Appendix-1

Interest Rate Shock Scenarios

Banks shall apply six prescribed interest rate shock scenarios to capture parallel and non-parallel gap risks for EVE and two prescribed interest rate shock scenarios for NII (the scenarios of parallel shock up and parallel shock down). These scenarios are applied to IRRBB exposures in each currency for which banks have material positions. In order to accommodate heterogeneous economic environments across jurisdictions, the six shock scenarios reflect currency specific absolute shocks as specified in Table 2 below. Under this approach, IRRBB is measured by means of the following six scenarios:

a) parallel shock up;
b) parallel shock down;
c) steepener shock (short rates down and long rates up);
d) flattener shock (short rates up and long rates down);
e) short rates shock up; and
f) short rates shock down

2. The interest rate shocks for exposures to INR and other currencies[1] are as follows:

Table 2

	Specified size of interest rate shocks:									
	INR	**ARS, BRL, IDR, MXN, RUB, TRY, ZAR**	**AUD**	**CAD, USD, SEK, SAR**	**CHF**	**CNY, GBP**	**EUR, HKD**	**JPY**	**KRW**	**SGD**
Parallel	250	400	300	200	100	250	200	100	300	150
Short	300	500	450	300	150	300	250	100	400	200
Long	200	300	200	150	100	150	100	100	200	100

[1] These shocks have been calibrated by BCBS based on data of historical time series ranging from 2000 to 2015 for various maturities. These shocks will be reviewed by RBI from time to time. Exposure in currencies less than 5 percent of the total of either the bank's global assets or global liabilities, shall be treated under residual category and the shocks pertaining to the largest among the residual currencies shall be applied to it. If banks have exposures to currencies not listed in Table 2, the highest of the shocks prescribed will be applicable.

Given the above table, the instantaneous shocks to the risk-free rate for parallel, short and long, for each currency, the following parameterisations of the six interest rate shock scenarios should be applied:

a) Parallel shock for currency c: a constant parallel shock up or down across all time buckets.

$$\Delta R_{parallel,c}(t_k) = \pm \overline{R}_{parallel,c}$$

b) Short rate shock for currency c: Shock up or down that is greatest at the shortest tenor midpoint. That shock, through the shaping scalar $S_{short}(t_k) = (e^{\frac{-t_k}{x}})$, where x=4, diminishes towards zero at the tenor of the longest point in the term structure[2] [3].

$$\Delta R_{short,c}(t_k) = \pm \overline{R}_{short,c} \cdot S_{short}(t_k) = \pm \overline{R}_{short,c} \cdot e^{\frac{-t_k}{x}}$$

c) Long rate shock for currency c (note: this is used only in the rotational shocks): Here the shock is greatest at the longest tenor midpoint and is related to the short scaling factor as: $S_{long}(t_k) = 1 - S_{short}(t_k)$

$$\Delta R_{long,c}(t_k) = \pm \overline{R}_{long,c} \cdot \left(1 - e^{\frac{-t_k}{x}}\right)$$

d) Rotation shocks for currency c: involving rotations to the term structure (i.e. steepeners and flatteners) of the interest rates whereby both the long and short rates are shocked and the shift in interest rates at each tenor midpoint is obtained by applying the following formulas to those shocks:

$$\Delta R_{steepener,c}(t_k) = -0.65 \cdot \left|\Delta R_{short,c}(t_k)\right| + 0.9 \cdot \left|\Delta R_{long,c}(t_k)\right|$$

$$\Delta R_{flatener,c}(t_k) = +0.8 \cdot \left|\Delta R_{short,c}(t_k)\right| - 0.6 \cdot \left|\Delta R_{long,c}(t_k)\right|$$

Examples:

Short rate shock:
Assume that a bank uses the framework with K=19 time bands and with t_K=25 years (the midpoint (in time) of the longest tenor bucket K), and where t_k is the midpoint (in time) for bucket k. In the standardised framework, if k=10 with t_k=3.5 years, the scalar adjustment for the short shock would be: $S_{short}(t_k) = \left(e^{\frac{-3.5}{4}}\right) = 0.417$. Banks would

[2] The value of x in the denominator of the function $e^{\frac{-t_k}{x}}$ controls the rate of decay of the shock. This should be set to the value of 4 for all currencies.

[3] t_k is the midpoint (in time) of the kth bucket and t_K is the midpoint (in time) of the last bucket K. There are 19 buckets in the indicative framework, but the analysis may be generalised to any number of buckets.

multiply this by the value of the short rate shock to obtain the amount to be added to or subtracted from the yield curve at that tenor point.

$$\Delta R_{short,c}(t_k) = \pm \overline{R}_{short,c} \cdot S_{short}(t_k) = \pm \overline{R}_{short,c} \cdot e^{\frac{-t_k}{x}}$$

$$\Delta R_{short,c}(3.5 years) = \pm \overline{R}_{short,c} \cdot 0.417$$

If the short rate shock was +100 bp, the increase in the yield curve at t_k =3.5 years would be 41.7 bp.

$$\Delta R_{short,c}(3.5 years) = 100 \cdot 0.417 = 41.7\ bp$$

Steepener: Assume the same point on the yield curve as above, t_k =3.5 years. If the absolute value of the short rate shock was 100 bp and the absolute value of the long rate shock was 100 bp (as for the Japanese yen), the change in the yield curve at t_k=3.5 years would be the sum of the effect of the short rate shock plus the effect of the long rate shock in basis points:

$$\Delta R_{steepener,c}(t_k) = -0.65 \cdot \left| \Delta R_{short,c}(t_k) \right| + 0.9 \cdot \left| \Delta R_{long,c}(t_k) \right|$$

$$\Delta R_{short,c}(3.5 years) = 100bp \cdot 0.417 = 41.7\ (calculated\ above)$$

$$S_{long}(t_k) = 1 - S_{short}(t_k) = 1 - 0.417 = 0.583\ bp$$

$$\Delta R_{long,c}(3.5 years) = 100bp \cdot (1 - 0.417) = 58.3bp$$

$$\Delta R_{steepener,c}(3.5 years) = -0.65 \cdot 41.7bp + 0.9 \cdot 58.3bp = \pm 25.4bp$$

Flattener: The corresponding change in the yield curve for the shocks in the example above at t_k=3.5 years would be:

$$\Delta R_{flatener,c}(t_k) = +0.8 \cdot \left| \Delta R_{short,c}(t_k) \right| - 0.6 \cdot \left| \Delta R_{long,c}(t_k) \right|$$

$$\Delta R_{flatener,c}(3.5 years) = +0.8 \cdot 41.7bp - 0.6 \cdot 58.3bp = -1.6bp$$