**Guidelines on Banks' Asset Liability Management Framework –
Interest Rate Risk**

1.   Scope

Banks should compute their interest rate risk position in each currency applying the Duration Gap Analysis (DGA) and Traditional Gap Analysis (TGA) to the Rate Sensitive Assets (RSA)/ Rate Sensitive Liabilities (RSL) items in that currency, where either the assets, or liabilities are 5 per cent or more of the total of either the bank's global assets or global liabilities. The RSA and RSL include the rate sensitive off balance sheet asset and liabilities. The interest rate risk position in all other residual currencies should be computed separately on an aggregate basis.

2.   Adoption of Earnings and Economic Value Approach

Interest rate risk is the risk where changes in market interest rates affect a bank's financial position. Changes in interest rates impact a bank's earnings (i.e. reported profits) through changes in its Net Interest Income (NII). Changes in interest rates also impact a bank's Market Value of Equity (MVE) or Net Worth through changes in the economic value of its rate sensitive assets, liabilities and off-balance sheet positions. The interest rate risk, when viewed from these two perspectives, is known as 'earnings perspective' and 'economic value perspective', respectively. Generally, the former is measured using the TGA and the latter is measured using more sophisticated DGA. Banks should carry out both the analyses.

3. Earnings Perspective - TGA

The focus of the TGA is to measure the level of a bank's exposure to interest rate risk in terms of sensitivity of its NII to interest rate movements over the horizon of analysis which is usually one year. It involves bucketing of all RSA and RSL and off balance sheet items as per residual maturity/ re-pricing date in various time bands, as is being currently done (circular DBOD. BP. BC. 8 / 21.04.098/ 99 dated February 10, 1999) and computing Earnings at Risk (EaR) i.e. loss of income under different interest rate scenarios over a time horizon of one year.

4.   Economic Value Perspective – DGA

The focus of the DGA is to measure the level of a bank's exposure to interest rate risk in terms of sensitivity of Market Value of its Equity (MVE) to interest rate movements. The

DGA involves bucketing of all RSA and RSL as per residual maturity/ re-pricing dates in various time bands and computing the Modified Duration Gap (MDG). The RSA and RSL include the rate sensitive off balance sheet asset and liabilities. MDG can be used to evaluate the impact on the MVE of the bank under different interest rate scenarios.

4.1 Relationship between MDG and sensitivity of MVE to interest rate changes

(i) MD of an asset or liability measures the approximate percentage change in its value for a 100 basis point change in the rate of interest.

(ii) The MDG framework involves computation of Modified Duration of RSA (MDA) and Modified Duration of RSL (MDL). MDA and MDL are the weighted average of the Modified Duration (MD) of items of RSA and RSL respectively. The MDG can be calculated with the help of the following formula:

$$MDG = \left[MDA - \left(MDL * \frac{RSL}{RSA} \right) \right]$$

The MDG as defined above reflects the degree of duration mismatch in the RSA and RSL in a bank's balance sheet. Specifically, larger this gap in absolute terms, the more exposed the bank is to interest rate shocks.

(iii) The *impact* of changes in the interest rates on the MVE can be evaluated by computing ΔE with the help of following formula

$$\Delta E = -[MDG] * RSA * \Delta i$$

In the above equations:

- Equity would mean Networth as defined in DBS Circular No.
  DBS.CO.PPD.ROC. 12 /11.01.005/2007-08 dated April 7, 2008.
- 'ΔE' stands for change in the value of equity
- 'Δ i' stands for change in interest rates in percentage points (1% change to be written as 0.01)

Ideally, in the calculation of changes in MVE due to changes in the interest rates, market values of RSA and RSL should be used. However, for the sake of simplicity, banks may take the book values of the RSA and RSL (both inclusive of notional value of rate sensitive off-balance sheet items) as an approximation.

