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State-contingent Debt Instruments as Insurance against future Sovereign Debt Crises in Latin America

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About the COVID-19 Response and Recovery project

This paper is an output from the project “Response and Recovery: Mobilising financial resources for development in the time of COVID-19”, which is co-ordinated by the Debt and Development Finance Branch of UNCTAD and jointly implemented with ECA, ECLAC and ESCAP. This project is one of the five UN Development Account short-term projects launched in May 2020 in response to the COVID-19 crisis.

The project aims to enable low-income and middle-income developing countries (LICs and MICs) from Africa, Asia-Pacific, and Latin America and the Caribbean to diagnose their macro-financial, fiscal, external financial and debt fragilities in the global context, and design appropriate and innovative policy responses to the COVID-19 pandemic leading toward recoveries aligned with the achievement of the Sustainable Development Goals (SDGs).

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ABBREVIATIONS AND ACRONYMS

ATSM	Affine Term Structure Model
B-CoCos	Bank-Contingent Convertible Bonds
BERT	Barbados Economic Recovery and Transformation
CAPM	Capital Asset Pricing Model
CAS	Collective Action Clauses
CAT	Catastrophe Bond issued by Mexico
CCRIF	Caribbean Catastrophe Insurance Risk Facility
CCRIF SPC	Caribbean Catastrophe Insurance Risk Facility - Segregated Portfolio Company
CCRT	Catastrophe Containment and Relief Trust
CDS	Credit Default Swap
CoCos	Contingent Convertible Bonds
DSSI	Debt Service Suspension Initiative
ECLAC	Economic Commission for Latin America and the Caribbean
EFF	Extended Fund Facility
FACE	Fund to Alleviate COVID-19 Economics
FCL	Flexible Credit Line
GLWs	GDP-Linked Warrants
GDP	Gross Domestic Product
IADB	Inter-American Development Bank
IDA	International Development Association
ILO	International Labour Organization
IMF	International Monetary Fund
LAC	Latin American Countries
PAHO	Pan American Health Organization
PLL	Precautionary Liquidity Line
PRGT	Poverty Reduction and Growth Trust
SCDIs	State-contingent Debt Instruments
S-CoCos	Sovereign-Contingent Convertible Bonds
SDGs	Sustainable Development Goals
S&P GSCI	Standard & Poor's Goldman Sachs Commodity Index
SDRs	Special Drawing Rights
UDROP	Universal Debt Rollover Option with a Penalty
UN	United Nations
UNDP	United Nations Development Programme
VRI	Value Recovery Instruments

SECTION 1: BACKGROUND AND INTRODUCTION

The unexpected and still unfolding COVID-19 crisis has triggered an economic and social collapse of historic proportions in Latin America and the Caribbean, a region that is projected to return to pre-crisis levels of economic activity in two to three years from now (UN, 2021). However, at the time the pandemic disrupted economic activities in Latin America and the Caribbean, many countries were already engaged in a struggle against severe economic difficulties. Data from the United Nations' Economic Commission for Latin America and the Caribbean (ECLAC, 2021a) indicates that between 2014 and 2019 the region grew only 0.3%. Moreover, according to ILO (2021), when the pandemic started, informal labor in the region accounted for 56% of the employed work force. This stagnant growth evolution along with a precarious labor market, weak investment and limited macroeconomic policy space made the region highly vulnerable to a global shock.

The Covid-19 started to hit the region in March 2020. With the associated external shock, the domestic lockdowns, and the containment policies to face the pandemic, the Latin American and Caribbean region registered the sharpest economic contraction in GDP (-7.7%) on historical record, as well as an impressive fall in investment growth (-20%). These last estimations made by ECLAC (2021b) indicate that although COVID-19 affected all countries in the region, it did so to varying degrees depending on the containment policies they were adopting, producing a negative impact on aggregate supply with a knock-on effect on aggregate demand.

Table 1 shows that ECLAC estimates growth of 6.2% for the region in 2021 and forecasting 2,1% for 2022, which will be insufficient to regain the level of output recorded in 2019. The growth estimate for 2021 reflects the low base of comparison resulting from the 2020 slump, and the positive effects of stronger growth worldwide. But for 2022 an average growth rate of 2.1% represents a slowdown from the previous year's rebound. The point is that weak growth dynamics prior to the crisis may not change, since the structural problems (low productivity, high informality, unemployment, inequality, and poverty) that weighed on the region's growth before the pandemic have worsened; and they will hamper the recovery of economic activity and labor markets beyond the growth rebound in 2021. Indeed, there are reasons to think that in terms of per capita income, the region remains on course for a lost decade.

Table 1: Latin America and the Caribbean: GDP growth rate between 2017 and 2020 and projections for 2021 and 2022 (Percentages)

	2017	2018	2019	2020	2021	2017-2021	2022
Latin America and the Caribbean	**1.3**	**1.1**	**0.1**	**-7.7**	**6.2**	**0.2**	**1.8**
Latin America	1.3	1	0.1	-7.7	6.3	0.2	1.5
The Caribbean	0.2	1.5	0.5	-7.9	1.2	-0.9	4.7

Sources of data: ECLAC (2021b)

Despite the differences between countries, both the external shock as well as the lockdowns have also had a substantial effect on earnings in the labor market. By its very nature, the labor market in most countries of the region leaves workers vulnerable to these shocks. Poor social security and inadequate or non-existent social safety nets mean that income losses quickly led to poverty or death. The International Labor Organization (ILO) (2021) recently warned that the Latin American and Caribbean region lost 26 million jobs as a result of the pandemic and started 2021 with a complex employment landscape aggravated by structural problems in the labor market, the waves of contagion and slow vaccination processes that make the prospects for recovery in labor markets more uncertain. Data from ILOStat indicates that informality among youths may have reached 68.5% by the end of 2021.

Poor labor market performance led very rapidly to an increase in poverty. For instance, according to a recent report by the World Bank (2021), despite the offset from the temporary social transfer program applied in Brazil, an estimated 20 million people would fell into poverty during 2020, with another 1.4 million increase due to population growth. The pandemic has claimed nearly 1.5 million lives in economies already troubled by sluggish growth and despite having only 8.4% of the world's population, the region accounts for nearly 20% of confirmed cases of COVID-19 and about 30% of deaths worldwide (ECLAC-PAHO, 2021).

Moreover, the COVID- 19 pandemic has been a critical test for the already overburdened and mostly underfunded public healthcare systems of Latin America. In a region that suffers from severe inequalities and poor social protection, public healthcare systems are the only source of medical care for a large sector of the population who work in the informal economy or are unemployed. But in practice the system does not grant a universal coverage and suffers from anemic primary care and staffing crisis, and hospitals are inadequate. State-run hospitals and clinics have been in many places overstressed by continuous demand for treatment of vector-borne diseases and community-acquired infections as well as high rates of non-communicable diseases and this have limited the ability to respond to the challenges of the pandemic.

This demand for public health services is just one example of how important it is, amid these types of economic stress, to have sufficient policy space to meet the most urgent needs of these countries and not compromise their development prospects. Exceptional transitory income and credit support measures, such as cash transfers to households and specific loan facilities to the productive units, constitute further examples of key importance.

The effects of the pandemic and the policies implemented in response have increased the financial needs of the countries of the region. In the short run, resources are needed to support the attention to vulnerable groups, including to low-income segments and to older persons, but also to offset the detrimental effects of containment policies on economic activity and employment. In the medium and long run, as policy priorities shift from addressing the urgency to building forward better, a financing for development agenda must support an active and countercyclical policy stance aimed at increasing employment and

sustaining adequate growth. Within this context, expanding public capital expenditures and outlays on productive transformation and greening the economy are key to ignite the recovery efforts.

The rolling out of large stimulus packages, and falling government revenues, have strained public finances worldwide. The UN (2021) estimates that in almost one in five developing and transition economies, the government deficit is projected to reach double digits as a percentage of GDP in 2020. A slower recovery of growth will only further exacerbate fiscal deficits. As discussed below, this rapid growth of financing needs have exacerbated debt burden risks across the region, pushing public debt to historical high levels, which in turn may jeopardize the recovery and countries' capacity to build forward better. According to ECLAC (2021a) the Latin America and Caribbean region is already the most indebted region of the developing world and currently allocates more than half of the exports of goods and services to the payment of the external debt service. For the region, development momentum can be lost if priority is given to servicing external debt at current conditions by raising taxes and/or cutting back on public spending.

Future debt crises cannot be ruled out while the external debt and the debt service-to-exports ratio remains high in most countries of the region. The dramatic impact of the current crisis on liquidity and debt-sustainability across the development world have required an immediate response. Early in the pandemic, the IMF had already provided debt service relief to its poorest and most vulnerable members through grants from the Catastrophe Containment and Relief Trust (CCRT). However, under this initiative only one country in the region (Haiti) has been eligible.

The Common Framework for Debt Treatment beyond the Debt Service Suspension Initiative (DSSI), the Common Framework, is an initiative endorsed by the G20 together with the Paris Club of official creditors to support low-income countries with unsustainable debt, by extending the provision of debt relief to all the DSSI-eligible countries. Its goal is to facilitate on a case-by-case basis a timely and orderly debt restructuring of bilateral official debts with members of the G20. However, to date the extent of this initiative has been limited, with only a few countries requesting debt relief under the Common Framework.

Traditional debt relief initiatives, such as the joint IMF–World Bank's Heavily Indebted Poor Countries (HIPC) Initiative has focused almost exclusively on lower-income countries. Yet currently over 75 per cent of the world's poor live in countries with a per capita GDP above US$1,185, so they aren't eligible for concessionary finance. This is precisely the case of most Latin American and Caribbean countries and yet these states don't have the fiscal or monetary space to address the pandemic and its sequels or even the sequels of natural disaster to protect their most vulnerable and poor.

Beyond these initiatives, the international architecture to manage debt crises effectively is mostly missing. Existing forums are fragmented, which makes negotiations difficult. Many, such as the International Monetary Fund (IMF), are dominated by creditors. But as the world gradually recovers from the current

crisis, catch-up growth for Latin America and the Caribbean will remain vulnerable partially due to the risk of a premature phase out of current fiscal support measures and continuing debt service obligations.

Despite debt downgrades, the Covid -19 crisis was accompanied by unusually low interest rates, which have helped maintain market access regardless of increasing debt ratios (Sturzenegger, 2020). However, a sudden capital stop remains a big threat and even though flows have returned to some countries after an initial sharp retrenchment, this limited short run availability does not mean that a problem may not be brewing. [1]

The extensive literature on financial stress and sovereign defaults (see, for instance, Manasse and Roubini 2009; and Das, Papaioannou and Trebesch, 2012) indicates that most defaults and restructuring episodes are triggered by one or more of the following factors: a worsening of the terms of trade; an increase in international borrowing costs (e.g., due to tighter monetary policy in creditor countries); consistently poor macroeconomic policies that accentuate vulnerabilities; a crisis in a systemic country that causes contagion across goods and financial markets, and shifts in market sentiment.

When markets perceive a government as less likely to repay in the future, this can rapidly raise its borrowing costs and, therefore, the likelihood of default. Under extreme circumstances, a sudden change in investor perceptions may even act as a default trigger. The structure of the debt portfolio can also impact the likelihood and timing of default and debt negotiation. Factors that determine the debt profile (e.g., currency composition, fixed vs. floating interest rate, maturity, and creditor composition) may have implications for liquidity, as well as solvency conditions and, therefore, the decision to restructure.

Once sovereigns become over-leveraged and unable to roll over debts, governments are forced to default or to take drastic actions that may impede recovery from the crisis. Very often taxpayers, rather than willing investors, are forced to become the final bearers of risk.

