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The Basic Tools of Finance

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Present Value, Part 1

- ## Finance

  - Studies how people make decisions:
    - Allocation of resources over time
    - Handling of risk

- ## Present value

  - Amount of money today
  - That would be needed
    - Using prevailing interest rates
    - To produce a given future amount of money

Present Value, Part 2

- Future value
  - Amount of money in the future
  - That an amount of money today will yield
  - Given prevailing interest rates
- Compounding
  - Accumulation of a sum of money
    - Interest earned remains in the account
    - To earn additional interest in the future

Present Value, Part 3

- Present value = $100

  – Interest rate = r

  – Future value = …

    - $(1+r) \times \$100$ after 1 year,
    - $(1+r) \times (1+r) \times \$100 = (1+r)^2 \times \$100$ after 2 years,
    - $(1+r)^3 \times \$100$ after 3 years, …
    - $(1+r)^N \times \$100$ after N years,

Present Value, Part 4

- Future value = $200 in N years
  - Interest rate = r
  - Present value = $200/(1+r)^N

- Discounting
  - Find present value for a future sum o money

Present Value, Part 5

- General formula for discounting:

  - r, interest rate
  - X, amount to be received in N years (future value)

  Present value = $X/(1+r)^N$

Managing Risk, Part 1

- Rational response to risk
  - Not necessarily to avoid it at any cost
  - Take it into account in your decision making
- Risk aversion
  - Dislike of uncertainty
- Utility
  - A person's subjective measure of well-being/ satisfaction
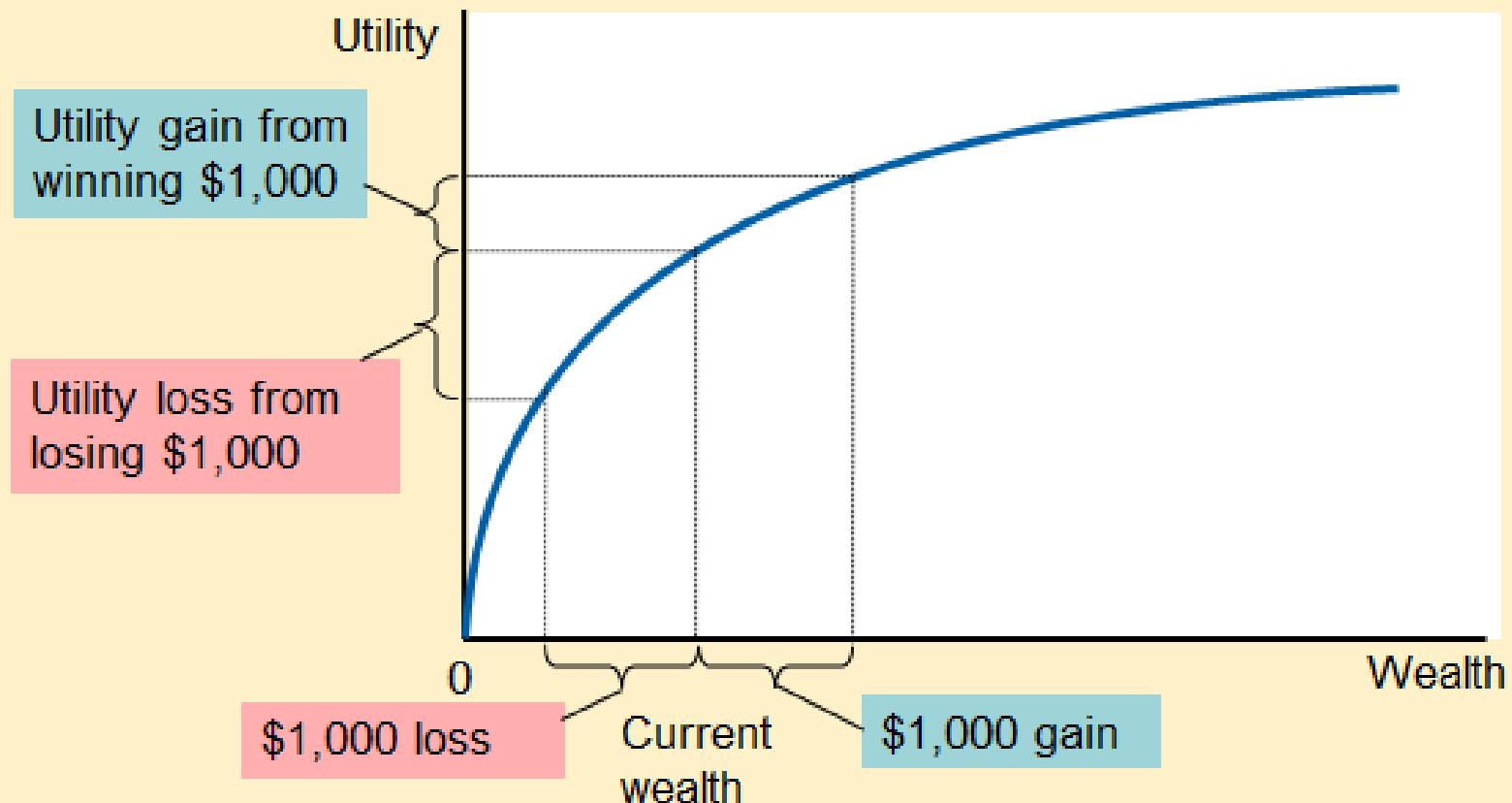
Managing Risk, Part 2

