CUMULATIVE DEFAULT RATE AND MARGINAL DEFAULT RATE APPROACH

A. BACKGROUND

SEBI, vide its circular No SEBI/ HO/ MIRSD/ DOS3/ CIR/ P/ 2019/ 70 dated June 13, 2019 advised revised guidelines to CRAs for Computation of Cumulative Default Rates (CDR) and also introduced Probability of Default (PD) benchmarks for CRAs through the Marginal Default Rate (MDR) approach using monthly static pool, for last 10-year period. Based on the approach given by SEBI, all CRAs were advised to disclose, on an annual basis, the average one-year, two-year and three-year cumulative default rates (based on weighted average) each for Last 10-financial years period (Long-run average default rates) and Short run and long run PD bench marks.

B. THE APPROACH:

1. Marginal Default Rate (MDR): MDR is defined as the number of entities defaulting in a particular year in a specific rating category as a proportion of the number of entities in that rating category in the cohort at the beginning of the year under study, adjusted for withdrawals. Here we take annual static cycles for our data, since it is presented as such but it can be easily converted to monthly static cycles with the appropriate dataset.

2.Cohort: Cohorts consists of the total issuers of a particular rating at the beginning of the year of study.

3.Cumulative Default Rate (CDR): CDR captures the default rate over one or more-than-one-year horizon. In calculating the CDR the weighted average marginal default rates (MDRs) of the various cohorts are used, the weights being the number of issuers in the cohorts across various rating categories.

Let us calculate 1-year, 2-year, 3-year CDRs using the MDRs for the year 2011 for rating B which will give us an overview of our overall calculations.

In the **first step**, we calculate the MDRs for FY2012, FY2013 and FY2014 with regards to a cohort which is formed of the companies having the rating A in 2011. The Cohort Size (C) remains fixed for the time horizon T for which the CDRs are meant to be calculated.

Note: - In order to adjust for rating withdrawal, we assume that the risk exposure was there for half of the year in which the rating withdrawal was done and so we reduce the cohort size as such. After that they are not considered in C in the subsequent time periods.

$MDR1$= (Defaults in the year FY2012 out of C) / (C – (W1 / 2))

MDR1: Marginal default rate for FY2011-2012

W1: Withdrawals in FY2012 out of C

Similarly,

$MDR2$= (Incremental Defaults in the year FY2013 out of C) / (C – W1 – (W2 / 2)) x (1 – MDR1))

MDR2: Marginal default rate for year FY2012-2013

Note: We only take incremental defaults into consideration here and not the defaulters who had been taken into consideration earlier in the calculation of MDR1

W2 = Incremental withdrawals in FY2013 out of C

And

$MDR3$= (Incremental Defaults in the year FY2014 out of C) / (C – W1 – W2 – (W3 / 2) x (1 – MDR1) x (1 – MDR2)

MDR3: Marginal default rate for year FY2013-2014

W3 = Incremental withdrawals in FY2014 out of C

After the calculation of various MDRs we proceed onwards towards **the calculation of CDRs** in question with the help of them.

The calculation of CDR1 (1- year CDR) is straightforward as it is equal to MDR1 as both represent a single year.

Thus, CDR1 = MDR1

In case of CDR2 (2 - year CDR) we take into consideration the default rate of year 1 and the conditional probability of the issuers surviving the first year (using their survival rate) multiplied by the default rate of year 2 (MDR2).

So, CDR2 = MDR1 + (1 – MDR1) * MDR2

= 1 – (1 – MDR1) * (1 – MDR2)

We see that CDR2 is the sum of default rate of year 1 and the probability that a firm which has survived year 1 or the survival rate (1 - MDR1) multiplied by the default rate of year 2 (MDR2).

Similarly, 3- year CDR (CDR3) can be calculated using a similar formula,

CDR3 = MDR1 + (1 - MDR1) * MDR2 + (1 – MDR1) * (1 – MDR2) * MDR3

= 1 – (1 – MDR1) * (1 – MDR2) * (1 – MDR3)

The reasoning for this is similar to that of CDR2.

Rating	Year	Cohort Size	CDR1	CDR2	CDR3	MDR1	MDR2	MDR3
A	2011	242	0.41%	0.41%	0.82%	0.41%	0.00%	0.41%
A	2012	244	0.00%	0.82%	3.26%	0.00%	0.82%	2.46%
A	2013	235	0.43%	1.27%	NA	0.43%	0.85%	NA
A	2014	222	0.45%	NA	NA	0.45%	NA	NA

We proceed onwards towards the calculation of Average CDRs (CDR1, CDR2 and CDR3) over the time horizon T (2011-2015) using the weighted average method where the weights used are the size of the cohort for the particular period.

Therefore,

Weighted Average CDR1 for A = $(\sum C_i * CDR1_i)/ (\sum C_i)$

(where i goes from 2011 to 2014)

	RATING	CDR1	CDR2	CDR3
AVERAGE CDR	AAA	0.00%	0.00%	0.00%
	AA	0.00%	0.22%	0.00%
	A	0.32%	0.83%	2.05%
	BBB	0.72%	2.92%	5.90%
	BB	5.29%	8.75%	10.17%
	B	20.67%	31.13%	41.73%
	C	100.00%	100.00%	NA

Thus, we have calculated the required CDRs and Average CDRs required by us using the MDRs and annual static pools method.