Unfortunately, an unbalanced situation between debtors and creditors during restructuring, find creditors in a position to make their interests prevail. This leads them to force through an ‘insufficient restructuring,’ that temporary alleviates liquidity in the short term but that may have negative implications in the long term. When a restructuring is insufficient to bring back debt sustainability, debtor often have to undergo further restructurings.

Sovereigns do not buy insurance and instead use the resources of the state to address whatever calamity befalls their citizens. Potentially new insurance schemes must involve risk sharing with the markets. Risk-sharing with the markets is a constructive way forward in a context of system-wide risk reduction. Among proposals for resolving the built-in conundrum of sovereign debt in a durable and predictable way, the possibility of change in repayment terms so that

[1] Sturzenegger (2020) points out that throughout 2020 Colombia and Brazil placed debt at a 3% interest rate, and Honduras and El Salvador at around 5%.

they can be built into the contract rather than being the outcome of renegotiation has gained momentum. This is precisely what can be achieved by the design and issuance of state-contingent financial instruments as insurance mechanisms.

State-contingent debt instruments (SCDIs) are designed to provide automatic, market-based protection against pre-specified shocks. This can insure sovereigns against adverse shocks, often by reducing debt service requirements during difficult economic times. This risk-sharing would be defined, ex-ante, in the clauses and conditions of the sovereign bond, thereby improving the predictability around burden-sharing and allowing markets to incorporate these risk-sharing elements into the price of the debt.

Depending on their nature and design, such instruments would also reduce default risk, the likelihood of debt restructurings and the need for pro-cyclical fiscal policy. Some of these instruments could even attenuate overspending during a boom by limiting a sovereigns' ability to spend windfall income during good times. Examples of such instruments can range from the narrowly specific commodity-linked bond (for instance, linked to the behavior of commodity prices) to the broadly general GDP-linked instruments, where principal and interest payments are linked to economic growth rates.[2] In addition, there are natural disaster-linked or pandemic bonds, where some form of debt relief is provided in the event of a pre-defined disaster. A third example would be sovereign contingent convertible bonds ('Sovereign CoCos'), which envisage a maturity extension under pre-defined triggers.

SCDIs can be seen today as an alternative to conventional sovereign long-term debt which can guard sovereigns against refinancing risks but not against the impact on repayment capacity of say, a sharp adverse macroeconomic, a financial shock or a natural disaster. This risk-sharing would be defined, ex ante, in the clauses and conditions of the sovereign bond, thereby improving the predictability around burden-sharing and allowing markets to incorporate these risk-sharing elements into the price of the debt.

This chapter evaluates and analyzes the use of SCDIs to support policy responses and strategies for Latin America and the Caribbean with the main objective of preserving the policy space necessary to both weather the immediate economic impacts and build forward better. The chapter builds on a growing body of research examining how state-contingent borrowing can help governments better manage their debt commitments and contribute to improved welfare outcomes.

We introduce and evaluate several state-contingent bonds designed to improve debt crisis resolution and prevention. The chapter discusses the advantages and disadvantages of these instruments, looks at how debtors and investors might benefit, and evaluates possible ways of addressing the operationalization

[2] Although commodity-indexed debt may be as good an instrument for insurance and risk sharing as GDP-indexed debt, in this paper we focus on the latter types of indexation since we are interested in studying the potential for introducing indexation on loans that could find the largest possible application and not be confined to specific export producers as is the case with commodity-price indexation.

challenges identified in the literature. Changes to sovereign debt contracts introducing state-contingent clauses would help to improve debt management and fiscal space and reduce the likelihood of sovereign defaults.

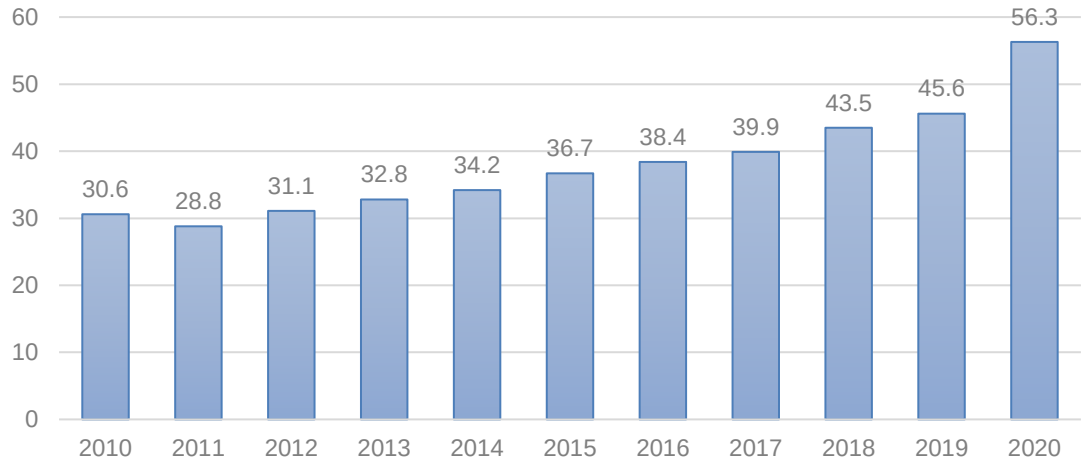
For the LAC region a proper mix of SCDIs and conventional bonds would be welcome, but in addition a proper mix between sovereign contingent convertible and GDP-link bonds could be beneficial since they complement each other. While contingent convertible bonds (such as Sovereign CoCos or Disaster-linked bonds) provide stabilization and immediate relief during a liquidity crisis, GDP-linked bonds can more effectively deal with solvency issues. The chapter also provides guidance and some recommendations regarding the way LAC countries can address some of the challenges that hinder market liquidity, and discusses ways in which multilateral institutions can contribute to the development of a market for such securities.

The structure of this paper is as follows. The next section briefly reviews the debt overhang problem that affects many countries in the LAC region. Section 3 presents background information of State-contingent Debt Instruments (SCDIs), the main families of instruments and experiences. Section 4 discusses the benefits and challenges of GDP-linked bonds. Section 5 deals with Sovereign CoCos, their benefits and main challenges. Section 6 summarizes some lessons from the experience of bonds that contain hurricane clauses. Section 7 examines the pricing question and the several risks involved in SCDIs. Section 8 discusses the importance of having robust and standard contracts and brings a proposal and practical toolbox for prevention and crisis resolution. Section 9 concludes.

SECTION 2: DEBT BURDEN AND EXTERNAL SUPPORT IN LATIN AMERICA AND THE CARIBEAN

According to ECLAC (2021a), without exception and during the pandemic, all countries in the Latin American region have experienced a deterioration in their fiscal situation and an increase in the general government debt levels. ECLAC estimates that as of end-2020, gross central government debt represented 56.3% of GDP —10.7 percentage points above the 45.6% recorded in 2019 (see figure 1). Moreover, the debt of the general government at the regional level is expected to rise from 68.9% in 2019 to 79.3% of GDP in 2020 (ECLAC, 2021b). Thus, Latin America and the Caribbean has become the most indebted region in the developing world and the region with the highest external debt service relative to exports of goods and services (59%). Also, around half of the region's countries are on Fitch Ratings' negative watch list for credit ratings downgrades.

Figure 1: Debt as % of GDP in selected countries of Latin America (2010-2020)

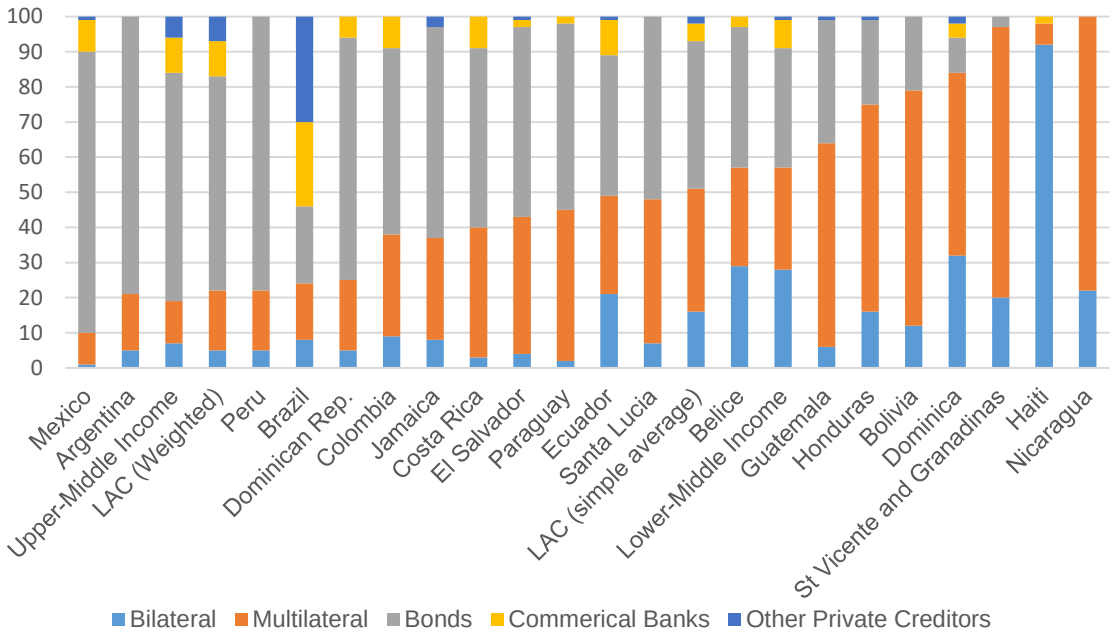


Source: ECLAC (2021)

Figure 1 also shows that debt levels have been on the rise since 2012 in Latin America and the Caribbean. It is certainly true that compared to advanced economies, the level of sovereign debt to GDP appears low. However, aggregates do not reflect important differences between individual countries. Even with moderate debt to GDP ratios, many developing countries often face higher borrowing costs and need to mobilize foreign currency to service external debt, which is why debt servicing costs are crucial to analyze debt sustainability. Some countries are already dedicating a very large share of government revenues towards debt servicing.

The sources of external finance vary across countries. Whereas some countries with market access favor issuing debt in international markets, loans with official creditors constitute a major source of external financing and in some cases the most important one for several countries. Figure 2 clearly shows that for most countries in Central America and the Caribbean at least half of the external obligations were of bilateral or multilateral nature.

Figure 2: External Public Debt Balances by Creditor in Selected Countries of Latin America and the Caribbean, 2018

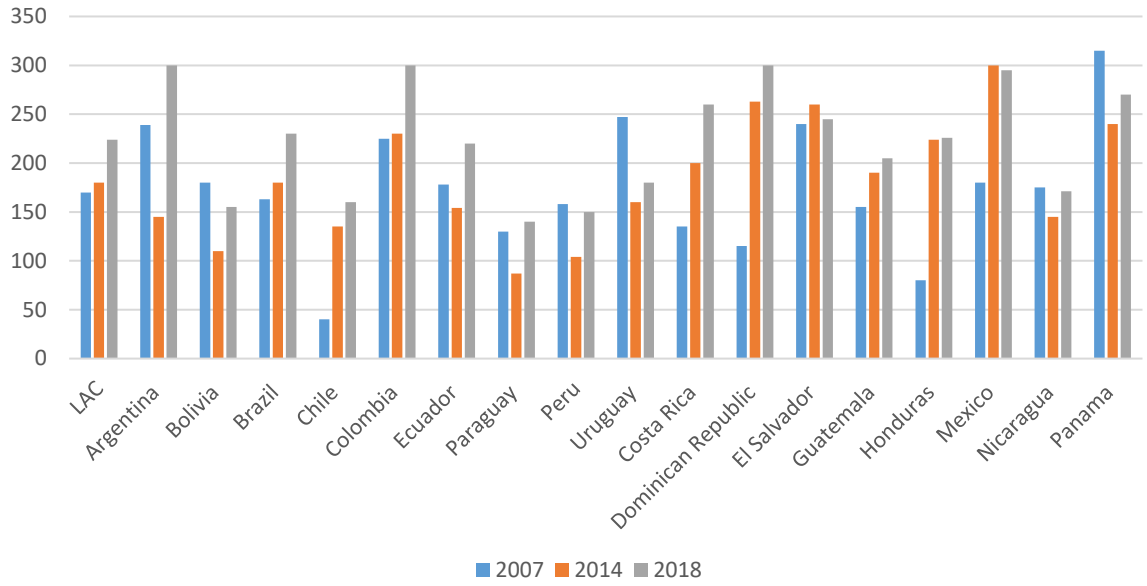


Source: OECD (2020)

Higher indebtedness, coupled with the prospect of higher interest rates suggest that debt service will absorb more and more public resources in the region, reducing the funds available to finance the achievement of the SDGs. Considering the increasingly limited fiscal space and the increasing amount of revenue required to meet the multiple developmental challenges, global coordination of public debt management must be a priority looking forward.