- Utility function
  - Every level of wealth provides a certain amount of utility
  - Exhibits diminishing marginal utility
    - The more wealth a person has
    - The less utility he gets from an additional dollar

Figure 1
The Utility Function

This utility function shows how utility, a subjective measure of satisfaction, depends on wealth. As wealth rises, the utility function becomes flatter, reflecting the property of diminishing marginal utility. Because of diminishing marginal utility, a $1,000 loss decreases utility by more than a $1,000 gain increases it.

Managing Risk, Part 3

- The markets for insurance
  - Person facing a risk
    - Pays a fee to insurance company
  - Insurance company
    - Accepts all or a part of risk
- Insurance contract – gamble
  - You may not face the risk
  - Pay the insurance premium
  - Receive: peace of mind

Managing Risk, Part 4

- Role of insurance
  - Not to eliminate the risks, but to spread the risks around more efficiently

- Markets for insurance – problems:
  - Adverse selection
    - High-risk person – more likely to apply for insurance
  - Moral hazard
    - After people buy insurance - less incentive to be careful

Managing Risk, Part 5

- Diversification
  - Reduction of risk
  - By replacing a single risk with a large number of smaller, unrelated risks
  - "Don't put all your eggs in one basket"
- Risk
 - Standard deviation - measures the volatility of a variable
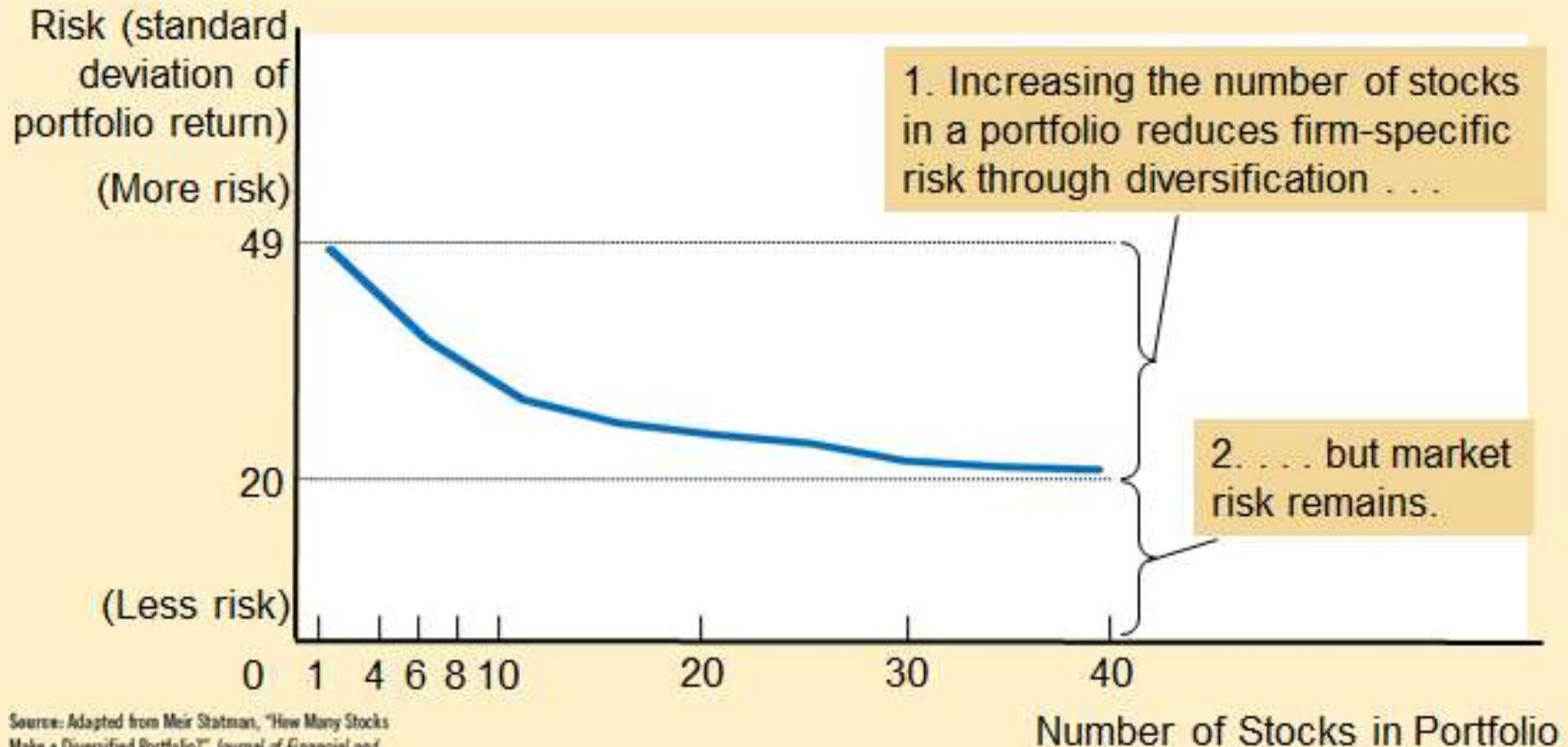
Managing Risk, Part 6

- Risk of a portfolio of stocks
  - Depends on number of stocks in the portfolio
  - The higher the standard deviation
  - The riskier the portfolio

Figure 2
Diversification Reduces Risk

Risk (standard deviation of portfolio return)

(More risk)

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20

(Less risk)

1. Increasing the number of stocks in a portfolio reduces firm-specific risk through diversification . . . .

2. . . . . but market risk remains.

0   1   4 6 8 10   20   30   40

Number of Stocks in Portfolio

This figure shows how the risk of a portfolio, measured here with a statistic called the standard deviation, depends on the number of stocks in the portfolio. The investor is assumed to put an equal percentage of her portfolio in each of the stocks. Increasing the number of stocks reduces, but does not eliminate, the amount of risk in a stock portfolio.

