On the Potential of Sovereign State-Contingent Debt in Contributing to Better Public Debt Management and Enhancing Sustainability Outcomes

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Outline

• Introduction: Why care about state-contingent debt instruments?
• Types of instruments
• The role of state-contingent debt instruments in debt restructurings
• Measurement and management challenges
• Conclusion
Introduction: Why Care about State-Contingent Debt Instruments?
• Sovereign debt is not only one of the oldest, but also the world’s largest asset class.
  – Around USD90 trillion of sovereign debt outstanding.
• Sovereign debt enables governments to invest in crucial areas of development or smoothen fiscal spending during times of crises.
• The sustainability of public debt is essential for macroeconomic stability.
• A worsening of sovereign risk does not only increase the cost of sovereign capital, but has also effects on the corporate cost of capital through a sovereign ceiling effect.
  – In the worst case, a sovereign debt crisis can trigger financial and economic crises and cause severe harm to a country’s growth and development.
• Sustainable public debt management is therefore of utmost importance.
The macrofinancial risks associated with accelerating global climate change and environmental degradation present a novel risk to public debt sustainability.

– Empirical research indicates that climate vulnerability is already driving up the costs of sovereign debt and that the macroeconomic impacts of climate change may lead to significant sovereign downgrades by credit rating agencies.

With capital markets becoming increasingly concerned about ESG risk, mitigating climate and other environmental risks for public finances has become a key challenge for government debt management offices.
• Sovereign state-contingent debt instruments (SCDIs) have for long been suggested as complements or alternatives to conventional sovereign bonds.

• The basic idea behind SCDIs is that they can help to better manage risk for the sovereign or incentivise certain desirable policies.
• The IMF (2017: 5) defines sovereign SCDIs as instruments that:
  1) bear contractual debt service obligations tied to a pre-defined state variable (e.g. GDP growth, exports, or commodity prices), and
  2) are designed to alleviate pressure on sovereign indebtedness and/or financing needs in a bad state of the world (e.g. occurrence of a natural disaster).
• They provide additional creditor compensation in good times and/or some form of debtor relief in bad times.
• Krugman (1988), in an attempt to solve the trade-off between debt forgiveness and financing, suggests that linking payments to measures of economic conditions could benefit both debtors and creditors.

• IMF (2017: 6) argues that state-contingent debt instruments for sovereigns have the potential to “enhance policy space for sovereigns in bad states of the world, offer diversification opportunities to investors, and generate ancillary benefits for other economic agents and the broader system”.

Against this backdrop, this paper discusses the role that state-contingent debt can play in contributing to better public debt management, in climate-proofing public finances, and in enhancing sustainability outcomes in the economy.

It develops a taxonomy of SCDIs and reviews the advantages, challenges and the actual uptake of different SCDIs.

It argues that the escalating climate and ecological crises provide a strong rationale for a wider use of sovereign SCDIs as the physical and transition impacts of climate change and environmental degradation are increasingly altering the risk profile of sovereigns.
Types of Instruments
## A taxonomy of state-contingent debt instruments

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<th>Debt instruments linked to macroeconomic and price variables</th>
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<th>Debt instruments linked to the occurrence of specified events</th>
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Source: Compiled by author.

2.1 Debt instruments linked to macroeconomic and price variables

Various debt instruments linked to macroeconomic and price variables have been developed, including inflation-linked bonds, commodity-indexed bonds, GDP-linked bonds, wage-indexed bonds, and revenue-indexed bonds.

**Inflation-linked bonds**

Inflation-linked bonds—commonly referred to as linkers—are financial securities devised to protect bond holders from the risk of unexpected inflation or to hedge against long-run inflation risk by linking the principal and coupons to inflation through a price index (Krämer 2017, Farrugia et al. 2018). Inflation-linked bonds are typically issued with a floor clause that prevents negative returns in the case of deflation.

As pointed out by Campbell et al. (2009: 110), “[t]he basic case for investing in inflation-indexed bonds […] is that these bonds are the safe asset for long-term investors. An inflation-indexed perpetuity delivers a known stream of real spending power to an infinite-lived investor, and a zero-coupon inflation-indexed bond delivers a known real payment in the distant future to an investor who values wealth at that single horizon.”

