



**Solvency Assessment and Management:
Steering Committee
Position Paper 40¹ (v 3)
Risk-free Rate: Dashboard**

EXECUTIVE SUMMARY

1. INTRODUCTION AND PURPOSE

The purpose of this document is to set out a dashboard that can be used to weigh up the various strengths and weaknesses of using either the government bond or swap curve as the base risk free rate under SAM. This document does not consider the liquidity premium or the methodology to be used in determining the curve and extrapolation of the curve. These issues are dealt with in separate discussion documents.

As a basis for this document, the relevant CEIOPS level II advice (former CP40) and the document from the European Insurance CFO Forum and CRO Forum setting out their proposals for the risk-free rates to be used in the QIS5 technical specifications. Furthermore, the working group's own view of the appropriate characteristics is also included. These views have been confirmed during our interviews with investment banks.

2. INTERNATIONAL STANDARDS: IAIS ICPs

The draft ICP 14 that deals with Valuations, has reference.

Par 14.10 reads as follows: “ ***Valuation of technical provisions allows for the time value of money. The solvency regime establishes criteria for the determination of appropriate interest rates to be used in the discounting of technical provisions.***”

It is clear from the above that it is the responsibility of the solvency regime to determine what an “appropriate interest rate” is.

The IAIS is currently revising the ICPs and the aim is to have these ready for adoption at their October 2011 General Meeting. This section will be updated based on these revisions.

3. EU DIRECTIVE ON SOLVENCY II: PRINCIPLES (LEVEL 1)

3.1. According to the guiding principles referred to in the Commission's letters, the legal basis for the advice presented in this paper is primarily found in Article 86 of the Level 1 text which states:

“The Commission shall adopt implementing measures laying down the following: [...]”

¹ Discussion Document 40 (v 3) was approved as a Position Paper by the SAM Steering Committee on 29 February 2012.

b. The relevant risk-free interest rate term structure to be used to calculate the best estimate referred to in Article 77(2); [...];”

3.2. Article 77(2) requires that:

“[...] The best estimate shall correspond to the probability-weighted average of future cash-flows, taking account of the time value of money (expected present value of future cash-flows) using the relevant risk-free interest rate term structure.

The calculation of the best estimate shall be based upon up-to-date and credible information and realistic assumptions and be performed using adequate, applicable and relevant actuarial and statistical methods. [...].”

3.3. Article 76 states the objective for the valuation of insurance and reinsurance obligations:

- 1. “Member States shall ensure that insurance and reinsurance undertakings establish technical provisions with respect to all of their insurance and reinsurance obligations towards policyholders and beneficiaries of insurance or reinsurance contracts.*
- 2. The value of technical provisions shall correspond to the current amount insurance and reinsurance undertakings would have to pay if they were to transfer their insurance and reinsurance obligations immediately to insurance or reinsurance undertaking.*
- 3. The calculation of technical provisions shall make use of and be consistent with information provided by the financial markets and generally available data on underwriting risks (market consistency).*
- 4. Technical provisions shall be calculated in a prudent, reliable and objective manner. [...].”*

4. MAPPING ANY PRINCIPLE (LEVEL 1) DIFFERENCES BETWEEN IAIS ICP & EU DIRECTIVE

To the extent that the criteria that the supervisory regime lay down for the appropriate interest rate structure tie in with a risk free interest rate term structure, there are no differences between the IAIS principles and the Level 1 text.

5. STANDARDS AND GUIDANCE (LEVELS 2 & 3)

5.1. CEIOPS CPs (consultation papers)

5.1.1. Desired characteristics

5.1.1.1. No Credit Risk

CEIOPS considers the bonds issued by AAA rated governments to have no relevant credit risk. For currencies linked to governments that are not AAA rated, CEIOPS proposes that an adjustment need to be made to the rates to remove the credit risk.

Given that the South African government is rated BBB, the SAM committees need to decide whether such an adjustment would be required in SAM. The view of the risk-free rate working group is that SAM should not require such an adjustment, because:

One of the reasons for the proposed adjustment in Solvency II is to gain consistency across Member States within the EU.

For SAM, the South African government's credit standing should be used as the risk-free reference point.