The profound fiscal impacts of the crisis are triggering debt distress in a growing number of countries. Debt burdens that either were already unsustainable prior to the COVID-19 crisis or that are now threatening to generate liquidity shortages or to become unsustainable under the impact of this shock, severely limit the ability of many countries to invest in the recovery, and impinge upon the prospects of long-term goals such as the SDGs and climate action.

Figure 3: Debt-to-Tax Ratio (Gross Public Debt) in selected countries of Latin America and the Caribbean, 2007, 2014, 2018



Source: OECD (2020)

Sovereign debt can undermine the sustainable development of a country in two different ways. First, debt crises can provoke economic recessions and humanitarian crises. Second, debt overhang can force governments to dedicate a very large share of their revenues to debt services at the expense of development oriented public investments.[3] The reduction of public expenses sometimes forces countries to undertake cuts in social services, affecting the poor who rely on publicly provided services more than others. In the absence of debt restructuring mechanisms, debt distressed countries are usually forced to make such cuts to avoid default.

SECTION 3: STATE-CONTINGENT DEBT INSTRUMENTS: BACKGROUND AND RECENT EXPERIENCES

At present, when facing a contingency that affects their capacity to service sovereign debt, most governments can either choose to pay in full or seek to restructure their debt obligations. This binary decision can have significant costs and benefits on each side. For instance, in highly indebted countries in which governments are unable to generate adequate tax revenues to meet the demand for public spending and where the scope for domestic borrowing or inflationary financing is limited, adjusting primary spending (i.e. non-interest) in response to rising debt service may close the current fiscal gap, but may generate an undesirable level of public spending and may trigger a perverse dynamics leading to “self-fulfilling solvency traps.”

[3] Debt overhang describes a situation in which a country has not lost access to capital markets and is still able to face its obligations. However, to do so requires resources so vast that its capacity to invest in its development is dramatically reduced.

On the other hand, a default and eventual restructuring will help tackle debt overhang problems and ease fiscal management but can prevent future market access for a prolonged period and can severely damage future fiscal finance and the domestic economy.

Given the uncertainty and spillover costs associated with debt stress and restructuring, significant gains could be realized by both the debtor and creditors from a more predictable and orderly system.

The research on sovereign debt has recently focused on identifying mechanisms that could improve liquidity as well as debt sustainability for sovereigns in times of economic downturns, often produced by an exogenous shock. In this context, debt instruments that link capacity to service debt to economic performance and that provide some form of debtor relief in bad times have received considerable attention. They are indeed a way to share some risks between an issuer and its creditors. Thus, sovereign bonds can be made state-contingent to increase risk-sharing with private sector creditors and improve crisis prevention and resolution. This risk-sharing would be defined, ex ante, in the clauses and conditions of the sovereign bond, thereby improving the predictability around burden-sharing and allowing markets to incorporate these risk-sharing elements into the price of the debt. This is precisely the main idea behind the design and implementation of sovereign state-contingent debt instruments (SCDI).

SCDIs are instruments that either link contractual debt service obligations to a pre-defined state variable (for example, GDP, exports, or commodity prices) or are designed to provide additional creditor compensation in good times and/or provide some form of debtor relief in bad times, such as the occurrence of a natural disaster. Consequently, SCDIs can be broadly divided into two categories: debt instruments featuring continuous adjustment of debt service payments (for instance, a GDP-linked bond, where payments are indexed to nominal GDP), and those involving discrete adjustment, (for instance, instruments with natural disaster clauses where debt service relief is triggered by a predefined natural disaster event, such as a hurricane of given intensity or where the maturity or grace period extends in the face of a shock to exports, as in the case of some official bilateral loans).

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.

The idea has been around for some time and even though market development has been limited so far, selected examples of debt instruments with state-contingent features can be very useful to understand their complexity and offer invaluable lessons for design and broader uptake.

Early attempts of general evaluations of SCDIs in the economic literature focused on the theoretical advantages for the issuer. For instance, Froot, Scharfstein, and Stein (1989) maintained that linking debt payments to the issuer's GDP

performance would cushion the impact of negative growth shocks on the ability to service debt. Shiller (1993) argued that the use of GDP-linked debt would allow a sovereign to buy insurance against growth uncertainty, and, thus, help smooth the revenue loss from adverse economic performance. Obstfeld and Peri (1989) and Borensztein and Mauro (2002) suggested that government would be able to reduce their idiosyncratic GDP risks by issuing GDP-linked warrants, a derivative security, the payments of which are linked to a sovereign's GDP performance.

Despite their analytical appeal, however, the take-up of SCDIs has been low, with issuance mostly limited to debt restructuring contexts. In these restructuring events, SCDIs have tended to be designed and structured in one of two ways: (a) As instruments that provide only upside payouts to creditors under positive scenarios (e.g. warrants) or (b) as instruments that provide downside protection to borrowers under negative scenarios (for instance, hurricane clauses).

Limited take-up partly reflects the liquidity/novelty premia demanded on new instruments, but also concerns regarding data accuracy, first-issuer moral hazard, as well as political economy and transition issues. Discussions in turn has focused on how these barriers can be surmounted to develop a market and on how to assess the operational viability of such instruments.

Against this backdrop, in this section we attempt to examine the conceptual and, practical issues that SCDIs raise, with a view to enabling the sound development of a market in these instruments. We provide a description of the variety of most instruments at play and take stock of the ongoing debate on each instrument, from both a conceptual and practical perspective.

3.1 GDP-linked Bonds and Warrants

The underlying idea behind GDP-linked securities is to link debt repayments to economic activity performance. Unlike other state-contingent debt mechanisms analyzed below, which are designed to improve debt crisis resolution processes and only come into effect in the event of debt distress episodes (e.g. problems of liquidity, default, etc.), indexing securities to GDP performance constitutes more of an ex-ante and preventive mechanism, that seeks to avoid this type of debt distress episodes from happening in the first place.

GDP-linked bonds can be structured in many ways. For example, principal and/or coupon payments could be linked to GDP. In the first case (coupon-indexed) they are called "floaters." In the second case (principal-indexed) they are known as "linkers". There are other variants depending on the measure of GDP that can be nominal or real.

Authors such as Missale and Bacchiocchi (2012) argue that the choice as to whether to use nominal or real GDP values should be determined by the currency in which these securities are denominated. They argue that, if denominated in foreign currency, debt should be indexed to real GDP measures, (so as to avoid the double charge of paying for inflation and exchange rate movements). On the other hand, if securities are denominated in local currency, nominal GDP measures should be used to insure the borrower against unexpected deflationary

dynamics that could put upward pressure on debt-to-GDP ratios, whilst also removing inflationary temptations and protecting foreign lenders against depreciation of the exchange rate. In practice, however, bonds that are indexed to GDP nominal values have been used with foreign denominated GDP-linked securities.

The concept could be more attractive with institutional investors such as insurers, sovereign wealth funds, and pension funds which may have appetite for bonds designed to be held over a number of business cycles. Despite some early experiences,[4] GDP-linked instruments have only been issued by governments as part of debt restructuring processes and in the form of GDP-linked 'warrants', which contain an element of indexation to GDP — providing holders with a higher coupon if GDP exceeds some threshold level— but without symmetric payout.

For example, securities with some similarities to GDP-linked bonds were issued by several countries as part of the Brady restructuring process that started in 1989,[5] as well as by Argentina in 2005, by Greece in 2012 and, most recently, by Ukraine in 2015 during their restructuring processes. In each case, governments issued these securities offering higher returns in the event of a faster-than-expected recovery, thereby encouraging investors to accept a 'haircut' on their existing debt claims. However, no sovereign has yet issued a GDP-linked bond with returns that vary symmetrically, falling with lower GDP and rising with higher GDP.

Notwithstanding the theoretical benefits of GDP-linked Warrants, their potentially catalytic role in sovereign debt restructurings remains constrained by design and implementation challenges. Cohen et al. (2020) identify three major barriers to their successful implementation: Investor preferences, valuation uncertainty and lack of liquidity, and unclear payout calculations (many times due to moral hazard problems).

It is argued, for instance, that institutional investors and fixed-income mutual funds generally prefer "plain vanilla" fixed-income securities with standard debt contract terms, as these are easy to understand and price, and are much more liquid than innovative instruments. Moreover, such instruments are viewed as exotic derivative instruments with very limited secondary market liquidity. The lack of standardization of warrant payment structures and reference variables, initial low market value, and illiquidity make these instruments less desirable to investors. Finally, analysts have argued that it is possible to envisage that such securities could generate measurements issues and moral hazard problems. Contract design in some instances includes unclear payout calculations if warrants indeed reduce the issuer government's incentive to undertake growth-oriented policies.[6]

In practice warrants vary considerably in their complexity and design (Bank of

[4] As early as the 1970s, Mexico issued several bonds indexed to oil prices.
[5] Warrants were offered to investors as part of the Brady restructuring process for Mexico, Nigeria, Uruguay, and Venezuela.
[6] However, since GDP is the sum of efforts made by many economic agents, it is unlikely to be solely under control of the government.

England, 2015). GDP warrants have often turned out to be poorly designed, overly complex in terms of payment formula, and as a result have been difficult to price. Indeed, warrants have been attractive only to niche investors (Bank of England, 2015) and these investors have historically discounted these instruments severely in sovereign debt restructurings due to their lack of standardization, illiquidity, and idiosyncratic risk profiles (Cohen et al., 2020).

a) Experiences

Some significant and contentious restructuring process have used warrants to compensate for deep haircuts. As part of Brady Plan restructurings in the 1980s and 1990s, several countries exchanged bonds that included GDP detachable warrants that increased their coupon payments when GDP exceeded some predetermined threshold.[7] At the time these GDP-linked debt instruments were designed in part to appeal to those commercial banks involved in the debt restructurings who felt that their concessions, in terms of debt relief, to the sovereign borrowers should be only temporary, and that they should be repaid when the sovereigns' financial health improved (Buchheit, 1991).[8] Argentina, Greece and Ukraine have all issued similar instruments in their more recent restructurings.

Argentina defaulted on US$82 billion of sovereign debt in December 2001, after three years of negative growth. The episode ended in a devaluation of the peso and the abandonment of its hard peg against the US dollar in early 2002. After failed initial negotiations with creditors in June 2004, the Argentine authorities made a proposal, which was accepted by 76% of holders of the defaulted debt in June 2005.

The warrants were issued in different currencies, jurisdictions, and varieties for a total notional amount of US$62 billion in 2005 (76% of the US$82 billion of eligible debt). The exchange included 30-year 'GDP warrants' that were attached, for a period of 180 days. Investors detached the coupons which they then began to trade independently. They had no principal and instead acted as series of standalone, state-contingent coupons.