Managing Risk, Part 7

- **Diversification**
  - Can eliminate firm-specific risk
  - Cannot eliminate market risk
- **Firm-specific risk**
  - Affects only a single company
- **Market risk**
  - Affects all companies in the stock market
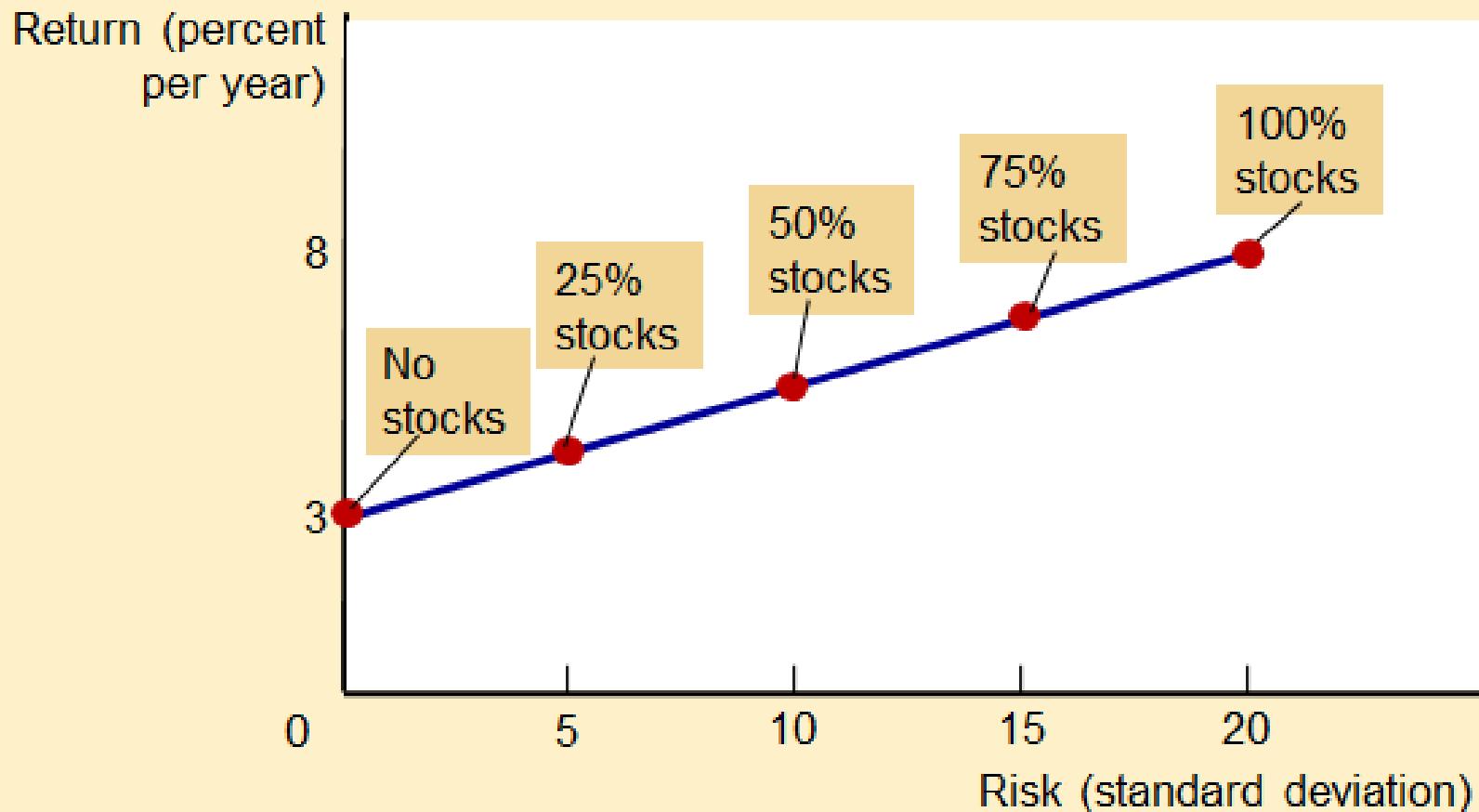
Managing Risk, Part 8

- The trade-off between risk and return
  - Two types of assets
    - Diversified group
      - 8% return
      - 20% standard deviation
    - Safe alternative
      - 3% return
      - 0% standard deviation
  - The more a person puts into stocks
    - The greater the risk and the return

Figure 3
The Trade-off between Risk and Return

When people increase the percentage of their savings that they have invested in stocks, they increase the average return they can expect to earn, but they also increase the risks they face.