(iv) Illustration:

A schematic hypothetical illustration for computation of MDG, and $\frac{\Delta E}{E(\%)}$ for an interest rate shock of 200 basis points is given below:

(Rs. in crore)

Particulars	Amount
Equity as on date	1350.00
RSA as on date	18251.00
RSL as on date	18590.00
MDA (Weighted Modified Duration of Assets)	1.96
MDL (Weighted Modified Duration of Liabilities)	1.25
MDG [1.96- {1.25*(18590/18251)}]	0.687
$\Delta E = - [MDG]*RSA*\Delta i$	-250.77
For a 200 bps rise in rate of interest, MVE will fall by (250.77/1350)*100	18.58%

4.2 Preparation of Interest Rate Sensitivity statement

4.2.1 Need for behavioural studies

In the **Interest Rate Sensitivity (IRS) Statement** as per format prescribed in **Appendix II,** while RSA and RSL with fixed maturities are straightaway classified in the relevant time buckets based on residual maturity/ re-pricing dates, there could be an element of variance in the manner of bucketing those items which do not have a fixed maturity or have embedded optionality (i.e savings bank deposits, current account deposits and mortgage loans etc.). This calls for behavioural studies to be undertaken by banks in order to have a realistic assessment of the interest rate sensitivity, an issue which has already been highlighted in the present ALM guidelines. Banks should not only have an appropriate process to conduct such behavioural studies in a consistent manner, but also have a detailed framework to review these studies and their output periodically (say annually). Banks may apply the results of the behavioural studies on a consistent basis and the results may be reviewed/ revised **once a year in the first quarter of the financial year, if necessary.** The behavioural studies should be based on at least three years data. Banks may evolve a suitable mechanism, supported by empirical studies and behavioural analysis to estimate the future behaviour of assets and liabilities and off-balance sheet items with respect to changes in market variables. Pending such studies, banks may use the indicative framework for bucketing of assets and liabilities, as furnished in **Appendix I**.

4.2.2 *Introduction of additional time buckets*

The past few years have seen banks' foray into financing long-term assets such as home loans, infrastructure projects, etc. Banks also have been allowed to raise funds through long-term bonds with a minimum maturity of five years to the extent of their exposure of residual maturity of more than 5 years to the infrastructure sector. Hence, it has been decided to add the following time buckets to the existing Statement of Interest Rate Sensitivity viz; 'over 5 years and up to 7 years', 'above 7 years and up to 10 years' and 'over 10 years and up to 15 years' and 'over 15 years. The existing and revised time buckets for compiling the Statement of Interest Rate Sensitivity, both under TGA and DGA, are given below:

Statement of Interest Rate Sensitivity – Time buckets

Sr. No.	Existing time buckets	Revised time buckets
1.	1-28 days	1-28 days
2.	29 days and up to 3 months	29 days and up to 3 months
3.	Over 3 months and up to 6 months	Over 3 months and up to 6 months
4.	Over 6 months and up to 1 year	Over 6 months and up to 1 year
5.	Over 1 year and up to 3 years	Over 1 year and up to 3 years
6.	Over 3 years and up to 5 years	Over 3 years and up to 5 years
7.	Over 5 years	Over 5 years and up to 7 years
8.	Non-sensitive	Over 7 years and up to 10 years
9.		Over 10 years and up to 15 years
10.		Over 15 years
11.		Non-sensitive

4.2.3 *Grouping of assets and liabilities in time buckets*

(i) Calculation of the MD of each individual rate sensitive asset, liability and off-balance sheet position and taking their weighted average to derive the MD of RSA and RSL would enhance the accuracy of calculation. However, it may lead to an increase in volume and complexity of calculations. The feasibility of this approach would depend on bank's information technology infrastructure (availability of core banking solution, MIS capability), staff skills, size of the branch network, etc. Banks have therefore been provided certain extent of flexibility in applying the proposed framework. Those banks which are not equipped to compute the MD of each individual rate sensitive asset, liability and off balance sheet position may:

   a) group RSA and RSL under the broad categories indicated in **Appendix I** under various time buckets; and

b) compute Modified Duration (MD) of these categories of assets/ liabilities and off balance sheet items using the suggested **common** maturity, coupon and yield parameters indicated in **Appendix I.**

(ii) The Modified Duration Gap (MDG) computed from the above would be simpler and may also lead to a cost- benefit advantage, in spite of the approximations in the calculation of MD. However, banks which have the capability to compute the MD of each item of RSA and RSL may do so in order to improve the accuracy of measurement of interest rate risk.

(iii) Banks may compile the ALM statements and compute the MDG for the Balance Sheet as a whole, which would be a combination of the Banking and Trading books. Trading Book currently comprises securities included under Held for Trading and Available for Sale categories and specified derivative positions.

