Growth-indexed bonds and Debt distribution: Theoretical benefits and Practical limits

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Introduction

- Growth-indexed bonds (GIBs): fixed principal repayment, coupon indexed to nominal GDP growth rate

- Two main arguments:
  - Counter-cyclical fiscal policy (Borensztein and Mauro 2004)
  - Reduced debt variance, reduction in the upper tail of the distribution and lower probability of default (Blanchard et al. 2016, Barr et al. 2014)

- However, 'non-contingency puzzle'. GIBs almost never issued:
  - Moral hazard issue
  - Technical issues
  - Potential premium (novelty, liquidity, risk vs. default)

Introduction

- GIBs have two effects on upper tail of debt-to-GDP distribution:
  - reduce variance of the distribution (under specific circumstances)
  - shift baseline up if have to pay a positive premium
- Question: Which effect quantitatively dominates? Would GIBs reduce the risk to reach very high, unsustainable, debt-to-GDP ratios?
- This paper:
  - Estimates the reduction in the upper tail for 32 AEs and EMEs
  - Explores alternative indexation formulas
  - Estimates the maximum 'net' premium that would equalize upper tails

Outline

Methodology and Data

- Paper expands approach used in Blanchard, Mauro and Acalin (2016)
- Debt dynamics equation with $X\%$ GIBs:

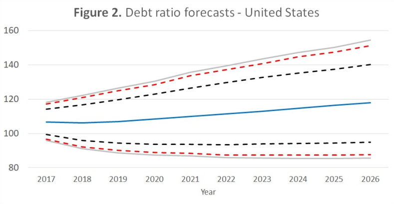
$$\Delta debt_t = [(1 - X).(r_t - g_t) + X.k].debt_{t-1} - pb_t$$

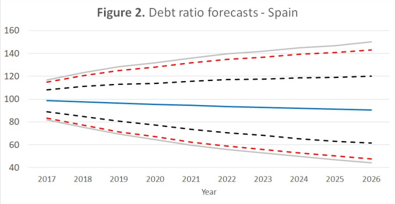
- Baseline scenario: IMF forecasts for r, g and pb
- Assume the distribution of shocks for r, g, and pb is a multivariate normal distribution, with a covariance matrix given by the empirical covariance matrix estimated over 1990–2015
- The shocks are assumed to be i.i.d. over time, and debt dynamics are generated through 10,000 random draws (Monte Carlo simulations) from the multivariate distribution

Results

- Gains from simple GIBs vary importantly across countries: US vs. Spain

1-st and 99-th percentiles of debt distribution
non-indexed (grey) / 20% indexed (red) / 100% (black)



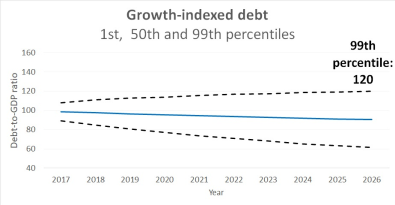


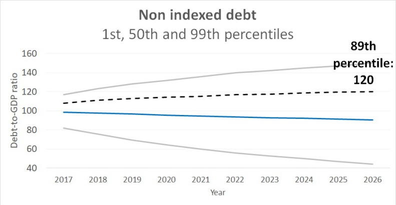
Results (continued)

- How important is the reduction in the upper tail of the distribution?

  1/ Find the value of the 99-th percentile in the indexed distribution
  2/ Then find the percentile in the non-indexed distribution which corresponds to this value

- Example: 1% risk that debt ratio above 120% if all debt indexed vs. 11% risk if non-indexed debt





Results (continued)

- How important is the reduction in the upper tail of the distribution?

Indexation to the growth rate - Percentile of the non-indexed distribution corresponding to the 99-th percentile of the indexed distribution

% indexed debt:	100%	20%	% indexed debt:	100%	20%
Lebanon	65	97	United States	92	98
Egypt	74	97	Austria	92	98
Greece	75	97	Malta	92	98
Japan	78	97	Israel	92	98
Argentina	80	97	Canada	94	98
Brazil	81	97	Turkey	94	98
Mexico	84	97	South Africa	94	98
Portugal	85	97	Peru	94	98
Italy	89	98	Netherlands	95	98
Spain	89	98	Australia	95	98
Costa Rica	90	98	Chile	95	98
Indonesia	90	98	United Kingdom	96	98
France	91	98	Belgium	97	98
Germany	91	98	Sweden	97	98
Colombia	91	98	Korea	98	98
India	91	98	Cameroon	98	98

Source: Author's calculations.

Can debt uncertainty be further reduced?

- Solving $\Delta debt_t = 0$ gives:

$$rind_t = g_t + \frac{pb_t}{debt_{t-1}}$$

- We consider an alternative formula:

$$rind_t = c.g_t + k$$

where g: nominal growth rate; k: constant

- Optimal coefficient:

$$c^* = 1 + \frac{cov(pb, g)}{debt_{t-1}.var(g)}$$

Optimal coefficients

- Optimal indexation coefficients to the nominal growth rate by Country

Optimal indexation coefficient to the nominal growth rate

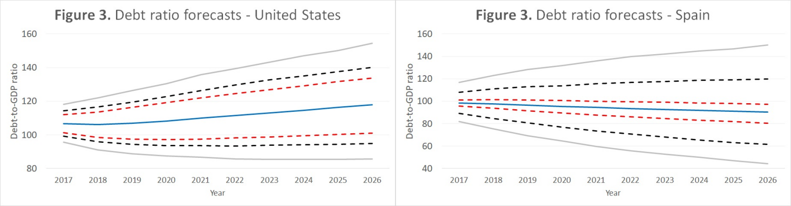
Country	c*	Country	c*
Argentina	0,92	Brazil	1,57
Lebanon	1,04	Indonesia	1,62
Colombia	1,05	France	1,71
Malta	1,06	Korea	1,76
Greece	1,09	Belgium	1,86
Egypt	1,14	Costa Rica	1,88
Mexico	1,18	Sweden	1,96
Portugal	1,19	United States	1,97
Japan	1,21	Spain	1,99
India	1,25	Australia	2,05
Austria	1,30	South Africa	2,07
Italy	1,32	United Kingdom	2,09
Turkey	1,36	Peru	2,19
Germany	1,42	Cameroon	2,26
Israel	1,45	Netherlands	2,28
Canada	1,50	Chile	3,08

Note: In order to make the coefficients independent of time, in each formula debt is fixed to its level at t=0. Thus the efficiency of the coefficients is decreasing the further the debt deviates from its initial level. This effect tends to be modest over the estimated 10-year horizon.