Inflation-linked bonds are particularly attractive in an environment of high and volatile inflation, as they may allow governments to raise long-term funds from capital markets when issuing fixed-rate bonds with long maturities is difficult otherwise (Di Iorio and Fanari 2020).

For governments, inflation-indexed bonds are also attractive because they are associated with a lower cost of borrowing as investors won’t require an inflation risk premium. Inflation-indexed bonds can also help a government to show its commitment to maintaining a low-inflation environment as they reduce the incentive for governments to allow for high inflation to erode the real value of its outstanding obligations. UK Prime Minister Margaret Thatcher reportedly likened inflation-indexed bonds to a “sleeping policeman” that would help to keep inflation in check by “by creating a situation in which the government would have to face a large interest expense if it ever allowed inflation to pick up” (Campbell and Shiller 1996: 163).

The first inflation-indexed bonds, so-called “depreciation notes”, were issued by the Commonwealth of Massachusetts in 1780 during the Revolutionary War (Shiller 2005).
Inflation-linked bonds

• Inflation-linked bonds (“linkers”) are fixed income securities whose principal and coupons are linked to inflation through a price index (Krämer 2017).
• They are designed to eliminate the risk of unexpected inflation or to hedge against long-run inflation risk to the holders of the bonds (Farrugia et al. 2018).
  – Most of the bonds are issued with a floor clause so that in the event of deflation this will prevent the capital at maturity from being below the original investment.
• The world’s first known inflation-indexed bonds were issued by the Commonwealth of Massachusetts in 1780 during the Revolutionary War (Shiller 2003).
• The UK was the first developed economy to issue inflation-indexed bonds.
  – The first index-linked gilt was issued in 1981 for institutional investors (UK DMO 2021).
    • Indexation was to the General Index of Retail Prices and ownership was initially restricted to pension funds or similar institutions writing pension business.
Commodity-indexed bonds

• The use of commodity-indexed bonds dates as far back as 1863, when the Confederate States of America issued bonds payable in bales of cotton (O’Hara 1984).
• France issued a gold-linked bond in 1973 (the “Giscard”) with a 7% nominal coupon rate and a redemption value indexed to the price of a 1 kilogram bar of gold (Atta-Mensah 2004).
  – India issued gold bonds in 2015, with the principal linked to the price of gold.
• In 1977, Mexico was the first to issue oil-linked bonds (“petrobonds”) through National Financiere S.A. (NAFINSA), a public development bank (Holt 1981).
  – Each 1,000 peso bond was linked to 1.95354 barrels of oil.
GDP-linked bonds (1/2)

• The underlying premise of GDP-linked bonds is that the issuer’s debt obligations grow and shrink in line with its economic growth (Myles 2016).
  – This discourages procyclical fiscal policies (by freeing up funds when growth is stagnant, and limiting spending during good times) and improves long-term debt sustainability.

• Originally proposed by Shiller (1993), with both the coupon and the principal being indexed to the level of nominal GDP.
  – Similar to inflation-linked bonds.
  – Have their coupon and principal indexed to the price level.

• Borensztein and Mauro (2004) link the coupon to the growth rate, but the principal remains fixed.
GDP-linked bonds (2/2)

• GDP-linked ‘warrants’ have been issued by several countries as part of debt restructuring agreements.
  – Costa Rica, Bulgaria, Bosnia and Herzegovina; Argentina, Greece, and Ukraine.
  – Contain an element of indexation to GDP – providing holders with a higher coupon if GDP exceeds some threshold level.

• In 2013, Portugal issued small-denomination bonds to domestic savers with additional payouts tied to GDP.
Wage-indexed bonds

• In 2014, Uruguay issued a $1 billion bond with principal and coupon payments indexed to nominal wages.
• Wage indexation is argued to provide a better hedge against output shocks that affect tax revenues.
Revenue indexed bonds

• Turkey issued Revenue Indexed Bonds in both TL and USD in 2009.

• The coupon payments are indexed to the transfers from State Owned Enterprises to the Budget as Revenue Shares.
Risk-linked securities (1/3)

• Innovative financing devices that enable insurance risk to be sold in capital markets, raising funds that insurers and reinsurers can use to pay claims arising from mega-catastrophes and other loss events (Cummins 2008).