Asset Valuation, Part 1

- Fundamental analysis
  - Study of a company's accounting statements and future prospects
  - To determine its value
- Undervalued stock: Price < value
- Overvalued stock: Price > value
- Fairly valued stock: Price = value

Asset Valuation, Part 2

- Use fundamental analysis to pick a stock
  - Do all the necessary research yourself
  - Rely on the advice of Wall Street analysts
  - Buy a mutual fund
    - A manager conducts fundamental analysis and makes the decision for you

Asset Valuation, Part 3

- The efficient markets hypothesis
  - Asset prices reflect all publicly available information about the value of an asset
  - Each company listed on a major stock exchange is followed closely by many money managers
  - Equilibrium of supply and demand sets the market price

Asset Valuation, Part 4

- **Stock markets**
  - Exhibit informational efficiency
- **Informational efficiency**
  - Description of asset prices
  - Rationally reflect all available information
- **Implication of efficient markets hypothesis**
  - Stock prices should follow a random walk
    - Changes in stock prices are impossible to predict from available information

Random walks and index funds, Part 1
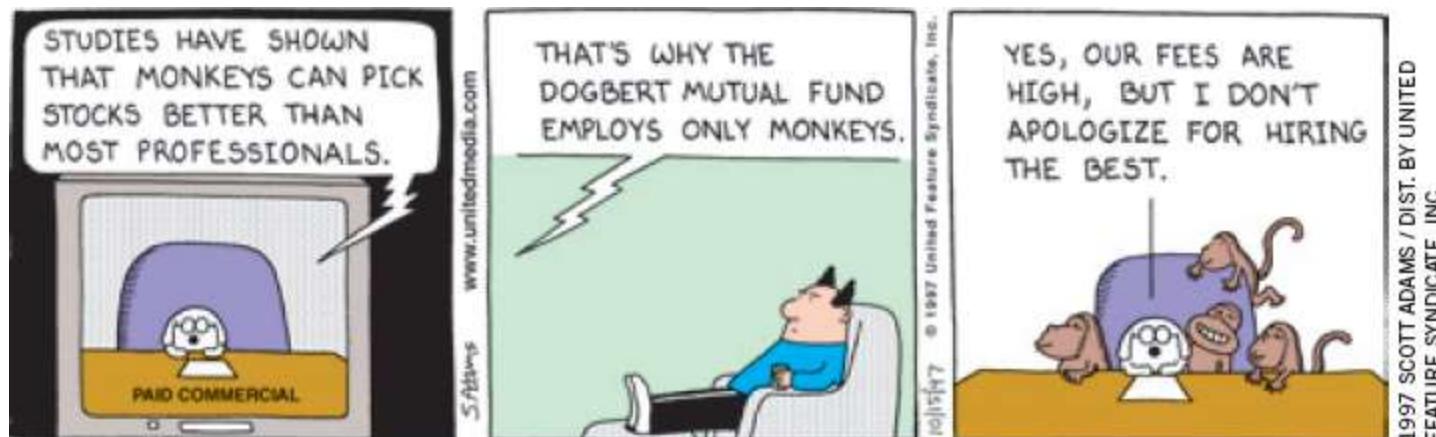
- The efficient markets hypothesis
  - –Theory about how financial markets work
  - –Probably not completely true
- Evidence on stock prices
  - –Even if not exactly a random walk, are very close to it
- Index fund
  - –Mutual fund that buys all stocks in a given stock index

Random walks and index funds, Part 2

- ## Active funds

  - Actively managed mutual funds

    - Professional portfolio manager

  - Buy only the best stocks

- ## Performance of index funds

  - Better than active funds

case study

- Active portfolio managers
  - Lower return than index funds
  - Trade more frequently
  - Incur more trading costs
  - Charge greater fees
  - Only 16% of managers beat the market

Asset Valuation, Part 5

- Efficient markets hypothesis
  - Assumes that people buying & selling stock are rational
    - Process information about stock's underlying value
- Fluctuations in stock prices
  - Partly psychological

Asset Valuation, Part 6

- When price of an asset
  - Above its fundamental value
  - Market - experiencing a speculative bubble

- Possibility of speculative bubbles
  - Value of the stock to a stockholder depends on:
    - Stream of dividend payments
    - Final sale price

- Debate: frequency and importance of departures from rational pricing
  - Market irrationality
    - Movement in stock market
      - Hard to explain - news that alter a rational valuation
  - Efficient markets hypothesis
    - Impossible to know the correct/rational valuation of a company