

# Risk Management Overview

## Risk Management: Sprint 1

### What is risk management:

Definition: Risk management is the process of identifying, assessing, and controlling threats to an organization's capital, earnings, operations, or objectives.

### Risk management steps:

#### 1. Identify Risks

- List everything that could go wrong (financial, operational, legal, safety, environmental, etc.).
- Use brainstorming, checklists, historical data, expert input, and scenario planning.

#### 2. Assess and Analyze Risks

- Determine the **likelihood** (probability) and **impact** (severity) of each risk.
- Rank or prioritize risks using a risk matrix (low/medium/high).

#### 3. Develop Risk Response Strategies

- Decide how to handle each risk:
  - **Avoid** – eliminate the activity that creates the risk.
  - **Reduce/Mitigate** – put controls in place to minimize likelihood or impact.
  - **Transfer/Share** – shift risk to another party (insurance, outsourcing).
  - **Accept/Retain** – live with the risk if it's small or the cost to control is too high.

#### 4. Implement Controls

- Put your risk response plan into action (training, safety protocols, monitoring systems, contingency plans).

#### 5. Monitor and Review

- Continuously track risks and controls.

- Review regularly because risks change over time.
- Update your plan as new risks emerge.

#### Factors of Risk Management:

- Diversification

Spreading investments across different asset classes, industries, and regions to reduce exposure to the failure of any single investment.

- Asset Allocation

The strategic distribution of investments among asset categories (e.g., stocks, bonds, cash, real estate) based on goals, risk tolerance, and time horizon.

- Risk Tolerance

An investor's ability and willingness to endure losses or volatility in pursuit of potential returns.

- Liquidity Risk

The risk of not being able to quickly convert an investment into cash without significant loss in value.

- Market Risk (Systematic Risk)

The possibility of investment losses due to factors affecting the entire market, such as recessions, interest rate changes, or geopolitical events.

- Credit Risk

The chance that a borrower or bond issuer will default on their payment obligations, leading to losses for the investor.

- Inflation Risk

The risk that the purchasing power of returns will be eroded over time by rising prices.

- Time Horizon

The expected length of time an investor plans to hold an investment before needing the money, which influences the level of risk that can be taken.

- Stop-Loss and Hedging Strategies

Risk control techniques (like stop-loss orders, options, or futures contracts) used to limit potential losses.

- Regular Monitoring and Rebalancing

Ongoing review of investments and adjustments to the portfolio to keep it aligned with risk tolerance, market conditions, and long-term goals.

# Risk Assessment Metrics

## Risk Assessment Metrics:

- VaR: Value at Risk quantifies potential portfolio losses
  - Variance-Covariance Method
    - Investment Value \* [Expected Return - (Z-score \* Standard deviation)]
- Alpha measure of risk relative to the market or a benchmark index
- Beta measures the volatility of a fund relative to the market or a benchmark index
- Credit risk metrics (Moody's, S&P, Fitch): for bonds
- Volatility/Standard deviation: measures deviation from average return
- Max drawdown: largest drop from peak to low
- Liquidity measures (B-A spread, turnover ratio): measures how easily you can enter or exit an investment

## Risk Metrics:

<https://www.investopedia.com/terms/r/riskmeasures.asp>

- Alpha: the return on an investment that is not a result of a general movement in the greater market
  - <https://www.investopedia.com/terms/a/alpha.asp>
- Beta: describes the activity of a security's returns as it responds to swings in the market
  - <https://www.investopedia.com/terms/b/beta.asp>
- $R^2$ : proportion of the variance in the dependent variable that is predictable from the independent variables
  - Essentially we create machine learning model and it tells us how good it is
  - <https://www.investopedia.com/terms/r/r-squared.asp>
- Standard Deviation: statistical measurement that looks at how far discrete points in a dataset are dispersed from the mean of that set
  - How far away from average most points are
  - <https://www.investopedia.com/terms/s/standarddeviation.asp>
- Sharpe Ratio: compares a fund's historical or projected returns relative to an investment benchmark with the historical or expected variability of such returns
  - <https://www.investopedia.com/terms/s/sharperatio.asp>

# Future/End Goals

## **What do we want our end goal to look like?**

### **(1) Intelligent risk profiling**

- The final system should leverage machine learning models to automatically determine the user's portfolio risk level.
- By looking at the numbers like revenues, expenses, and profits, the user should clearly understand the financial health of the stocks.

### **(2) Personalized risk tolerance mapping and recommendation**

- The system should be able to analyze the historical price data and market volatility to generate a personalized risk profile. This will help the investors to understand the exposure in the portfolio at any given time and help them make informed investment decisions.
- The final system should compare the user's risk appetite (how much risk they are comfortable with) against their actual portfolio. Then it should suggest safer or more adventurous options.