CEIOPS also considers that other financial instruments, such as swaps, do involve relevant credit risk. It highlights that during the financial crisis the issuers of swaps, mainly investment banks, showed high default vulnerability. Although swaps are collateralised, CEIOPS believe that swaps still involve significant credit risk, mainly for two reasons:

- The market value of the collateral may be affected by the default event
- The collateral only covers the current value of the swap. If interest rates change, a significant exposure may not be covered, in particular for swap with long maturities.

Furthermore, because swaps are unfunded, the insurer needs to earn the floating rate on the nominal amount as well, which also may involve credit risk.

5.1.1.2. Realism

It should be possible for all insurers to earn the specified risk-free rate in a risk-free manner.

5.1.1.3. Reliability

The data basis and methods to determine risk-free term structure should be robust, particularly in times of market crisis or turbulence.

5.1.1.4. Highly liquid for all maturities

Rates should be derived from instruments for which reliable market value is observable from a deep, liquid and transparent market. The term structure should be extrapolated from the longest maturity for which there is sufficient liquidity. A deep, liquid and transparent market should meet the following requirements:

- Large volume transactions can be executed rapidly without influencing the price
- Current trade and quote information is readily available to the market
- These properties are expected to be permanent

5.1.1.5. No technical biases

The consultation paper considers two examples where either government bond or swap rates may be distorted due to supply / demand distortions:

- Government bond prices may be distorted due to artificially high demand from financial institutions that are subject to regulatory constraints that favour government bonds or were used as a benchmark (e.g. the 10 year bond yield might be 50bps lower than either a 9 or 11 year bond yield.)

- While under normal conditions swaps have higher yields than government bonds, during the financial crisis the swap rates became lower than government bond rates for longer maturities. The high demand for the fixed swap leg from insurers and pension funds could not be met by the limited supply of swaps from banks.

5.1.1.6. Available for all relevant currencies

This is not a relevant issue for SAM.

5.1.1.7. Proportionate

In the view of the importance of the risk-free rate, the principle of proportionality may not allow for simplified or approximate derivations of the risk-free rate term structure. CEIOPS believes that it is necessary to provide both the term structure and the methodology used to derive the term structure for all major currencies.

The SAM risk-free rate working group agrees with this view and intend to develop a methodology to derive the term structure, which will be made available to all insurers. Furthermore, the risk-free rate working group proposes that the FSB publish a risk-free rate term structure to be used on a monthly basis.

5.1.2. Proposed approach to derive risk-free term structure

CEIOPS proposes the following three stage approach to determine the relevant risk-free rate term structure:

- **First stage**
If government bonds are available that meets the criteria set out in 5.1.1 above, then government bonds should be used to determine the risk-free term structure.
- **Second stage**
If government bonds are available, but they do not meet the risk-free criteria, they should be adjusted.

The view of the risk-free rate working group is that SAM should not require such an adjustment. See section 5.1.1.1.

- **Third stage**
If government bonds are not available or if government bond rates cannot be adjusted to meet risk-free criteria, other financial instruments should be used. These should be as similar to government bonds as possible and should be adjusted for credit risk and any other deviations.

5.2. Proposal from European Insurance CFO Forum and CRO Forum

The CFO and CRO Forum's document proposes that the local inter-bank swap curve be used as the basis for the risk-free interest rate term structure for 14 out of the 18 currencies considered. It also proposes that this should be adjusted for credit risk and an illiquidity premium. However, it proposes that swap rates should only be used for maturity terms up to where the market is deemed liquid. It does not motivate why it has chosen swap rates instead of government bond rates.

Included in the CFO and CRO Forum's document is:

- A proposed methodology (or principles) for selecting the basic risk-free rate
- A proposed method for adjusting inter-bank swap rates for credit risk
- An assessment of the entry point into the yield curve extrapolation (i.e. where swaps are deemed illiquid)
- A proposal regarding liquidity premiums (beyond the scope of this document)

5.2.1. Principles for selection of basic risk-free rate

The following are the CFO and CRO Forum's proposed framework in setting the basic risk-free rates.