Results: Growth-indexed with c*

- Gains from GIBs vary importantly across countries: US vs. Spain
  Efficiency depends on correlation between *g* and *pb*

1-st and 99-th percentiles of debt distribution
non-indexed (grey) / 100% c=1 (black) / c* (red)



Results: Growth-indexed with c* (continued)

- How important is the reduction in the upper tail of the distribution?

Indexation to the growth rate - Percentile of the non-indexed distribution corresponding to the 99-th percentile of the indexed distribution

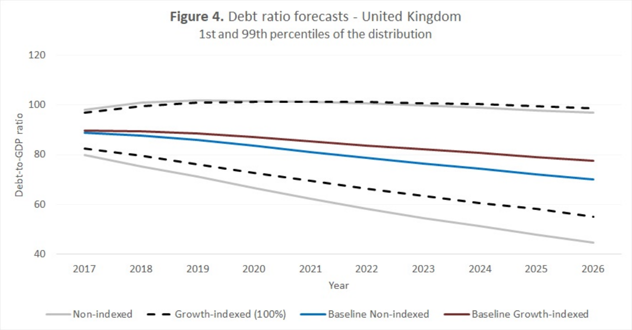
c coefficient =	1	c*	difference	c coefficient =	1	c*	difference
Spain	89	62	-27	Portugal	85	82	-3
Netherlands	95	74	-21	Australia	95	92	-3
Costa Rica	90	72	-18	Belgium	97	95	-2
Brazil	81	68	-13	Egypt	74	72	-2
France	91	81	-10	Austria	92	91	-1
South Africa	94	85	-9	Germany	91	90	-1
United States	92	85	-7	Sweden	97	96	-1
Turkey	94	87	-7	Greece	75	74	-1
Italy	89	83	-6	Israel	92	91	-1
United Kingdom	96	91	-5	Lebanon	65	64	-1
Mexico	84	79	-5	India	91	90	-1
Peru	94	89	-5	Korea	98	97	-1
Chile	95	91	-4	Malta	92	92	0
Indonesia	90	86	-4	Argentina	80	80	0
Canada	94	91	-3	Colombia	91	91	0
Japan	78	75	-3	Cameroon	98	98	0

Source: Author's calculations.

Impact of the premium: the UK

- For most countries, a 'net' premium of 100 basis points over a 10-year period would increase the upper tail of the debt distribution

1-st and 99-th percentiles of debt distribution



Non-linearities in the premium

- As we increase the time horizon the impact of a rise in the baseline tend to dominate the impact of a lower distribution around it

Maximum premium that would equalize the upper tail of the distribution

Target:	99th	95th	Target:	99th	95th
Horizon:	**10y**	**20y**	**Horizon:**	**10y**	**20y**
Lebanon	4,1%	2,2%	South Africa	1,2%	0,7%
Argentina	5,4%	2,2%	Australia	1,4%	0,7%
Brazil	2,8%	1,6%	Japan	1,2%	0,6%
Greece	3,0%	1,6%	Netherlands	1,2%	0,6%
Egypt	2,6%	1,5%	Italy	0,9%	0,5%
Mexico	2,3%	1,3%	India	1,1%	0,5%
Turkey	2,2%	1,2%	United States	1,0%	0,5%
Spain	2,3%	1,2%	Canada	1,0%	0,5%
Colombia	1,7%	1,0%	Israel	1,0%	0,4%
Indonesia	2,3%	1,0%	France	0,8%	0,4%
Portugal	1,6%	0,9%	United Kingdom	0,8%	0,3%
Malta	1,6%	0,9%	Austria	0,7%	0,3%
Peru	1,8%	0,8%	Sweden	0,5%	0,3%
Chile	1,9%	0,8%	Belgium	0,3%	0,1%
Costa Rica	1,7%	0,8%	Cameroon	0,2%	0,1%
Germany	1,3%	0,7%	Korea	0,0%	-0,9%

Source: Author's calculations.

Main results: An interesting idea, but ...

- Reduction in the debt variance. The share of indexed debt matters: 20% provides almost no reduction
- Simple GIBs can bring relevant benefits to some countries, but offer no protection against shocks to the primary balance
- Alternative indexation formulas could achieve a higher reduction in the debt distribution variance in theory, but no one-size-fits-all formula
- The size of the potential premium is crucial: 'net' premium of 100bps or even lower may increase upper tail (think about it as annual insurance premium of 1% GDP for an average AE)

Further explorations

- Formula. For most countries, optimal indexation coefficient > 1.
  Idea: Index principal to GDP level and coupon to GDP growth rate, and increase share of fiscal stabilizers in primary balance.

- Size/Implicit premium. Could explain 'non-contingency puzzle'.
  Idea: For the Euro Area, ESBies a la Brunnermeier et al. (2016) backed by sovereign GIBs. ESM would:
  - buy GIBs (60% of GDP) at 'fair' price + a small margin (30bps)
  - tranche and issue safe and risky European assets