### **(3) Educating while guiding**

- The system score and chart should come with simple explanations so that users new to the system can understand why something is considered risky and how they can improve their investments.

### **(4) Diversification of risk**

- The system should show how the user's portfolio is balanced, whether someone is only investing in one type of stock or spreading their money across different sizes of companies.



# Survey

Questions to ask people to evaluate their knowledge of risk management:

- Questions start basic then get more in depth so we can cut off after a certain point if wanted

1. What is risk management, and why is it important?
2. Can you explain the difference between systematic and unsystematic risk?
3. What is a stop-loss order, and how is it used?
4. What role does diversification play?
5. How do you define risk tolerance?
6. How would you adjust a portfolio during a downturn?
7. Can you explain position sizing?
8. How do you use Sharpe Ratio or similar metrics?
9. What tools/indicators do you use to assess market risk?
10. What is drawdown, and how do you monitor/control it?
11. What would you do if a stock drops 20% in a week?
12. Describe a major market loss you experienced.
13. How do you handle emotions during volatility?
14. High-risk trade example – how was risk managed?
15. Managing a volatile but promising stock?
16. How do you use beta to evaluate risk?
17. What is VaR, and how is it calculated?
18. How do you hedge a long equity portfolio?
19. How do macro factors impact your risk strategy?
20. Describe your strategy during high-volatility events.

Questions to ask to evaluate their risk tolerance:

- Emotional Response to Risk:

1. How would you feel if your portfolio dropped 20% in a month?
2. What's the largest percentage loss you could tolerate before feeling compelled to sell?
3. Do you lose sleep or get anxious when markets are volatile?
4. Would you describe yourself as a cautious, moderate, or aggressive investor?
5. Do you focus more on potential gains or potential losses when making investment decisions?

- Behavioral Indicators:

1. Have you ever sold an investment in a panic? What led to that decision?
2. Do you typically stick to your investment plan, or do you change course when the market moves suddenly?
3. What types of investments have you made in the past (e.g., stocks, crypto, real estate, options)?
4. Have you ever regretted not taking a financial risk? What stopped you?

- Financial Capacity (Risk Capacity):

1. What percentage of your total net worth is currently invested in the stock market?
2. Do you rely on your investments for short-term needs, or are they primarily long-term?
3. If you lost 25% of your investment today, how would it impact your lifestyle or financial obligations?
4. Do you have an emergency fund set aside? For how many months?

5. What is your investment time horizon (1–3 years, 5–10 years, 10+ years)?

- Hypothetical Scenarios:

1. If two investments had the same expected return, but one had twice the volatility, which would you choose?

2. You're offered a guaranteed 5% annual return or a 50/50 chance to earn 15% or 0%. Which do you take?

3. If you had \$10,000 to invest today, how much would you put in high-risk vs. low-risk assets?

4. Would you prefer a smooth but low-return investment, or a high-return investment with sharp ups and downs?

5. What would you do if your retirement account lost 30% in a year due to a market crash?

- Optional Follow-Up Questions:

1. What would make you increase your risk level?

2. How do you define a "risky" investment?

3. Do you think it's more important to take on risk when you're younger or older? Why?

Previous Questions:

What is the largest percentage drop in your investment portfolio you could accept?

options

{ value: 1, label: "I can't tolerate any losses" },

{ value: 2, label: "I prefer to avoid a loss greater than 15%" },

{ value: 3, label: "I'm okay with a 20% loss" },

{ value: 4, label: "I can handle significant drops" }

If you faced sudden job loss two months before a planned luxury vacation, your response would be to

options: [

{ value: 1, label: "Cancel the vacation completely" },

{ value: 2, label: "Scale down to a more affordable trip" },

{ value: 3, label: "Proceed with the vacation as planned" }]

If you won \$5000, how would you consider using it?

options: [

{value: 1, label: "keep it as cash"},

{value: 2, label: "Invest it in stocks"},

{value: 3, label: "gamble it for a chance at a bigger win"}]

If your stocks dropped 30% in value, your reaction would be:

options: [

{value: 1, label: "Sell to minimum loss"},

{value: 2, label: "Hold on and wait for recovery"},

{value: 3, label: "Invest more to average down"}]

What is your primary goal of investing?

options: [

{value: 1, label: "Maintain my wealth"},

{value: 2, label: "Long-term wealth accumulation"},

{value: 3, label: "Quick profits"}

How comfortable are you with investing in high-risk stocks?

