INTER-AMERICAN
DEVELOPMENT BANK

External Sustainability Assessment at the IDB

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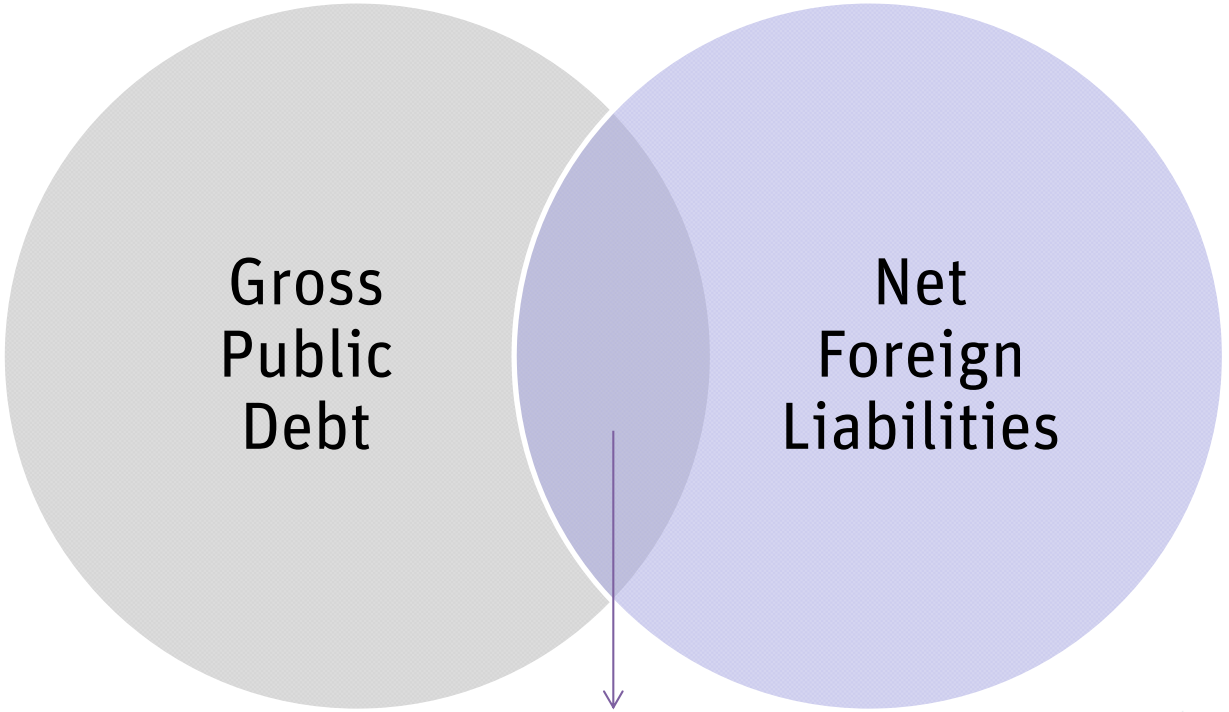
Outline of the Presentation

- **Debt Sustainability Analysis (DSA) vs. External Sustainability Analysis (ESA)**
- **How do NFA get accumulated?**
- **Methodologies and applications:**
  - **Standard Approach**
  - **Dynamic Approach**
  - **Fan Charts**

DSA vs ESA: Similarities and Differences

	DSA	ESA
Unit of Analysis	Gross Public Debt	Net Foreign Liabilities
Scope	Public Sector	Public and Private Sectors
	Gross: does not take into account assets of the public sector	Net = Liabilities *minus* Assets
	Debt Only	All assets and liabilities: Debt, FDI, portfolio equity, international reserves
	Domestic and External Debt	External Only

DSA vs ESA: Unit of Analysis



External Sustainability Analysis

How do net foreign assets (liabilities) get accumulated?

$$\Delta \square\square\square = \square\square\square + \square\square + \square\square \qquad (1)$$

$NFA = net\ foreign\ assets\ (= -net\ foreign\ liabilities)$

$CAB = trade\ balance + net\ current\ transfers + investment\ income\ balance$

$KG =$ nominal capital gains (losses)on stock of foreign assest and liabilities

$KT =$ capital account transfers (grants, debt forgiveness, errors and omissions)

