Days	Profit	Deviation from Mean	
1	1000		
2	1020		
3	1040		
4	980		
5	940		
Total	$\boxed{4980}$		

$\bar{x} = 996$

$$= \sqrt{\frac{(+4)^2 + (24)^2 + (44)^2 + (-16)^2 + (-56)^2}{5}}$$

$$\sqrt{\frac{16 + 576 + 1936 + 256 + 3136}{5}}$$

$\boxed{34.4}$

Volatility

2 factors

1) Potential losses

2) Probability of occurance

DOWNSIDE POTENTIAL

- **Risk materializes** only when earnings deviate adversely.
- **Volatility captures both** upside and downside deviations.

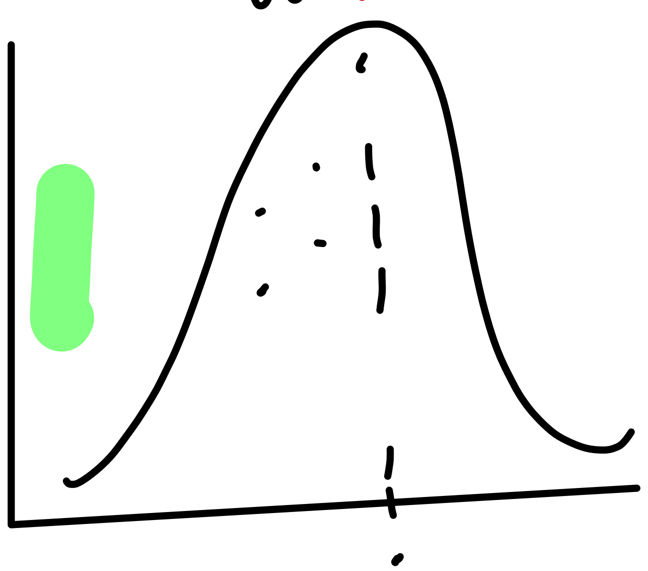
VaR

Value at Risk

8600 @ 99% CL 30 days

Normal conditions 1% +

- Downside potential **only captures possible losses** ignoring profit potential.
- It is the **ADVERSE DEVIATION** of a target variable.



The downside potential has 2 components - **POTENTIAL LOSSES AND PROBABILITY OF OCCURRENCE.**

- Potential losses may be estimated but **difficulty lies in estimating probabilities.**
- Hence, downside risk measures **require prior modelling of the probability distribution** of potential losses.
- Downside potential is the most **comprehensive measure of risk** as it integrates sensitivity and volatility with the adverse effect of uncertainty.
- The **VALUE AT RISK** (VaR) is a downside risk measure.

CAIIB → 8360944207

RISK PRICING

Risks in banking transactions impact banks in two ways.

1. **banks have to maintain necessary capital** as per regulatory requirements. The capital required is not without costs. The pricing of transaction must take that into account.
2. **there is a probability of loss** associated with all risks. This also needs to be factored into pricing.

RISK PRICING implies factoring risks into pricing through capital charge and loss probabilities.

- This would be in **addition to the actual costs** incurred in the transaction.
- The **actual costs incurred are cost of funds** that has gone into the transaction and costs incurred in giving the services, which are incurred by way of maintaining the infrastructure, employees and other relevant expenses.

#1 Identification
#2 Quant.
#3 pricing
#4

PRICING, THEREFORE, SHOULD TAKE INTO ACCOUNT THE FOLLOWING:

1. **Cost** of Deployable Funds
2. **Operating Expenses**
3. **Loss** Probabilities
4. **Capital** Charge

