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Making the Market Access Countries' Debt Sustainability Framework Relevant for Emerging Markets

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Abstract

The debt sustainability framework for market access countries has been designed by the International Monetary Fund for all market access countries, a set that includes emerging markets and advanced economies. The debt sustainability framework for market access countries was reviewed in 2021 and renamed the "sovereign risk and debt sustainability framework for market access countries." A new public debt sustainability analysis template was rolled out in 2022 and became operational in 2023. This paper examines the framework from the perspective of emerging markets, which borrow from and have a policy dialogue with the World Bank. While the debt sustainability analysis template is based on government borrowing in both the home, or local, currency and foreign currency, advanced economies predominantly borrow only in the local currency. Emerging market governments are more likely to borrow in both currencies, are more vulnerable to crises, and have less fiscal and monetary policy space than their advanced economy counterparts. Therefore, a single framework for both advanced economies and emerging markets is unduly restrictive. The paper suggests changes to fit the emerging market debt context better, motivating the recommendations by a contrast between Japan and Sri Lanka. The recommended changes would require a composite real interest rate to be calculated for emerging markets as in the single-currency environment typical of advanced economies. This would facilitate an assessment of debt dynamics based on the debt-to-GDP ratio, primary deficits, and (r-g), or the difference between the real interest and the real growth rate. Further, the composite real interest rate could usefully be broken down into its local and foreign currency components to provide insight into debt dynamics and guide borrowing decisions. These modifications would facilitate a more transparent assessment of near-term risks and medium-term projections, for which the paper suggests that the set of comparator countries exclude advanced economies.

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I. Introduction

Two debt sustainability frameworks exist at the World Bank and IMF. The first, for low-income countries or LICs, is implemented jointly by both institutions under the guidance of the LIC Debt Sustainability Framework (LIC DSF). Gill and Pinto (2023) critique this framework from the perspective of making it fit for purpose in the new financing environment for LICs, where market borrowings and sentiment have been playing an increasingly important role at least since 2017. The second framework, the debt sustainability framework for market access countries (MAC DSF), applies to both emerging market countries (EMs) and advanced economies (AEs), collectively referred to as "market access countries", or MACs. The MAC DSF is the sole province of the IMF.

We discuss the MAC DSF with the goal of enhancing its relevance for EMs, which borrow from and have a policy dialogue with the World Bank. Our audience is two-fold: IMF economists designing and implementing the MAC DSF and related debt sustainability analysis (DSA) template; and World Bank country economists using the output of the MAC DSF.

Our note is part tutorial, aimed at acquainting World Bank country economists with the nuances of the framework to better assess whether public debt dynamics are sustainable. This inevitably involves the tedium of algebraic derivation, but with the upside that a country economist familiar with the nuts and bolts of the debt sustainability analysis (DSA) template can then modify it suitably to fit a particular context better or carry out a counterfactual analysis.

But the more important part of this note is the reasoning that since EMs and AEs have very different borrowing structures and debt vulnerabilities, a single MAC framework may be unduly restrictive for the following reasons:

(a) AE governments typically operate in a single currency environment (the home or local currency). However, EM governments frequently borrow both in the local currency and in foreign currency (FX). Besides, they typically face higher vulnerability with less monetary and fiscal policy space to respond. Hence, a separate MAC DSF for EMs makes sense.

(b) Understanding debt dynamics in EMs requires the calculation of a composite real interest rate which amalgamates borrowing costs in local currency (L) and FX. Also required is a breakdown of the composite real interest rate into its L and FX components; the latter is the real cost of FX borrowing translated fully into local currency terms so that it includes the capital gain or loss on the inherited stock of FX debt as a result of exchange rate appreciation or depreciation.

(c) The composite real interest rate is needed for a clear picture of debt dynamics based on primary deficits and the difference between the real interest rate and the real growth rate, (r-g). As Olivier Blanchard (2023) said, (r-g) is probably the most important variable for macroeconomic policy in AEs. The same holds true for EMs. The relevant r for EMs is the composite real interest rate because it mimics a single currency environment. It is a debt-weighted average of its L and FX components.

(d) Also insightful from the perspective of debt dynamics is a breakdown of the composite real interest rate into its L and FX components to (i) see what is driving the composite real interest rate and (ii) guide borrowing costs. With open capital accounts and interest parity, we would expect the L and FX components to be roughly equal over long periods. But the balance sheet effects are likely to be very different: a government with a high ratio of FX debt may put pressure on the central bank to support the currency even when fundamentals warrant a depreciation, a form of fiscal dominance.

The MAC DSF was reviewed in 2021 (IMF 2021) and renamed the MAC Sovereign Risk and Debt Sustainability Framework (MAC SRDSF). As the Appendix on Ruritania shows, the DSA template was not changed. Subsequently, a new IMF Staff Guidance Note was issued in July 2022 (IMF 2022), and with a modified DSA template. But items (a)-(d) above are missing.

In addition, the text of the DSA should include historical time series on the key variables driving debt dynamics, including the ratio of the primary deficit to GDP, pd, the composite real interest rate, rc, and its L and FX components, growth rates, and a discussion of contingent liabilities. Further, the simulations going forward to assess debt sustainability risks should be based on the stochastic properties of these variables. Also, if residuals have been historically high, some explanation needs to be provided; at present, there is none.

Suppose the ratio of debt to GDP, d, is above 60%, pd>0 and rc>g based on recent history. Then based on EM crisis experience, it is likely that d is on an unsustainable trajectory with high probability. This would call for lowering pd, reducing external borrowing if the FX component of rc is high and volatile, and focusing on better spending composition and domestic resource mobilization. Further, if local real interest rates are high, then there is serious risk of crowding out private investment. Such "corrective policy" issues are typically included in IMF reports; but placing them in the context described above would enhance the urgency and provide early warning.

We contrast a DSA for Japan with one for Sri Lanka and then make recommendations on improving the DSA template to fit the EM debt context better. This is followed with suggestions on improving the near-term risk assessment and medium-term projection modules.