For each currency where swaps exist and are sufficiently liquid and reliable, the basic risk-free interest rate applicable to the valuation of a liability should be based on the swap curve appropriately adjusted to remove credit risk.

When using swaps where the deposit period on the floating rate leg is not overnight an adjustment for long-term through-the-cycle credit risk appropriate to the deposit period should be made.

Where swaps do not exist or are not sufficiently liquid and reliable from a certain point, the basic risk-free interest rate applicable to the valuation of a liability should have reference to the government curve in that currency.

For government curves where the government is of credit quality lower than AAA an adjustment for long-term through-the-cycle credit risk should be made.

The view of the risk-free rate working group is that SAM should not require such an adjustment. See section 5.1.1.1

In all cases, the basic risk-free interest rates should follow a smooth progression.

5.2.2. Adjusting inter-bank swap rates for credit risk

The following paragraph is an extract from the CFO and CRO Forum's document, which motivates the need for a credit risk adjustment to inter-bank swap rates. The actual proposed adjustment is beyond the scope of this document.

“Features such as collateralisation arrangements and the fact that the notional amount is never at risk means the credit risk in a swap contract is negligible. However, for swap contracts based on 3 or 6 month inter-bank rates there can be credit risk associated with earning the reference floating rate, as there is some risk associated with depositing the notional amount with an institution for the 3 to 6 month

period. An overnight index swap is where the period of depositing the notional amount with an institution is overnight so limiting the credit risk in the floating rate. However, at this time the inter-bank swap curve represents the most liquid and therefore reliable source of data. We therefore focus on the deposit risk in inter-bank swaps.”

5.2.3. Assessment of entry point into yield curve extrapolation

In assessing the relative liquidity of swaps, the CFO and CRO Forum’s document considered:

- A qualitative survey amongst CFO and CRO Forum members and three banks
- Quantitative measures, including contributor counts and forward rate volatility
- The impact of stressed market conditions

5.2.3.1. Lessons from qualitative survey

The following is an extract from the CFO and CRO document:

“One message to come out of the feedback is that there is a relatively strong link between the last liquid swap and the longest available government bond for a sizeable transaction. This is because banks will often hedge a swap transaction by buying a matching government bond. Under benign market conditions, banks may be prepared to trade at longer terms as they can “warehouse” the swap until they find an offsetting transaction or they may hedge in another currency and accept some basis risk. However, both of these approaches are capital intensive and given the pressures on banks’ capital positions at the end of 2008 they would have been less likely to enter into such transactions.”

5.2.3.2. Qualitative results

Currency	Max Bond term available (years)	Max swap term available (years)	Proposed Entry Point (years)
European Euro	45.3	50	30
UK Pound Sterling	49.8	50	50
US Dollar	29.9	50	30
Japanese Yen	26.7	50	20
Swiss Franc	39	50	15
Swedish Krona	29.2	30	10
Danish Krone	An adjusted Euro swap curve is proposed		
Norwegian Krone	9.4	30	10

Czech Koruna	47.8	30	15
Polish Zloty	27.3	20	15
Hungarian Forint	13.9	20	15
Romanian Lei	10.5	20	10
Bulgarian Lev	9.1	10	10
Turkish Lira	4.4	10	10
Iceland Krona	15.3	5	5
Estonian Kroon	An un-adjusted Euro swap curve is proposed		
Latvian Lats			

The following table summarises the findings of the CFO and CRO Forum's document regarding liquidity of the various swap markets based, on the chosen qualitative measures, and therefore the entry point from which to extrapolate the yield curve:

It is noticeable that the only currencies where the full available swap terms were used are the UK Pound Sterling, Bulgarian Lev, Turkish Lira and Iceland Krona. The UK Pound Sterling is the only currency of these which have available swaps with maturities longer than 10 years.

