
# Local-Currency sovereign risk on South African government bonds

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**Abstract**

While local-currency bond markets have become a dominant source of emerging-market financing and an integral component of the global financial system, market-observed measures of sovereign default risk are still based on foreign-currency denominated debt. This note replicates and assesses the Du-Schreger credit risk spread on local-currency debt for South Africa for the period between January 2008 and December 2021. This credit spread is found to be a good measure of local-currency sovereign risk for South Africa during the period under review as it captures the evolution in key developments relevant to domestic sovereign risk while being less responsive than market-based measures to global developments that are not directly linked to fiscal risk.

*JEL classifications: F34, G12, G15, H63*

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# 1 Introduction

Local-currency bond issuance has become a dominant source of financing for many emerging markets (EMs) in response to the financial crises these economies experienced in the 20th century. In the post-Great Financial Crisis era of ultra-low developed-market interest rates, the EM local-currency bond market has also become a more important destination for international-investor portfolio flows as well as a more integral component of the global financial system. Despite these developments, however, the market's pricing of EM sovereign default risk is still derived from the foreign-currency denominated component of these borrowers' debt portfolios.

In this note, I replicate the local-currency credit spread developed by Du and Schreger (2016) for South Africa, which was not included in the original study, for the period between January 2008 and December 2021. I then compare this measure to market-based measures of credit risk, namely the CDS spread and EMBI+ spread, for a period during which South African sovereign risk experienced several shocks. I find that the Du-Schreger risk spread is a good measure of local-currency credit risk for South Africa during the period under review, and it captures the upward trend in South Africa's sovereign risk since 2017. The measure has strong co-movement with market-based measures of sovereign risk on domestic developments, with the added advantage of being less responsive to external developments that are not directly related to domestic fiscal risk. In its consideration of market-based measures of default risk, the note is compared with Soobyah and Steenkamp (2020) who use the CDS spread to extract a domestic measure of the sovereign risk premium.

# 2 Literature review

Historically, financial crises in EMs have often been associated with a country's external obligations. One of the main vulnerabilities of EM financial systems that has contributed to previous crises has been 'original sin', defined by Eichengreen et al. (2003) as the inability of a country to borrow abroad in its currency. When a country's debt obligations are in foreign currency, a real exchange rate depreciation increases its debt servicing costs in terms of its home currency, which may render its debt service burden unsustainable and lead to default as happened in the 1980s Latin American debt crisis and the 1997 Asian crisis (Corsetti et a., 1999).

From the mid-1990s, EMs steadily developed their local currency bond markets with the intention of enhancing financial stability by reducing their vulnerabilities to external shocks. The change in the currency composition of EM debt, however, has only introduced a new set of vulnerabilities for these economies. As discussed by Hofmann et al. (2020), this is because EMs

typically have a smaller domestic institutional investor base, such that their debt markets rely more on foreign investor participation, regardless of the currency in which debt issuances are denominated. If foreign portfolio investors evaluate their returns in hard currency such as the United States (US) Dollar, then unhedged positions will make their holdings of EM local-currency bonds more sensitive to measures of risk. This reinforces exchange rate depreciations and in widening of bond spreads in times of financial turmoil, with real impacts on the functioning of EM financial markets (Korinek, 2011). Carstens and Shin (2019) refer to this shift in currency mismatches from the borrower to lender's balance sheet as 'original sin redux'. Empirically, Ebeke and Lu (2015) find that foreign investor participation in local currency bond markets contributes to higher yield volatility. Moreover, the post-Great Financial Crisis era, with unconventional monetary policy and ultra-low interest rates in advanced economies, has seen a steady increase in dollar-denominated bond issuance by long-standing EM corporate borrowers as well as smaller sovereign issuers that previously had no access to capital markets (McCauley, McGuire and Sushko, 2015), such that the nature of original sin has shifted but remains prevalent in debt markets.