• The most prominent type of risk-linked security is the catastrophic risk (CAT) bond.
  – Fully collateralised instrument that pays off on the occurrence of a defined catastrophic event.
    • The proceeds raised from investors go into a secure collateral account.
    • In case of a disaster, the collateral is released to the issuer, and investors lose (part of) their principal.
  – CAT bonds and catastrophe insurance programs were born from the need to mitigate some of the risks the insurance industry face when major catastrophes happen.
  – Allow insurers access to broader financial markets and offering institutional investors the opportunity to earn an attractive return on investment uncorrelated with the returns of other financial market instruments in exchange for assuming catastrophe insurance risks.
  – The first CAT bonds were issued in mid-1990s.
Risk-linked securities (2/3)

• The use of proceeds of **resilience bonds** are earmarked for projects that increase resilience to climate change, e.g. sea walls to combat sea-level rise or building shelters in cyclone- and typhoon-vulnerable areas.
  – If there is no trigger event over the lifetime of the bond, investors recoup their principal investment as well as their regular coupon payments.
  – If there is a trigger event over the lifetime of the bond, investor will lose their principal investment as well as their regular coupon payments.
Risk-linked securities (3/3)

• A **pandemic bond** is a bond where the capital raised is earmarked for responding to pandemic outbreaks.
  – As with ‘normal’ bonds, investors in pandemic bonds receive coupons. However, the repayment of their capital investment at maturity depends on whether a pandemic occurs.
  – If there is no pandemic outbreak, the investors will receive their initial investment on the maturity date.
  – In the event of a pandemic, investors lose part or all their capital, which is then used to finance the response to the outbreak in the eligible countries.
  – The first pandemic bond was issued by the World Bank in 2017.
Natural disaster clauses in sovereign debt

• A disaster clause is designed to provide cash flow relief during the crucial period after a natural disaster event, when financing needs are high and new sources of funding are limited.
  – By embedding disaster clause clauses in debt contracts, countries can tap into extended maturity periods in the event of a natural disaster.
  – This would allow a disaster-hit country to defer either interest payments or principal or both for a defined period.

• Grenada was the first country to include a natural disaster clauses as part of a comprehensive debt restructuring in 2014/2015.
  – Grenada’s hurricane clause was endorsed by the Paris Club.
  – Barbados introduced a hurricane clause in its debt restructuring in 2018/2019.
  – For both countries, parametric-based assessment by the Caribbean Catastrophe Risk Insurance Facility, an independent body, is used to determine when the natural disaster event has been triggered.
Sovereign contingent convertible debt (S-CoCo)

• Sovereign debt instruments with a built-in trigger to allow standstill of payments (Consiglio and Zenios 2016).
  – Activated when an indicator breaches a threshold – invoking a precautionary credit line from the IMF – and making the triggered bond senior to subsequently issued debt.
  – A trigger could be a moving average on CDS spreads.

• Similar to contingent convertible debt for banks (where debt is converted to equity), but with S-CoCos the conversion is to debt with more favourable repayment schedule.
Sustainability-linked bonds

- ICMA (2020: 2): “any type of bond instrument for which the financial and/or structural characteristics can vary depending on whether the issuer achieves predefined Sustainability/ ESG objectives.”
  - Forward-looking performance-based instruments.
  - Issuers commit explicitly to future improvements in sustainability outcome(s) within a predefined timeline.
  - Objectives are (i) measured through predefined Key Performance Indicators (KPIs) and (ii) assessed against predefined Sustainability Performance Targets (SPTs).
Nature performance bonds

• Tied to measurable targets for restoring wetlands, protecting forests, and reducing threats to wildlife and plant species, but would allow for general use of proceeds (F4B 2020).

– They would incentivise nature performance by offering a reduction in coupon and the potential for a principal adjustment on full delivery of the targeted nature and climate outcomes.
The Role of State-Contingent Debt Instruments in Debt Restructurings
• Cohen et al. (2021: 6): “By tying the debt service payments of restructured debt contracts to future outcomes, SCDIs may help avoid protracted disputes about current valuations and facilitate quicker agreements between creditors and debtors, thus allowing countries to restore debt sustainability and facilitating their return to market access.”