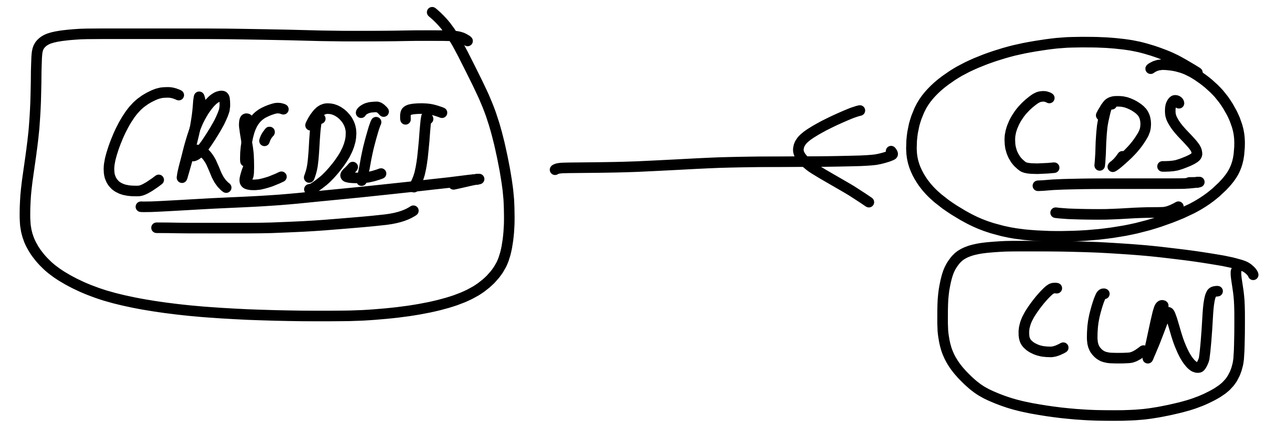
BASEL III
CAR / CRAR
100Cr × 125%
125 RWA
9%

RISK MONITORING AND CONTROL

Banks should put in place the following:

1. An organizational **structure**.
2. Comprehensive risk measurement **approach**.
3. **Risk Management Policies** adopted at the corporate level **consistent** with the business strategies, capital strength, management expertise and risk appetite.
4. It should include detailed structure of **prudential limits, discretionary limits and risk-taking functions**.

5. To ensure that the organisation **functions in a planned manner**, feedback of the actual functioning is necessary for control.
6. **MONITORING** to ensure that the divergence between the planned performance and actual performance is kept at the level that is acceptable.



RISK MITIGATION

- Since **risks arise from uncertainties** associated with the risk elements, risk reduction is achieved by adopting strategies that eliminate or reduce the uncertainties associated with the risk elements. This is called 'Risk Mitigation'.
- The **techniques** to mitigate different types of risk are different.
- For **mitigating credit risk** banks have been using traditional techniques, such as collateralizations by first priority claims with cash or securities or landed properties, third party guarantees, etc.

- Banks may **buy credit derivatives** to offset various forms of credit risk.
- For **mitigating interest rate risk** banks use interest rate swaps, forward rate agreements or financial Futures.
- **RISK MITIGATION MEASURES** aim to reduce downside variability in net cash flow but it also reduces upside potential simultaneously.

Risk Mitigation through Diversification and Portfolio Risk

Risks can be mitigated through diversification.

CASE STUDY 1: Volatility and Risk

Bank ABC is engaged in 3 business lines namely lending, Investments and Remittance. The information related to operating profits of these three business lines is a s under:

Business Lines	2018	2019	2020
Lending	200	310	190
Investment	150	160	230
Remittance	50	55	65

Total	**400**	**525**	**485**

Based on the above calculate the mean, and also find which of the business line is most volatile and least volatile and is having highest risk?

CASE STUDY 2: Value at Risk

Based on previous 60 days trading data, the following information is available:

Volatility per day → 2% (assuming 252 days in a year)

No of observations days → 10 days Time Horizon

Confidence level → 99%

Investment amount = Rs 60,000

Calculate VaR for $\boxed{\text{10 days}}$ and 30 days.

