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Enquiries
Head: Research Department
South African Reserve Bank
P O Box 427
Pretoria 0001

Tel. no.: +27 12 313-3911
0861 12 SARB (0861 12 7272)

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A measure of South Africa's sovereign risk premium

Luchelle Soobyah and Daan Steenkamp

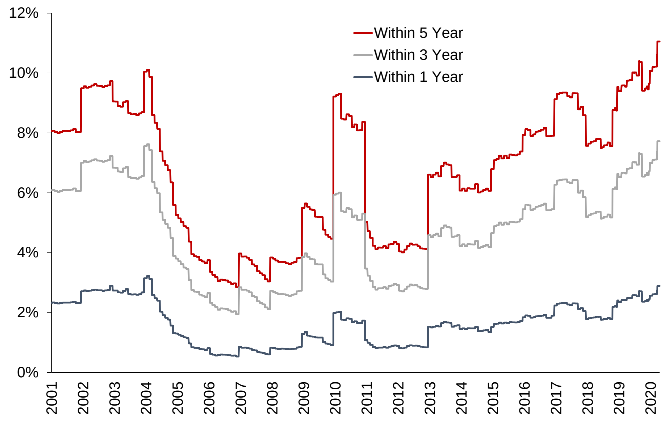
Abstract

We show that global factors explain about three quarters of the variation in South African sovereign credit default swap (CDS) spreads. We construct a South African-specific sovereign risk premium measure that strips out global factors from South African CDS spreads. We show that the increase in the South African CDS spread between mid-2019 and early 2020 reflected an increase in the domestic component. Since the outbreak of COVID-19, about 80 percent of the spike has reflected domestic sovereign credit risk. The 5 year CDS spread rose 38 basis points on the day following the Moody's downgrade, 25 basis points of which reflected an increase in the domestic component of the CDS spread. Furthermore, we find that our risk premium measure is highly correlated with the South African term premium. This suggests that an increase in South Africa specific risk has contributed to the recent steepening of the South African yield curve.

1 Introduction[1]

Market participants use credit default swap (CDS) contracts to hedge exposure against sovereign defaults or debt restructuring, and are therefore useful indicators of developments in credit spreads. The probability of default embedded in South African sovereign bonds has been steadily rising since the Global Financial Crisis (Figure 1). Since the 2020 Budget, the outbreak of COVID-19 has seen the South African yield curve steepen substantially and large spikes in CDS spreads at all maturities (Figure 2). Even though the probability of sovereign default within the next year is low according to Bloomberg's sovereign default model, the probability of default within the next 5 years currently stands at over 10 percent.

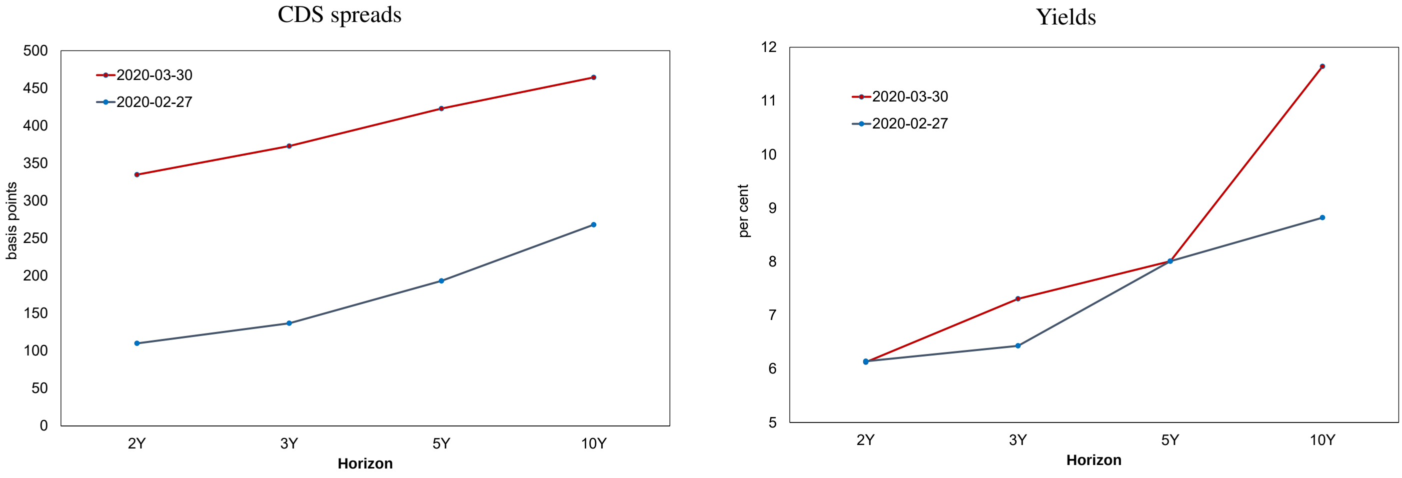
Figure 1: Probability of default on South African sovereign bonds