• SCDIs can be used to “sweeten” the deal offered to private creditors in debt restructurings.
  – Allows creditors to benefit from prospects of faster-than-anticipated economic recovery.
• State-contingent instruments have become a common component of sovereign debt restructurings (IMF 2017).
  – The Brady instruments offered contingent upside payments to investors, tied to a specified economic variable, but did not foresee any fall in payments in the event of a downside scenario.
  – Some Brady bonds included ‘value recovery rights’: if the debtor country’s terms of trade or economic conditions improved, creditors could also benefit by receiving additional debt service payments.
State-contingent Brady instruments

The first use of state contingent bonds in debt restructurings occurred in the Brady deals from 1989 to 1997 (Box 5). The Brady instruments offered contingent upside payments to investors, tied to a specified economic variable, but did not foresee any fall in payments in the event of a downside scenario. Warrants have featured as part of the package of bonds issued to creditors in each of the three major restructurings of the past decade: Argentina (2005 and 2010), Greece (2012), and Ukraine (2015) (Table 3). In the case of Grenada (2015), the restructuring deal included instruments with both upside and downside features (Table 3).

Box 5. Brady Deals

The first prominent use of SCDIs in a restructuring context arose with the so-called ‘Brady’ deals issued in the 1980s and 1990s. The key innovation of the Brady deals was that they allowed commercial banks to exchange their claims on the participating countries for tradable instruments, allowing the banks to transfer this debt off their balance sheets. Each Brady country negotiated the specific terms and details of its restructuring, and this often resulted in a ‘menu of options’ for their exchange of eligible debt.

The general principle was that receiving additional debt service payments. Oil exporters generally issued VRRs linked to oil prices, while other countries linked either to GDP or measures of the terms of trade (Table). The Brady bond VRRs offered contingent payments only in an upside scenario, and obligations were often imbedded in the bonds rather than issued as detachable instruments. Most deals included some form of limit on upside payments, either in the form of a payment cap or a buyback option.

<table>
<thead>
<tr>
<th>Index / warrant</th>
<th>GDP</th>
<th>Commodity Price</th>
<th>Terms of Trade</th>
</tr>
</thead>
</table>

### Feedback from Potential Issuers and Investors

**Recent Sovereign Debt Restructurings**

<table>
<thead>
<tr>
<th>Type</th>
<th>Country</th>
<th>Haircut</th>
<th>Currency of denomination</th>
<th>Period covered (years)</th>
<th>Main trigger</th>
<th>Formula for payout/deferral</th>
<th>Caps/Exercise limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upside</td>
<td>Argentina (2005 &amp; 2010) - GDP-linked warrant</td>
<td>29.8%/ 76.8%</td>
<td>Local and Foreign currency</td>
<td>20</td>
<td>Real GDP level</td>
<td>• Pays out 5% of real GDP in excess of reference level</td>
<td>Total payments capped at 48% of notional principal</td>
</tr>
<tr>
<td></td>
<td>Greece (2012) - GDP-linked warrant</td>
<td>53.5%/ 64.6%</td>
<td>Local Currency</td>
<td>27</td>
<td>Real GDP growth</td>
<td>• Pays out 1.5 times real GDP growth in excess of reference growth rate</td>
<td>Annual cap at 1%</td>
</tr>
<tr>
<td></td>
<td>Ukraine (2015) - GDP-linked warrant</td>
<td>20%/ 28%</td>
<td>Foreign Currency</td>
<td>20</td>
<td>Real GDP growth, level of GDP in USD</td>
<td>• Pays out 15% of real GDP growth between 3-4%</td>
<td>Annual cap at 1%</td>
</tr>
<tr>
<td></td>
<td>Grenada (2015) - CBI revenue-linked payments in 2030 bond</td>
<td>50% of which 25% upfront/ 54%</td>
<td>Local and Foreign Currency</td>
<td>15</td>
<td>CBI revenues</td>
<td>• Pays out 25% of CBI proceeds between US$15mn-50mn</td>
<td>Discounted value of total payments capped at 35% of outstanding principal</td>
</tr>
<tr>
<td></td>
<td>Grenada (2015) - Hurricane clause in 2030 bond</td>
<td>50% of which 25% upfront/ 54%</td>
<td>Local and Foreign Currency</td>
<td>13</td>
<td>&quot;Modelled&quot; Hurricane damage</td>
<td>• 6 month deferral if modelled loss is greater than USD 15mn, less than USD30mn</td>
<td>Can be triggered a maximum of 3 times</td>
</tr>
</tbody>
</table>

