Credit Benchmark®

Collective Intelligence For Global Finance

Whitepaper // No.1

Sovereign Bond Risk Management: Added Value in Default Probability Data

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Introduction

In the current low yield environment, many Sovereign bonds issued by different countries are priced at similar levels. However, this report demonstrates that default probability estimates made by IRB banks for the same Sovereigns show major differences. Using data from 2011 and 2012, this report provides a framework for pricing default risk with important implications for efficient bank and CCP risk management.

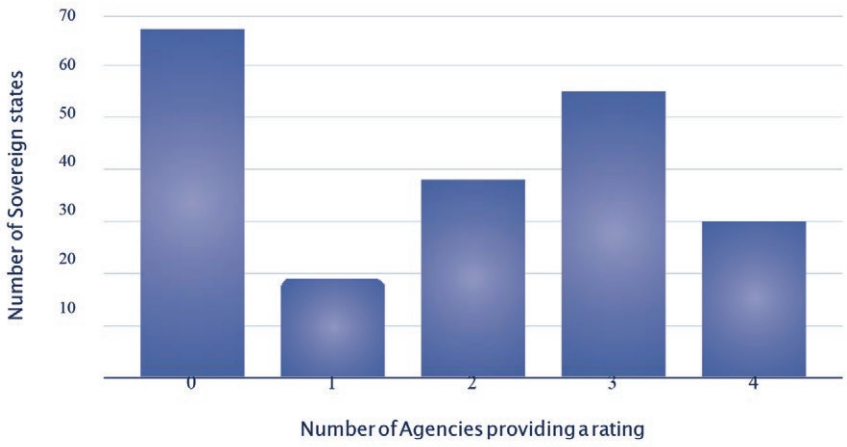
- The Sovereign Bond market is the benchmark for global interest rates, and is also the most trusted and liquid form of collateral for a growing number of financing and margining transactions. Developed market Government bonds are now so highly valued that in some cases – such as Germany - investors have at times been close to having to pay to hold them.
- But choosing between Government bonds is now almost a binary decision. Most market participants are willing to pay a fee (effectively an insurance policy) to minimize the credit risk to capital; but some may choose to run a large capital risk and hope to accumulate enough income to compensate. For example, Russian bonds recently yielded above 11%, while Greek Government bonds have recently traded as high as 13%; and Argentinian bonds peaked at 19%.
- A few bond markets still occupy the middle ground - Australia has traditionally traded at a significant premium to the other G7 markets due to inflation risk. But it is becoming harder to distinguish between the highest quality bonds.
- **Default risk is one metric which does offer a clear differentiator**. For a better understanding of how banks view default risk, this report draws on the research and experience of banks' credit analysts. With more than 100 IRB banks employing thousands of credit analysts around the world, there is considerable scope to broaden and deepen understanding of Sovereign credit risk.
- IRB data can provide consensus ratings (derived from these default probabilities) on previously unrated Sovereign countries; it highlights where bank views differ from Credit Rating Agencies; it can be used to finesse the rankings of high quality Sovereigns, and it can be used to price default risk.
- Credit Benchmark provides a service for banks which aggregates IRB default probability estimates to calculate a consensus risk estimate across a broad range of exposures for each participating bank. Moreover, IRB derived probabilities go beyond the ordinal nature of agency credit ratings and provide cardinal values.
- Credit Benchmark research suggests that, after adjusting yields for inflation, there remains significant differentiation between Sovereign bond real yields - and this difference can be explained by variances in perceived probability of default.
- Research also shows that over time, this difference is reflected in bond yields as markets adjust to changing perceptions of Sovereign credit risk.
- These results have implications for efficient bank and CCP risk management as well as collateral choices.

Sovereign Rating Coverage

The four major Credit Rating agencies – S&P, Moody's, Fitch, DBRS – cover 142 of the 209 Sovereign states[1]. They are often in close alignment on individual Sovereign ratings.

The chart below shows the depth of coverage:

Exhibit 1: Rating Agency coverage



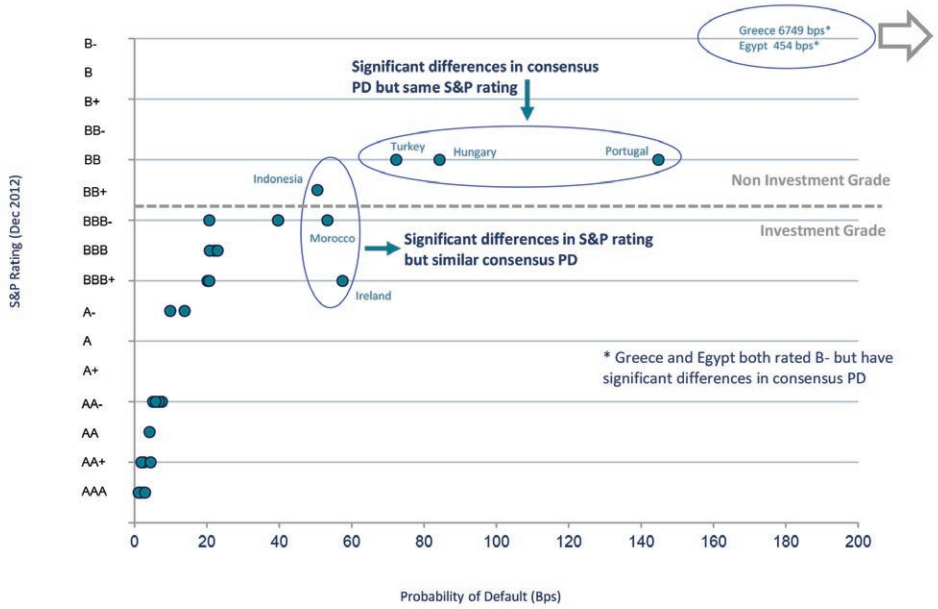
This shows that 19 countries are only rated by one agency; 38 are covered by 2 of the 4; 55 are covered by 3 of the agencies, and 30 states are covered by all 4 agencies. However, 67 of the Sovereign states are not rated by any of the major agencies. It is worth noting that some of the unrated Sovereigns may have no external debt and therefore have no need to purchase an external rating.

The Credit Benchmark dataset - based on Probability of Default (PD) submissions from banks - does contain data on a growing number of these 67 states. This may be because one or more of the IRB banks is providing a credit line (e.g. a short term overdraft) to some of these unrated Sovereigns, or is conducting business with an obligor in that country. This additional form of credit assessment sheds light on a previously opaque area, where banks and corporate treasurers have had to rely on their own analysis or imperfect proxies such as OECD country ratings for business planning, DCF calculations, and individual loan decisions.

[1] Some Sovereigns are disputed, or only recognized by a minority of other Sovereign states.

And as the following chart shows, even where ratings coverage is available, there are considerable differences between Rating Agency opinions and bank risk model PD estimates.

Exhibit 2: Sovereign PD estimates vs S&P Ratings



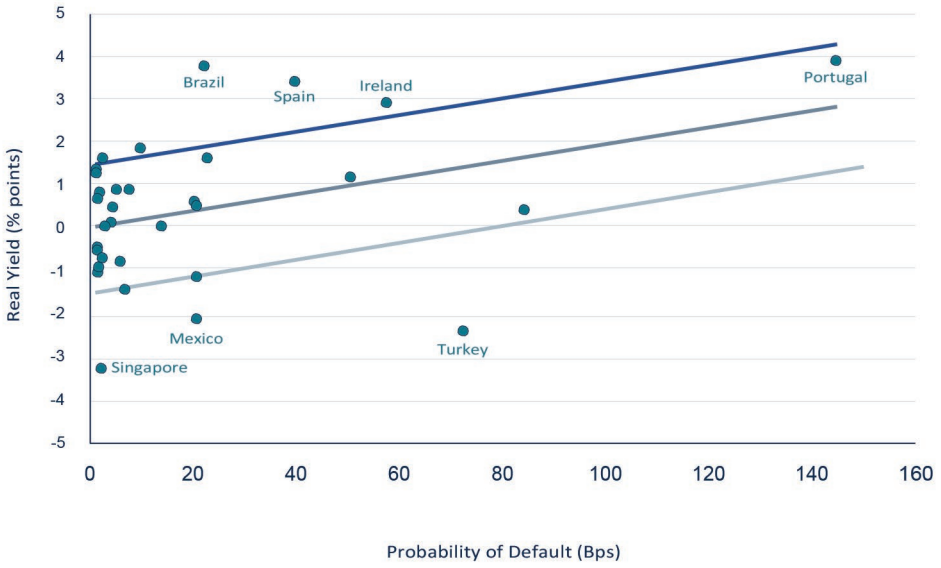
Each point plotted above represents a Sovereign state. Two of these - at the top of the chart - have identical ratings, but the staggered x-axis scale shows that their respective PD estimates differ by a large proportion. Similarly, a number of Sovereigns have near identical PDs but very different agency ratings.

So even where a rating exists, there are powerful reasons to use PD based data. As the discussion of unrated Sovereigns shows, PD estimates may be the only way to ensure consistency across all Sovereign ratings.