Source: Bloomberg

[1] Thanks to Matt Greenwood-Nimmo and Konstantin Makrelov for useful suggestions.

Figure 2: Change in sovereign CDS and yield curves since the 2020 Budget



Source: Bloomberg (Yields), JPMorgan (CDS spreads)

We measure the extent to which developments in global sovereign debt markets and global macroeconomic factors influence the South African government's CDS contracts to construct a measure of South Africa-specific sovereign credit risk. We find that:

- Common variation in global and emerging market sovereign credit spreads explain about 75 percent of the movements in the South African government CDS spread;
- The increase in the South African CDS spread between mid-2019 and early 2020 reflected an increase in the domestic component;
- Since the outbreak of COVID-19, about 80 percent of the spike has reflected domestic sovereign credit risk;
- Approximately 25 basis points of the 38 basis points rise in the 5 year CDS spread on the day following the Moody's downgrade reflected an increase in the domestic component.

2 Methodology

Longstaff et al. (2011) show that global macroeconomic factors play a dominant role in changes in country-specific sovereign credit risk. Whereas Longstaff et al. (2011) focus on assessing which global and regional factors can explain a country's sovereign CDS spread, we estimate a country-specific sovereign credit risk measure. We start by extracting a global factor from 19 sovereign CDS spreads[2] as their first principal component (F_{Global}). We also construct an emerging market factor as the first principal component of a set of emerging market sovereign CDS spreads (excluding South Africa). We construct a measure of the common variation of emerging market CDS spreads by purging it of the global factor by running a regression of the first principle component from emerging market CDS spreads on a constant and F_{Global}, and save the residuals (as F_{EME}):

$$PC_{EME} = C + F_{Global} + \epsilon \quad (1)$$

where

$$\epsilon = F_{EME} \quad (2)$$

2 The selection of countries is based on availability back to 2007 which is all SARB has access to under our Bloomberg license (see Figure 8 for the list of countries). Reference obligations are senior external or international sovereign debt (US dollar denominated issues for all countries except the US where it is euro). Note that we have not included the US in our sample, although including it makes very little difference to the SA sovereign credit risk estimate obtained.

To estimate the South Africa-specific sovereign credit risk premium that is independent of global and emerging market factors, we run a regression of the South African sovereign CDS spread on a constant, F_{Global} and F_{EME}:

$$SA_{CDS} = C + F_{Global} + F_{EME} + \upsilon \quad (3)$$

The residuals from this regression (υ) proxy the SA sovereign risk premium.

We present estimates based on data in levels (where all series used were confirmed to be stationary), as well as results based on data expressed in monthly changes as in Longstaff et al. (2011). We also consider including various controls of developments in global financial markets (including USDZAR, US and SA stock indices, SA foreign exchange reserves, US term premium as estimated in Soobyah and Steenkamp (2020, forthcoming), the US stock market volatility premium (implied less realised volatility), the USDZAR variance risk premium (implied less realised volatility, from Greenwood-Nimmo et al. 2020, forthcoming), as well as a proxy for the US equity premium (the price-earnings ratio for the S&P 500) that could also explain developments in domestic and foreign CDS spreads.

3 An estimate of SA's sovereign credit risk

Table 1 presents the benchmark model based on daily data, while the Appendix presents the full model specifications for estimating the South African-specific risk premium at a monthly frequency. We conducted extensive model specification tests, and the Appendix presents alternative specifications that control for additional global factors in estimating the South African sovereign credit risk premium.

We find that South African sovereign credit risk is predominantly driven by global factors. The benchmark model (column 1) can explain 74 percent of variation in the level of South African 5 year CDS spreads. Common variation in global sovereign credit spreads (their first principle component) explains roughly 60 percent of South African government CDS spread movements, while variation in emerging market spreads explains another 14 percent (when each is regressed along with a constant on the South African CDS spread). Global and emerging market credit spreads have a positive coefficient, consistent with the argument by Longstaff et al. (2011) that global and regional factors capture global or group liquidity conditions that affect all sovereign spreads.