**Source:** IMF (2017).
Debt Relief for Green and Inclusive Recovery?

Reforms that align policies and budgets with the 2030 Agenda for Sustainable Development & the Paris Agreement
Brady-type credit enhancement to facilitate access to capital markets

Pillar 1
Comprehensive debt relief by public creditors

Pillar 2
Private-sector involvement, with creditors swapping their old debt with a haircut for new «Green Recovery Bonds»

Pillar 3
Facilitating a green and inclusive recovery through debt swaps and new SDG-aligned debt instruments

Heavily indebted countries with an unsustainable debt burden
Countries that are not heavily indebted

Enhanced Debt Sustainability Analysis
Measurement and Management Challenges
Potential problems

• Novelty, liquidity, and model risk premia demanded by investors.
• Adverse selection and moral hazard?
• Incentives for data manipulation?
• Decline in supply of ‘safer’ (?) conventional assets?
• Excessive risk migration to the private sector?
How to best design outcome-linked bonds?

• Choosing the right KPIs.

• How to best manage performance assessment?
  – Development of relevant nature and climate metrics and associated monitoring, reporting and verification (MRV) assessment tools to oversee robust performance outcomes.

• What role for digital solutions?
  – E.g. use of blockchain in bond certification processes, and automating the proof of impact of the use of proceeds.
Proposal for a ‘Nature and Climate Sovereign Bond Facility’

• F4B (2021: 2): “The Nature and Climate Sovereign Bond Facility builds on recent experience in establishing collaborative platforms to support green and sustainability bonds. Such platforms have provided services to creditors and debtors in advancing nature-and climate-linked debt agreements, including technical assistance, performance assessment, credit enhancement and other financial services. All of these are crucial to rapidly mobilise public and private finance to support economic recovery and scale up funding for investments in nature and climate.”
Conclusion
For decades, sovereign SCDIs have been suggested as complements or alternatives to traditional sovereign debt instruments.

– Inflation-linked sovereign bonds have gained a certain popularity, with issuances by more than 30 countries and inflation-linked treasuries accounting for 7% of all public debt issued by the US, the largest issuer.

– However, the global inflation-linked debt market accounts for less than 5% of total sovereign debt of outstanding.

– The uptake of other SCDIs, such as GDP- or commodity-linked bonds has been even smaller, despite often appealing features that could improve public debt management while providing interesting opportunities for investors.

To date, markets for SCDIs have suffered from low liquidity and issues around measurement.
The escalating climate and ecological crises provide a strong rationale to reconsider the use SCDIs.

- The physical and transition impacts of climate change and environmental degradation are increasingly recognised to alter the risk profile of sovereigns.

The use of risk-linked sovereign instruments such as cat bonds or resilience bonds and embedding disaster risk clauses in sovereign debt contracts would be an important way for governments, especially in highly climate-vulnerable countries, to mitigate climate risks and scale up disaster risk financing.
• SCDIs such as SLBs that incentivise sustainability-oriented policies or investments could not only help to bring about better sustainability outcomes.

• They could also contribute to greater debt sustainability, given that climate change and a depletion of natural capital are likely to worsen sovereign credit ratings and undermine debt sustainability.

• SCDIs can also play an important role in facilitating debt restructurings.
• Although the uptake of SCDIs has been slow to date, the experience with CACs has shown that market practice can change when governments take a concerted approach internationally.

• The international community, supported by key institutions like the IMF and the major multilateral development banks, should make a concerted effort to promote the widespread adoption of sovereign SCDIs to support better public debt management, the climate-proofing of public finances, and the achievement of more ambitious sustainability outcomes.