Section II discusses the new MAC SRDSF DSA template. Section III provides a reality check by contrasting the DSAs for Japan, an AE whose government borrows only in its local, currency, and Sri Lanka, an EM whose government borrows both in its local and foreign currencies. The differences prove significant. Section IV outlines how the DSA template could be usefully modified for gauging the underlying drivers of debt sustainability in EMs. It also discusses risk assessment in the MAC SRDSF and makes suggestions on how this could be better aligned with our preferred template. Section V summarizes the main recommendations.

II. Sovereign Risk and Debt Sustainability Framework (SRDSF)—IMF's 2023 MAC DSA Template

The application of the new MAC SRDSF DSA template began in 2023—for example, the public sector DSA for India issued in December 2022 (IMF 2022) uses the old template. But the DSAs for Japan and Sri Lanka issued in 2023 are based on the new template. Hence, we refer to the new MAC SRDSF template as the "2023 MAC DSA" template.

Derivation of difference equation for public debt-to-GDP ratio

Box 3, pp 29-31, in IMF (2022) derives the difference equation for the public debt-to-GDP ratio underlying the 2023 DSA template. We rederive this equation in a simpler manner with the goal of acquainting the reader with the underlying formulas. In section III, we discuss desirable modifications in the template for EMs based on a comparison of Japan, an AE, and Sri Lanka, an EM.

Let D be nominal public debt at the end of the year and Y for GDP during that year, both in local currency, with d representing the debt ratio, D/Y. The change in d from year-to-year, $d_t - d_{t-1}$, can be broken down into the following different components, all as percentages of GDP:

1. Primary fiscal deficit (non-interest expenditure minus total revenue)
2. Contribution from real interest rate
3. Contribution from real GDP growth rate
4. Contribution from exchange rate changes
5. Other factors such as privatization revenue (decrease in debt) or contingent liabilities (increase)
6. A residual term equal to $d_t - d_{t-1}$ minus the sum of 1 to 5 above, which add up to the "identified debt creating flows". IMF (2022) calls the residual the "stock-flow adjustment" or SFA, to capture "all other effects".

Items 2 to 4 in the list capture the impact of interest rates, growth rates and exchange rate changes on the debt ratio. They add up to "automatic debt dynamics", or ADD—presumably because these cannot be easily influenced by policy in the short run—while the first item, the primary deficit, captures policy effort.

In gauging the sustainability of public debt dynamics, the two key variables are the ratio of the primary deficit to GDP, pd, and ADD, which encapsulates the effect of the term (r-g), that is, the difference between the real interest rate on public debt and the real growth rate of GDP.[2] While AEs tend to operate in a single-currency environment, that is, the public sector tends to borrow exclusively in the local currency, most EM public sectors borrow both in the local currency and in foreign currency, such as the US dollar ($), euro or Japanese yen. This requires modifications in the DSA template, as we shall see.

We now derive the difference equation for d starting with a single-currency environment and then adding on the $ as an additional currency. For simplicity, and since our focus is on underlying public debt dynamics, we shall assume items 5 and 6 in the list above, namely, privatization proceeds and the SFA, are both zero. We shall also narrow the discussion to the government.

The change in nominal government debt is equal to the fiscal deficit. In other words, the gap between government spending and revenues (including central bank profits transferred to the Ministry of Finance) is filled by borrowing:

(1) $D_t - D_{t-1} = FD_t = PD_t + iD_{t-1}$, where:

D_t= Nominal debt in local currency *at the end* of year t

FD_t= Nominal fiscal deficit *during* year t

PD_t= Primary deficit = non-interest expenditure minus total revenue

iD_{t-1}= Interest payments during year t, with i denoting the nominal interest rate for year t.

Two assumptions are embedded here. First, interest payments are incurred on the stock of inherited debt, that is, debt at the end of the previous year. Second, interest is paid at the end of the year. These assumptions are consistent with the IMF's computation of the "effective interest rate" as interest paid during the year divided by the total nominal debt stock at the end of the previous year. This is, by construction, a nominal interest rate.

Now split D into its local currency (L) and foreign currency ($) components and rewrite equation (1) as

(1') $D_t - D_{t-1} = \{PD_t + \left[i^L D^L_{t-1} + i^\$ D^\$_{t-1} e_t\right]\} + D^\$_{t-1}(e_t - e_{t-1})$,

where D^L_{t-1} and $D^\$_{t-1}$ are local currency and $-denominated debt, respectively, at the end of the previous year, i^L and $i^\$$ are the nominal interest rates on local currency debt and foreign currency ($) debt, and e is the end-of-year exchange rate (local currency price of $, so a rise in e means a depreciation).

Note 1: Debt in local currency at the end of year t-1 is given by $D_{t-1} = D^L_{t-1} + D^\$_{t-1}.e_{t-1}$. Let α denote the share of foreign currency debt at the end of year (t-1), that is, $\alpha \equiv D^\$_{t-1}.e_{t-1}/D_{t-1}$.

Note 2: The expression in curly brackets on the RHS of (1') is the fiscal deficit (primary deficit plus interest payments). The expression in square brackets represents total interest payments (sum of interest on local currency and $ debt in local currency terms) for year t. By the IMF's definition of the effective nominal interest rate, namely, interest payments divided by the debt stock at the end of the previous year, the two terms in square brackets can be replaced by iD_{t-1}.

[2] For example, in continuous time, the trajectory of the government or public debt-to-GDP ratio d is given by the differential equation $\dot{d} = pd + (r - g)d$. Suppose d exceeded some market-determined threshold (as signaled by interest rates and bond spreads) while pd>0 and r>g. The debt trajectory would be considered explosive absent decisive reform to raise primary surpluses. Bringing r down or raising g may be harder in the short run.

Note 3: The last term on the RHS of (1') is the capital gain or loss on $ debt due to nominal exchange rate changes. This gets added on to the nominal debt stock, D, which is expressed in local currency. Using the definition of α in Note 1 and dividing and multiplying by e_{t-1}, this term can be replaced by $\alpha\varepsilon D_{t-1}$, where, once again using IMF notation, $\varepsilon \equiv \frac{e_t - e_{t-1}}{e_{t-1}}$ is nominal exchange rate depreciation against the $.

Using the information in Notes 1-3, (1') can be rewritten as follows:

(2) $D_t - D_{t-1} = PD_t + [i + \alpha\varepsilon]D_{t-1}$.