Table 1: Model specifications

Dependent Variable	SA CDS 5 year Spread (level) Daily
Sample	03/03/2003 - 30/03/2020
Constant	164.85***
	(0.54)
F_{Global}	28.87***
	(0.24)
F_{EME}	31.84***
	(0.56)
R Squared (Adj)	0.74

() indicate standard errors, *, ** and *** indicates significance at 10, 5 and 1 percent significance, respectively.

The risk premium in QPM is proxied by the JP Morgan EMBI+ for South Africa, which captures the total returns for USD denominated debt issued by the South African government. Figure 3 compares our sovereign risk estimate to the EMBI+ for South Africa. Whereas the EMBI+ will be contaminated by co-movement with global factors, our measure has been purged of the effects of foreign factors that affect movements in South African CDS spreads. While the two series do co-move (correlation of 0.64 over the past 5 years), our measure shows a stronger correspondence to South Africa-specific risk events such as *Nenegate* in December 2015 and the rating downgrades in April 2017 and June 2017. Our measure of the domestic risk premium has risen by a higher percentage and remained more elevated compared with history than the EMBI+, and suggests that the market continues to price in a high South African sovereign credit risk currently. Our sovereign credit risk measure is mean zero, so the final index value can be interpreted as the sovereign credit risk measure being about 200 index units above its long term average.

Figure 4 shows that while global CDS spreads pulled down SA CDS spreads between early 2016 and early 2020, the domestic component has been steadily rising. Since the outbreak of the COVID-19 virus, both the domestic and international components have spiked dramatically, with roughly 210 basis points (80 percent) of the 262 basis point increase in CDS spreads reflecting domestic sovereign credit risk. The 5 year CDS spread rose 38 basis points on the day following the Moody's downgrade (30 March 2020), with approximately 25 basis point estimated to have reflected an increase in the domestic component. Consistent with our results for CDS spreads, Figure 9 in the Appendix applies our methodology to the EMBI+ and shows that the contribution from domestic risk to long bond yields has risen by more than international risk.

Figure 3: SA sovereign risk measure vs EMBI+ (daily)