Argentine's warrants annually pay 5 percent of excess cash flows, defined as the difference between actual GDP and threshold GDP in nominal terms, when the following trigger conditions are satisfied: (a) actual GDP, expressed in constant peso terms as of the reference date, exceeds threshold GDP, and (b) the annual growth rates of actual GDP, expressed in constant peso terms as of the reference date, exceed 3 percent. Total cumulative payments made on the GDP warrant should not exceed the payment cap for that security of 48 cents per dollar of notional amount. Argentina's GDP-linked warrants are detachable from the plain vanilla bond and have been traded separately since the end of November 2005.

[7] In the Brady packages for oil-exporting countries, such as Mexico, Venezuela, and Nigeria, creditors were offered warrants linked to the price of oil (which was closely linked to their ability to repay hard currency debt), while non-oil-exporting countries offered warrants linked to GDP or revenues of key state owned enterprises.

[8] The cases of Bulgaria, Bosnia and Herzegovina, and Singapore are briefly surveyed by Miyajima (2006)

One important issue in the case of Argentina was that the design of the instrument was too complicated, with coupon payments depending on both growth and the level of GDP compared with a 'base case' or expected trend that the government set at the outset, for the rate of real GDP growth, and on the evolution of the exchange rate relative to the GDP deflator. In addition, there was also a lifetime cap. The payment structure, as a result, was not only complex but the coupon amounts were divorced from the state of the economy. In the event, the path of GDP exceeded the 'base case' by a long way, implying that Argentina had to make high payments even in years when the economy was performing only moderately. There was also the problem of data continuity with the example of Argentina changing the base year for GDP calculation in 2013. After this, the bond documentation was far from comprehensive and gave rise to different interpretations on which GDP methodology to adopt for the coupon calculation.

On the bright side, Argentinian GDP-linked warrants managed to find some liquidity, despite their complexity, suggesting that novelty premiums will not necessarily hinder the effectiveness of future attempts.

The Argentinean experience show that GDP-linked warrants might have been an instrument too complex to find a large acceptance and have been used only as sweeteners for debt restructurings in distress countries. Nonetheless the experience provides lessons relevant for the design of GDP-linked bonds: The payment structure has to be simple in order to find acceptance by investors and not create obstacles to the creation of a liquid secondary market. Most of all, the indexation should hold true to its premise of providing fiscal space by make debt service pro-cyclical, conversely, the premise to contractually specifying a temporarily interest payment relief in times of economic distress.

3.2 Sovereign Contingent Convertible Bonds

Sovereign Contingent Convertible bonds (Sovereign-CoCos) are state contingent debt instruments that stipulate a suspension of debt payments when, for instance, the government has lost market access. Proposals of sovereign CoCos are motivated in part by the rapid growth in the issuance of bank CoCos after the financial crisis of 2007-2009. Building on the 'Universal Debt Rollover Option with a Penalty' (UDROP) proposal by Buiter and Sibert (1999), Sovereign Cocos were strongly advocated by Weber, Ulbrich and Wendorff (2011) in the context of euro-area bonds.[9]

Bank CoCos convert debt into equity in the event of predetermined contingencies and have a specific strike price that, once breached, can convert the bond into equity or stock. Under Basel III, European banks were allowed to meet a fraction of their Tier 1 capital requirement with hybrid debt-capital instruments, such as bank CoCos. Indeed, bank CoCos represented one third of new securities issuances by the largest European financial institutions between July 2013 and August 2014 (Avdjiev et al., 2015).

[9] Other variants of this idea include Barkbu, Eichengreen and Mody (2011) and Mody (2013).

In the case of sovereign CoCos, bonds would automatically extend in repayment maturity when a country, for instance, has lost market access or when the country receives emergency liquidity assistance from the official sector.[10] Therefore, once the trigger clause is activated the entire amortization profile of the sovereign would shift into the future. Contractually speaking activation of the maturity extension would not require approval by the existing bondholders. If the entire debt stock of a country were to contain these clauses, the entire amortization profile of the sovereign would shift into the future when a crisis occurred and official sector emergency assistance is provided. Thus, the details of this automatic private sector bail-in would be defined ex ante in the bond's legal documentation. Calomiris and Kahn (1991) stress that an appropriate trigger must be accurate, timely, and comprehensive in its valuation of the issuing entity and should be defined so that it can be implemented in a predictable way.

Barkbu, Eichengreen, and Mody (2011) suggest the debt-to-GDP ratio as trigger. But the debt-to-GDP ratio by itself is not a definite and appropriate sign of trouble since there are no absolute rules to determine when the ratio is too high. After all, the sustainable level debt varies from country to country. The same value of ratio could be sustainable for one country whereas a heavy burden for another country. Consiglio and Zenios (2018) argue that market data indicating a sovereign's probability of default such as credit default swaps (CDS) spreads may be useful. CDS spreads are timely and comprehensive as they aggregate the views of multiple market participants and incorporate information about a sovereign's contingent liabilities. But sovereign CDS markets tend to be small and illiquid, or not available for all counties.

A common conceptual design highlights the principal (but not coupon) payments postponed for the length of the maturity extension. The standstill can be a pre-specified grace period or for as long the threshold is breached. Brokee et al. (2013) assert that the maturity extension needs to be long enough to overcome the sovereign's liquidity problems so that it can provide policy space to put in place required adjustment policies. However, it should not be that long that it unduly penalizes creditors. Brokee et al. (2013) also suggests that the length of the maturity extension should match that of typical official sector support programs such as an IMF programs, which typically last three years. Longer standstills increase the discount of the Sovereign CoCo. A maturity-extending trigger clause would allow then a reprofiling of debt payments that does not constitute a credit event.

There is no doubt that extendible bonds provide liquidity relief, but the case for solvency support cannot be fully substantiated. In cases where a sovereign is hit by a shock that undermines debt sustainability, this instrument provides no reduction in principal or coupon payments though certainly would buy time for an orderly restructuring. Furthermore, if the sovereign elected for a 'knock-in option' structure, the decision to trigger the option could adversely affect the pricing of

[10] Brooke et al. (2013) correctly point out that some types of IMF program assistance should not be used as triggers for S-CoCos clauses. For instance, long-term concessional poverty reduction programs, IMF Flexible Credit Line (FCL) and the Precautionary Liquidity Line (PLL), should be exempt since they are not provided for immediate balance of payments need or sovereign debt crisis.

conventional bonds, if it were interpreted as a signal of solvency risks.

3.3 Disaster-linked Bonds and Hurricane-linked Clauses

The inability of vulnerable governments to service international debts is often triggered by unexpected exogenous shocks. The literature has highlighted the fundamental role of macroeconomic and financial shocks in shaping sovereign risk. However, non-economic shocks, such as extreme weather and natural disasters in general, though equally important deserve more attention. An inspection of recent default episodes in middle- and low-income countries shows that extreme weather has sometimes played a prominent role. This is especially true for small agricultural producing countries as well as tourist-dependent regions, where extreme weather events are particularly disruptive to the economy and affect a vast portion of the territory.

Moldova, Suriname, and Ecuador offer three clear examples of the nexus between sovereign risk and extreme weather in agriculture-dependent countries. Moldova and Suriname defaulted in 1992 and 1998 respectively following severe droughts that weakened the production of agricultural export goods. Ecuador, a primary export-dependent economy defaulted in 1997 just a few months after floods caused major power shortages.

The more recent case of Grenada is also emblematic (Asonuma et al., 2017). Between 1999 and 2002, Grenada's fiscal position deteriorated sharply, and the debt-to-GDP ratio increased from about 35% to 80%. Grenada's weak fiscal position ultimately became unsustainable when hurricane Ivan hit the island in September 2004, causing damages estimated at $900 million, equivalent to about 150% of Grenada's GDP. Tourism and agriculture, the two major sources of export earnings, were especially hit forcing the government of Grenada to restructure its debt.

Extreme weather appears especially salient, for instance, in light of the key role played by natural disasters in recent default episodes in Caribbean countries (Grenada 2004, Antigua and Barbuda 2004 and 2009, and to some extent Barbados 2018) and not to mention the ongoing debate that extreme weather has had around climate-change adaptation strategies.

In particular, the increasing frequency and intensity of natural disasters, such as hurricanes and tropical storms, has led some analyst and policy makers to go beyond market solutions, such as insurance through catastrophe bonds, and advocate in favor of "disaster clauses", that allow for a temporary debt moratorium when countries are hit by natural disasters.

Given the frequency and destruction caused by these extreme weather events, some Caribbean countries have recently been exploring climate-resilient debt instruments and other innovative means to build financial resilience. One such way has been the introduction of a hurricane or similar disaster-linked clauses in their loan agreements. Such clauses may be increasingly relevant given growing risks due to climate change and other environmental concerns, and their use could potentially be expanded to larger countries and broader sets of shock

criteria (including public health disasters).

The hurricane clause is designed to provide cash flow relief at the crucial period after a natural disaster event, just when financing needs are high and new sources of funding may be limited. By embedding hurricane-linked 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. Theory as well as the short practical experience show that investors might be willing to accept them, but probably only at the cost of higher interest payments.

Disaster-linked or hurricane-linked clauses require first that the issuer and investors agree on quantifiable and externally verifiable indicators of economic shock. The suspension of principal and/or interest payments would then be tied to those indicators reaching certain pre-defined thresholds. But this deferral is at the option of the issuer, providing a degree of flexibility to suspend payments for a prescribed period of time.

The choice of the trigger is very important. A primary concern is that the trigger is not designed in such a way that it places one party in a financial disadvantage. In the case of Grenada, the negotiations with Taiwan (one of Grenada's bondholders) considered both indexed and parametric triggers – both triggers regarded as difficult to manipulate by the borrower as they were amenable to objective, independent and quantifiable measurement. Parametric triggers make payments based on the natural hazard rather than on the actual losses determined by an insurer and claimed by the borrower. The parameter may be wind-speed in the case of a hurricane, ground acceleration or intensity in the event of an earthquake or some other objective and appropriate natural disaster benchmark. The clause would be triggered if the actual event parameters exceeded the pre-established threshold parameters. In contrast to parametric triggers, the parametric index triggers make payments based on both the intensity of an event as well as on the losses incurred as determined by catastrophe modelling software.

The clauses could help pre-empt the need to restructure by reducing debt service burdens at times when sovereign finances are tightest, allowing the sovereign's economy time to rebound from the shock before they need to resume debt service. Moreover, the cash that would otherwise be used towards debt service could be used by the country towards rescue, relief, and rebuilding efforts in the wake of a natural disaster. Further, the ability of the issuer to make the deferral eliminates the need to seek affirmative bondholder consent and reduces the risk of a disorderly default, thereby avoiding the costs associated with a formal restructuring process.

According to Acevedo (2016) the Caribbean region regularly incurred in damage to housing, crops, and infrastructure due to extreme weather events. Estimates indicate that the economic impact of natural disasters weighs more heavily on these small economies; where the average annual cost of disaster damage is about six times higher (2.4 percent of GDP) compared to 0.4 percent of GDP for larger states.

In 2015, Grenada became the first country that inserted a clause that stipulated an immediate, if temporary, debt moratorium if the economy were struck by another natural disaster. Three years later, in 2018, Barbados inserted a hurricane clause into its restructured domestic debt. Thus far, these clauses have been inserted only in restructured debt, rather than through traditional bond sales.

Hurricane clauses are less dramatic than other recent innovations introduced and standardized in the market for bonds and some investors might be willing to accept them, but probably only at the cost of higher interest payments. This has become apparent in the case of Barbados, where international bondholders appear to have cooled on the idea of introducing hurricane clauses and had to be incentivized through higher interest payments. The limited experience with these instruments make these bonds with natural disasters-link clauses more difficult to value than a plain vanilla financial instrument and this may be one the main issues that will determine their success in the future.

a) Experiences

i) Mexico

Mexico is vulnerable to several natural hazards, including hurricanes, large earthquakes, floods, and volcanic eruptions. When such natural disasters occurred in the past, the government had to shift budgetary resources away from planned public infrastructure expenses into reconstruction efforts. To avoid this problem, in 1996 the government created a fund for natural disasters — FONDEN — to which it transfers budgetary funds for disaster relief and reconstruction efforts. The fund has developed an institutional framework for disaster preparedness involving risk assessment, risk reduction, the promotion of a culture of prevention, and insurance.