Comparing equation (2) with (1), we see that the only difference is the new term $\alpha\varepsilon$ because we are now in a two-currency environment—but note that i is now a composite of nominal interest rates on local currency and $ debt.

It is worth noting that, after dividing and multiplying the terms on the RHS of equation (1') above by D_{t-1} and e_{t-1} where needed, equation (1') can also be written:

(2') $D_t - D_{t-1} = PD_t + [(1-\alpha)i^L + \alpha i^{\$}(1+\varepsilon) + \alpha\varepsilon]D_{t-1}$.

Comparing (2) and (2') gives us the formula for i, information that we shall use later, with $i^{\$}$ translated into local-currency equivalent terms:

(3) $i = (1-\alpha)i^L + \alpha i^{\$}(1+\varepsilon)$.

The next step is to express nominal debt as a ratio of GDP=Y. Let d=D/Y denote this ratio. Note that $\frac{Y_t}{Y_{t-1}} = (1+G)$, where G is nominal GDP growth. Then dividing both sides of (2) by Y_t and multiplying and dividing by Y_{t-1} where needed and collecting terms, we get the expression:

(4) $d_t = pd_t + \frac{(1+i+\alpha\varepsilon)}{(1+G)}d_{t-1}$, where pd_t is the ratio of the primary deficit to GDP.

Subtracting $d_{t-1} \equiv D_{t-1}/Y_{t-1}$ from both sides of (4) and rearranging gives:

(5) $d_t - d_{t-1} = pd_t + [\frac{(i-G+\alpha\varepsilon)}{(1+G)}]d_{t-1}$.

The second term on the RHS of (5) is the formula for "Automatic debt dynamics" in the DSA template, capturing the combined effects of interest rates, growth rates and exchange rates. Before proceeding, three points on notation need be made:

1. Box 3 in IMF (2022) uses ρ to denote (1+G), where G is the nominal growth rate of GDP. For expositional ease, we shall simply use (1+G).
2. z (see 'Step 1' in Box 3, IMF 2022) denotes the depreciation of the bilateral real exchange rate, R, relative to the US. By definition, $R \equiv \frac{eP^*}{P}$, such that dP*/P and dP/P are inflation in the US and in the EM measured by the GDP deflator in the US and in the EM, denoted $\pi^{\$}$and π^L respectively. In this case, $z \equiv dR/R$ is given implicitly by the equation $(1+z) = \frac{(1+\varepsilon)(1+\pi^{\$})}{(1+\pi^L)}$.[3]
3. Recall that α represents the share of $ debt at the end of the previous year. Box 3 incorrectly gives it the time subscript t instead of (t-1) and adds a superfluous superscript, which we ignore.

Noting that (1+G) equals $(1+g)(1+\pi^L)$, where g is real GDP growth and π^L is inflation measured by the GDP deflator and that $(1+i) = (1+r)(1+\pi^L)$, where r is the real interest rate, equation (5) can be manipulated to get:

[3] Box 3 (IMF 2022) inadvertently defines z as the real exchange rate instead of as its depreciation. It also needs to specify that inflation should be measured on an end-year basis for consistency with the assumptions underpinning the DSF. We use $ and L to denote US variables and EM variables respectively instead of the f (foreign) and d (domestic) used in Box 3 of IMF (2022) because (i) d also denotes the public debt-to-GDP ratio and (ii) all foreign currency borrowing is assumed to be in US dollars.

(6) $d_t - d_{t-1} = pd_t + [\frac{r-g}{1+g} + \frac{\alpha\varepsilon}{1+G}]d_{t-1}$,

where r is the real interest rate given by $\frac{1+i}{1+\pi^L} - 1$ and *i* is given by equation (3) above. Solving for ε from the expression for (1+z) given in the second bullet above, substituting into (6) and rearranging terms gives:

(7) $d_t - d_{t-1} = pd_t + \frac{r-g}{1+g}d_{t-1} + \frac{z}{(1+g)(1+\pi^\$)}d^\$_{t-1} + \frac{\pi^L-\pi^\$}{(1+\pi^\$)(1+G)}d^\$_{t-1}$,

where $d^\$_{t-1} = \alpha d_{t-1}$ is the ratio of $ debt expressed in local currency at the end of year (t-1) to GDP in local currency for year (t-1).

Equation (7) is the same as the 'final equation' used in the MAC SRDSF shown at the top of Box 3 on page 31 of IMF (2022), noting that $\Delta d \equiv d_t - d_{t-1}$, -pb=pd, $d^f_{t-1} = d^\$_{t-1}$, and ignoring the stock-flow adjustment term, sfa.[4] This completes the derivation.

Note 4: In equation (7), using IMF parlance from Box 3 in IMF (2022), the third term on the RHS "accounts for the real exchange rate" while the last term "corresponds to the relative inflation component"—although the formulas prevent a clean interpretation of these effects. The sum of these two terms, which equals $\frac{\alpha\varepsilon}{1+G}d_{t-1}$ (compare equations (6) and (7)), is simply the capital gain or loss as a result of exchange rate appreciation or depreciation transmitted via the dollar-denominated component of debt at the end of the previous year—recall Note 3 and equation (2) above. This capital gain or loss is part of the cost of borrowing in $ and should be amalgamated into the effective interest rate on $ borrowing to guide decisions about borrowing in $ versus borrowing in local currency (see Box 1 in Gill and Pinto 2023 for a numerical example).

In the next section, we look at the DSA for an AE, Japan, and then for an EM, Sri Lanka, both using the new MAC SRDSF template, and both conducted in 2023. We then contrast the two DSAs to point to improvements that could be made when the DSA template is applied to EMs.

Japan and Sri Lanka could be considered outliers. We therefore emphasize that our arguments for making the 2023 MAC DSA template more relevant for EMs do not hinge on the contrast between these two countries *per se* but on the generic differences between EMs and AEs. The Japan-Sri Lanka comparison merely illustrates these differences, which pertain to macroeconomic vulnerability, the fiscal and monetary space available for preempting crises and the currency composition of public debt.

III. The 2023 MAC DSA Template: A Reality Check from the EM Perspective

We start with the 2023 DSA for Japan and then proceed to the 2023 DSA for Sri Lanka. Our goal is to illustrate the differing implications of the DSA template, not to engage in a detailed macro-debt diagnostic.