options: [

{value: 1, label: "Not comfortable at all"},

{value: 2, label: "Somewhat comfortable"},

{value: 3, label: "Very Comfortable"}]

What percentage of your total investments is currently in stocks?

options:

{ value: 1, label: "Below 30%" },

{ value: 2, label: "30-60%" },

{ value: 3, label: "60-80%" },

{ value: 4, label: "Over 80%" }

"How do you rate your understanding of investing concepts?",

options: [

{ value: 1, label: "Not very knowledgeable" },

{ value: 2, label: "Moderately knowledgeable" },

{ value: 3, label: "Very knowledgeable" }]

# Refined Survey

Questions to ask to evaluate their risk tolerance:

**1 = Does not want to be risky      4 = Will be risky**

How would you feel if your portfolio dropped 20% in a month?

{ value: 1, label: "Very anxious — I'd want to sell immediately" },

{ value: 2, label: "Concerned — I'd consider reducing exposure" },

{ value: 3, label: "Uncomfortable but I'd likely hold" },

{ value: 4, label: "Unbothered — I'd see it as a buying opportunity" }

What's the largest percentage loss you could tolerate before feeling compelled to sell?

{ value: 1, label: "Less than 10%" },

{ value: 2, label: "10–20%" },

{ value: 3, label: "20–35%" },

{ value: 4, label: "Over 35%" }

Do you lose sleep or get anxious when markets are volatile?

{ value: 1, label: "Yes, it keeps me up at night" },

{ value: 2, label: "Sometimes, but I try not to worry" },

{ value: 3, label: "Rarely — I can tolerate ups and downs" },

{ value: 4, label: "No — I stay calm and focused on the long term" }

Would you describe yourself as a cautious, moderate, or aggressive investor?

{ value: 1, label: "Very cautious" },

{ value: 2, label: "Moderate" },

{ value: 3, label: "Growth-oriented" },

{ value: 4, label: "Aggressive / high-risk taker" }

Do you focus more on potential gains or potential losses when making investment decisions?

{ value: 1, label: "Completely focused on avoiding losses" },

{ value: 2, label: "More focused on safety than gains" },

{ value: 3, label: "Balanced between risk and reward" },

{ value: 4, label: "Mostly focused on maximizing gains" }

Have you ever sold an investment in a panic?

{ value: 1, label: "Yes, multiple times" },

{ value: 2, label: "Yes, once or twice" },

{ value: 3, label: "Rarely — I try to stay disciplined" },

{ value: 4, label: "Never — I stay the course regardless" }

Do you typically stick to your investment plan, or do you change course when the market moves suddenly?

{ value: 1, label: "I often change course or react emotionally" },

{ value: 2, label: "I sometimes adjust my plan" },

{ value: 3, label: "I mostly stay disciplined" },  
{ value: 4, label: "I always follow my long-term plan" }

What types of investments have you made in the past?

{ value: 1, label: "Only low-risk (savings, CDs, bonds)" },  
{ value: 2, label: "Some moderate-risk (mutual funds, ETFs)" },  
{ value: 3, label: "High-risk (stocks, crypto)" },  
{ value: 4, label: "Very high-risk or speculative (options, startups, leveraged assets)" }

What percentage of your total net worth is currently invested in the stock market?

{ value: 1, label: "Less than 10%" },  
{ value: 2, label: "10–30%" },  
{ value: 3, label: "30–60%" },  
{ value: 4, label: "Over 60%" }

Do you rely on your investments for short-term needs, or are they primarily long-term?

{ value: 1, label: "Rely heavily on them for short-term needs" },  
{ value: 2, label: "Occasionally use investment funds" },  
{ value: 3, label: "Mostly long-term focus" },  
{ value: 4, label: "Completely long-term; no short-term reliance" }

If you lost 25% of your investment today, how would it impact your lifestyle or financial obligations?

{ value: 1, label: "Severely — it would cause financial hardship" },  
{ value: 2, label: "Noticeable impact, but manageable" },  
{ value: 3, label: "Minimal impact — I'd adjust spending slightly" },  
{ value: 4, label: "No impact — I'd continue as normal" }

What is your investment time horizon?

{ value: 1, label: "1–3 years" },  
{ value: 2, label: "3–5 years" },  
{ value: 3, label: "5–10 years" },  
{ value: 4, label: "10+ years" }

If two investments had the same expected return, but one had twice the volatility, which would you choose?

{ value: 1, label: "The stable, low-volatility one" },  
{ value: 2, label: "Probably the stable one, unless the risk is small" },  
{ value: 3, label: "Either — depends on the opportunity" },  
{ value: 4, label: "The high-volatility one — more excitement and potential" }

You're offered a guaranteed 5% annual return or a 50/50 chance to earn 15% or 0%. Which do you take?