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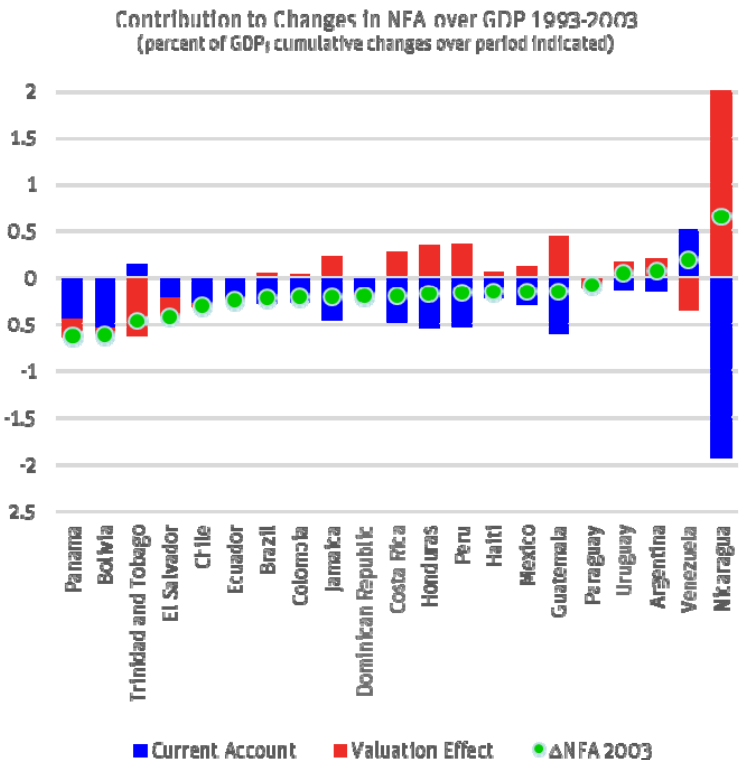
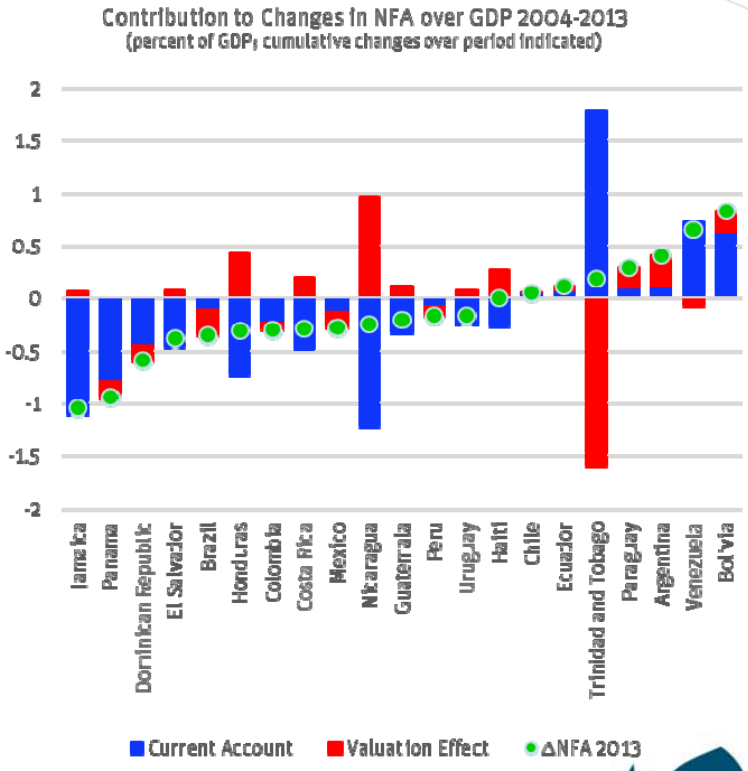
Contributions of Current Account vs Valuation Effects to ΔNFA





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External Sustainability Analysis