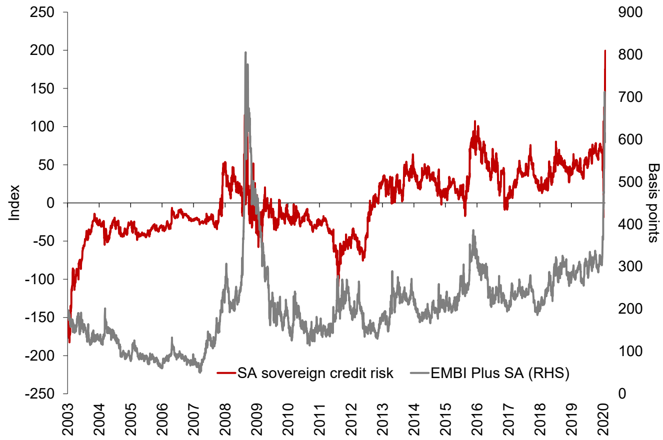
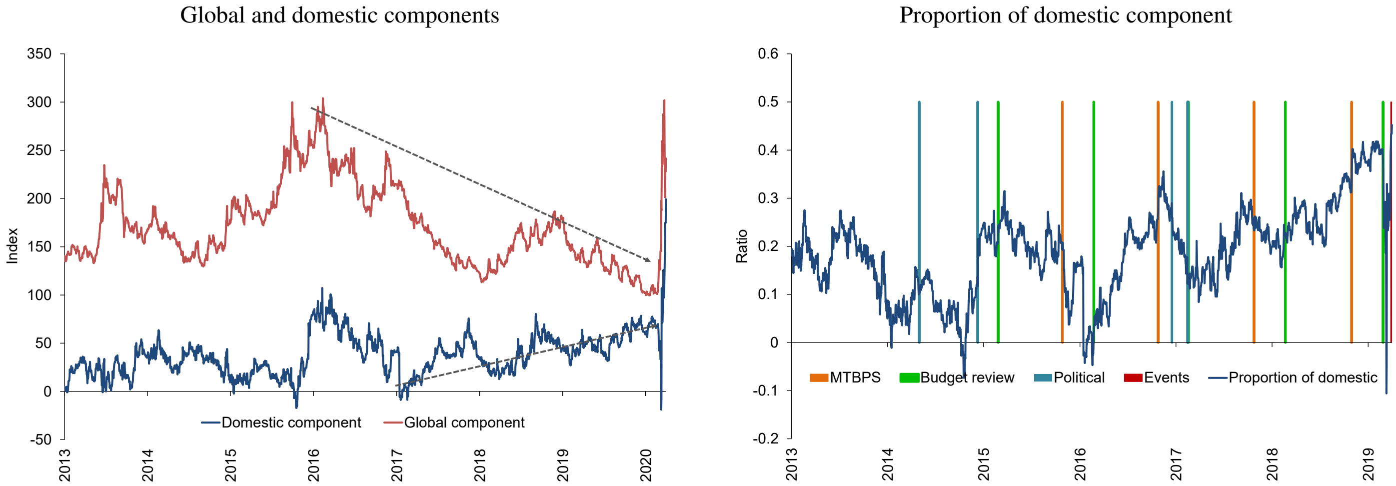
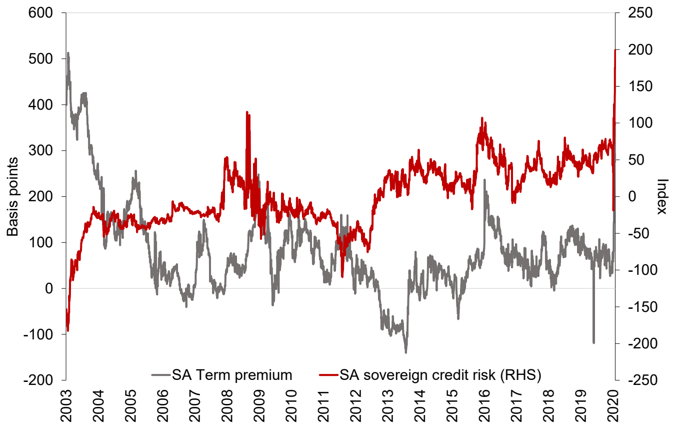


Figure 4: CDS 5 year Decomposition



One would expect that shifts in the South African country risk premium should spillover to term premia, which in turn would affect the level of long term interest rates. Figure 5 shows that our measure is indeed highly correlated with the term premium in long rates (from Soobyah and Steenkamp 2020, forthcoming), although the correlation of the EMBI+ with the term premium is also relatively high. Over the last five years, the correlation between our measure and the term premium is over 0.6. Our estimates therefore suggest that an increase in South Africa-specific risk has contributed meaningfully to the recent increase in long term interest rate spreads, given the divergence between the South African and US term premia.

Figure 5: SA sovereign risk measure vs 10-year term premium (daily frequency)



4 Conclusion

This note quantifies a South Africa-specific sovereign risk premium that could be re-estimated on an ongoing basis. Whereas the movements of the EMBI+ that is used in QPM often reflect global developments in CDS spreads and risk appetite, our measure has been purged of such influences. This bears out in its strong correlation with the term premium. This suggests that an increase in South Africa-specific risk has contributed to the recent increase in long term interest rate spreads. We argue that our measure therefore closely approximates a sovereign risk premium concept for South Africa and is useful for distinguishing developments in domestic sovereign risk from globally-driven country risk. The decomposition implies that even if global CDS spreads decline once the current crisis abates, the worsening of the South African sovereign position would continue to keep the South African sovereign CDS spread (and therefore long term interest rates) at relatively elevated levels.

The forecast process could benefit from subscribing to a larger quantum of CDS data to expand the number of pricing sources available to estimate sovereign credit risk. To measure exactly how much sovereign risk contributes to long term borrowing costs, future work should decompose long rates using a structural model.

References

Greenwood-Nimmo, M., D. Steenkamp, and R. van Jaarsveld (2020 *forthcoming*). Spillovers of global risk to ZAR. *SARB Working Paper*.

Longstaff, F. A., J. Pan, L. H. Pedersen, and K. J. Singleton (2011, April). How Sovereign Is Sovereign Credit Risk? *American Economic Journal: Macroeconomics 3*(2), 75–103.