4.2.4   Treatment of positions in various currencies

As indicated in para 1, banks should separately compute their interest rate risk position in each currency for the purpose of DGA where either the assets, or liabilities are 5 per cent or more of the total of either the bank's global assets or global liabilities. The interest rate risk position in all other residual currencies should be computed separately on an aggregate basis. While reporting the above interest rate risk position in Part B of Appendix II, the foreign currencies would be converted into Indian Rupees using the relevant spot closing rates as published by FEDAI. MD of each item or group of items of rate sensitive assets, liabilities and off-balance sheet items may be computed using the appropriate coupon and appropriate foreign currency yield curve. For residual currencies, the appropriate coupon and appropriate foreign currency yield curve of the largest among the residual currencies may be used. In deciding on coupon and yield curves, the principles behind the choice of coupons and yield curve in Appendix I may be followed.

4.2.5 Treatment of Interest Rate Derivatives instruments

(i) Derivatives are converted into positions in the relevant underlying. The amounts considered are the principal amount of the underlying or of the notional underlying.

(ii) Interest Rate Swaps could be considered as a combination of a short position and a long position. The notional of the fixed and floating leg of an Interest Rate Swap could be shown in the respective maturity bucket based on the *maturity date for the fixed leg* and *the reset date for the floating leg.* Suppose, a bank receives 5-year fixed and pays floating MIBOR, then the fixed leg of the swap could be shown as an asset in the '5-7 year' bucket and the floating leg would be shown as a liability in '1-28 days' bucket. Similarly, a currency swap may be considered as a combination of a short position in one currency and long position in another

currency. The two positions will be sensitive to the changes in the respective interest rates. The notionals of the two currencies will be bucketed as a short/long positions in the respective currency with relevant maturity.

(iii) Interest Rate Futures (IRFs) and Forward Rate Agreements (FRAs) could also be considered as a combination of a short position and long position. For instance, a long position in a September three month FRA (taken on June 1), can be bucketed as a short position in a bond with a maturity of six months and a long position in a bond with a maturity of three months. The amount to be shown in the Statement of interest rate sensitivity is the notional of FRA. IRFs could also be considered as a combination of a short position and a long position. For instance, a long position in a September three month IRF (taken on June 1), can be bucketed as a long position in a Government bond, with a maturity of six months and a short position in Government bond with a maturity of three months. The amount to be shown in the Statement of interest rate sensitivity is the notional of IRF.

(iv) Interest Rate Options (wherever permitted) are considered according to the delta equivalent amount of the underlying or of the notional underlying.

4.2.6 *Reporting format of the Statement of Interest Rate Sensitivity*

Currently banks are reporting interest rate sensitivity as a part of DSB returns which is based on the Traditional Gap Approach. The methodology for compiling these statements stands revised to the extent specified in these guidelines, viz; in relation to maturity buckets, methodology for bucketing various items of RSA and RSL. In addition to extant reporting, interest rate sensitivity as per DGA approach should be reported in the formats stipulated in **Appendix II** on a quarterly basis with effect from June 30, 2011 till March 31, 2012 and on a monthly basis with effect from April 30, 2012. The quarterly returns may be submitted within 21 days from the end of the quarter and monthly returns may be submitted within 15 days from the end of the month. The average yield and coupons on assets / liabilities used for computation of modified duration may be reported as per format stipulated in **Appendix IIA**.

4.3 Methodology for computing Modified Duration Gap

This framework is based on the utilization of book values of banking book assets and liabilities for the purpose of computation of MD. However, banks which have the capability to use market value of assets and liabilities of banking book may do so. Market values of assets and liabilities may be determined by discounted cash flow method. The step-by-step approach for computing modified duration gap is as follows:

i) Identify variables such as principal amount, maturity date / re-pricing date, coupon rate, yield, frequency and basis of interest calculation for each item / category of RSA/RSL.

ii) Plot each item / category of RSA/RSL under the various time buckets. For this purpose, the absolute notional amount of rate sensitive off-balance sheet items in each time bucket should be included in RSA if positive or included in RSL if negative.

iii) The mid-point of each time bucket may be taken as a proxy for the maturity of all assets and liabilities in that time bucket, except for those for which the bank is able to compute modified duration on individual basis.