5.2.3.3. Impact of stressed market conditions

The following extract considers the impact on liquidity of stressed market conditions:

“In stress market conditions the number of liquid market data points may be reduced. For example, reduced supply from banks due to change in risk appetite or increased demand by market participants due to hedging activities. In particular, we have considered the following conditions as potential evidence of reduced liquidity at the longer swap tenors:

- **Excess volatility in forward curve:** *Volatility in longer tenor forward rates is significantly in excess of the level in “normal” market conditions. Further, the longer tenor volatility is disproportionately higher than the volatility of shorter tenor forward rates (where in normal market circumstances a lower volatility would be expected).*
- **Forward rate curve becomes more downward sloping:** *It can already be observed that forward curves are slightly downward sloping for longer tenors due to convexity, but in stress markets the downward slope can become more extreme as participants charge a negative term premium for the longest tenors*
- **Forward rates drop significantly below the ultimate long-term forward level:** *One would expect that longer tenor forward rates do not significantly deviate from their long-term level (unless limited market data is available) and a significant drop versus the ultimate long-term level could be a sign of reduced liquidity of such market data points.*
- **Swap rates drop significantly below longest maturity government bonds of high credit rating:** *When swap rates drop significantly below AAA government*

bonds in a currency, this may indicate stressed market conditions, as long term government bonds are used to hedge long term swaps.”

5.3. Proposal from the UK Financial Services Authority

The UK Financial Services Authority (FSA) recommends the use of a swap curve less an adjustment for credit risk in the UK market.

5.4. Mapping of differences between above approaches (Level 2 and 3)

CEIOPS proposes using government bond rates if available. These should be adjusted where they do not meet the criteria for a risk-free rate as set out by CEIOPS. If government bonds are not available or if government bond rates cannot be adjusted to meet risk-free criteria, other financial instruments should be used. These should be as similar to government bonds as possible and should be adjusted for credit risk and any other deviations.

The CFO and CRO Forum’s document proposes that the local inter-bank swap curve be used as the basis for the risk-free interest rate term structure for 14 out of the 18 currencies considered. It also proposes that this should be adjusted for credit risk and an illiquidity premium. However, it proposes that swap rates should only be used for maturity terms up to where the market is deemed liquid.

6. ASSESSMENT OF AVAILABLE APPROACHES GIVEN THE SOUTH AFRICAN CONTEXT

6.1. Risk-free rate Working Group’s own views on desired characteristics

The following is a list of criteria for the appropriate risk-free curve based on the views of the risk-free rate working group, after consultation with investment banks:

6.1.1. Observable

Although the current indications are that the FSB will publish the appropriate yield curve, participants should be able to derive the curve independently. Therefore, the methodology to be used by the FSB should also be published.

The swap rates quoted by banks and observed in the market are mostly indications of where banks would be willing to trade swaps with each other. This is in other words an indication of where the interbank market would trade swaps.

6.1.2. Objective

Ideally there should be no bias in the curve used or the data that the curve is based on. This situation is normally addressed in financial markets by having many price contributors. An average rate across all publishers will then give one a really good idea of where the market levels are.

6.1.3. No / Low Credit Risk

For SAM, the South African government’s credit standing should be used as the risk-free reference point.

Investment banks explained to the working group that there are mechanisms in place to reduce the credit risk associated with swaps. They highlighted two levels of

protection, namely agreements of the International Swaps and Derivatives Association (ISDA) and Credit Support Annex (CSA) agreements.

ISDA agreements contain information which define the process and method of offsetting/netting the credit risk in derivative transactions and, among other, contain provisions which specify close-out netting. In addition to this netting agreement most banks also sign a CSA. CSA agreements further permit parties to an ISDA Master Agreement to mitigate their credit risk by requiring the party which is “out-of-the-money” to post collateral corresponding to some agreed amount based on the current mark-to-market value of the agreements between the relevant counterparties. Normally, if the collateral is not cash its value will be reduced by a hair-cut to account for the market risk inherent in the collateral itself.

All the banks that are active within the interbank swap market have ISDA and CSA agreements with each of the counterparty banks that they trade with.

In the interbank swap market, the quotes assume that the counterparty credit risk in the swap transaction would be mitigated by the ISDA/CSA agreements described above. If a bank quotes a swap to a corporate client with whom the bank does not have one of these agreements in place, the swap rate will be adjusted in such a way as to ensure that the bank compensates itself for the credit risk assumed in the swap contract.