Daily Volatility = $60000 \times 2\% = 1200$

$V_{10} = \text{Daily Volatility} \times \sqrt{\text{Time Horizon}}$

$= 1200 \times \sqrt{10}$

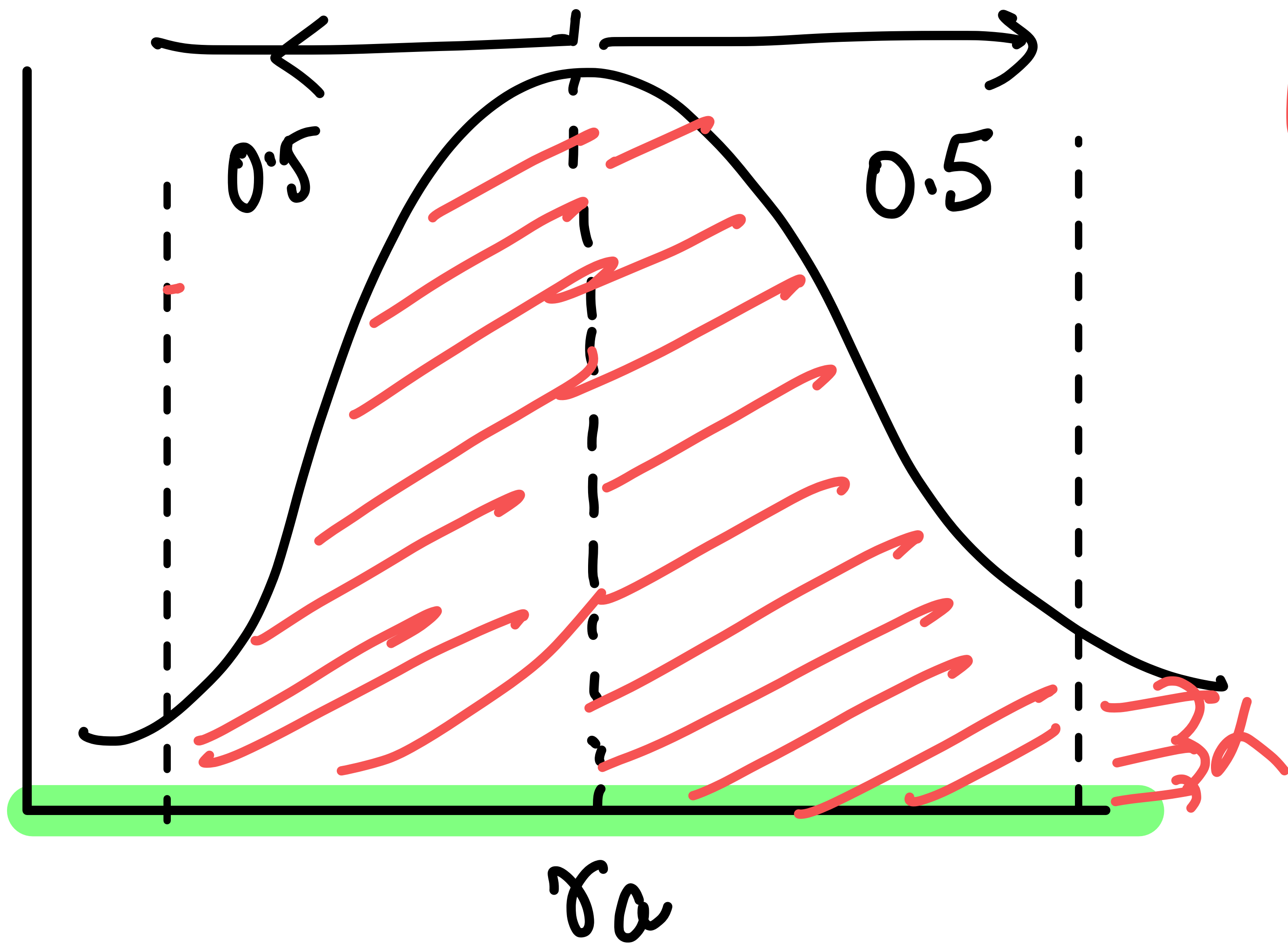
$\boxed{= 3794}$

$\boxed{2.33}$

$VaR = V_0 \times Z\text{-index}$

$= 3794 \times 2.33$

$= \boxed{8840}$



$\boxed{99\%}$

$= \boxed{0.99}$

$/2$

$\boxed{0.495}$

2.33

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	$\boxed{.9901}$	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