Economic Interpretation—Japan 2023 DSA

Equation (7) forms the basis for the debt decomposition (contribution to the annual change in d by the different variables driving debt dynamics) in the new DSA template. We start with Japan, using the DSA contained in IMF (2023a). The numbers are taken from the baseline DSA in Figure 4, p. 64 of IMF (2023a). Footnotes with the formulas for the contributions of the variables driving debt dynamics are absent, unlike in the old template. This would be a useful addition.

[4] Ignoring sfa is a simplification and is not meant to imply that it is unimportant. Realized contingent liabilities, mis-reported primary deficits and differences related to end-period exchange rates (used for debt stocks) versus period average exchange rates (used for debt service flows) would all feed into sfa.

We look at the one year of history provided, namely, 2021 (Exhibit A contains the DSA).

1. Change in d during 2021 was -3.3 percentage points of GDP, that is, $d_t - d_{t-1}$= -3.3, so with d in 2021 at 255.4, d in 2020 was 255.4 + 3.3 = 258.7.

2. pd for 2021 = 5.6.

3. ADD (effect of interest rates, growth rates and exchange rates) = -3.3.

4. Other identified flows = 0.0.

5. Residual = 1 – (2+3+4) = -3.3 – (5.6 – 3-3 + 0) =-5.6 (the actual change in d was 5.6 percentage points of GDP less than that predicted by the components).

The underlying debt dynamics are driven by 2 and 3 above, namely, pd and ADD. We now look at ADD. According to Exhibit A, the "real interest rate and relative inflation" contribution was 2.1, the "real growth rate" contribution was -5.4 and the "real exchange rate" contribution was zero. We take each in turn:

(i) Real interest rate contribution = $\frac{r}{(1+g)} d_{t-1}$. The "Memo" in the DSA tells us that the "effective interest rate" (nominal interest rate) was 0.6% in 2021 and inflation was -0.2%, so that 1+r = (1+0.006)/0.998, or r=0.8%. With g=2.1% and d in 2020 (t-1) at 258.7, this puts the "real interest rate" contribution at 2.03, which roughly equals the "real interest rate and relative inflation" contribution of 2.1 shown in Exhibit A, implying the relative inflation contribution was zero.

Notice also that the "real exchange rate" contribution was also zero for 2021. This is not surprising: recall from Note 4 that the relative inflation and real exchange rate contributions apply only when there is borrowing in foreign currency. **The Japanese government, in common with governments in most, if not all, AEs, borrows only in the local (home) currency. This crucial difference between AEs and EMs raises the question of whether a common DSF for both sets of countries makes sense, a topic we return to below.**

(ii) Real growth contribution = $\frac{-g}{(1+g)} d_{t-1}$. The "Memo" in the DSA tells us g = 2.2% for 2021, so that the real growth contribution was (-0.021/1.021) X 258.7 = -5.32, compared to -5.4 in Exhibit A.

Another crucial difference between AEs and EMs pertains to the vulnerability to sovereign debt crises. For an EM to have a government debt-to-GDP ratio of 255%, as in Japan, is virtually unthinkable. However, Japan has been able to avoid a crisis or even a major selloff in its Japanese Government Bonds (JGBs) in spite of repeated predictions of crisis, leading to the shorting of JGBs being described by Wall Street traders as a 'widow-maker trade', that is, a trade that could result in a catastrophic wipeout.[5] An important reason the short sale may fail is the central bank, Bank of Japan in this case, acts to prop up the price of the security either by buying it or through other means, such as taxes on short sales.

While there are many factors that could explain the resilience of Japan to a sovereign debt crisis (including high levels of foreign exchange reserves and net foreign assets) compared to an EM with the same debt levels—a topic beyond the scope of this note—the mantra that it is unwise to bet against a central bank in a major AE would not apply to EMs in general. This calls for a different set of yardsticks in gauging the vulnerability of an EM to a debt crisis compared to an AE: an EM is likely to have much less monetary policy space than an AE.

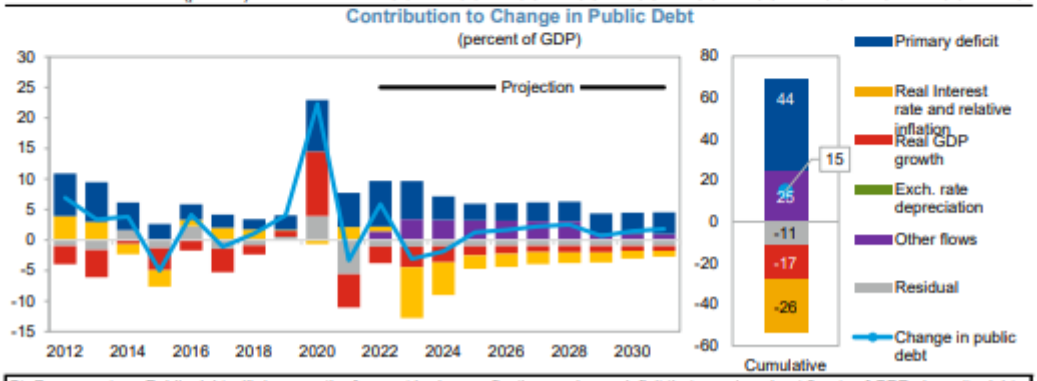
[5] Short-selling, or shorting, typically involves borrowing a security that is considered to be overvalued with the agreement to return it plus interest to the owner after a certain period. The short-seller sells the borrowed security and banks the proceeds until the time to return the borrowed security, hoping to buy it back at a lower price and thereby make a profit.