iv) Determine the coupon for computation of MD of RSAs and RSLs as indicated in Appendix-I except for those for which the bank is able to compute MD on individual basis.

v) Determine the yield curve for arriving at the yields based on current market yields or current replacement cost or as specified in **Appendix I** for each item / category of asset / liability/ off-balance sheet item.

vi) Calculate the MD in each time band of each item/ category of RSA/RSL using the maturity date, yield, coupon rate, frequency, yield and basis for interest calculation.

vii) Calculate the MD of each item/category of RSA/RSL as weighted average MD of each time band for that item.

viii) Calculate the weighted average MD of all RSA (MDA) and RSL (MDL) to arrive at MDG and MDOE.

5. Risk management and control issues

As a step towards enhancing and fine-tuning the existing risk management practices in banks, Guidance Notes on Credit Risk Management and Market Risk Management were issued to banks on October 12, 2002, giving indicative guidelines for effective credit risk and market risk management. Additionally, banks may ensure that:

5.1 Each bank should set appropriate internal limits on Earnings at Risk (EaR) and on the volatility in the Market Value of Equity with the approval of its Board / Risk Management Committee of the Board by **March 31, 2011.** These limits may be linked to MVE for DGA and the NII (for TGA). Further, the Board / ALCO must also periodically review the above limits after assessing various scenarios of interest rates and the resultant volatility of earnings in terms of Net Interest Income and volatility in networth.

5.2 The institutionalised framework of the ALCO in banks must be strengthened and the ALCO's prior approval must be taken for deciding upon yields, assumptions used / proposed to be used, bucketing, behavioural studies, etc. for duration gap analysis. Banks must also ensure that these are compliant with regulatory prescriptions.

5.3 It is also imperative that material assumptions made, if any, are updated regularly to reflect the current market and operating environment. Further, the process of developing material assumptions should be formalized and reviewed periodically (say annually).

5.4 As prescribed in para 4.2 of Annex 10 of Master Circular dated July 1, 2010 on Prudential Guidelines on Capital Adequacy and Market Discipline- Implementation of the New Capital Adequacy Framework, a level of interest rate risk which generates a drop in the value of equity of more than 20% of MVE with an interest rate shock of 200 basis points, will be treated as excessive and such banks would be required by RBI to take action as indicated in the circular. It is clarified that the under this circular the shock of 200 basis points will be applied to the entire balance sheet including the trading book. This is considered appropriate considering the illiquidity in various market segments and the trading book generally being smaller in relation to the entire balance sheet. Banks should monitor their interest rate risk positions and take appropriate corrective action with reference to the stipulations in para 5.1 for internal limits on volatility of MVE i.e percentage variation in the MVE and the limits on individual gaps. Any significant difference in the assessment of interest rate risk for the bank under two scenarios – (i) the bank as a whole and (ii) separately for banking and trading book with different shocks – and their implication for regulatory capital would be considered under Supervisory Review and Evaluation Process (SREP).

5.5 Banks should also measure their vulnerability to loss in stressed market conditions, including the breakdown of key assumptions, and consider these results when establishing and reviewing their limits and policies in respect of Interest Rate Risk. The possible stress scenarios may include: changes in the general level of interest rates, e.g. a change in the yield by 200 and 300 basis points or more in a year, changes in interest rates in individual time bands to different relative levels (i.e. yield curve risk), changes in volatility of market rates, and earlier withdrawal of the core portion of current account and savings accounts deposits (i.e. placement of the core portion of savings deposits in the first time band as also in the 3 to 6 months bucket than in the 1 to 3 year bucket) etc.

5.6 Banks must adopt the practice of periodic model validation. Thus, where internal models / software packages are being used, the integrity and validation of data/ assumptions being used to generate the results, its validation and functioning of the entire system of interest rate risk management should be subjected to an independent audit either by an experienced internal auditor or external auditor who is conversant with risk management processes. The Audit Committee of the Board (ACB) would be responsible to ensure suitability of auditors after a proper due diligence process.

5.7 Banks should ensure documentation in respect of discount rates, coupons, assumptions used / proposed to be used, bucketing, behavioural studies, validation process etc. All material assumptions, regardless of the source, should be supported with analysis and documentation. Banks shall ensure that sufficient documentation is made available at the time of validation, internal audit, statutory audit and RBI inspection.