Policy and FX Intervention

- Preserve economic and financial stability, prevent BOP crises
- Metric to Assess Reserve Adequacy

Capital Flows

- Gross, Net flows; Composition
- Taking account of the IMF Institutional View

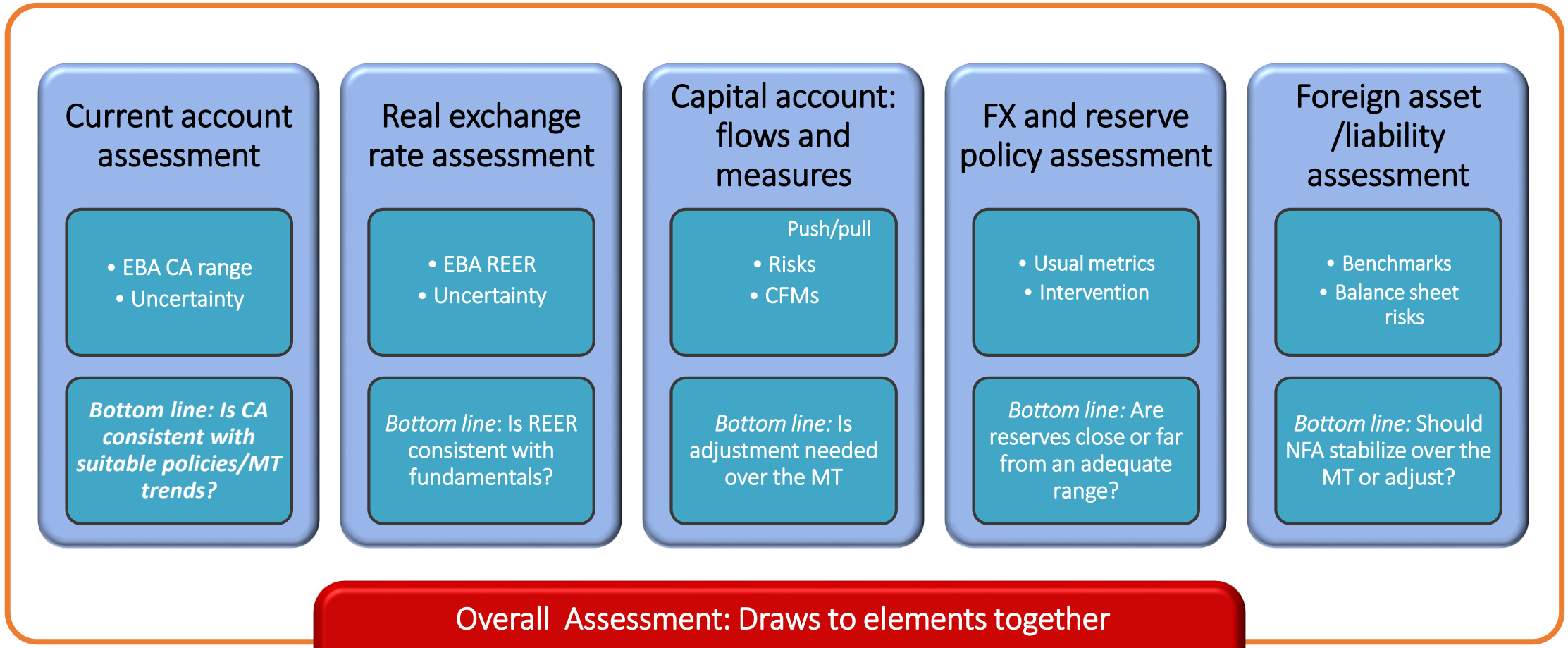
Balance Sheet (composition, maturity, gross, net)

- Even where external sustainability is not of immediate concern

Extensions, Judgement

- Vital for a holistic view. Country-specific or idiosyncratic factors

Deriving an External Sector Assessment



Overall Assessment: Draws to elements together

- Acknowledges uncertainty
- Excludes temporary factors
- Takes into account policy action

Thank you