Exhibit A: Japan 2023 DSA

Figure 4. Japan: Baseline Scenario

(Percent of GDP unless indicated otherwise)

	Actual	Medium-Term projection						Extended Projection			
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Public debt	255.4	261.3	258.2	256.3	257.6	259.2	261.5	264.0	264.7	266.1	268.0
Change in public debt	-3.3	5.9	-3.1	-1.9	1.3	1.7	2.2	2.5	0.7	1.5	1.8
Contribution of identified flows		7.0	-2.0	-0.8	2.3	2.6	3.2	3.5	1.7	2.4	2.8
Primary deficit	5.6	7.5	6.2	3.8	2.7	2.9	3.1	3.2	3.4	3.5	3.6
Noninterest revenues	35.6	35.1	34.6	34.4	34.4	34.4	34.4	34.4	34.4	34.4	34.4
Noninterest expenditures	41.2	42.6	40.9	38.3	37.1	37.3	37.5	37.7	37.8	37.9	38.0
Automatic debt dynamics	-3.3	-1.9	-11.7	-8.0	-3.7	-3.4	-3.0	-2.8	-2.7	-2.1	-1.8
Real interest rate and relative inflation	2.1	0.8	-8.3	-5.4	-2.2	-2.2	-2.0	-1.7	-1.7	-1.3	-1.0
Real growth rate	-5.4	-2.7	-3.4	-2.6	-1.5	-1.3	-1.0	-1.1	-1.1	-0.8	-0.8
Real exchange rate	0.0	...	...	...	...	...	...	...	...	...	...
Other identified flows	0.0	1.4	3.4	3.3	3.2	3.2	3.1	3.1	1.0	1.0	1.0
Contingent liabilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other transactions	0.0	1.4	3.4	3.3	3.2	3.2	3.1	3.1	1.0	1.0	1.0
Contribution of residual	-5.6	-1.1	-1.1	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Gross financing needs	68.0	62.1	57.2	54.9	52.9	52.9	54.4	55.3	56.0	54.9	54.3
of which: debt service	63.4	55.7	52.0	52.1	51.2	51.0	52.3	53.0	53.6	52.3	51.7
Local currency	63.4	55.7	52.0	52.1	51.2	51.0	52.3	53.0	53.6	52.3	51.7
Foreign currency	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Memo:											
Real GDP growth (percent)	2.1	1.1	1.3	1.0	0.6	0.5	0.4	0.4	0.4	0.3	0.3
Inflation (GDP deflator; percent)	-0.2	0.3	3.8	2.6	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Nominal GDP growth (percent)	1.9	1.3	5.2	3.7	1.9	1.8	1.7	1.7	1.7	1.6	1.6
Effective interest rate (percent)	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.8	1.0



Staff commentary: Public debt will rise over the forecast horizon, reflecting a primary deficit that remains about 3 ppts of GDP above its debt stabilizing level in 2031.

Source: IMF (2023a).

Economic Interpretation—Sri Lanka 2023 DSA

We now look at the DSA for Sri Lanka contained in IMF (2023b). This DSA was done following Sri Lanka's debt default in May 2022 and incorporates a "Restructuring Scenario"—see Exhibit B. Our goal is not to analyze the adequacy of the restructuring but simply to illustrate how a DSA for an EM differs from that for an AE, and this is the context in which we use the Sri Lanka DSA in Exhibit B.

Once again, we look at the one year of history provided, this time, for 2022.

1. Change in d during 2022 was +13.8 percentage points of GDP, that is, $d_t - d_{t-1}$= +13.8, so with d in 2022 at 128.1, d in 2021 was 128.1 – 13.8 = 114.3.

2. pd for 2022 = 3.6.

3. ADD (effect of interest rates, growth rates and exchange rates) = 4.3.

4. Other identified flows = 0.0.

5. Residual = 1 – (2+3+4) = 13.8 – (3.6 + 4.3 + 0) = +5.9 (the actual change in d was 5.9 percentage points of GDP more than that predicted by the components).

The underlying debt dynamics are driven by 2 and 3 above, namely, pd and ADD. We now look at ADD. According to Exhibit B, the "real interest rate and relative inflation" contribution was -14.8, broken down into a real interest rate contribution of -31.6 and a relative inflation contribution of +16.8, the "real growth rate" contribution was +10.8 and the "real exchange rate" contribution was 8.3. We take each in turn:

(i) Real interest rate contribution = $\frac{r}{(1+g)} d_{t-1}$. The "Memo" in the DSA tells us that the "effective interest rate" (nominal interest rate) was 9.7% in 2022 and inflation was 46.6%, so that 1+r = (1+0.097)/1.466, or r = -25.17%. With g = -8.7% and d in 2021 (t-1) at 114.3, this puts the "real interest rate" contribution at – [0.2517/(1-0.087)]X114.3 = -31.51, close to -31.6 shown in Exhibit B.

(ii) The "relative inflation" contribution is 16.8. The formula is given by the last term of the RHS in equation (7) above, but the background information is not available in Exhibit B to reproduce this result.

(iii) Real growth contribution = $\frac{-g}{(1+g)} d_{t-1}$. The "Memo" in the DSA tells us g = -8.7% for 2022, so that the real growth contribution was (+0.087/0.913)X114.3 = +10.89, compared to +10.8 in Exhibit B.

(iv) Real exchange rate contribution is +8.3. The formula is given by the third term on the RHS of (7) above, but once again, the DSA does not contain the background data.

The composite real interest rate: A crucial question for an EM like Sri Lanka is how we would assess whether the public debt-to-GDP ratio is on a sustainable trajectory based on the standard parameters of pd and (r-g). To do this, we would need to calculate r as in a single-currency environment, as for Japan. In other words, the "r" so calculated would need to fully include the impact of currency depreciation on the $-denominated portion of public debt. This capital gain/loss effect would need to be added on to the r in the IMF's DSA template.

The IMF's r is obtained in two steps: first, divide total interest payments on public debt in local currency terms (the sum of interest payments on local currency debt and $ debt expressed in local currency terms) by the total debt stock, also expressed in local currency, at the end of the previous year. This would give us what the IMF's DSA template calls the "effective interest rate", which is a nominal rate, denoted *i*, corresponding to equation (3) above. Second, adjust this nominal rate for inflation (based on the GDP deflator for the EM) to get the IMF's r (see equation (6) and related commentary).

The 'r' we are interested in is different. It would add on the capital/gain loss from currency depreciation to the sum of interest payments before dividing by the debt stock at the end of the previous year to obtain the nominal interest rate, which we denote i^c, or the *composite* nominal interest rate, to distinguish it from the *i* of the previous paragraph. i^c can be adjusted for inflation in exactly the same way to get the composite real interest rate, r^c, which is comparable to the real interest rate in a single-currency environment. In this case, ADD is given by the formula:

(8) $ADD = \frac{r^c - g}{(1+g)} d_{t-1}$.