Use of Default Probabilities to Segment the Sovereign Universe

In this section, we analyze the value of PD data in differentiating between Sovereign bonds (and by extension the Sovereign credit risk directly). The analysis covers 32 consensus Sovereign probabilities of default collected by Credit Benchmark for year end 2011 and 2012. The following chart shows these estimates, plotted against the corresponding real 10 year yields for each Sovereign. Plotting real yields against default probabilities shows the extent to which the bond market has adjusted for the relative risks of the Sovereign bonds:

Exhibit 3: Probability of Default vs Real Yield



The chart shows the best fit line (the middle line), and identifies obligor outliers using boundary lines – the upper bound is dark blue and the lower bound is pale blue. The obligor data has been filtered using a number of calibrations for these upper and lower bounds; in this paper we focus on ranges of +/- 1.5% points above and below the fitted line. Obligors which lie outside of these lines are clearly differentiated from the main group. This gives an approximate indication of the real yield risk premium associated with different default risks.

The rationale for this approach to differentiating between Sovereigns is as follows: if the forward-looking Sovereign PDs contain useful information, then the real yields of outliers can be viewed as over-compensating relative to the underlying risk of that Sovereign in a portfolio. This implies that real yields could fall (and bond prices rise) when markets move to reflect the lower perceived risk. Conversely, obligors with low real yields are not compensating for the underlying credit risk, implying that real yields could rise (and bond prices fall).

[2] The real 10 year yields were generated by subtracting actual inflation from the nominal 10 year yield. Although subtracting 10 year inflation expectations rather than actual inflation is generally used to generate a 10 year real bond yield, the paucity and inconsistent nature of survey data spawns additional challenges for comparative analyses. Actual inflation and expected inflation are highly correlated, and given the comparative nature of the analysis, the consistency of the data is a more important factor.

NB: Total return data, nominal yields and inflation all sourced from Thomson Reuters Datastream

Results

The analysis uses +/- 1.5 percentage point lower and upper bounds from Exhibit 3 to compare end 2011 and end 2012 real yields to Credit Benchmark PD estimates. The subsequent changes in yields are calculated for the identified outliers over the subsequent 12 month periods.

The average annual USD returns for the upper and lower groups of outlying Sovereigns are shown in the first column below. Sample returns and standard deviations across the 32 Sovereigns are averaged across the two time periods.

For comparison purposes, the Exhibit 4 below also shows the results based just on real yields and CDS.

Exhibit 4: Comparison of outlier groups

	Total Return % (USD, Average)	Standard Deviation %
Total Portfolio	-0.90	11.5
Real Yield vs CB PD Upper Bound	7.47	12.4
Real Yield vs CB PD Lower Bound	-4.28	11.4
Real Yield Upper Bound	6.56	13.8
Real Yield Lower Bound	-3.20	13.1
CDS Upper Bound	7.03	15.5
CDS Lower Bound	1.50	7.3

This table shows that default probabilities are a valuable additional dataset for risk managers. They go beyond nominal yield, real yield, and CDS spread to help identify the highest quality Sovereigns.

For example, the first set of upper and lower bounds refer to groups of high and low real yield Sovereign bonds which are further filtered by PD. These show an average differential price change over the 2 year period of 11.7% points. This is partly because the Sovereign bonds with the highest real yields outperformed by 7.47% and partly because those with the lowest real yield underperformed by 4.28%. The volatility of the two sets of bonds are 12.38 and 11.37 respectively.

Real yield alone shows a lower return differential of 9.9% and has a volatility of more than 13%, CDS provide even less differentiation (a return differential of 6.53% points (7.03% vs 1.50%) and volatility of between 7.32 and 15.5).

This suggests that IRB banks' Sovereign estimates are good indicators of future creditworthiness, and that PD-adjusted real yields help in the selection of less risky bonds and support less risky lending practices.

Conclusions

- IRB bank data can be used to generate ratings for Sovereigns which are not rated by the main agencies.
- IRB banks are often not aligned with Rating Agencies – either showing a spread of rating views across banks for a single Sovereign, or a spread of ratings from agencies for Sovereigns which are viewed as being very similar by banks.
- Credit Benchmark research also shows that, after adjusting yields for inflation, there remains a significant difference between Sovereign bond real yields - with much of this difference explained by perceptions of credit risk.
- Over time, this difference is reflected in bond yields, as markets adjust to t h e changing perceptions of Sovereign credit risk.
- IRB banks' Sovereign estimates are good indicators of future creditworthiness.
- Analyzing forward looking consensus PDs, in conjunction with real Sovereign yields can provide useful signals to identify outliers, which in turn has implications for efficient bank and CCP risk management as well as collateral choices.

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Credit Benchmark is an entirely new source of data in credit risk. We pool PD and LGD estimates from IRB banks, allowing them to unlock the value of internal ratings efforts and view their own estimates in the context of a robust and incentive-aligned industry consensus. The resultant data supports banks' credit risk management activities at portfolio and individual entity level, as well as informing model validation and calibration. The Credit Benchmark model offers full coverage of the entities that matter to banks, extending beyond Sovereigns, banks and corporates into funds, Emerging markets and SMEs.

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