Dividing equation (1) by GDP and doing some algebra (see Castillo, 2016):

$$nfa_t - nfa_{t-1} = tb_t + ntr_t + kt_t + \left(\frac{(r_t^{fl} - g_t^{LCU})(1+\Delta X_t)}{(1+g_t^{LCU})} + \Delta X_t\right) nfa_{t-1}$$

Dynamic equation of the accumulation of net foreign assets (liabilities)

$$+ \frac{(r_t^{fa} - r_t^{fl})(1+\Delta X_t)}{(1+g_t^{LCU})} fa_{t-1}$$

Where r_t^{fa} (r_t^{fl}) is the total real return (yield plus capital gains) on external assets and liabilities, respectively. ΔX is the change in REER. g_t^{LCU} is the real GDP growth rate in local currency units.

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External Sustainability Analysis

We have recently developed a template to standardize and unify three approaches to assess the external sustainability:

- Standard Approach
- Dynamic Approach
- Fan Charts

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Standard Approach

An operational definition of sustainability consists in imposing the non-income current account (nica^s) that stabilizes the ratio of NFA to GDP at a benchmark level (denoted as nfa^s) in the long-run.

$$\Delta nfa_t = nica_t + (r - g)nfa_{t-1} = -\left(\frac{r^{nica} - g^{nica}}{1 + g^{nica}}\right)gdp_{t-1} - \left(\frac{r^{nica} - g^{nica}}{1 + g^{nica}}\right)nfa_{t-1} - nfa^s$$

Where the “non-income” current account balance = trade balance plus net current transfers.

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Dynamic Approach: Equation

$$nfa_T = tb_T + ntr_T + kt_T + \left(\frac{\left(1+r_T^{fl}\right)(1+\Delta\tilde{X}_T)}{(1+g_T^{LCU})}\right) nfa_{T-1} + \frac{\left(r_T^{fa}-r_T^{fl}\right)(1+\Delta\tilde{X}_T)}{(1+g_T^{LCU})} fa_{T-1} \quad (2)$$

This approach depicts the projected path of net foreign assets (as a share of GDP) as a function of its determinants.

It allows to introduce temporary negative shocks to the underlying variables on the equation of the accumulation of net foreign assets.

Dynamic Approach: Intuition

The intuition behind this approach is that countries must ultimately be able to pay their debts—the so called intertemporal budget constraint—therefore the non-income current account and NFA are tied in the long run, given by Eq. 2.

E.g. It implies that a debtor country is solvent:

- if the net present value of future non-income current accounts equals the current value of NFA and,
- if the NFAs increase exponentially at a rate lower than the difference between the real rate of return and the growth rate.

Dynamic Approach: Application

In order to depict the effect of a temporary shock to each underlying variable on the NFA over GDP future path, we assume a 1 s.d. negative shock to all of the variables that enter equation (2):