This expression for ADD is simply the sum of the last three terms on the RHS of equation (7), that is, everything other than pd, and equivalently, everything on the RHS of equation (6) other than pd. We can use (8) in conjunction with the information given in Exhibit B to solve for r^c for Sri Lanka in 2022 with ADD

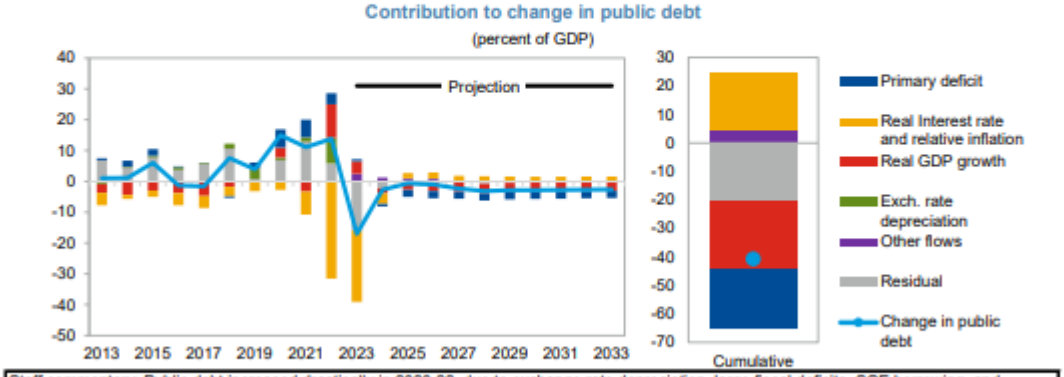
= 4.3, g = -8.7% and d in 2021 = 114.3. This gives r^c = -5.27%. This is the equivalent of a real interest rate in a single-currency environment, and this can be cross-checked by calculating its contribution to the change in d using the formula $\frac{r^c}{(1+g)} d_{t-1}$, giving - 6.6 percentage points of GDP, which, by construction, equals the sum of the real interest rate, relative inflation and real exchange rate contributions in Exhibit B: -6.5=-31.6+16.8+8.3.

Exhibit B: Sri Lanka 2023 DSA

Table 4. Sri Lanka: Baseline Scenario (Restructuring Scenario)

(Percent of GDP unless indicated otherwise)

	Prel.	Medium-term projection						Extended projection				
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Public debt	128.1	111.2	108.5	107.8	106.8	104.4	101.3	98.5	95.6	92.8	90.1	87.5
Change in public debt	13.8	-17.0	-2.7	-0.7	-1.0	-2.4	-3.1	-2.8	-2.8	-2.8	-2.7	-2.7
Contribution of identified flows	7.9	-1.0	-0.4	-1.1	-1.4	-2.2	-2.3	-2.3	-2.4	-2.4	-2.3	-2.3
Primary deficit	3.6	0.7	-0.8	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3
Noninterest revenues	8.4	10.9	13.3	14.9	15.0	15.1	15.1	15.1	15.1	15.1	15.1	15.1
Noninterest expenditures	12.0	11.6	12.5	12.6	12.7	12.8	12.8	12.8	12.8	12.8	12.8	12.8
Automatic debt dynamics	4.3	-4.2	-0.9	0.7	0.3	0.1	0.0	0.0	-0.1	-0.1	0.0	0.0
Real interest rate and relative inflation	-14.8	-8.2	0.8	3.4	3.5	3.3	3.1	3.0	2.8	2.8	2.8	2.7
Real interest rate	-31.6	-23.2	-3.4	1.7	1.9	1.8	1.7	1.6	1.5	1.5	1.6	1.6
Relative inflation	16.8	14.9	4.2	1.7	1.5	1.5	1.5	1.4	1.3	1.3	1.2	1.2
Real growth rate	10.8	4.0	-1.6	-2.8	-3.1	-3.2	-3.1	-3.0	-3.0	-2.9	-2.8	-2.7
Real exchange rate	8.3	...	...	...	...	...	...	...	...	...	...	...
Other identified flows	0.0	2.5	1.2	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contingent liabilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other transactions	0.0	2.5	1.2	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contribution of residual	5.9	-16.0	-2.3	0.4	0.4	-0.1	-0.8	-0.5	-0.4	-0.4	-0.4	-0.4
Gross financing needs	34.5	26.6	17.9	15.4	15.9	14.2	13.1	14.0	12.2	12.5	12.2	11.5
of which: debt service	30.9	25.9	18.7	17.7	18.2	16.5	15.4	16.3	14.5	14.8	14.5	13.8
Local currency	21.5	21.3	14.5	13.1	14.9	13.0	11.1	11.9	10.0	10.3	10.2	9.8
Foreign currency	9.4	4.6	4.2	4.5	3.3	3.5	4.3	4.3	4.5	4.4	4.3	3.9
Memo:												
Real GDP growth (percent)	-8.7	-3.0	1.5	2.6	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Inflation (GDP deflator; percent)	46.6	30.0	10.7	5.6	5.2	5.1	5.0	5.0	5.0	5.0	5.0	5.0
Nominal GDP growth (percent)	33.9	26.0	12.3	8.3	8.4	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Effective interest rate (percent)	9.7	7.2	7.2	7.3	7.2	6.9	6.7	6.7	6.7	6.7	6.8	6.9



Staff commentary: Public debt increased drastically in 2020-22, due to exchange rate depreciation, large fiscal deficits, SOE borrowing, and external borrowing by the Central Bank. In the near term, inflation and contribution from creditors will lead to a sizable drop in public debt. The debt reduction over the longer term rests on continued fiscal discipline.

Source: IMF (2023b).

Our quest does not end here. First, the impact of currency depreciation alone *added* 16.8+8.3 = 25.1 percentage points of GDP to d in 2022 (the sum of the relative inflation and real exchange rate effects,

recall Note 4 above). But overall, the composite real interest rate *lowered* d by 6.5 percentage points of d, suggesting a highly negative real interest rate on local currency debt that outweighed a highly positive real interest rate (inclusive of the capital loss from currency depreciation) on $ debt.