With this institutional framework, Mexico was the first sovereign to issued standalone catastrophe-linked (CAT) bonds in 2006. The US$ 160 million CAT bond, which matured in May 2009, was designed, and issued to provide FONDEN financing in the event of an earthquake. The coupon was LIBOR-based. The bond had a parametric trigger, defined as an earthquake with a certain magnitude and depth occurring in any of three pre-defined geographical zones in Mexico.

CAT bonds are a standardized method of transferring insurance risk to the capital markets. The proceeds from the sale of the bond are invested in near risk-free assets to generate money market returns, which combined with an insurance company’s premium, allow the bond to pay a substantial spread over money market returns as a quarterly coupon to the investor. If no insurance events occur the investor enjoys the enhanced coupon for the term of the bond, typically three years, and receives the principal back at maturity. If one of the designated events occurs, for instance an earthquake in a pre-defined geographical zone as in the case of Mexico, then the all or part of the principal would be forgiven and the insurance company would use this money to pay their claimholders, whereas the investor’s coupon payments cease or are reduced.

The 2006 bond was structured in two tranches for different regions; both were rated BB+ by S&P. The bond matured win 2009 without being triggered. Mexico

returned to the CAT bond market using the World Bank's MultiCat platform twice, with the 2009 issued MultiCat Mexico 2009 Ltd. and then the 2012 cat bond that eventually paid out for the government following hurricane Patricia. More recently, Mexico utilized the World Bank's IBRD Capital-At-Risk Notes Program for a 2017 issuance that was triggered by the Chiapas earthquake, and then most recently for a 2018 issuance which is now soon to mature. Mexico's latest and sixth catastrophe bond issuance was completed in March 2020, a $485 million CAT bond that provides the country with a four-year source of parametric earthquake and hurricane insurance protection.

The relatively limited adoption of CAT bonds to transfer insurance risk to the capital markets is due to the following two reasons: first, the costs of CAT bond issuance are significantly higher than for a traditional reinsurance contract, and are not economically viable for small principal amounts. Second, the number of investors willing to buy CAT bonds is still limited, mostly due to lack of familiarity with catastrophe risk.

ii) Grenada

Grenada pioneered an innovative 'hurricane clause' in its bonds that is gaining approval from multilateral agencies such as the IMF and the IADB to the International Capital Markets Association (a trade body). In 2015, eleven years after Hurricane Ivan devastated the country and ten years after a comprehensive but insufficient debt restructuring exercise triggered by Ivan, the island state undertook a second comprehensive restructuring of its public debt. The agreements secured by Grenada were noteworthy, not only for the degree of debt relief that they achieved, but also for their precedent-setting inclusion of hurricane clauses.

In this latest debt restructuring, Grenada offered a bond exchange and the willingness to receive all tenders of the EC$ 2025 Bonds. Grenada took a proactive step and adopted the inaugural natural disaster clause in its new U.S. dollar bonds due 2030. The clause inserted stipulated an immediate, if temporary, debt moratorium if the country were struck by another natural disaster. The move, endorsed by the influential Paris Club of governmental creditors, held out the promise of vital financial relief at times of distress.[11]

Over the period December 2014 to November 2015, debts amounting to US$318 million (one-third of Grenada's total public debt) were restructured with three creditors. These included, the Export-Import Bank (the Eximbank) of Taiwan, holders of Grenada's previously restructured 2025 sovereign bond, and Grenada's Paris Club creditors. Their provisions differed markedly, with the Eximbank's deal most closely aligned to Grenada's request. Using a discount rate of 13.9 percent Asonuma et al. (2017) estimate that the net present value of the haircut in this deal was 50.3 percent on average.

[11] Before restructuring, Grenada and the IMF had reached agreement on program parameters that included debt restructuring and the importance of restoring fiscal substantiality while creating supportive conditions for high-quality growth.

The natural disaster clause included in the bond exchange allows Grenada to defer the principal and interest payment due on the next semi-annual payment date if it experiences a tropical cyclone causing between U.S.$ 15 million and U.S.$ 30 million in losses, and to defer the principal and interest payments due on the next two semi-annual payment dates if it experiences a tropical cyclone causing U.S.$ 30 million or more in losses.

The determinations of both what constitutes a qualifying tropical cyclone and the dollar amount of loss experienced are tied to Grenada's parametric insurance policy from the Caribbean Catastrophe Risk Insurance Facility, a risk pool that provides coverage for catastrophic hurricanes, earthquakes, and excess rainfall events to Caribbean and Central American countries.[12]

Grenada saw the primary benefits as: immediate cash relief and fiscal space in the event of a disaster; avoidance of a payment default; and the prevention of further debt restructuring.

iii) Barbados

In August 2018, the authorities in Barbados rolled out the Barbados Economic Recovery and Transformation program. This economic reform program also provided the macroeconomic framework for the IMF's Extended Fund Facility support program. One of the key elements of the program included a comprehensive debt restructuring, including both domestic and external debt. After several rounds of negotiations, the government reached a deal with the external creditor committee in October 2019, consisting of a 26 percent haircut, issuance of new long-term debt with 10-year maturity and 6.5 percent interest, and a $40 million repayment plan between 2019-2021. Moreover, the Government was able to successfully negotiate natural disaster clauses in its restructured government bonds. In this case, the new 2029 bond allows for capitalization of interest and postponement of scheduled amortization falling due over a two-year period, following the incidence of a major natural disaster (Anthony et al., 2020). In the same fashion as Grenada, the trigger for a natural disaster event would be a payout above a prearranged threshold by the Caribbean Catastrophe Risk Insurance Facility under the authorities' catastrophe insurance policy.

The Barbados' events are wider than those proposed by Grenada in that they include events related to earthquakes and rainfall as well as hurricanes. The minimum claim threshold specified is US$ 5 million, in the case of an earthquake or rainfall event, and US$ 7.5 million in the case of hurricane. Following an event of this magnitude, Barbados may elect to defer for two years any principal or interest payments which would otherwise fall due in the two-year period from the effectiveness of that election. Deferred principal and interest, which is capitalized, continue to accrue interest and are, at the end of the two-year deferral period,

[12] Grenada is a member of the Caribbean Catastrophic Risk Insurance Facility and has purchased insurance on its 2030 and Exim Bank of Taiwan bonds against the risks of tropical cyclone, earthquake, and excess rainfall. The event is triggered based on parametric measures. If the insurance is triggered, as determined by the CCRIF, the hurricane clause in the bond contract is also triggered.

added to all remaining principal instalments on a pro rata basis. As a result, Barbados would have a debt service moratorium for two years and the repayment of the deferred amounts would be spread over the remaining term of the bonds. The deferral option cannot be used more than three times nor within the last two years of the term of the 2029 bonds.

b) An initiative by the IADB

The IADB is planning to include through its Flexible Financing Facility a “hurricane clause” that allows borrowing countries to defer principal payments on eligible loans for two years after an eligible event. The option would be available on both new and existing loans. No borrowers have used hurricane clauses in primary bond markets, but the IADB’s initiative could be the first step.

In its 2019 – 2023 Country Strategy with Barbados, which envisions up to US$300 million in investment lending, the IDB Group proposes the use of its contingent credit facility instrument to respond to a natural disaster emergency. The facility mechanism allows for a rapid transfer of funds to cover immediate financing needs that may arise following a natural disaster until other sources of funding are available. In 2018, both The Bahamas and Jamaica signed agreements with the IDB to access this contingent facility, while Suriname signed a similar agreement in March 2019.

SECTION 4: THE BENEFITS AND CHALLENGES OF GDP-LINKED AND CONTINGENT CONVERTIBLE BONDS

4.1 Benefits

GDP-linked bonds offer benefits not only for the parties, both the issuer and the investors but also for the broader economy through the positive externalities they generate.

The most important benefit that the literature attributes to a government that issues GDP-linked bonds is its effect on debt sustainability. In particular, the government’s burden of servicing its debt would be lessened during an economic downturn. More generally, the government’s ratio of debt to GDP would be more stable than if it had borrowed using conventional bonds, holding all else constant. This is because the interest burden on GDP-linked debt would be positively related to economic growth, so any additional borrowing to cover debt-servicing costs would be lower during downturns and higher during upturns.

However, it is important to point out that if investors demand too high a premium to compensate them for the GDP risk they are taking on, the issuer could be worse off than if they had issued state contingent debt with a lower premium.

In addition to making a given level of debt more sustainable, GDP-linked bonds reduce the credit spread on the government’s remaining conventional debt and it could also allow governments to increase their debt without putting at risk their ability to pay during periods of economic weakness. Previous studies have

suggested that the use of GDP-linked bonds could increase the level of debt that a government can sustainably service as a share of GDP by up to 100 percentage points (Barr, Bush and Pienkowski 2014), which is equivalent to raising the sovereign's maximum sustainable debt threshold.

Like any countercyclical tool, GDP-linked bonds can help attenuate boom-bust cycles in public spending by requiring the sovereign to allocate a lower share of revenue to debt service in 'bad times' and larger share of revenue to debt service in 'good times.' This could be particularly useful for sovereigns that struggle to pay-down debt (or build rainy day buffers) in such times and particularly attractive for governments of emerging market and developing country economies, which may otherwise face pressure to cut expenditures during a recession in order to restore market confidence. Barro (2003) has also argued that it allows governments to smooth taxation over the economic cycle.

GDP-linked bonds could benefit holders of the issuing government's conventional bonds, as GDP-linked bonds might reduce a government's default risk (Chamon and Mauro, 2005). A large proportion of GDP-linked bonds may reduce the government's default risk, including the default risk of its conventional bonds, which brings down the costs of their overall debt portfolio. The improvement in debt sustainability could also benefit other economies since sovereign defaults often lead to contagion and turbulence in foreign financial markets more generally.

To investors, these instruments may be attractive also because they offer an opportunity to claw back the losses incurred in the restructuring — much like an 'equity kicker' acquired through an option to purchase shares following corporate debt restructurings. They have arguably facilitated debt exchanges that might otherwise have taken longer to agree on.

GDP-linked bonds could have important benefits for the international monetary and financial system if the large dead-weight costs associated with disorderly and protracted debt restructurings could be avoided.[13] Furthermore, by reducing default risk, capital flows and therefore risk-sharing could, in theory, increase (Bai and Zhang, 2012). With private creditors playing a greater role in risk-sharing, this should also reduce the need for international bailouts of sovereigns and so reduce moral hazard.

Another attractive feature of GDP-linked bonds is that they complement other existing initiatives to reform and strengthen the international monetary and financial system. Indeed, GDP-linked and in general state contingent debt instruments are consistent with the revealed preference for contract-based, market solutions to prevent and resolve sovereign debt crises.

Within an optimizing framework several recent studies have investigated the

[13] Benjamin and Wright (2009), find that average default takes almost 8 years to resolve and leaves the sovereign country more highly indebted than when it entered default. Guzman and Lombardi (2018) show that 49–60% of the sovereign debt restructuring episodes since 1970 have been followed by another default or restructuring within 3–7 years, suggesting the existence of insufficient relief in sovereign debt restructuring processes which would explain serial defaults.

welfare implications of GDP-linked debt. All of them conclude that GDP-linked debt can raise national welfare. Durdu (2009) studies the effects of one-period income-indexed debt on consumption and welfare and corroborates welfare gains. Hatchondo and Martinez (2012) introduce income-indexed bonds into a model of strategic sovereign default and find that welfare gains may be significant. Onder (2016) shows how welfare gains from issuing GDP-linked debt depend on the nature of the indexation scheme for the debt.

