

## THE CHALLENGE

Marcus had invested \$18,000 in a diversified index fund over three years. When he heard about a "hot" biotech stock, he moved everything into that single stock at \$85/share. It climbed to \$110 (+29%), and Marcus felt like a genius. Then the company's drug trial failed—the stock crashed to \$22 in one day. Marcus panic-sold, losing 74% of his savings. Had he stayed diversified, one company's failure would barely have affected him.

How can understanding the relationship between risk and return help you avoid devastating losses while still building long-term wealth?

### Learning Objectives

- Analyze the relationship between investment risk and potential returns.
- Calculate and interpret key risk metrics including standard deviation and beta.
- Assess personal risk tolerance and match investments to individual profiles.

## CORE CONCEPTS

| Term                        | Definition   |
|-----------------------------|--|
| <b>Risk-Return Tradeoff</b> | Higher potential returns come with higher risk; lower-risk investments offer more certain but lower returns. |
| <b>Systematic Risk</b>      | Market-wide risk (recession, inflation) that cannot be eliminated through diversification.                   |
| <b>Unsystematic Risk</b>    | Company-specific risk (poor management, product failure) that CAN be reduced through diversification.        |
| <b>Standard Deviation</b>   | Measures volatility—how much returns vary from average. Higher = more volatile = riskier.                    |
| <b>Beta</b>                 | Measures how investment moves vs. market. Beta 1.0 = moves with market; above 1.0 = more volatile.           |

**Background:** Risk and return are inseparably linked—you cannot expect high returns without accepting higher risk. Savings accounts (2-3%) are safe but barely beat inflation. Stocks average 10% annually but can lose 30%+ in bad years. The key is not eliminating risk but **managing it appropriately** for your situation. A 25-

year-old with 40 years to invest can accept more volatility than a 60-year-old approaching retirement. Your **time horizon**, **financial situation**, and **emotional temperament** all determine appropriate risk level.

## APPLY IT

### PART A: RISK-RETURN ANALYSIS

Analyze these investment options and their risk-return profiles.

| Investment        | Avg Return | Std Dev | Beta | Risk Level |
|-------------------|------------|---------|------|------------|
| Savings Account   | 2%         | 0.5%    | 0.0  | Very Low   |
| Bond Fund         | 4%         | 5%      | 0.2  | Low        |
| Stock Index Fund  | 10%        | 18%     | 1.0  | Moderate   |
| Small-Cap Stocks  | 12%        | 25%     | 1.3  | High       |
| Single Tech Stock | 15%        | 40%     | 1.8  | Very High  |

#### Scenario 1: Emma (Age 24, 40 years to retirement)

Stable job, no debt, investing \$300/month. Can tolerate seeing portfolio drop 30% without panicking.

Best investment choice: \_\_\_\_\_

Because: \_\_\_\_\_

#### Scenario 2: Robert (Age 62, retiring in 3 years)

Has \$400,000 saved. Cannot afford significant losses before retirement.

Best investment choice: \_\_\_\_\_

Because: \_\_\_\_\_

**Hint:** Time horizon is crucial. Over any 20-year period, stocks have never lost money historically—but in any single year, they can lose 30%+.

### PART B: UNDERSTANDING STANDARD DEVIATION

3. The Stock Index Fund has 10% average return with 18% standard deviation. This means in ~68% of years, returns fall between \_\_\_\_% and \_\_\_\_%. (Hint: one standard deviation above and below average)

4. If you invested \$10,000 in Small-Cap Stocks (12% avg, 25% std dev), what is your range of likely outcomes in a typical year?

Show your work:

Range: \$\_\_\_\_\_ to \$\_\_\_\_\_

### PART C: THE POWER OF TIME

5. Emma invests \$300/month for 40 years. Calculate her ending balance at 2% (savings) vs. 10% (stock index). How much does accepting risk add to her wealth?

Use the formula provided or estimate:

At 2%: \$\_\_\_\_\_ | At 10%: \$\_\_\_\_\_ | Difference: \$\_\_\_\_\_

### CHECK YOUR UNDERSTANDING

1. Risk that affects the entire market and cannot be eliminated through diversification is called:

- ☐ A. Unsystematic risk
- ☐ B. Systematic risk
- ☐ C. Standard deviation
- ☐ D. Beta risk

2. Explain why Marcus's decision to put ALL his money in one biotech stock was risky, using the concepts of systematic vs. unsystematic risk.

3. **Calculation:** Fund A has 14% return with 28% standard deviation. Fund B has 10% return with 15% standard deviation. Calculate Sharpe ratio for each (assume 2% risk-free rate). Which has better risk-adjusted returns?

Sharpe = (Return - Risk-free rate) / Standard Deviation

Fund A Sharpe: \_\_\_\_ | Fund B Sharpe: \_\_\_\_ | Better: \_\_\_\_

4. Jasmine chose Fund B (lower returns but better Sharpe ratio) over Fund A. Why might this be the smarter choice even though Fund A has higher expected returns?

**5. Reflection:** If your \$10,000 portfolio dropped to \$7,000 in six months due to market decline, how would you honestly react? What does this tell you about your actual risk tolerance?

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