These effects need to be quantified by breaking r^c down into its local currency and $ components. To do this, we would need to have the share of $ debt at the end of 2021, the depreciation of the Sri Lankan rupee (LKR) against the $ based on end-year exchange rates and the "effective interest rate" broken down into its LKR and $ components. Such information would capture the vulnerability of the government's balance sheet to currency collapses on account of $-denominated debt, a vulnerability AEs are typically not subject to.

The formulas for the composite nominal (i^c) and real (r^c) interest rates and the breakdown of the composite real interest rate into its local currency (L) and foreign currency ($) components are given below, drawing on equation (6) above and related commentary:

(9) $i^c = (1-\alpha)i^L + \alpha[i^{\$}(1+\varepsilon)+\varepsilon] = (1-\alpha)i^L + \alpha i^{\$,L}$,

where $i^{\$,L}$ is the local currency equivalent of the interest rate on $-denominated debt, $i^{\$}$, translated into local currency terms using the formula in square brackets on the RHS of (9).[6] And:

(10) $r^c = \frac{1+i^c}{1+\pi^L} - 1 = \frac{i^c-\pi^L}{1+\pi^L} = (1-\alpha)\frac{(i^L-\pi^L)}{1+\pi^L} + \alpha\frac{(i^{\$,L}-\pi^L)}{1+\pi^L} = (1-\alpha)r^L + \alpha r^{\$,L}$,

where r^L and $r^{\$,L}$ are the real interest on local currency debt and on $-denominated debt translated fully into local currency terms and including the capital loss on $-denominated debt as the result of currency depreciation. Pulling things together, we can write:

(11) $d_t - d_{t-1} = pd_t + [\frac{r^c-g}{1+g}]d_{t-1}$,

and by comparison with equation (6), $r^c = r + \frac{\alpha\varepsilon}{1+\pi^L}$, which can be directly verified using the information in equations (3), (9) and (10).

NB: $i^L$and $i^{\$}(1+\varepsilon)$ are notional interest rates calculated, respectively, by dividing interest payments on local currency debt for year t by the local currency debt stock at the end of (t-1) and on $-denominated debt assumed to be paid in local currency at the end of year t divided by the $ debt stock expressed in local currency at the end of the previous year, (t-1).[7]

A final note to conclude this section: the residuals both for Japan (-5.6% of GDP in 2021) and Sri Lanka (+5.9% of GDP in 2022) are significant and it would be worthwhile to provide some explanation.

IV. Suggestions for Improvement of the 2023 MAC DSA Template

The 2023 IMF MAC DSA template could be usefully modified to account for the special needs of EMs relative to AEs.

- First, it would be useful to compute the composite real interest rate to mimic a single-currency environment to get an idea of the sustainability of the trajectory of d based on pd and r-g.

[6] Suppose the initial exchange rate is 1 and $100 is borrowed for one year at 4% ($i^{\$}$) and the currency depreciates by 10% (ε=0.1) to 1.1 a year later when the interest and principal are due. Then the interest payment of $4 becomes 4.4 in local currency terms while the principal is now 110, implying a total effective interest rate in local currency terms of 14.4/100 = 0.144=0.04X1.1 + 0.1, or 14.4%. This is essentially the expression in square brackets on the RHS of (9) and is denoted $i^{\$,L}$. See Box 1 in Gill and Pinto (2023) for a complete explanation.

[7] Once again, please see Box 1 in Gill and Pinto (2023).

- Second, the "relative inflation" and "real exchange rate" components of automatic debt dynamics in the new template add little by way of policy insight while requiring additional information on the bilateral real exchange rate relative to the US as well as inflation differentials. These two components capture the capital loss from currency depreciation on $-denominated debt and should be amalgamated into the cost of $ debt to guide borrowing decisions, with the "relative inflation" and "real exchange rate" components dropped from the DSA.
- Third, the contribution of the composite real interest rate to the change in the debt-to-GDP ratio should be broken down into its local currency and $ components to get a better idea of debt dynamics and to guide borrowing decisions. Notice that the composite real interest rate and its breakdown into its L and $ components embody market signals on default risk and these would be worth an explicit discussion.
- Fourth, the DSA should include a few more years of history to help readers without access to the underlying data files. It should also add information on the shares of local and $-denominated debt in total public debt, on the notional nominal interest rates on these two components of debt calculated (as discussed in section III) and currency depreciation based on end-year exchange rates to the "Memo" section of the DSA.

Table 1 summarizes the suggested changes in the 2023 MAC DSA template.

Table 1: Summary of Suggested Changes in the 2023 MAC DSA Template

2023 MAC DSA Template	Suggested Changes
Public Debt	**Public Debt**
	% Foreign ($) ($\alpha$)
	% Local currency ($1-\alpha$)
Automatic Debt Dynamics. Contribution from:	**Automatic Debt Dynamics. Contribution from:**
Real interest rate and relative inflation	Composite real interest rate ($\frac{r^c}{1+g} d_{t-1}$)
Real interest rate	*Local currency* ($(1-\alpha)\frac{r^L}{1+g} d_{t-1}$)
Relative inflation	*Foreign ($)* ($\alpha \frac{r^{\$,L}}{1+g} d_{t-1}$)
Real growth rate	Real growth rate ($-\frac{g}{1+g} d_{t-1}$)
Real exchange rate	
Memo:	**Memo:**
Real GDP growth (percent)	Inflation (GDP deflator, percent)
Inflation (GDP deflator, percent)	Nominal GDP growth rate (percent)
Nominal GDP growth rate (percent)	($r^c - g$) percentage points
Effective interest rate (percent)	Effective (nominal) interest rate (percent)
	Local currency (i^L)
	Foreign ($) ($i^{\$}(1+\varepsilon)$)

Note: The formulas in the second column come from the various equations in the text above.

A last set of suggestions pertains to the "realism tools" and risk assessment in the MAC SRDSF, which has two parts: an assessment of near-term stress and one of medium-term risk based on fan charts.