4.2 Main Challenges

In practice, however, there are several factors that may discourage governments from issuing GDP-linked bonds or dissuade investors from purchasing them. These can broadly be grouped into problems associated with moral hazard, adverse selection and developing a market for a new product.

It has been argued that, by increasing debt repayments (in case GDP growth is higher than normal) such bonds might reduce debtors' incentives to grow. But as remarked by Griffith-Jones and Hertova (2013) this concern is exaggerated "as it does not make political sense for governments to ever want to limit or underreport growth". Benford et al. (2016) have suggested the introduction of a clause in the instrument's contract which outlines a set of 'put events', one of which could be the issuer ceasing to meet IMF data quality standards, which would trigger early redemption. Another commonly cited concern is that GDP is difficult to measure, with estimates that are prone to revision and rebasing. But these concerns are surmountable.

Despite the known long-term, system-wide benefits that both issuers and investors can derive from adopting this type of financing, a main challenge that GDP-linked debt face is the absence of fully developed markets in which these securities can be traded. The absence of such markets reduces the liquidity of such debt instruments, making them riskier for potential investors and a more expensive financing option for sovereign issuers, who may have to pay an additional risk premium.

Revisions can be allowed for in part by linking repayments to lagged data which incorporate one or two revisions. However, it could be problematic to link repayments to substantially revised data (as in the case of both the Argentine and Greek warrants payment) since the fear is that such a long lag in payment may imply a pro-cyclical effect rather than the intended or expected counter cyclical effect.

In the case of rebasing and changes in the method of calculation some scholars and analysts have suggested that to deal with these problems governments or outside agencies could keep separate GDP series based on the traditional method (so that payments are based on a 'notional' series rather than the one following the latest methodology).

Issuance and acceptance of GDP-linked bonds is also hampered by a collective action problem. This is also called the 'first mover problem.' The first country to introduce these instruments is likely to have to pay the greatest premium. The

more countries that issue, the lower the premium and the greater the diversification benefits to potential investors. Here the best strategy is a simultaneous issuance by a group of credible sovereigns.

Several co-ordination and technical issues have been seen as hindering issuance and acceptance of such an instrument. For example, concerns about the timeliness and reliability of GDP statistics are often raised, as well as the challenges of creating a liquid market for any new financial instrument.

There is a political economy problem that may explain why governments that expect to lose elections and also expect bad times in the near future may have little incentive to buy protection that benefits their successor. In essence they see that when everything goes well, they must pay more, while in bad times their successor gains relief.

GDP-linked bonds can be structured in many ways. For example, principal and/or coupon payments could be linked to GDP, or the measure of GDP could be real or nominal. However, regardless of their precise form, the benefits and challenges associated with issuing GDP-linked bonds are likely to be broadly similar.

GDP-linked bonds are primarily aimed at reducing the likelihood of solvency crises by ensuring that over the lifetime of the bond its repayment terms are tied to capacity to repay. At the margin, they may also help to address the liquidity issues that might arise when a sovereign loses access to sovereign bond markets. By reducing the likelihood of sovereign crises the bonds help support market access. And by providing for debt-relief on the principle of maturing debt and on regular coupon payments they can help to reduce a sovereign's immediate borrowing needs.

However, GDP-linked bonds do not completely remove liquidity risks associated with maturing debt. Other instruments, such as sovereign CoCos that automatically extend in maturity following a trigger event, are more closely targeted at tackling liquidity crises.

SECTION 5: THE BENEFITS AND CHALLENGES OF SOVEREIGN CONTINGENT CONVERTIBLE BONDS

5.1 Benefits

In principle, sovereign CoCos could improve existing market arrangements (Consiglio and Zenios, 2018, Benford et al. 2016) by: serving as automatic stabilizers, forestalling default during a crisis, generating market discipline for debtors, dealing with creditor moral hazard problems, providing speedy response to crises, and reducing the required size of official sector emergency loans.

During a sovereign debt crisis, conventional fiscal strategies leave limited scope to provide needed fiscal support. In contrast, a standstill on debt payments lowers primary surplus needs and creates space for fiscal intervention. Since the official

sector does not need to pay out existing bond holders, more money is available for a gradual and less costly economic adjustment path.

While sovereign CoCos do not address insolvency situations, they could address liquidity crises. Consiglio and Zenios (2018) and Brooke et al. (2013) argue that a standstill gives space so that a liquidity crisis does not evolve into an insolvency situation. Hence sovereign CoCos give the sovereign space to put public finances in order. In addition, there is a consensus that given the ex-post inefficiencies associated with the lack of a system for discharge of sovereigns' unsustainable debt burdens, there is value in decreasing the ex-ante probability of default, and sovereign CoCos could contribute towards this goal.

Soverign CoCos price ex-ante the risk of future payment standstills thus making the costs immediately visible. With risk sharing between creditors and debtors, the interest charged on sovereign CoCos will increase as the risk of a crisis increases, and this will be an early warning signal for standard bonds as well, disciplining the sovereign.

Creditor and debtor moral hazard problems can arise if there is an expectation of official liquidity support once downside risks materialize. While there are often good reasons for such support, it can have the adverse consequence of encouraging excessive risk taking by the sovereign borrower and its private sector creditors, although the evidence is mixed (Brooke et al., 2013). Sovereign CoCos address debtor moral hazard. If creditors could no longer anticipate full repayment by the official sector in times of crisis, this would reduce the incentive to lend incautiously to sovereigns.

Consiglio and Zenios (2018) indicate that once a default has occurred it takes on average almost 8 years to resolve, and "this delay destroys value for both creditors and debtor". Since the core of sovereign Cocos is the contingent standstill, triggering is automatic and costly delays are avoided.

As already pointed out, the market presence of SCDIs significantly alters burden-sharing between private creditors and debtors, and the activation of Sovereign CoCos are not the exception. Once a S-CoCo is activated the maturity extension ensures that the official sector liquidity assistance would not have to cover debt amortization payments, and this will reduce the required size of official sector emergency loans.

5.2 Main Challenges

Several challenges can be identified in launching sovereign CoCos. Conglio and Zenios (2018) state that the instruments could be potentially destabilizing "if they cause flight to safety as the threshold is approached". Indeed, market participants could give raise to a self-fulfilling crisis by fleeing from a potential standstill as the spreads increase.

Hatchondo et al. (2017) argue that sovereign CoCos may also increase the cost of borrowing because Convertible Contingent bonds may weaken market discipline and thus induce higher debt levels, and because lenders dislike

reprofiling triggered by global liquidity shocks. However, they also show that together with conditionality or a debt limit that compensate for the loss of market discipline, Sovereign CoCos can reduce sovereign spreads without damaging the government's ability to borrow during periods of low liquidity. Moreover, they show that S-CoCos reduce the frequency of sovereign defaults triggered by liquidity shocks and increase consumption in periods of low global liquidity.

SECTION 6: LESSONS FROM HURRICANE CLAUSES

The main point regarding the previous experiences with hurricane clauses employed in the case Grenada and Barbados is not only whether these countries benefited from a particular set of circumstances that allowed them to insert disaster-link clauses in debt contracts, but whether such provisions can be replicated with substantial improvements by other economies vulnerable to natural disasters when restructuring their debt or negotiating new agreements.

Successful replication of natural disaster-link clauses requires the identification of the conditions that are necessary for a mutually beneficial exchange between the sovereign and investors. Issuers and investors' expectations on the expected return of the SCDI diverge, because of diverging expectations about the evolution of the state variable. If the sovereign believes that an SCDI will be associated with lower average payouts than investors expect—say for example, because the state variable will perform worse—the sovereign will be willing to offer bond characteristics that are more generous to the investor, and a trade would be more likely.

Debt restructurings present an important opportunity for natural disaster clauses to provide future downside protection to sovereign debtors. However, such clauses would likely be useful in future new issuances as they provide valuable insurance at low-cost against exogenous shocks in ways that are not easily replicable through private contracts. Of course, there are many obstacles to implement hurricane-linked clauses in debt contracts and that is the reason why some financial experts are skeptical that hurricane clauses will take-off or offer much relief if they do.

On the negative side, Mallucci (2020) argues that disaster clauses may induce governments to engage in "gambling for debt-servicing suspension" behavior. Thus, knowing that debt payments will be suspended in the event of a natural disaster, governments may expand borrowings.

The choice of trigger is an important aspect to consider by both issuers and investors in the case of Disaster-linked clauses. In the case of Grenada, bondholders decided to rely on the Caribbean Catastrophe Risk Insurance Facility's parametric index as the trigger for the hurricane clause in their agreements. This meant that the intensity of an event as well as on the expected losses incurred provided the guidelines to determine the need of cash flow relief.

Drawing on Barbados and Grenada's experience also, countries contemplating including a hurricane or similar disaster-linked clause in their loan agreements should consider assessing whether their debt portfolio compositions are

amenable to including hurricane clauses, and whether such clauses would cover a large enough proportion of their country's debt to deliver adequate fiscal space in the event of a natural disaster. Moreover, the country should determine a trigger and dataset for measuring the type and intensity of a disaster, and the extent of damage caused, that can be independently and reliably verified.

Multilateral engagement could be also important. A considerable amount of technical assistance could be required. In the context of the financing assurances assessments mandated for a multilateral program, debt sustainability analysis and medium-term financing and cash flow forecasts will be helpful for both debtors and investors. In the context of a process of restructuring, this will ensure that the restructuring and the inclusion of disaster-linked clauses will have positive material impact on future debt sustainability. Furthermore, it would be convenient to keep close contact with the country's restructuring negotiators to ensure consistency in financing assumptions and to confirm that the restructuring terms are in line with authorities' program parameters. Finally, support of multilateral agencies regarding the terms of the new debt contracts could provide valuable investor confidence.

The hurricane-clause in a debt contract is a liquidity relief instrument introducing a debt moratorium. It does not reduce the stock of debt. For a catastrophic event such as the hurricanes that have caused damages estimated at more than 100 percent of GDP in many Caribbean countries, the cash flow relief from the hurricane clause cannot be expected to match the potential financing needs. In that case an instrument such as a catastrophe bond or insurance would be more appropriate.

SECTION 7: PRICING AND RISK

One concern of private investors is the lack of agreement over the pricing of a SCDI. As a result, even if an investor perceives great value in the SCDI, it may be reluctant to pay that amount for fears it will need to sell it and future buyers will not value it under the same assumptions. In the case of GDP-linked bonds a critical factor in issuance is the likely size of the GDP risk premium. If there is no intersection between what issuers are willing to pay and what investors expect to receive, then there will be no market for these bonds.

GDP-linked bonds are not currently traded in secondary markets. Although there is no generally accepted principle for pricing sovereign bonds, the investor base that normally participates in sovereign debt markets is very familiar with trading (and pricing) 'plain vanilla' bonds.[14] Hence, a natural question for analysts is that of comparative pricing: how does the price of a GDP linked bond differ from a plain vanilla one issued by the same issuer? There are some studies published recently following this approach. Kruse, Meitner, and Schröder (2005) and Miyajima (2006) showed that, without expectation errors on future GDP, differences in their performance compared to straight or plain vanilla bonds should stem from risk premia associated with factors such as liquidity or

[14] A **plain vanilla bond** is the most basic version of a bond, and it contains a fixed coupon yield and coupon period; a fixed maturity date; and a fixed denomination.

uncertainty. Miyajima (2006) uses the capital asset pricing model to calculate the size of the indexation premium, finding it to be low.