Soobyah, L. and D. Steenkamp (2020 *forthcoming*). Term premium and rate expectation estimates from the South African yield curve. *SARB Working Paper*.

A Appendix

A.1 Monthly estimates

Table 2 presents the full model specifications for estimating the South African-specific risk premium at monthly frequency. Like the updated daily estimates, we find that South African sovereign credit risk is driven mainly by global factors, with the benchmark model (column 1) explaining 85 percent of variation in 5 year CDS spreads. The first principle component[3] explains roughly 25 percent of South African government CDS spread movements, while variation in emerging market spreads explains another 50 percent.

Table 2: Model specifications (monthly frequency)

Dependent Variable	SA CDS 5 year Spread (level)		SA CDS 5 year Spread (changes)
Sample	2007M11-2019M12	2007M01-2019M11	2005M09-2019M12
1 Constant	186.39***	1319.69***	0.65***
	(2.12)	(223.40)	(1.07)
F_{Global}	39.20***	44.63***	24.94***
	(2.24)	(2.42)	(1.07)
F_{EME}	86.92***	90.81***	31.52***
	(3.60)	(3.99)	(6.06)
USDZAR VRP		0.24*	
		(0.13)	
USEP		-204.47***	
		(40.30)	
R Squared (Adj)	0.85	0.87	0.77

() indicate standard errors, *, ** and *** indicates significance at 10, 5 and 1 percent significance, respectively. For columns 3 and 4, all regressors were expressed as monthly changes.

Column 2 presents an alternative specification that controls for additional global factors in estimating the South African sovereign credit risk premium. Of the foreign factors considered, only the US Equity Premium ($USEP$) helps explain movements in South African sovereign CDS spreads,[4] and is positively associated with the South African CDS spread, consistent with what Longstaff et al. (2011) found for South Africa. Of domestic variables considered, only the USDZAR Variance Risk Premium ($USDZARVRP$) is significant and again, a higher VRP is associated with a higher CDS spread.[5]

Column 3 summarises the regression results when the specification is expressed in monthly changes instead. In contrast to the results for specifications in levels, almost all of the explanatory power of the model comes from the global factor. Control variables were generally not significant when added to the specification. Nonetheless, these two factors explain around 77 percent of monthly changes in the South African government CDS spread.

Figure 6 plots the various monthly estimates of the risk premium. Adding control variables do not make a meaningful difference to the estimates for the level specification (left pane), consistent with the global factor picking up the global drivers of the CDS spread. Estimates based on monthly changes in CDS spreads instead as in Longstaff et al. (2011) are also highly correlated to the level specification from Coloumn 1, which we select the specification since it is the easiest to interpret.

Figure 7 compares the evolution of the SA CDS spread against the global and EME factors. Since 2015, the SA CDS spread has risen by more than the global and EME factors and has remained more elevated than foreign factors explain.

[3] Similarly to what Longstaff et al. (2011) find, the loadings on the global principal component are roughly uniform across countries, though they are low for Brazil, Columbia and Turkey in our case (Figure 8).

[4] Changes in US stock market indices are sometimes significant, but then the resultant model residuals are not stationary.

[5] Longstaff et al. (2011) find that local factors (in their case local stock returns and percentage changes in the dollar value of government holdings of foreign reserves) can explain more than 50 percent of the variation in the South African CDS spread between 2000 and 2010, and overall their model has an adjusted R squared of 0.63 once foreign factors are included.

Figure 6: SA sovereign risk measures (monthly frequency)