Figure: Sustainable NFA/GDP path

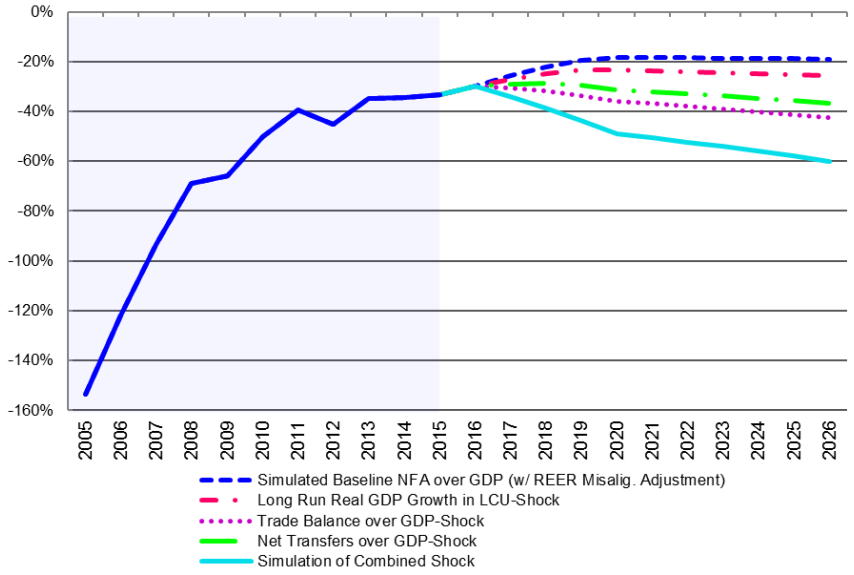
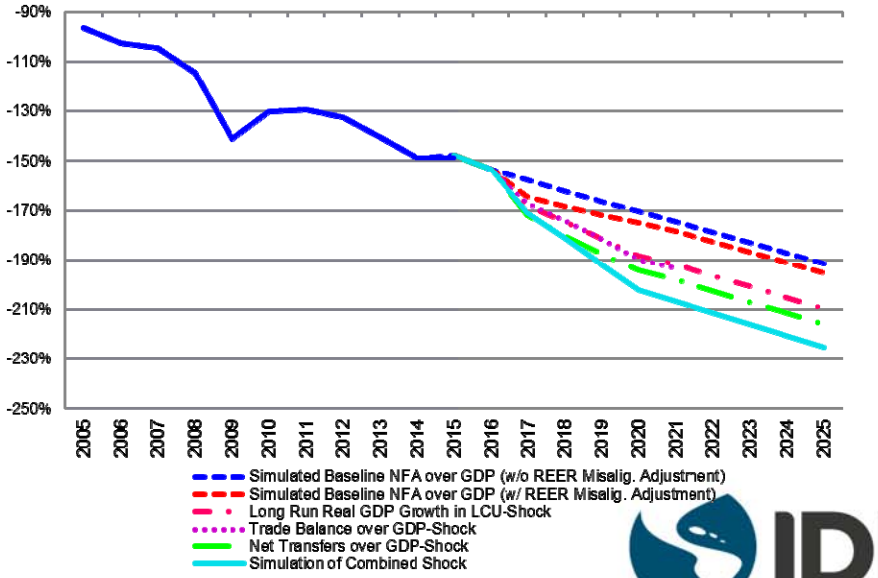


Figure: Unsustainable NFA/GDP path



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Dynamic Approach: Extensions

The effect of REER misalignments on NFA over GDP.

The correction of the REER misalignment can have implications on external sustainability by affecting the NFA over GDP (which is measured in US dollars) in two directions:

- Valuation Channel: a real depreciation would "reduce" USD-measured GDP. (NFA/GDP)⬆. Net creditor countries' IIP improves, and Net debtor countries' IIP deteriorates.
- Trade Channel: a real depreciation would improve the ratio of NFA position to GDP through the Effect on Trade Balance.

Dynamic Approach: Extensions

$$nfa_T = tb_T + ntr_T + kt_T + \left(\frac{\left(1+r_T^{fl}\right)\left(1+\Delta\tilde{X}_T\right)}{\left(1+g_T^{LCU}\right)}\right) nfa_{T-1} + \frac{\left(r_T^{fa}-r_T^{fl}\right)\left(1+\Delta\tilde{X}_T\right)}{\left(1+g_T^{LCU}\right)} fa_{T-1}$$

- For simplicity, we take the estimated REER misalignment from the latest IMF's Article IV, if available.
- The way to implement the REER adjustment is assuming a one-time jump in the REER from current level to its equilibrium level.
- The one-time jump REER adjustment at T will have a gradual effect on trade balance through trade semi-elasticities (Tokarick, 2010).

Dynamic Approach: Limitations

1. Measurement problems for NFA positions. E.g. lack of information concerning the currency composition and nature of financial instruments of external assets and liabilities from the IMF's BOP database.
2. Only imperfect proxies of "real rate of return differential" $\left(r_T^{fa} - r_T^{fl}\right)$ are available.
3. No forecasts available for current account determinants (i.e. trade balance) beyond 5-year WEO forecasts.
4. "Deterministic" Approach.