Ruban, Poon and Vonatsos (2008) point out that major drawback of this strand of research is the underlying implicit assumption that the GDP-linked bond will not change the default likelihood of the whole sovereign debt. Yet one of the main theoretical arguments in favor of GDP linked bonds is that their use may reduce the probability of costly formal default. Chamon and Mauro (2005) introduce the risk of default and show that with the introduction of GDP indexation the average price of the country's debt increases, while the likelihood of default falls.

Despite this relatively few attempts to develop a pricing framework for GDP linked bonds, the lack of a pricing model is not necessarily an obstacle to issuing GDP-linked bonds. After all stocks and options were traded before Black, Scholes and Merton developed their formulas. Of course, availability of such models will encourage the development of a market (Borensztein and Mauro., 2004; Griffith-Jones and Sharma, 2005).

An initial premium to compensate investors for uncertainties about a contingent debt instrument and how it might perform due to its newness is called 'novelty risk'. Although the size of this premium might decline rapidly, it is likely to be more persistent if the structure of the instrument is complex, valuation is difficult, statistical agencies are not trusted or risk aversion is high — all factors that contributed to Argentina's GDP warrants being charged a high novelty premium (Costa, Chamon and Ricci, 2008). Indeed, when GDP warrants were issue by Argentina as part of its 2005 debt restructuring, the premium on these instruments, after taking out default risk, were estimated to be as wide as 1200 basis points at issuance, and to have declined to a still high 600 bps. This can be interpreted as a premium that investors demand because they are not familiar with the instruments.

In the case of GDP-linked bonds, in exchange for taking on the risk of holding an asset with uncertain payoff, investors would probably want to be paid a premium (a 'GDP risk premium') over the risk-free rate. The magnitude of such a premium is likely to depend on whether there is an international and diversified market in GDP-linked bonds. Indeed, foreign investors, if their income is not closely correlated with the GDP of the issuing country, might require only a small premium.

Previous studies have estimated that the benefits of issuing GDP-linked bonds are likely to outweigh the costs if the growth risk premium is less than 200–350 basis points (Barr et al 2014; Blanchard et al 2016). While this suggests that governments would benefit from issuing GDP-linked bonds, there is considerable uncertainty surrounding the estimates of the growth risk premium. Benford et al. (2016) report a few academic studies that do attempt to calculate the GDP risk premium giving estimates ranging from 35 to 150 basis.

The default risk premium on GDP-linked bonds could be systematically lower than on conventional debt. This should be the case because, when growth falls, the issuer should be better able to stay current on its GDP-linked bonds because

of the repayments due on it having fallen. However, a key benefit of GDP-linked bonds is that by making the debt to GDP ratio much less volatile, this reduces the probability of unsustainable debt dynamics, and so lowers default risk of all government debt — conventional as well as GDP-linked. How much lower is difficult to gauge, but the more GDP-linked debt that is issued and the larger the initial debt to GDP ratio (and so the closer a country is to the point of debt becoming unsustainable), the larger the likely fall.

Liquidity describes the ease with which an investor can trade large quantities of a security quickly, at low cost, and without altering the security's price. Understanding the relationship between a security's return and market liquidity is especially important during financial stress when market liquidity becomes scarce. During a period of stress market participants tend to value liquidity more highly and shift into more liquid sovereign bonds in so-called "flights to liquidity.". Liquidity is highly prized by asset managers who want to be able to liquidate positions and adjust portfolios at short notice but is of less concern to pension funds and sovereign-wealth funds who prefer to hold assets to maturity. Both GDP-linked bonds and Sovereign CoCos are exposed to liquidity premium, for trading in illiquid markets in the early launching stages.

SECTION 8: A PROPOSAL AND PRACTICAL TOOLBOX FOR PREVENTION AND CRISIS RESOLUTION

There are several challenges to making contingent debt part of the financing toolbox of sovereigns for prevention and crisis resolution. Indeed, all the benefits of SCDIs can only be realized if investors are willing to buy these instruments at a price acceptable to the sovereign. This section looks at how careful instrument design, supported by plain sailing (standard) and a robust international coordination, might help overcome the barriers.

It is certainly true that restructurings offer a unique opportunity for the introduction of SCDIs into a sovereign's debt portfolio. In a restructuring scenario, SCDIs can be implemented across the entire renegotiated debt stock with the consent of existing creditors, thereby eliminating the "first-mover" problem which lowers their appeal in the context of new issuance.

But in the context of new issuance, a mix that provides system-wide risk reduction and sustainable insurance mechanisms would be optimal. Both attributes are needed for an insurance market to function properly, making the complementary use of Contingent Convertible bonds and GDP-linked bonds desirable. Through a discrete intervention, instruments such as Sovereign CoCos provide liquidity relief and stabilization during a crisis, while GDP-linked bonds provide continuous smoothing.

The proposed formulation of Sovereign CoCos is primarily designed to help tackle sovereign liquidity crises (although dealing with liquidity problems alleviates the risk of liquidity turning into insolvency crisis). GDP-linked bonds provide a natural complement to Sovereign CoCos, as these provide not only a form of recession insurance but also help to reduce the likelihood of solvency crises. Indeed, GDP-linked bonds not only provide more fiscal space in times of crisis but reduce the

likelihood of solvency crises since they reduce the size of increases in sovereign debt related to contractions in GDP and raise the maximum sustainable debt level of the sovereign (Barr et al., 2014). However, the potential of these instruments will materialize only if they capture a significant share of the sovereign debt market.

It is necessary to distinguish between potential SCDIs issuances in normal and in debt restructuring times, since it implies different benefits for issuers (Benford et al., 2016). During normal times they would help in alleviating liquidity problems and preventing solvency crises. For their part, during normal times GDP-linked bonds offer additional fiscal space in downturns, another way of deleveraging from high debt levels, and a way of preventing solvency crises. These benefits are likely to be largest when debt levels are already high relative to GDP and there is a non-trivial probability of debt reaching an unsustainable trajectory. In restructurings, GDP-linked bonds can help by backloading debt repayments when recovery is fully underway and help governments insure themselves against subsequent negative growth shocks and having to restructure again.

It should be possible to address these concerns through careful design of the instruments and their contractual arrangements. Though specific circumstances of individual countries will be important for a right instrument design, there are large advantages to keeping to just a few benchmark designs. Of course, further work on the optimal form of SCDIs would be needed if this idea is to be advanced.

In the case of sovereign CoCos the maturity extension needs to be long enough to overcome the sovereign's liquidity problems and provide fiscal space to put in place required adjustment policies, but not so long that it unduly penalizes creditors. If a maturity extension is triggered, coupon payments for each bond will continue at their original level and frequency.

Another important feature in the design of a sovereign CoCo is the definition of the trigger. Triggers can be based on a mechanical rule or supervisors' discretion. Parties should contractually choose an indicator that automatically extends in repayment maturity when a country receives official sector assistance or the sovereign has lost market access.

Both sovereign CoCos and bonds with catastrophe-linked clauses are discrete instruments and provide 'accident insurance' against extreme or catastrophic events. In the case of countries in the region where a well-documented history of natural disasters exists and where evidence of frequency, intensity and damage impact of the disaster is registered, bonds may contemplate including hurricane or similar disaster-linked clauses.

The hurricane clauses of Grenada and Barbados provide only a one-year moratorium. Countries will need to consider whether a moratorium period of one year is adequate and whether future hurricane provisions should seek to extend the moratorium period. A longer moratorium period would increase the number of payments eligible to be deferred and therefore would afford countries more cash relief. This could help to avoid a debt restructuring by providing more adequate relief under the provision, but the longer the moratorium period the

higher the premium charged will be.

The country or even the parties should determine a trigger or the triggers and dataset for measuring the type and intensity of a disaster and the extent of damage caused, that can be independently and reliably verified. A key consideration is whether the provision should be restricted to hurricanes only or expanded to include other natural disasters such as earthquakes, floods, excess rainfall, or other natural disasters. The design should ensure that the clause only applies to catastrophic events in which the probabilities of occurrence are very low and where the possibility of an imminent debt default is most likely due to the severity of the event. A parametric index trigger as the one used in the agreement between Grenada and its bondholders may be convenient since it ties the cash flow relief that may result from the hurricane clause to the probable maximum loss of an event that occurs once in every 25 years.

With respect to GDP-linked bonds, the over-riding goal is to create an instrument the market is familiar with. Experience with GDP-linked warrants points to the desirability of much simpler instruments. Based on the experience of inflation-linked bonds market, it would make sense to standardize it as much as possible.

The two aforementioned canonical designs of GDP-linked bonds the so-called “linker” and the “floater” may be considered. Both designs offer their advantages, but still have some limitations.

Broadly speaking the “linker” may be described as a local currency-denominated bond where principal and coupon are both indexed to nominal GDP, with fully symmetrical payout profile with no caps, floors or thresholds, and a payment formula modelled on inflation-linked bonds. This structure where both the principal and the coupon are indexed to the level of GDP is the most effective at stabilizing the debt ratio, is closest to that of inflation linked bonds (which investors are already familiar with) and does not require the payment floors that growth-indexed structures do, and which may complicate pricing. GDP-linked bonds denominated in local currency also provide the issuer with insurance against exchange rate shocks which could otherwise reduce or cancel out the debt-stabilizing benefits of indexing to GDP. Local currency debt eliminates currency mismatches and in general those countries with already deep local currency bond markets may find it easiest to issue local currency GDP-linked bonds. However, not all countries, for instance, in Latin America and the Caribbean exhibit deep local currency bond markets and there may be some instances where investors prefer to receive GDP-linked bonds that settle in a foreign currency.

Moreover, and in favor of the “floater” design, a real GDP growth-linked may be more appropriate for Emerging Markets and Low Income Countries, both because incentives to manipulate real GDP down may be less; and also because of the negative correlation between real GDP and the deflator observed in stress episodes in these countries, which could lead to pro-cyclically high payouts on nominal GDP-linked bonds (see IMF, 2017).

Table 2 summarizes the design proposal of these SCDIs.

A major challenge still being worked through is the premium over conventional sovereign bonds that governments must pay investors as compensation for taking on the exposures inherent for instance in GDP-linked bonds, sovereign CoCos or bonds with catastrophe clauses. The premium will differ depending on the final terms and issuer. In the case of GDP-linked bonds, analyst talk about a range that can go between 20bps and 100bps (Myles, 2016).

Issuance and acceptance of SCDIs is also hampered by a collective action problem. The first country to introduce these instruments is likely to have to pay the greatest premium. The more countries that issue, the lower the premium and the greater the diversification benefits to potential investors. One way to overcome this collective action problem, as Brooke et al (2013) suggest, would be for a group of interested sovereigns to co-ordinate their issuance, enhancing the development of market infrastructure and standards. Sufficiently large issuance would lower the liquidity premium.