RISK AND BANKING BUSINESS

Banking business lines may be grouped as:

- The Banking Book
- The Trading Portfolio
- Off-Balance Sheet Exposures

THE BANKING BOOK includes **all advances, deposits and borrowings**, which usually arise from commercial and retail banking operations.

- all assets and liabilities in the banking book are **held until maturity**, maturity mismatch between assets and liabilities result in excess or shortage of liquidity. This is commonly known as **'Liquidity Risk'.**

- **Interest rates on assets as well as liabilities change on their maturity**. This affects net interest margin, i.e., interest received net of interest paid. This is called **Interest Rate risk**
- The **asset side of the banking book generates credit risk** arising from defaults in payments of principal and/or interest by the borrowers. This is called **'Default Risk' or 'Credit Risk',**
- **OPERATIONAL RISK:** Loss of possibilities arise due to human failures of omission or commission, deficiencies in information system and system failure, inadequacy or non-adherence to internal processes, external events etc. called operational risk.
- Accrual system of accounting applied.

THE TRADING BOOK includes all the assets that are marketable, i.e., they can be traded in the market.

- normally **not held until maturity** and positions are liquidated after holding for a period.

- **MARKED-TO-MARKET SYSTEM** is followed and the difference between market price and book value is taken to profit and loss account.
- **comprises** of fixed income securities, equities, foreign exchange holdings, commodities, etc., held by the bank on its own account.
- subject to adverse movement in market prices until they are liquidated. This is termed as **'Market Risk'**.
- **may have market overseas**. Instrument having **Lower Demand** have lower trading volume and are exposed to **LIQUIDATION RISK.**
- **CREDIT RISK OR DEFAULT RISK**: arises due to failure on the part of the counter party to keep its commitment.
- **OPERATIONAL RISKS** may also arise

OFF-BALANCE SHEET EXPOSURES

- **contingent** in nature. (Banks may also have **contingency receivables**)

- like banks guarantees, committed or backup credit lines, letters of credit, etc.
- **DERIVATIVES ARE OFF-BALANCE SHEET MARKET EXPOSURES**. They may be swaps, futures, forward contracts, foreign currency contracts, options, etc.
- Contingent exposure **may become a fund-based exposure**.
- Such exposures **may become a part of the banking book or trading book**, depending upon the nature of off-balance sheet exposure.
- off-balance sheet exposures may have liquidity risk, interest rate risk, market risk, default or credit risk and operational risk.

BANKING RISKS - DEFINITIONS

LIQUIDITY RISK is the **inability to obtain funds** to meet cash flow obligations at a reasonable rate.

- arises **from funding of long-term assets by short-term liabilities**

TYPES OF LIQUIDITY RISKS

FUNDING RISK arises from the need to replace net outflows due to unanticipated withdrawal/ non-renewal of deposits.

TIME RISK: This arises from the need to compensate for non-receipt of expected inflows of funds (performing assets turning into non-performing assets)

CALL RISK: This arises due to crystallization of contingent liabilities.

INTEREST RATE RISK (IRR) is the **exposure of a Bank's revenue to adverse movements in interest rates**. It **impacts the earnings** of the bank or on the **economic value** of the bank's assets, liabilities and off-balance sheet positions.