It's important to note that swaps are unfunded – i.e. there is no investment of cash up-front. Life insurers often buy structured deposits or fixed rate notes which are issued by banks. These notes are funded and their fixed rates are determined through the use of the swap curve. There is however often a premium paid for term funding by these issuing banks and the spread is expressed as a spread over 3M Jibar. These spreads differ from bank to bank and is mainly driven by the particular bank's funding requirements and liquidity position. In terms of quantifying the composition of the spread between credit risk and liquidity risk has been widely debated and no broadly accepted methodology has been proposed. It is however important to note that the spread is not payable if the transaction (as a whole) is done under the CSA. In other words, if the customer buying the note wants to have the transaction fully collateralised most banks would not offer the premium (spread over Jibar) as it would have to collateralise the transaction directly after agreeing the terms and therefore not have any benefit from the use of the funds. It is therefore argued that the only credit risk-free rate that can be earned based off the swap curve are the rates represented by the swap curve. One could therefore argue that any spread over the swap curve is compensation for a combination of credit risk and liquidity risk.

The working group has been informed by some investment banking specialists that the significant credit risk premium in the Libor is not present in Jibar.

The working group do not hold the view that an adjustment for credit risk is necessary in South Africa due to the fact that swap agreements are collateralised and that the credit risk on the cash required to earn Jibar backing the nominal is not material.

6.1.4. Liquidity across the term structure

Liquidity is an important consideration as it indicates the reliability of the observed prices/rates. For example, if a specific curve is not traded often or is illiquid then the observed prices in the market are not a true reflection of what the actual/achievable price/rate will be.

6.1.5. Arm's length transaction

This is often used in the definition of fair valuation. Ideally, a curve used in the valuation of cashflows should indicate the price or value at which such valued cashflows could be bought or sold (traded) in the financial market. This also implies that these rates should therefore also be achievable in the sense that it should be possible to buy or sell these cashflows in the market at these rates.

6.1.6. Reliability / Liquidity in stressed market conditions

In stress market conditions the number of liquid market data points for certain instruments may be reduced. In order to promote stability in the insurance sector, it is therefore desirable that the prescribed risk-free curve is reliable, even in stressed market conditions.

6.2. Challenges

The main challenge will be around the methodology used to determine the risk-free term structure, specifically the point at which extrapolation should start and the method used to extrapolate the curve.

The move to using a swap based risk-free rate term structure may have an impact on a macro-economic level due to changes in the demand from institutions in order to meet their matching requirements. The possible consequence of this was not dealt with by the working group, but was referred to the Economic Impact Sub-committee.

6.3. Impact of the approaches on EU 3rd country equivalence

EU 3rd country equivalence will not be influenced by whether government bond yield curves or inter-bank swap curves are used to determine the risk-free rate structure.

6.4. Comparison of the approaches with the prevailing legislative framework

Currently the discount rate used in the calculation of technical provisions is decided by the statutory actuary. Typically a benchmark gilt rate will be used as a basis for setting the discount rate; the statutory actuary will then decide on an appropriate risk margin for each relevant asset class relative to the benchmark rate and a weighted average discount rate will be calculated using the long term asset composition as weights. The benchmark gilt will normally be chosen such as to take the discounted mean term of the liabilities into account.



7. Dashboard

The following table shows the proposed dashboard to assess the relevant strengths and weaknesses of deriving the risk-free curve from either South African government bonds or swaps. The extent to which the alternatives satisfy the stated criteria is summarised in the dashboard below. The assessment includes a grading of the relative appropriateness of each instrument in each assessment category (H = Highly appropriate, M = Medium level of appropriateness, L = Low level of appropriateness).

Characteristic	Source	Government bonds		Swaps	
No credit risk / low credit risk	CEIOPS/ SAM WG/ FSA/ SA banks	H	Generally accepted that government bonds are risk-free.	H	<p>Present value of future payments is collateralised. The collateral is generally high quality securities.</p> <p>Credit risk on cash backing nominal required to earn JIBAR not material, since it is possible to earn this in overnight call deposits.</p> <p>Credit risk on swaps may therefore be very small.</p>
Realism		H	Insurer can earn bond rates.	M	Observable, but can insurer earn swap rates?