Table 2: Ideal Design Features of State-contingent Debt Instruments

	GDP-LINKED BOND		**SOVERIGN CoCo**	**HURRICANE CLAUSES**
	Linker	**Floater**		
Event	Deviations of the effective nominal GDP from its target value	Deviations of the effective growth rate from its target value	Liquidity problems that push the sovereign to receive emergency liquidity from the official sector	Hurricane, earthquake, excess rainfall insured under CCRIF Parametric Insurance Contract
Currency	Local currency	Foreign currency	Local or Foreign currency	Unspecified
State/Trigger variable	Level of Nominal GDP	Real GDP growth	When the sovereign receives emergency liquidity from the official sector. In practice, this will be when the sovereign draws upon credit from the IMF or another bilateral/regional facility	An institution such as CCRIF SPC modelled losses exceeding a threshold in US$

Debt Affected	Principal linked to GDP. Coupon varies somewhat, as it is a fixed percentage of this principal.	Coupon linked to the growth of GDP, but with a floor of zero. Principal is fixed. Coupon may vary a lot, but could be capped	Principal (but not coupon) payments postponed for the length of the maturity extension.	Principal and accrued interest due on the deferral dates
Payment Moratorium	N/A	N/A	Length of the maturity extension should match that of typical official sector support programmes. The typical length of an IMF programme is around three years.	Up to 6 months or one payment date (if CCRIF SPC payout is in certain range). Up to 12 months or two payment dates (if CCRIF SPC payout is greater than a second threshold)
Lenght of maturity	The London Term Sheet envisages it would be long-term in maturity, with a lifespan of 10 to 20 years, enough to cover more than one business cycle.	The London Term Sheet envisages it would be long-term in maturity, with a lifespan of 10 to 20 years, enough to cover more than one business cycle.		15 years
Repayment Terms	If nominal GDP exceeds the target, the principal increases from the baseline	If real GDP growth exceeds the target, the coupon increases from the baseline	Principal repayable in equal periodic installments over the remaining term of the loan.	Principal deferred and accrued interest deferred and capitalized both repayable in equal periodic installments over the remaining term of the loan
Maximun No. of triggers	Unspecified	Unspecified	The maturity extension clause can only be activated once.	Three (3)

Source: Prepared by Author

Standardized contracts can also help address liquidity concerns. Standardization of the instrument's commercial and legal terms would be important for reducing the first-mover problem and progress has already been made with the drafting of a common indicative term sheet for GDP-linked bonds.[15] Concerted efforts by governments, in both advanced and developing countries, creditors and multilateral financial institutions to push for the creation state contingent securities markets will also contribute to deal with the size of the market and liquidity problems. This would overcome first-mover disadvantage, encourage the development of standardized products and pricing models, and create liquid markets with depth.

One area of opportunity for further multilateral involvement is that access to all or some IMF facilities should be conditional on the issuance of new SCDIs, or on the remaining debt held by investors being swapped with SCDIs. Such a scheme would certainly contribute to limiting the moral hazard attached to IMF financing and help the development of GDP-linked bonds and sovereign CoCos.

Similar incentives could be provided by international official institutions such as the IMF if they incorporate the idea of SCDIs when doing its baseline projections of debt sustainability, to see how that would change if the sovereign had included GDP-linked bonds for instance in its debt portfolio. Amending its debt sustainability framework, the IMF can make clear, for example through stress testing, the benefits offered by GDP-linked, or other forms of stage-contingent debt, and this may significantly reduce the premium. However, these initiatives would primarily deal with the refinancing of the existing debt and would, therefore, be closer to the solutions that have already been developed by Greece, Russia and Ukraine rather than a decisive step towards the development of a large market.

Alternatively, official creditors could introduce state-contingent features into their lending (or even underwrite or guarantee SCDIs). Official sector lenders can also serve as potential buyers, since they already provide substantial support to sovereigns, and they have long horizons that allow them to absorb volatile returns. Further still, a major sovereign or regional institution could undertake a 'test issuance' of an SCDI to lead the way for others.

There is no reason to limit GDP debt indexation to private market participants. Principles of GDP-linked bonds and maturity extension clauses can be adopted by bilateral creditors as much as by multilateral agencies. This approach presents several advantages which might help circumvent some of the difficulties so far experienced in extending in practice the use of SCDIs in sovereign bonds issuances. Proposals by Tabova (2005) to extend the GDP indexation framework to concessional loans to LDCs by the International Development Association (IDA), and a similar proposal by Missale and Bacchiocchi (2012) to adopt GDP-indexation, contingent convertible debt and catastrophe clauses for all multilateral

[15] A model of the term sheet published by the Bank of England can be found at https://www.bankofengland.co.uk/-/media/boe/files/events/2015/november/gdp-linked-bonds-london-term-sheet-2.pdf

loans, are examples to be considered.

There are at least three main reasons for considering the benefits and adoption of SCDIs for all developing countries' external lending with official creditors, whether bilateral or multilateral, concessional or non-concessional (UNDP, 2015).

First, for many developing countries loans with official creditors constitute a major source of external financing, in some cases the most important one. Argentina and Ecuador are recent examples of countries in South America with an increasing share of external financing that comes from official creditors. In this sense, applying principles of SCDIs to this type of lending could avoid the build-up of excessive IMF or other multilateral exposure, which is "super-senior" due to its de facto preferred creditor status. Hence, this type of lending applying principles of SCDIs reduces the risk of countries receiving financial assistance becoming unable to repay official creditors.

Second, given the limited interest that market operators have so far shown in SCDIs, reaching out to official creditors might prove to be a more effective avenue for advocating for this type of financial innovation with a smaller number of counterparts: essentially international financial and development institutions, including regional agencies and multilateral banks, and sovereign governments.

Thirdly, official creditors presumably operate with a longer time horizon and, therefore, can factor in the long-term benefits that can be derived from this type of debt financing, especially in terms of reducing the risk of sovereign defaults and restructurings. Further, most, if not all, of these official creditors, also have an agenda for international development and may see in the adoption of GDP-linked lending as well as of maturity extension clauses a way of supporting global efforts to increase and improve the quality of liquidity relief and development finance.

There is not much experience in the use of SCDIs by official creditors in 'normal' times. A preliminary experience with a form of pandemic bonds was carried out by the World Bank in 2017. Unlike with a "hurricane" clause, which offers liquidity relief, this pandemic catastrophe bond is a type of insurance-linked security which pays insurance (bond principal) only if a catastrophe (pandemic) protected by the bond occurs. It offers highly attractive yields to investors at the risk of losing the principal payment amount and provides a quick payout to the borrower when the catastrophe occurs. As reported by Cohen et al. (2020) the bond, however, suffered from several challenges: insured event trigger complexity; high coupon rate; and limited payout. Apparently, these deficiencies have contributed to the World Bank's recent decision to discontinue issuing these instruments.

SECTION 9: CONCLUSIONS

Even before the COVID-19 crisis, Latin America and the Caribbean already faced a period of stagnant growth with a precarious labor market, low investment, and limited macroeconomic policy space to mitigate exogenous shocks. Thus, the COVID-19 pandemic arrived at a time of economic weakness in the region and in circumstances in which spontaneous market forces alone lack the capacity to generate a strong recovery from the shock. Both domestic and foreign direct investment is falling and with ever greater social demands, increasing debt levels, and difficulties in reversing recent expenditure increases, governments must implement policies yielding higher growth and development as the health crisis subsides. To do this, governments need to continue to borrow and invest.

Despite the current high level of government debt globally and the mounting risk of major and costly government debt crises in low- and middle-income countries, little has been done to render investors more responsible and to limit the impact of economic stress on the ability of a sovereign to repay its debt. This chapter has argued that one important avenue to do so is to develop State-Contingent Debt Instruments. If adequately designed and priced, these debt instruments can align investors and borrowers' incentives and give an "equity-like" exposure to the issuing countries. Overall, SCDIs would be beneficial for economic and financial stability and can complement other existing initiatives to reform and strengthen the international monetary and financial system. Not to mention that by improving solvency they would alleviate the economic cost of a debt restructuring.

The chapter reviewed SCDIs with a focus on those that link capacity to service debt to economic performance and to those that provide some form of temporary payment standstill in bad times. We have analyzed what the literature considers their potential benefits as well as their more problematic practical issues pertaining risk assessment, the components of the risk premium, and the pricing of such bonds. Work on resolving practical issues is ongoing and involves several initiatives and participants including central banks, multilateral agencies, and potential investors.

With respect to bonds that link capacity to service debt to economic performance, we strongly support the idea of symmetric GDP-linked bonds. The most important benefit that the literature attributes to GDP-linked bonds is its effect on debt sustainability. It is not only that the government's burden of servicing its debt would be lessened during an economic downturn, but more generally, the government's ratio of debt to GDP would be more stable because the interest burden on GDP-linked debt would be positively related to economic growth, so any additional borrowing to cover debt-servicing costs would be lower during downturns and higher during upturns. Moreover, these instruments would be beneficial thanks mostly to their power to allow higher debt limits without putting at risk the ability to pay and to increase the scope for countercyclical fiscal policy. GDP-linked bonds could also benefit holders of the issuing government's conventional bonds, as they might reduce a government's default risk. For the international monetary and financial system GDP-linked bonds could have important benefits if the large dead-weight costs associated with disorderly and

protracted debt restructurings could be avoided.

In the case of state contingent debt instruments that stipulate a suspension of debt payments such as sovereign CoCos, by providing liquidity relief the instrument would buy time for an orderly restructuring of payments. Sovereign CoCos have the potential for improving economic and financial stability. By providing a temporary payment standstill, sovereign CoCos allow gradual and less costly economic adjustment during crises. Moreover, once a sovereign CoCo is activated the maturity extension ensures that the official sector liquidity assistance would not have to cover debt amortization payments, and this will reduce the required size of official sector emergency loans. In addition, sovereign CoCos may also address debtor moral hazard behavior and reduce the incentive to lend incautiously to sovereigns when creditors could no longer anticipate full repayment by the official sector in times of crisis. Introducing distress contingencies into sovereign debt contracts has also the potential of forestalling defaults and avoiding costly delays when a crisis occurs.

To date, sovereigns have not used SCDIs as a regular instrument of budget financing. In contrast to normal times, SCDIs have become a much common component of sovereign debt restructurings. During restructurings, GDP-linked bonds can help by backloading debt repayments when recovery is fully underway and help governments insure themselves against subsequent negative growth shocks and having to restructure again. In the context of new issuance, it would be optimal to achieve a mix that provide system-wide risk reduction and sustainable insurance mechanisms. Both attributes are needed for an insurance market to function properly. It is in this sense that we propose the introduction contingent convertible bonds (such as Sovereign CoCos or Disaster-linked bonds), and GDP-linked bonds as complementary types of state-contingent bonds.

A major challenge still being worked through is the premium over conventional sovereign bonds that governments must pay investors to compensate them for taking on the exposures inherent in in GDP-linked bonds, sovereign CoCos or bonds with catastrophe clauses. There are various types of risk that affect the premium: Liquidity risk, novelty risk, growth risk, default risk. The idea is to find a good balance with a sufficiently low premium to make the instruments attractive to both governments and investors.

The more countries that issue SCDIs, the lower the premium and the greater the diversification benefits to potential investors. But there is a first-mover disadvantage and one way to overcome this collective action problem would be for a group of interested sovereigns to co-ordinate their issuance. Concerted efforts by governments (in both advanced and developing countries) and multilateral financial institutions to push for the creation of state contingent securities markets will contribute to deal with the size of the market and liquidity problems.

Standardization of the instrument’s commercial and legal terms can also help mitigate illiquidity. Clearly there are numerous ways in which SCDIs could be designed. Simple design proposal of contractual terms that may be adopted for

each instrument were presented, but further work on the optimal form of SCDIs terms would be needed if this idea is to be advanced.

There are several ways through which multilateral development banks and multilateral institutions could help develop the market for SCDIs. For instance, in the context of debt restructurings, concerted efforts by governments, creditors and multilateral financial institutions to push for the creation state contingent securities markets would contribute to deal with the size of the market and liquidity problems. Another possibility of more multilateral involving is that access to all or some IMF and development bank financial facilities would be conditional on the issuance of new SCDIs or on the remaining debt held by investors being swapped with SCDIs.

Moreover, multilateral institutions and creditors could introduce state-contingent features into their lending, or even underwrite or guarantee SCDIs. The introduction of SCDIs by Multilateral Development Banks could become a realistic project whose chances of success are worth investigating. By reducing the likelihood that debtor countries run into repayment difficulties and eventually file for debt relief, SCDIs may also benefit multilateral lenders. Official sector lenders can also serve as potential buyers, since they already provide substantial support to sovereigns, and they have long horizons that allow them to absorb volatile returns. A major sovereign or regional institution could undertake a ‘test issuance’ of an SCDI to lead the way for others.

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