GAP OR MISMATCH risk arises from **holding assets and liabilities and off-balance sheet items** **with different principal amounts,**

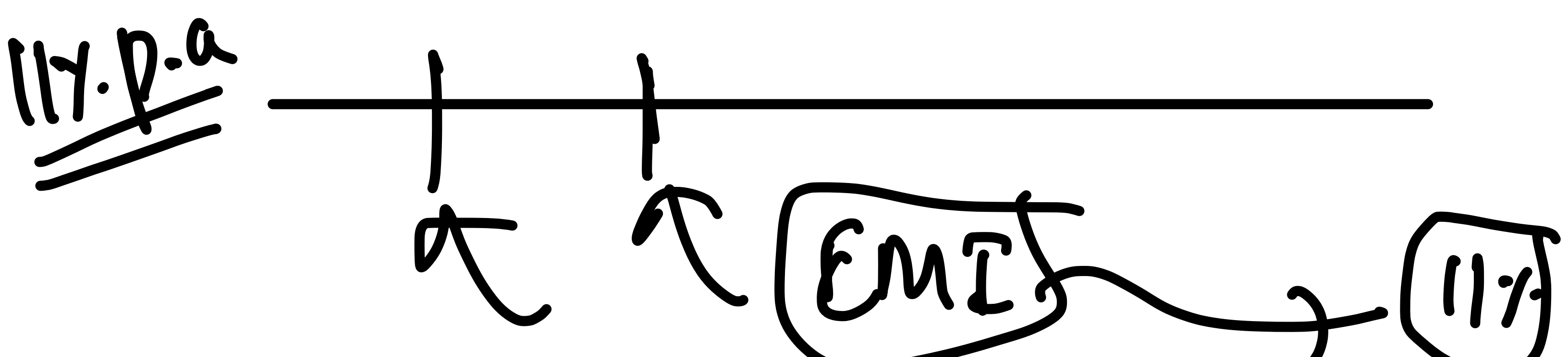
maturity dates or repricing dates, thereby creating exposure to unexpected changes in the level of market interest rates.

- **BASIS RISK:** the **interest rate** of different assets, liabilities and off-balance sheet items may **change in different magnitude**.

- **YIELD CURVE RISK:** **banks use two different instruments maturing at different time horizon for pricing their assets and liabilities**, any non-parallel movements in yield curves would affect the NII.

- **EMBEDDED OPTION RISK:** When there is **prepayment** of cash credit/ demand loans term loans and **exercise of call/ put options** on bonds/debentures and/or premature withdrawal of term deposits before their stated maturities.

- **Reinvestment Risk:** Uncertainty with regard to interest rate at which the future cash flows could be reinvested.



MARKET RISK is the **risk of adverse deviations of the marked-to-market value of the trading portfolio**, due to market movements, during the period of holding. Also referred as Price Risk.

- Price risk occurs when assets are sold before their maturities.

FOREX RISK/ Exchange Risk, is the risk that a bank may suffer losses **as a result of adverse exchange rate movements** during a period in which it has an **open position**.

MARKET LIQUIDITY RISK: when a bank is **unable to conclude a large transaction** in a particular instrument near the current market price.

DEFAULT OR CREDIT RISK the potential of a bank borrower or counterparty to fail to meet its obligations in accordance with agreed terms.

COUNTERPARTY RISK: This is **related to non-performance** of the **trading partners** due to counterparty's refusal and or inability to perform.

COUNTRY RISK: a type of credit risk (external factors) where non-performance by a borrower or counter-party arises due to constraints or restrictions imposed by a country.

OPERATIONAL RISK the risk of loss resulting **from inadequate or failed internal processes, people and systems or from external events**.

TRANSACTION RISK: Transaction risk is the risk arising from **fraud, both internal and external, failed business processes** and the inability to maintain business continuity and manage information.

COMPLIANCE RISK (integrity risk): Compliance risk is the **risk of legal or regulatory sanction, financial loss or reputation loss** that a bank may suffer as a result of its failure to comply with any or all of the applicable laws, regulations, codes of conduct and standards of good practice.

OTHER RISKS

STRATEGIC RISK: the risk arising from adverse business decisions, improper implementation of decisions, or lack of responsiveness.

REPUTATION RISK: the risk arising from negative public opinion. May expose the institution to litigation, financial loss, decline in customer base.