

Operational risk measurement

- Basis Indicator Approach (BIA)
- The Standardized Approach (TSA)
- Advanced Measurement Approach (AMA)

Capital charge = Average Gross Income in prev 3 years, if positive $\times 15\%$

Eg :

Scenarios	Y_1	Y_2	Y_3	Capital charge
S_1	50	-50	150	$100 \times 15\% = \underline{\underline{15}}$
S_2	100	100	200	$133.33 \times 15\% = \underline{\underline{20}}$
S_3	0	0	-10	$0 \times 15\% = \underline{\underline{0}}$

* Standardized Approach

- Break down the business in 8 different business lines
- Follow the BIA method, but at a business line level with different multiples to arrive at capital charge

⇒ Benefits

- Refined version of BIA
- Takes into account varying levels of risk posed by different business units
- Prevents netting off of income across business lines

* Advanced Measurement Approach

- Banks can develop their own models - to measure operational risk
- Needs to be approved by the regulator
- Certain broad guidelines given by Basel
- What risks to consider, how to consider is upto the bank

Eg: Frequent but low impact risk

i) Cases of data entry errors

Based on 5 years of internal experience,
on an avg there are (10) data entry errors
each year. ← rate of occurrence

Avg cost to rectify = £10,000 / error

No. of events $\sim \text{Poi}(10)$

Expected loss = Rate of occurrence
× Avg cost

$$= 10 \times 10,000 = \underline{\underline{£1,00,000}}$$

4) Standardized Measurement Approach

- Newest method to replace AMA
- Formula driven & non-model based
- No internal models are allowed

Components

1) Business Indicator (BI) : Proxy / representative of the financial statements

} BIA
&
TSA

2) Business Indicator Component (BIC):

1. based on the value of BI

3) Internal Loss Multiplier (ILM): Consider bank's internal loss data / experience

} considers
and
incentivizes
good
risk mgmt
practices

→ Approach recognizes that increase in scale of business will likely lead to increase in ops risk

→ At the same time, it incentivizes good & robust risk mgmt processes

1) BI

$$BI = SC + FC + ILDS$$

SC: Services Component

$$SC = \text{Max (Other Operating Income, Other Operating Expenses)}$$

$$+ \text{Max (Fee Income, Fee Expense)}$$

FC: Financial Component

$$FC = \text{Abs (Net P\&L Trading Book)} \\ + \text{Abs (Net P\&L Banking Book)}$$

ILDE: Interest, lease, dividend component

$$ILD = \text{Min} [\text{Abs (Interest Income - Int. Expenses)}, \\ 2.25\% \times \text{Interest Earning Assets}] \\ + \text{Dividend Income}$$

2) BIC: Multiple of BI

Bucket	BI	%
1	≤ 8000 Cr	12
2	$> 8000 \text{ \& } \leq 240000$ Cr	15
3	> 240000 Cr	18

$$3) ILM = \ln \left\{ e - 1 + \left[\frac{LC}{BIC} \right]^{0.8} \right\}$$

LC: Loss Component = 15 × Avg. annual ops risk losses

⇒ Sufficient internal data may not be available
→ Loss data may be difficult to aggregate & maintain

* Operational Risk Capital (ORC)

1) For banks in Bucket 1 & banks in buckets 2 & 3 with less than 5 years of internal data

$$ORC = BIC$$

2) Banks in buckets 2&3 with >5 years of internal data

$$ORC = PIC \times ILM$$

$$RWA = 12.5 \times ORC$$

Advantages

- Smaller banks can benefit since maintaining loan data may be expensive
- Benefits larger banks with strong risk mgmt practices ($ILM < 1$) by reducing capital requirement

Eg: Operating Income = 1,547

Other Operating Expense = 11,161

Fee income = 9,359

Fee expense = 7,222

P&L (Trading book) = 2,547

P&L (Banking book) = 5,200

Dividend income = 58 (Sch 14(v))

Interest income = 63,646 (Sch 13)

Interest expense = 34,406 (Sch 15)

BI : SC, FC, ILDC

$$FC = Abs(P\&L_{TB}) + Abs(P\&L_{BB})$$

$$= 2547 + 5200 = \underline{\underline{7,747}}$$

$$\begin{aligned}
 SC &= \text{Max}(\text{Other OI}, \text{Other OE}) \\
 &\quad + \text{Max}(\text{Fee Inc.}, \text{Fee Exp.}) \\
 &= \text{Max}(1547, 11161) + \text{Max}(9359, 7222) \\
 &= 11,161 + 9,359 = \underline{\underline{20,520}}
 \end{aligned}$$

$$\begin{aligned}
 ILDC &= \text{Min}[\text{Abs}(\text{II} - \text{IE}), 2.25\% \times \text{Int. Ann. assets}] \\
 &\quad + \text{Dir. Inc}
 \end{aligned}$$

$$\text{Int. earning assets} = 911,570$$

$$\begin{aligned}
 ILDC &= \text{Min}[\text{Abs}(63,646 - 34,406), \\
 &\quad 2.25\% \times 911,570] + 58 \\
 &= \text{Min}(29,240, 20,510) + 58 \\
 &= \underline{\underline{20,568}}
 \end{aligned}$$

$$\begin{aligned}
 BI &= 7,747 + 20,520 + 20,568 \\
 &= \underline{\underline{48,835}}
 \end{aligned}$$

$$\text{Falls in Bucket 2: } BI < = 15\% \times 48,835 = \boxed{7,325}$$

$\swarrow$
 > 5 years data
 availble

$\searrow$
 Not availble

$\Downarrow$

$$\begin{aligned}
 ORC &= BIC \\
 &= \underline{\underline{7,325}}
 \end{aligned}$$

$$\begin{aligned}
 RWA &= 7325 \times 12.5 \\
 &= \underline{\underline{91,566}}
 \end{aligned}$$

S2 where data is available

→ compute ILM

$$ILM = \ln \left[e^1 - 1 + \frac{LC}{BIC} \right]^{0.9}$$

$$LC = 15 \times \text{Avg. Annual operational losses}$$