Characteristic	Source	Government bonds		Swaps	
Reliability		M	<p>Publicly available. Rates available at a smaller number of points along the curve.</p> <p>Concern has been raised about forward rate volatility which seems to increase for forward terms longer than 10 years. This may be interpreted that the market is less liquid / efficient from this point onwards. However, high volatility does not necessarily indicate that the market lacks liquidity.</p>	H/M	<p>Swap prices quoted by large SA investment banks on Bloomberg. Rates available at a greater number of tenors. This fact, combined with the swap curve being less prone to technical bias (and more liquid), lead to a smoother curve than the government bond curve.</p> <p>It appears that market forces are more efficient at shorter durations, where banks may have positions in either direction. However, for longer durations there might not be a natural offset and banks tend to use government bonds to hedge their swap exposure.</p> <p>Concern has been raised about forward rate volatility which seems to increase for forward terms longer than 10 years. This may be interpreted that the market is less liquid / efficient from this point onwards. However, high volatility does not necessarily indicate that the market lacks liquidity.</p>

Characteristic	Source		Government bonds		Swaps
Highly liquid for all maturities	SAM WG/ FSA/ SA Banks	M	Highly liquid. Market makers are forced to provide liquidity, but, according to investment banks, trading volumes are not as high as for swaps.	H	Highly liquid. Dealing costs are typically lower than the dealing costs of bonds. Investment banks stated that trading volumes are higher for swaps, but the working group was unable to obtain data to investigate the accuracy of these statements.
No technical bias	SAM WG/ CEIOPS/ FSA	M	Government bond issues are based on government borrowing requirements rather than investor demand. Government macro-economic policies have also affected UK government bond yields in the past.	H/M	Less likely to suffer from technical bias. Supply and demand are more strongly linked in the case of swaps – banks have an incentive to increase supply to meet demand. Technical bias may however exist for longer duration swaps.
Objective	SAM WG	H	Bid-offer spreads are very tight.	H	Many price contributors. Quotes from banks may differ, depending on the balance sheet of the bank and the client. However, the best bid and offer prices are still close.
Arm's length transaction	SAM WG	M	Bond prices are not available at all durations.	H	Arms length prices are available at all durations.

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Characteristic	Source		Government bonds		Swaps
Level of extrapolation required.	SAM WG/ SA banks	L	<p>Maximum maturity term is currently 30 years. There is a constant shortening of the government bond curve until a new bond is issued at the long end. This may lead to more volatile extrapolation results.</p> <p>The constant shortening argument is demonstrated by the fact that the maximum term to maturity used to be 26 years earlier this year until the recent issue of a 2041 bond, the R214. This term will once again shorten until a new issue.</p>	M	<p>Banks generally quote rates for long dated maturities (maximum maturity term is 30 years).</p> <p>Swaps have always been available at the maximum maturity term, making the extrapolation of the term structure less problematic (depending on the entry point used for extrapolation). In times of extreme market turbulence, bid-offer spread might be made sufficiently wide to discourage trade at long durations.</p> <p>Swaps are always available at the maximum maturity term, making the extrapolation of the term structure less problematic (depending on the entry point used for extrapolation).</p>
Level of interpolation	SAM WG/ SA banks	M	Rates available at a smaller number of points along the curve.	H	Rates available at a greater number of points along the curve, making interpolation easier.

Note: some of the points stated in the dashboard were raised by investment banking specialists from Absa Capital and Standard Bank.



8. RECOMMENDATION

- 8.1. It is recommended that the methodology to derive the term structure should be made publicly available. A separate document dealing with methodology of constructing the curve will be tabled.
- 8.2. The risk-free rate working group recommends that the FSB publish the risk-free rate term structure on a monthly basis, including extrapolation of the curve. This process will ensure that all entities use the same risk-free rate term structure.
- 8.3. It is the view of the risk-free working group that swaps may be considered to be superior to government bonds in most of the criteria used to assess the two alternatives in this document. The working group therefore recommends that the swap curve be used to determine the risk-free rate term structure.
- 8.4. The general consensus from investment bank specialists with whom the working group had discussions was that the size of the inherent credit risk premium in the mid-market inter-bank swap rates quoted by the South African banks is not material enough to recommend an adjustment for credit risk to the swap curve.

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