{ value: 1, label: "Guaranteed 5% — safety first" },  
{ value: 2, label: "Likely the 5%, but I'd think about the gamble" },  
{ value: 3, label: "Take the 50/50 — I'm comfortable with risk" },  
{ value: 4, label: "Definitely the 50/50 — go big or go home" }

Would you prefer a smooth but low-return investment, or a high-return investment with sharp ups and downs?

{ value: 1, label: "Smooth and low-return" },  
{ value: 2, label: "Mostly smooth with some volatility" },  
{ value: 3, label: "Moderately volatile with higher potential" },  
{ value: 4, label: "Highly volatile, high-return" }

What would you do if your retirement account lost 30% in a year due to a market crash?

{ value: 1, label: "Sell to avoid further losses" },  
{ value: 2, label: "Wait cautiously for recovery" },  
{ value: 3, label: "Hold and consider rebalancing" },  
{ value: 4, label: "Buy more while prices are low" }

Do you think it's more important to take on risk when you're younger or older?

{ value: 1, label: "Avoid risk at any age" },  
{ value: 2, label: "Minimize risk at all times" },  
{ value: 3, label: "Take more risk while younger" },  
{ value: 4, label: "Take aggressive risks early to maximize growth" }

Previous Questions:

1. What is the largest percentage drop in your investment portfolio you could accept?

options

{ value: 1, label: "I can't tolerate any losses" }, 1  
{ value: 2, label: "I prefer to avoid a loss greater than 15%" }, 2  
{ value: 3, label: "I'm okay with a 20% loss" }, 3  
{ value: 4, label: "I can handle significant drops" }, 4

2. If you faced sudden job loss two months before a planned luxury vacation, your response would be to

options:

{ value: 1, label: "Cancel the vacation completely" }, 1  
{ value: 2, label: "Scale down to a more affordable trip" }, 2  
{ value: 3, label: "Proceed with the vacation as planned" }, 3  
{ value: 4, label: "Add on more to your vacation" }, 4

3. If you won \$5000, how would you consider using it?

options:

{ value: 1, label: "keep it as cash" }, 1  
{ value: 2, label: "Put it in a high-yield savings account" }, 2  
{ value: 3, label: "Invest it in stocks" }, 3



{value: 4, label: "gamble it for a chance at a bigger win"} 4

4. If your stocks dropped 30% in value, your reaction would be:

options: [

{value: 1, label: "Sell to minimize loss"}, 1

{value: 2, label: "Hold on and wait for recovery"}, 2

{value: 3, label: "Invest more to average down"}, 3

{value: 4, label: "Reevaluate my investment strategy before deciding"}, 4

5. What is your primary goal of investing?

options: [

{value: 1, label: "Maintain my wealth"}, 1

{value: 2, label: "Long-term wealth accumulation"}, 2

{value: 3, label: "Quick profits"}, 3

{value: 4, label: "Generate regular income or dividends"}, 4

6. How comfortable are you with investing in high-risk stocks?

options: [

{value: 1, label: "Not comfortable at all"}, 1

{value: 2, label: "Somewhat comfortable"}, 2

{value: 3, label: "Very Comfortable"}, 3

{value: 4, label: "Certain"}, 4

7. What percentage of your total investments is currently in stocks?

options:

{ value: 1, label: "Below 30%" }, 1

{ value: 2, label: "30-60%" }, 2

{ value: 3, label: "60-80%" }, 3

{ value: 4, label: "Over 80%" }, 4

8. "How do you rate your understanding of investing concepts?",

options: [

{ value: 1, label: "Not very knowledgeable" }, 1

{ value: 2, label: "Moderately knowledgeable" }, 2

{ value: 3, label: "Very knowledgeable" }, 3

{ value: 4, label: "Expert in investing" }, 4

# Interview Template

For easy filling in of the questionnaire, i made the refined survey in table form

### Risk Tolerance Evaluation Questionnaire

Scale: 1 = Does not want to be risky

4 = Will be risky

Question	Answer Options	Scale (1–4)	Response
How would you feel if your portfolio dropped 20% in a month?	Very anxious — I'd want to sell immediately	1	
	Concerned — I'd consider reducing exposure	2	
	Uncomfortable but I'd likely hold	3	
	Unbothered — I'd see it as a buying opportunity	4	
What's the largest percentage loss you could tolerate before feeling compelled to sell?	Less than 10%	1	
	10–20%	2	
	20–35%	3	
	Over 35%	4	
Do you lose sleep or get anxious when markets are volatile?	Yes, it keeps me up at night	1	
	Sometimes, but I try not to worry	2	
	Rarely — I can tolerate ups and downs	3	
	No — I stay calm and focused on the long term	4	
Would you describe yourself as a cautious, moderate, or aggressive investor?	Very cautious	1	
	Moderate	2	