Another possible reason why the development of local currency bond markets was expected to make EMs more resilient was that the transition from foreign to local currency sovereign debt issuance was expected to eliminate the problem of sovereign default risk. The literature on sovereign debt has often assumed that a government cannot default on its local currency debt, as it can simply inflate the nominal value of its debt burden away (Reinhart & Rogoff, 2011). However, some scholars have recently argued that the assumption that governments do not default on the local currency debt is extreme, as there may be circumstances under which it would be optimal for a government to default on its debt rather than inflate it away, as in Russia in 1998. Reinhart and Rogoff (2011) catalogue historical episodes of default on domestic debt by advanced economies and EMs showing that the assumption that governments always honour their domestic obligations is unwarranted.

Also relevant are the measures used to observe sovereign risk. While a few studies such as Amstad et al. (2020) use ratings assigned by major credit rating agencies as a measure of credit quality, most analyses rely on market-based credit risk spreads or indices such as the credit default swap (CDS) spread or the JP Morgan emerging markets bond spread (EMBI+). The drawback with these market-based measures is that they are indicators of the risk of default on foreign-currency denominated debt, whereas an increasing share of the sovereign debt burden among EMs is local-currency denominated. To the extent that local- and foreign- currency

sovereign risks are different, these measures may be unsuitable indicators of sovereign risk for certain purposes. Indeed, Amstad et al. (2020) find that the drivers of sovereign risk differ depending on the currency denomination of the debt, with a sovereign's local-currency denominated debt mostly affected by domestic factors such as inflation and banks' holdings of government debt while foreign-currency denominated debt is more affected by external indicators such as foreign reserve accumulation, exchange rate volatility and the sovereign's proportion of debt denominated in foreign currency. Furthermore, risk measures based on foreign-currency denominated debt may also be more sensitive to external developments that affect exchange rate markets. For instance, Longstaff et al. (2011) decompose CDS spreads into different premia and demonstrate that CDS spreads are driven more by global market factors and investment flows than country-specific fundamentals.

To address the shortcomings associated with CDS and index spreads as measures of sovereign risk, Du and Schreger (2016) (Du-Schreger) introduce a local-currency credit risk spread for sovereigns which captures the credit risk component of local-currency denominated debt. They estimate this local-currency sovereign risk spread for a sample of ten countries between 2005 and 2014 using the yield on a country's sovereign benchmark bond and the US Treasury yield of similar maturity. The measure is found to be lower than the country's foreign-currency credit risk spread, and less correlated with global risk factors and the credit spreads of other countries. This local currency credit risk spread can then be used to assess the impact of changes in sovereign risk on other macroeconomic variables.

## 3. Estimating the local currency credit spread

Du-Schreger use the covered interest parity (CIP) condition to develop a measure of local currency credit risk for a sample of emerging market countries, where the base country is the US. The CIP condition can be stated as

$$y_{nt}^{SA} = y_{nt}^{US} + \rho_{t,t+n} + x_{t,t+n}^{SA-US}$$

where, for instance, $y_{nt}^{SA}$ and $y_{nt}^{US}$ are the nominal *n*-year interest rates for South Africa and the S respectively at time *t*, $\rho_{t,t+n}$ is the *n*-year FX forward premium from time *t*, and $x_{t,t+n}^{SA-US}$ is the CIP deviation when the condition does not hold. Du-Schreger interpret this CIP deviation among EMs as a measure of local currency credit risk for that country relative to the US, which is taken to be free of credit risk.

I follow Du-Schreger and interpret the CIP deviation as the local currency credit risk premium. I replicate their premium for South Africa, which was not in the original study but

available from the study's updated data appendix. I estimate it at a daily frequency for the period January 2008 to December 2021. In line with Du-Schreger, I use a benchmark tenor of five years.

While the updated data appendix includes the credit spread for South Africa from January 2008, I choose to replicate the spread using their methodology rather than using the spreads available in the appendix for two reasons. First, I do the replication exercise as a simple cross- check of the methodology described in the original Du-Schreger (2016) study. This exercise is also beneficial in that it provides insight regarding how the different components in the credit spread contribute to certain peculiarities in the credit spread. Secondly, some of the data appendix's descriptions of the instruments used in the credit spread construction are quite vague, potentially resulting in differences between the measure derived by Du-Schreger and a replication; I therefore construct a credit spread to provide certainty about which instruments are used for each component of the spread.