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External Sustainability Analysis

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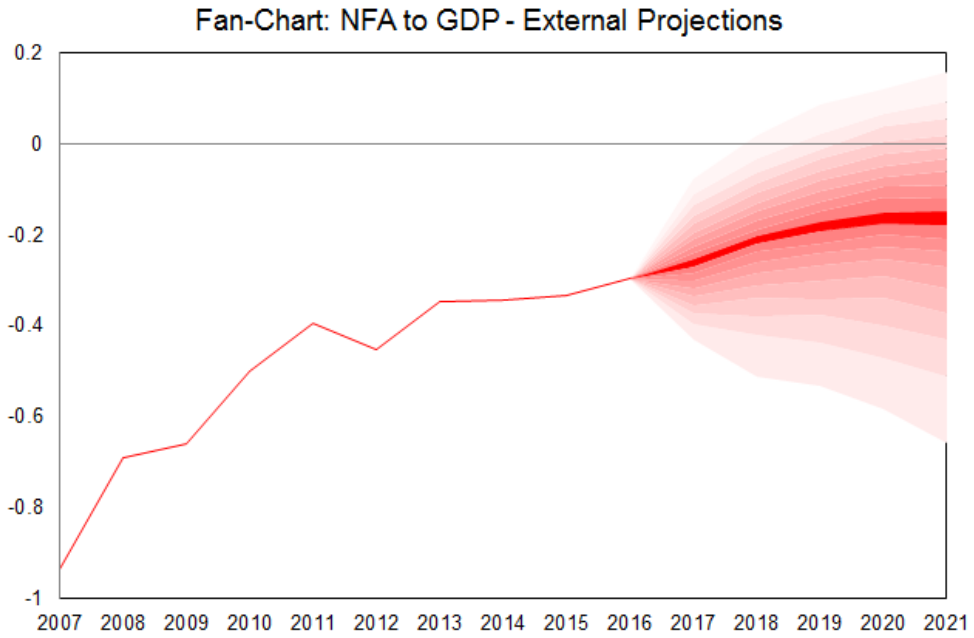
Fan Charts for ESA

- The Fan-Chart approach lays out that the expected future dynamic path of the Net Foreign Assets over GDP is uncertain and subject to temporary shocks.
- Fan Chart approach depicts the probability distribution of the Net Foreign Assets over GDP by randomly simulating a large number of shocks to each of its underlying determinants.
- Four methodologies have been programmed in the IDB template: a) VAR Approach, b) External Forecasts without correlated errors, c) External Forecasts with Correlated Errors, and d) Weighted Projections.

Example: External Forecasts without correlated errors



(a) Fan Chart

Value at Risk of the NFA / GDP	
Threshold of the NFA over GDP limit (X)	-20%
Prob(NFA/ GDP) < X	0.49

	Sensitivity Analysis of NFA over GDP			
Intervals	**<-0.2**	**<-0.25**	**<-0.3**	**<-0.35**
2017	68.5%	51.0%	35.4%	21.3%
2018	50.9%	37.3%	27.2%	19.4%
2019	43.6%	33.0%	25.3%	19.2%
2020	40.0%	30.8%	24.1%	18.0%
2021	41.5%	33.4%	27.2%	22.2%
Total	**48.9%**	**37.1%**	**27.8%**	**20.0%**

(b) Value at Risk

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THANK YOU!

Appendix: Real Rates of Return

- □ and □ denote real rate of return on foreign assets and liabilities held in period □:

$$1 + \square^{\square\square} = \frac{1+\square\square^{\square}+\square\square^{\square}\square}{1+\square_{\square}} \quad \square = \square\square, \square\square$$

- Where nominal yields on assets (liabilities) are denoted as:

  □ = and □= , respectively.

- Investment income credit (debit) in U.S. dollars in year □ is denoted as $\square\square_{E}\square\square_{F}$, and $\square\square_{E}\square\square_{F}$ denotes the stock of assets (liabilities) in □-*1*.

Appendix: Real Rates of Return

- And nominal capital gains (losses) on assets (liabilities) are respectively defined as:

$$\square\square = \qquad \square\square =$$

- They are defined by the difference between the change in the stock of assets (liabilities) between $\square$ and $\square - 1$ and its underlying capital outflows (inflows) during $\square$ denoted as $\square_{\mathrm{E}}\square_{\mathrm{F}}$, divided by the initial stock of assets (liabilities).