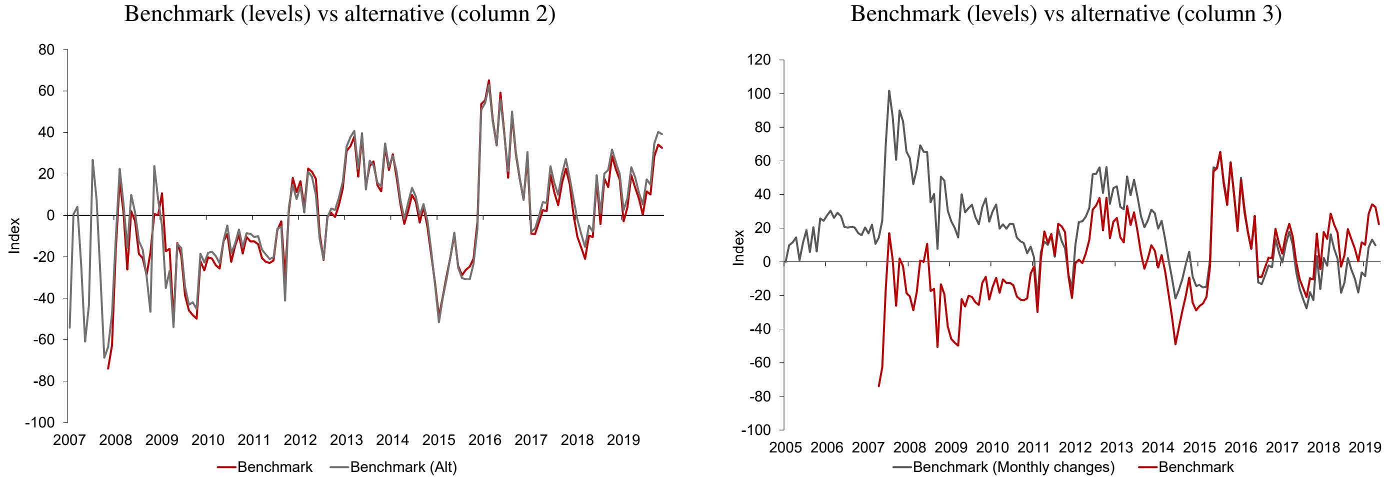


Figure 7: SA sovereign risk measure vs foreign components (monthly frequency)

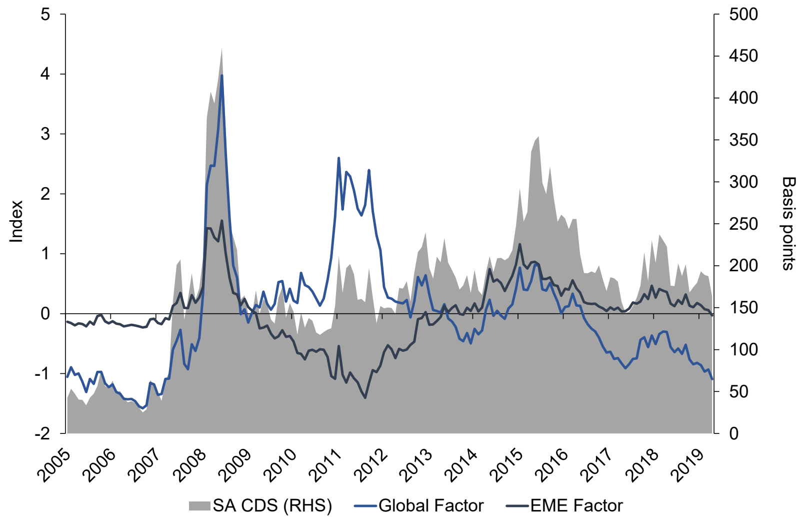


Figure 8: Loadings in global principal component of CDS spreads (monthly frequency)

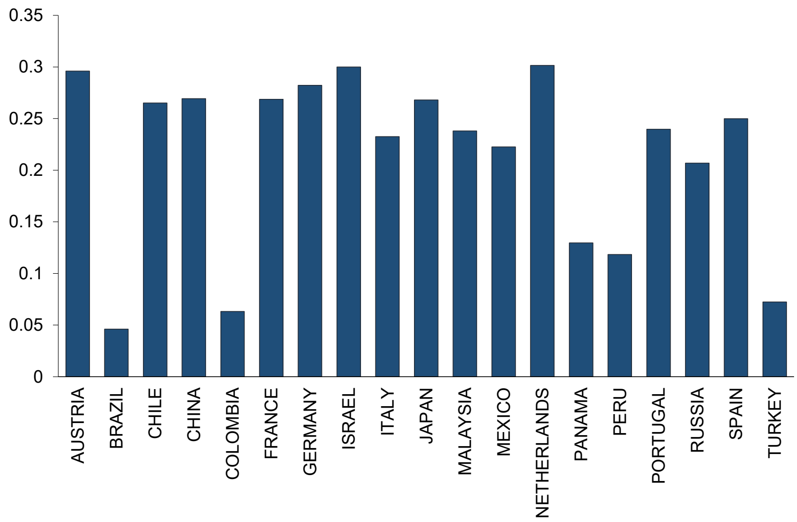


Figure 9: EMBI Decomposition