The local currency credit spread (LCCS) can be stated as

$$S_{nt}^{LCCS} = y_{nt}^{LC} - y_{nt}^{*LC} = y_{nt}^{LC} - (y_{nt}^{*\$} + \rho_{nt})$$

Where $y^{LC}$ is the zero-coupon yield on the $n$-year local currency nominal sovereign bond, $_{nt}$ $y_{nt}^{*LC}$ is the n-year local currency nominal risk-free rate and $y_{nt}^{*\$}$ is the zero-coupon yield on the n- year nominal US Treasury bond. The n-year local currency risk-free rate is defined as the sum of the zero-coupon nominal UST yield and the n-year forward premium, that is

$$y_{nt}^{*LC} = y_{nt}^{*\$} + \rho_{nt}$$

I note that the forward premium is the normalised difference between the forward and spot exchange rate for a given tenor, that is

$$\rho_{t,t+n} = \frac{1}{n}\left(f_{t,t+n} - s_t\right)$$

However, given that the FX forward market is generally illiquid past the 1-year tenor, there may be mispricing errors in the forward premium of longer maturities owing to the lack of liquidity in that market. To allow for this, I follow market convention as in Du et al. (2018) and calculate the 5-year forward premium as

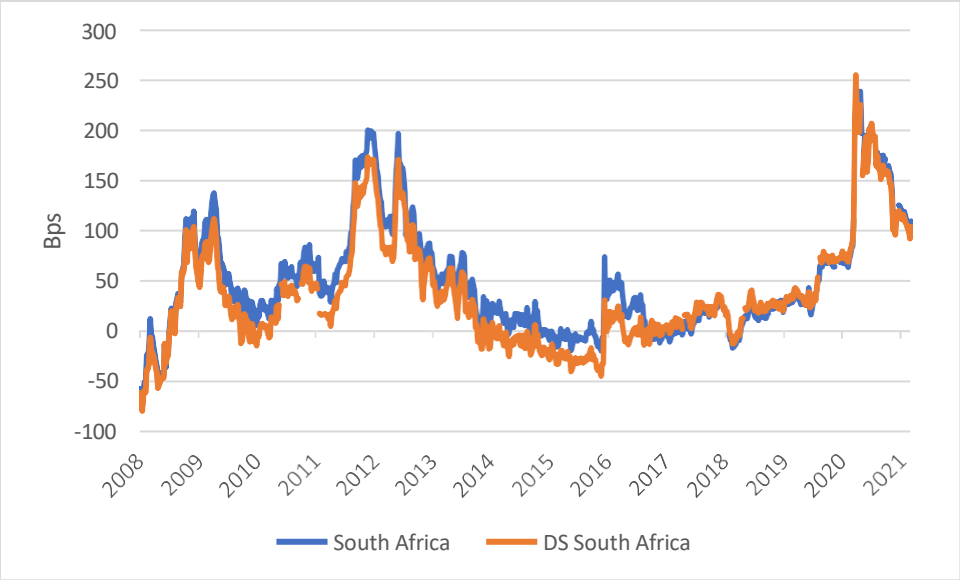
$$\rho_t = IRS_t^{ZAR} + CCB_t^{ZAR-USD} - IRS_t^{USD}$$

Where $IRS_t^{ZAR}$ is the 5-year ZAR fixed-for-float interest rate swap, $CCB_t^{ZAR-USD}$ is the 5-year ZAR-USD cross-currency basis swap, and $IRS_t^{USD}$ is the 5-year USD fixed-for-float

interest rate swap. I use Bloomberg data for the zero-coupon sovereign yields and swap rates.

Figure 1 depicts the local currency credit spread I estimate as well as the measure as calculated by Du-Schreger in the updated data appendix. My estimate appears to approximate the Du- Schreger measure well, with very similar levels and strong co-movement between the two series throughout the period under review. There are a few divergences where my estimate spikes relative the Du-Schreger measure; this is explained by spikes in the underlying data, whether that is in the South African IRS or the zero-coupon yield. Notably, the co-movement between the two series remains intact even during periods of market stress, as in the COVID- 19 induced market shock of early 2020. Therefore, to the extent that the Du-Schreger estimate is a good proxy for the local currency credit risk of an EM, my replicated measure is also robust.