	Growth-oriented	3	
	Aggressive / high-risk taker	4	
Do you focus more on potential gains or potential losses when making investment decisions?	Completely focused on avoiding losses	1	
	More focused on safety than gains	2	
	Balanced between risk and reward	3	
	Mostly focused on maximizing gains	4	
Have you ever sold an investment in a panic?	Yes, multiple times	1	
	Yes, once or twice	2	
	Rarely — I try to stay disciplined	3	
	Never — I stay the course regardless	4	
Do you typically stick to your investment plan, or do you change course when the market moves suddenly?	I often change course or react emotionally	1	
	I sometimes adjust my plan	2	
	I mostly stay disciplined	3	
	I always follow my long-term plan	4	
What types of investments have you made in the past?	Only low-risk (savings, CDs, bonds)	1	
	Some moderate-risk (mutual funds, ETFs)	2	
	High-risk (stocks, crypto)	3	

	Very high-risk or speculative (options, startups, leveraged assets)	4	
What percentage of your total net worth is currently invested in the stock market?	Less than 10%	1	
	10–30%	2	
	30–60%	3	
	Over 60%	4	
Do you rely on your investments for short-term needs, or are they primarily long-term?	Rely heavily on them for short-term needs	1	
	Occasionally use investment funds	2	
	Mostly long-term focus	3	
	Completely long-term; no short-term reliance	4	
If you lost 25% of your investment today, how would it impact your lifestyle or financial obligations?	Severely — it would cause financial hardship	1	
	Noticeable impact, but manageable	2	
	Minimal impact — I'd adjust spending slightly	3	
	No impact — I'd continue as normal	4	
What is your investment time horizon?	1–3 years	1	
	3–5 years	2	
	5–10 years	3	
	10+ years	4	
If two investments had the same expected return, but	The stable, low-volatility one	1	

one had twice the volatility, which would you choose?	Probably the stable one, unless the risk is small	2	
	Either — depends on the opportunity	3	
	The high-volatility one — more excitement and potential	4	
You're offered a guaranteed 5% annual return or a 50/50 chance to earn 15% or 0%. Which do you take?	Guaranteed 5% — safety first	1	
	Likely the 5%, but I'd think about the gamble	2	
	Take the 50/50 — I'm comfortable with risk	3	
	Definitely the 50/50 — go big or go home	4	
Would you prefer a smooth but low-return investment, or a high-return investment with sharp ups and downs?	Smooth and low-return	1	
	Mostly smooth with some volatility	2	
	Moderately volatile with higher potential	3	
	Highly volatile, high-return	4	
What would you do if your retirement account lost 30% in a year due to a market crash?	Sell to avoid further losses	1	
	Wait cautiously for recovery	2	
	Hold and consider rebalancing	3	
	Buy more while prices are low	4	
Do you think it's more important to take on risk	Avoid risk at any age	1	
	Minimize risk at all times	2	

when you're younger or older?	Take more risk while younger	3	
	Take aggressive risks early to maximize growth	4	
What is the largest percentage drop in your investment portfolio you could accept?	I can't tolerate any losses	1	
	I prefer to avoid a loss greater than 15%	2	
	I'm okay with a 20% loss	3	
	I can handle significant drops	4	
If you faced sudden job loss two months before a planned luxury vacation, your response would be to:	Cancel the vacation completely	1	
	Scale down to a more affordable trip	2	
	Proceed with the vacation as planned	3	
	Add on more to your vacation	4	
If you won \$5,000, how would you consider using it?	Keep it as cash	1	
	Put it in a high-yield savings account	2	
	Invest it in stocks	3	
	Gamble it for a chance at a bigger win	4	
If your stocks dropped 30% in value, your reaction would be:	Sell to minimize loss	1	
	Hold on and wait for recovery	2	
	Invest more to average down	3	
	Reevaluate my investment strategy before deciding	4	

What is your primary goal of investing?	Maintain my wealth	1	
	Long-term wealth accumulation	2	
	Generate regular income or dividends	3	
	Quick Profits	4	
How comfortable are you with investing in high-risk stocks?	Not comfortable at all	1	
	Somewhat comfortable	2	
	Very comfortable	3	
	Certain	4	
How do you rate your understanding of investing concepts?	Not very knowledgeable	1	
	Moderately knowledgeable	2	
	Very knowledgeable	3	
	Expert in investing	4	