The goal of the realism tools is to avoid excessive optimism or pessimism on underlying macroeconomic projections in the baseline scenario. We have two suggestions here. The first suggestion is to restrict the set of comparator countries to EMs and leave AEs out. While the econometrics underlying the SRDSF attempt to control for differences between EMs and AEs in terms of borrowing structure and vulnerability, the differences are vast, especially in terms of sustainable debt levels. One possibility is to have a single framework for LICs and MICs, that is, for all emerging market and developing economies (EMDEs), with a separate one for AEs. As argued in Gill and Pinto (2023), the LIC DSF was designed for a time when public debt was virtually synonymous with concessional external debt from donors so that debt sustainability was delinked from market sentiment. The big shift in LICs to market borrowings both in the domestic market and overseas has therefore rendered the existing LIC DSF with its focus on the net present value (NPV) of public and publicly guaranteed (PPG) external debt at an arbitrary discount rate of 5% obsolete: four out of the five debt distress indicators in the LIC DSF pertain to PPG external debt. This may be the time to debate whether a separate DSF for LICs is needed at all or whether a unified framework for all EMDEs, which looks at public debt dynamics in terms of d, pd and (r-g) makes sense: concessionality in LIC borrowing will be reflected in the level of the composite real interest rate and its dollar component.

The second suggestion is to do a deeper dive into r and its components. The purpose of the composite real interest rate is to mimic a single-currency environment so that debt dynamics in EMs can be based on d, pd and (r-g) as in AEs. Any concern that this would hide information is counterbalanced by the recommendation that the impact of the composite interest rate on debt dynamics be broken down into components attributable to the real interest rate on local currency debt and that on FX debt, as shown in Table 1 in the previous section and discussed in the Sri Lankan context in the two paragraphs following Exhibit B. A good starting point would be the composite nominal interest rate as set out in equation (9) and its local currency and $ components. The latter would require exchange rate projections—as do the realism tools, see Figure 10, IMF (2022). In our view, incorporating the exchange rate effect into the $ cost of borrowing is helpful because it tells us the effective, overall cost of such borrowing, enabling a comparison with local currency borrowing.[8] Likewise, projecting nominal GDP growth G would be helpful. These variables can all be converted into real terms using the GDP deflator.

The advantage of going the nominal route and then converting into real terms is that it lends greater transparency to what is driving debt dynamics: is it nominal interest rates and growth, or inflation? If inflation is above target, then the question of sustainability will arise, for example, if monetary policy tightening is needed. Besides, the identity $\frac{i^c-G}{1+G} = \frac{r^c-g}{1+g}$ can be made use of.

Our main comment on the Logit Stress Probability (LSP) model to gauge the probability of near-term stress (section V, IMF 2022) is that this could be usefully complemented with judgment based on d, pd and (r-g), especially for EMs, which have far less fiscal and monetary space than AEs. For example, based on past EM crises—the Russian Federation in 1998, Argentina in 2001—we know that d rising significantly above say 60% with a large primary deficit and r-g>0 spells trouble. This could be supplemented with information on market signals contained in domestic real interest rates and sovereign Eurobond spreads. Such simple analysis would convey whether d is on an explosive path or not and provide early warning about a potential crisis.

This thought carries over into the fan charts constructed as part of assessing medium-term risk (section VI, IMF 2022). First, we do not see any merit in predicting variables such as z (the bilateral real exchange rate) or inflation differentials with the US (recall from Note 4 that, when combined, these two effects add up to the capital gain/loss from $ debt because of exchange rate movements). Not only does this add to the information requirements, it makes the DSA less transparent. Knowing whether the real exchange

[8] Of course, with open capital accounts, we would expect some arbitrage across borrowing costs in local currency and $ averaged over time. But the latter is riskier because of the volatility of exchange rates and balance sheet effects: a government with heavy exposure to $ debt might put pressure on the central bank not to let the currency depreciate as when there is a negative terms-of-trade shock, for example.

rate is overvalued is important both from the current account balance and balance sheet currency mismatch perspective, but this will be reflected in projections of the nominal exchange rate.

Lastly, liquidity is assessed in terms of gross financing requirements (GFN), or the sum of the fiscal deficit and maturing principal. For EMs, including international liquidity would be helpful because a shortage of foreign exchange reserves combined with a negative shock could accentuate rollover problems. The so-called May 2013 "taper tantrum" is a case in point. Mere mention that the US Fed was poised to begin reducing asset purchases under its quantitative easing program led to a selloff in US government bonds with contagion spreading to EMs. Five large EMs were judged particularly vulnerable by the markets at that time, based on high ratios of the sum of the current account deficit plus short-term external debt (original maturity less than a year plus maturing principal of long-term debt) to foreign exchange reserves.[9]

Another important aspect of liquidity pertains to the average maturity of debt, which is likely to be much shorter in EMs, giving less time to adjust to a shock. Blanchard, Felman and Subramanian (BFS 2021) point out that EMs must raise primary surpluses faster than AEs in response to a rise in borrowing costs because their debt has shorter maturity. Hence, a rise in marginal borrowing cost feeds into the average interest rate, on which debt dynamics depend, faster. More generally, BFS make a strong case that EMs have less fiscal policy space than AEs for various reasons, including weaker fiscal and monetary policy institutions, smaller governments relative to GDP—calling for a proportionally larger budget adjustment for a given reduction in the primary deficit as a percentage of GDP—and greater risk from contingent liabilities.

V. Summary of Recommendations

EM governments typically borrow both in local and foreign currencies, are more vulnerable to sovereign debt crises and have less fiscal and monetary policy space than their AE counterparts. It would therefore make sense to have a separate DSF and DSA template for EMs. It would also be worthwhile to explore a common template for EMs and LICs given the shift to market borrowings in LICs with market sentiment now playing a big role in their debt sustainability, as set out in Gill and Pinto (2023).

The main modification we recommend in the 2023 DSA template from the EM perspective is to include the calculation of a composite real interest rate broken down into its local and foreign currency components to enable a better understanding of debt dynamics based on primary deficits and (r-g), and guide borrowing costs.

In addition, the DSA should include historical time series on primary deficits, the composite real interest rate and its local and foreign currency components, growth rates, and a discussion of contingent liabilities. If residuals have been historically high, some explanation should be provided. Lastly, the simulations going forward should be based on the stochastic properties of these variables and the comparator countries for cross-checks should be restricted to EMs.

[9] These EMs were Brazil, India, Indonesia, Türkiye, and South Africa.

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