**Figure 1: LCCS estimates with Du-Schreger measure**



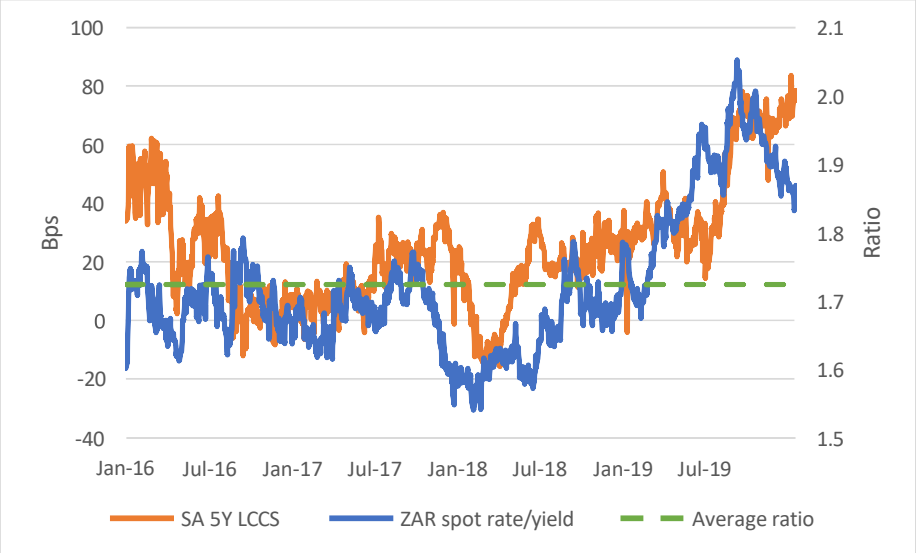

Source: authors' calculations, Du-Schreger (2021)

The LCCS also appears to be a good measure of local-currency sovereign risk. In particular, the LCCS reflects a downward trend in the pricing of sovereign risk from 2012 when South Africa was first included in the World Government Bond Index and foreign investors started increasing their exposure to South African government bonds. It also reflects the steady upward trend in sovereign risk from late 2015, when fiscal risk became a dominant concern among investors in South African government bonds. Moreover, the trend of the LCCS broadly tracks the South African financial cycle during the period under review (Farrell & Kemp, 2020), in line with the expectation that risk premia would increase amid tightening domestic financial conditions. The LCCS therefore captures domestic fiscal developments that would be relevant to

the sovereign risk of local-currency denominated debt during the period under review.

One important consequence of using a longer time period in this study than Du-Schreger is the greater variance in levels observed of the LCCS. Specifically, I note that the LCCS can be negative, particularly in periods when the EM's spot exchange rate is strong and thus low relative to the local currency nominal yield. For instance, Figure 2 shows that the LCCS was negative when the ratio of the spot exchange rate to the 5-year zero coupon yield was lower than the average for the period. A negative credit risk premium for an EM is difficult to interpret and is not addressed in Du-Schreger (2016). Given this challenge, using changes in the LCCS to analyse the evolution of the sovereign risk spread over time as opposed to its level would arguably be more reasonable.

**Figure 2: South Africa's LCCS and ratio of spot FX rate to sovereign yield**




Source: author's calculations, Bloomberg Finance LP

## 4. Comparing the LCCS with measures of sovereign risk

Having established that this study's LCCS is a good replication of Du-Schreger and also a good measure of local-currency sovereign risk, I now consider how local-currency credit risk compares with market-based measures of sovereign risk. Given that market measures of sovereign risk are still based on foreign-currency denominated despite the growth of EM local-currency bond markets, I compare my LCCS estimate to widely-observed foreign- currency measures of sovereign risk, specifically the CDS spread and the EMBI+ spread. These measures of sovereign default risk are based on the default risk on USD-denominated bonds. While the benchmark CDS spread is based on the cost of insuring against a borrower's default over a 5-year

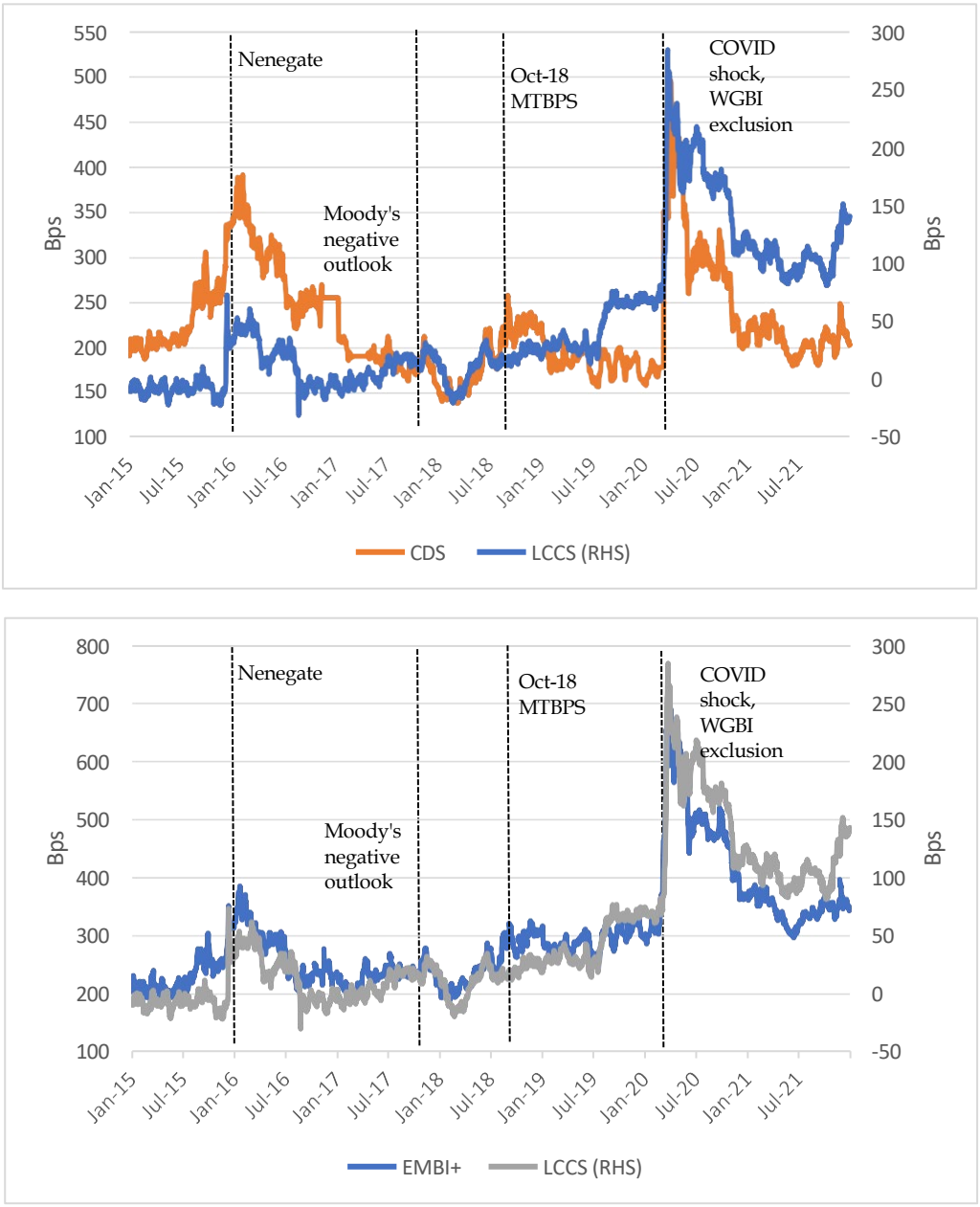
horizon, the EMBI+ measure is the yield spread of a basket of USD-denominated debt issued by the borrower over US Treasuries.

As noted in Du-Schreger, a key difference between the LCCS on one hand and both the CDS spread and the EMBI+ spread on the other is that the latter are measures of default risk on USD-denominated debt, which Amstad et al. (2020) show has different default drivers than local-currency-denominated debt, whereas the LCCS measures the credit risk on local- currency denominated debt. Furthermore, there is evidence that CDS spreads reflect global rather than domestic factors to a large extent (Longstaff, 2011). Nonetheless, my LCCS estimate should broadly move in line with both the CDS spread and EMBI+ spread on domestic or global developments that would affect the willingness or ability of the sovereign to service its debt.

Figure 3 shows the co-movement of the LCCS with the CDS spread and EMBI+ spread, respectively. I focus on the period January 2015 to December 2021 where sovereign risk underwent significant changes in response to several fiscal and political events that had a notable impact on financial markets. Notably, the range of the CDS and EMBI+ spreads are 139 to 497 basis points and 186 to 712 basis points respectively, while the LCCS has a lower range of -30 to 285 basis points. This is as expected, as the risk of default by a sovereign in its own currency would be lower than the default risk on foreign-currency denominated debt, as also found in Du-Schreger. Additionally, as illustrated by the highlighting of key developments during the period under review, the LCCS reflects these developments in the expected manner, such as the gradual increase in the risk spread following the downgrade in South Africa's rating outlook to negative by the credit rating agency Moody's in November 2017.

The LCCS generally exhibits the same trend as both measures, though the correlation differs between the CDS and EMBI+ spread. The LCCS spikes in line with large increases in both the CDS and EMBI+ spread, with the degree of volatility more comparable to the EMBI+ spread than the CDS spread. In particular, the rise in sovereign risk following the ousting of the Minister of Finance in December 2015 ("Nenegate") as measured by the LCCS was more in line with the increase in the EMBI+ spread, while the CDS spread rose to a larger extent and remained elevated for longer. The partial post-COVID shock recovery in the LCCS from its peak in late March 2020 is also more in line with the EMBI+ which also remained higher than its pre-COVID levels, as opposed to the CDS spread which broadly recovered to pre-COVID levels. This partial recovery in the LCCS is in line with the deterioration in South Africa's fiscal metrics following the onset of the COVID-19 pandemic, including an increase in the government debt burden and a steeper sovereign yield curve.

**Figure 3: LCCS estimates with CDS spreads**




Sources: author's calculations, Bloomberg Finance LP

While the CDS and EMBI+ spreads exhibit strong co-movement with the LCCS on domestic developments directly affecting sovereign risk, there are some notable instances when these market-based measures diverge from the LCCS. Both the CDS and EMBI+ spreads surge in September 2015, a period during which EMs sold off amid growing risk aversion following China's devaluation of the Renminbi and growing concerns about that country's economic outlook. By contrast, the LCCS remains steady during the period and only surges in December 2015. The CDS and EMBI+ spreads diverge again from the LCCS in early August 2018. During this period, there were no notable developments that would affect the sovereign's willingness or

ability to service its debt, however global risk sentiment had turned against EMs as Turkey's currency crisis worsened. Thus, while South Africa's market-based measures of sovereign risk are also driven by global developments that are not directly linked to fiscal risk, the LCCS is less responsive to such developments and is therefore a more appropriate measure of domestic sovereign risk. This arguably makes the LCCS a more appropriate measure of credit risk on local-currency debt than market-based measures.

## 5. Conclusion

As the world emerges from the COVID-19 pandemic, EM sovereign default risk has become an even more relevant consideration following the sharp increase in government debt burdens and the recent rapid tightening of financial conditions. On the other hand, the fact that major EMs now have most of their debt portfolios denominated in their local currencies means that a measure of a sovereign's risk of default on its local currency debt has become more important. This note assesses such a measure for South Africa, and shows that the Du- Schreger LCCS captures the evolution in key developments relevant to domestic sovereign risk, particularly regarding fiscal policy. The LCCS is also a more appropriate measure for South Africa than market-based measures of sovereign risk, as these foreign-currency based sovereign risk measures are shown to respond to external developments that are not directly related to domestic fiscal risk. More broadly, as large EMs such as South Africa continue to rely more on their local-currency bond markets for their funding requirements as sovereign risk increases, such a measure of local-currency risk will become even more appropriate for understanding default risk among these issuers.

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