

CHAPTER 27

# The Basic Tools of Finance

PRINCIPLES OF  
**Economics**  
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Premium PowerPoint Slides  
by Ron Cronovich

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**In this chapter,  
look for the answers to these questions:**

- § What is "present value"? How can we use it to compare sums of money from different times?
- § Why are people risk averse? How can risk-averse people use insurance and diversification to manage risk?
- § What determines the value of an asset? What is the "efficient markets hypothesis"? Why is beating the market nearly impossible?

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**Introduction**



- § The financial system coordinates saving and investment.
- § Participants in the financial system make decisions regarding
- § **Finance** is the field that studies such decision making.

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### Present Value: The Time Value of Money

§ To compare a sums from different times, we use the concept of present value.

§ The **present value** of a future sum:

§ The **future value** of a sum:

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### EXAMPLE 1: A Simple Deposit

§ Deposit \$100 in the bank at 5% interest.  
What is the future value (FV) of this amount?

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§ In three years, FV =

§ In two years, FV =

§ In one year, FV =

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### EXAMPLE 1: A Simple Deposit

§ Deposit \$100 in the bank at 5% interest.  
What is the future value (FV) of this amount?

§ In  $N$  years,  $FV = \$100(1 + 0.05)^N$

§ In this example, \$100 is the present value (PV).

§ In general,  
where  $r$  denotes the interest rate (in decimal form).

§ Solve for PV to get:

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### EXAMPLE 2: Investment Decision

Present value formula:  $PV = FV/(1 + r)^N$

§ Suppose  $r = 0.06$ .

Should General Motors spend \$100 million to build a factory that will yield \$200 million in ten years?

Solution:

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### EXAMPLE 2: Investment Decision

§ Instead, suppose  $r = 0.09$ .

Should General Motors spend \$100 million to build a factory that will yield \$200 million in ten years?

Solution:

*Present value helps explain why*

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### ACTIVE LEARNING 1

#### Present value

You are thinking of buying a six-acre lot for \$70,000. The lot will be worth \$100,000 in five years.

- A. Should you buy the lot if  $r = 0.05$ ?
- B. Should you buy it if  $r = 0.10$ ?

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## Compounding

### § Compounding:

§ Because of compounding, small differences in interest rates lead to big differences over time.

§ Example: Buy \$1000 worth of Microsoft stock, hold for 30 years.

If rate of return = 0.08, FV = \$10,063

If rate of return = 0.10, FV = \$17,450

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## The Rule of 70

§ The Rule of 70:

§ Example:

§ If interest rate is 5%, a deposit will double in

§ If interest rate is 7%, a deposit will double in

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## Risk Aversion

§ Most people are **risk averse** – they dislike uncertainty.

§ Example: You are offered the following gamble. Toss a fair coin.

§ If heads, you win \$1000.

§ If tails, you lose \$1000.

Should you take this gamble?

§ If you are risk averse,

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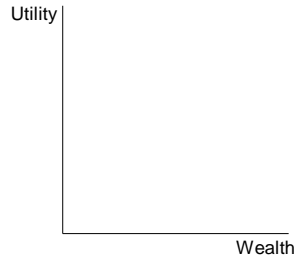
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### The Utility Function



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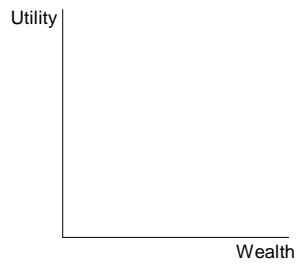
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### The Utility Function and Risk Aversion



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### Managing Risk With Insurance

§ How insurance works:  
A person facing a risk pays a fee to the insurance company, which in return accepts part or all of the risk.

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*E.g.*, it is easier for 10,000 people to each bear 1/10,000 of the risk of a house burning down than for one person to bear the entire risk alone.

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## Two Problems in Insurance Markets

### 1. Adverse selection:

### 2. Moral hazard:

Insurance companies cannot fully guard against these problems, so they must charge higher prices.

As a result,

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### ACTIVE LEARNING 2

#### Adverse selection or moral hazard?

Identify whether each of the following is an example of adverse selection or moral hazard.

- A. Joe begins smoking in bed after buying fire insurance.
- B. Both of Susan's parents lost their teeth to gum disease, so Susan buys dental insurance.
- C. When Gertrude parks her Corvette convertible, she doesn't bother putting the top up, because her insurance covers theft of any items left in the car.

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## Measuring Risk

§ We can measure risk of an asset with the **standard deviation**, a statistic that measures

§ The higher the standard deviation of the asset's return,

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## Reducing Risk Through Diversification

### § Diversification

§ A diversified portfolio contains assets whose returns are not strongly related:

§ Some assets will realize high returns, others low returns.

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## Reducing Risk Through Diversification

§ Diversification can reduce

§ Diversification *cannot* reduce

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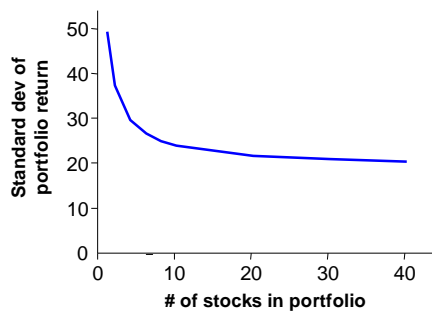
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## Reducing Risk Through Diversification



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## The Tradeoff Between Risk and Return

§ Tradeoff:

§ E.g., over past 200 years, average real return on stocks, 8%. On short-term govt bonds, 3%.

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## The Tradeoff Between Risk and Return

§ Example:

Suppose you are dividing your portfolio between two asset classes.

§ A diversified group of risky stocks:  
average return = 8%, standard dev. = 20%

§ A safe asset:  
return = 3%, standard dev. = 0%

§ The risk and return on the portfolio depends on the percentage of each asset class in the portfolio...

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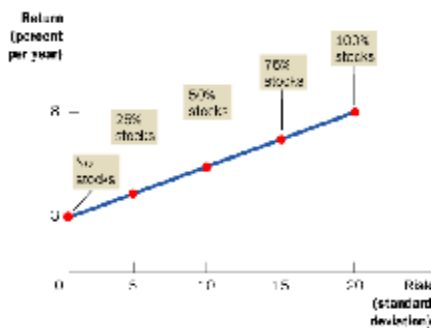
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## The Tradeoff Between Risk and Return



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### Asset Valuation

§ When deciding whether to buy a company's stock, you compare the price of the shares to the value of the company.

§ If share price > value, the stock is

§ If price < value, the stock is

§ If price = value, the stock is

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### ACTIVE LEARNING 3 Valuing a share of stock

If you buy a share of AT&T stock today,

§ you will be able to sell it in 3 years for \$30.

§ you will receive a \$1 dividend at the end of each of those 3 years.

If the prevailing interest rate is 10%, what is the value of a share of AT&T stock today?

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### ACTIVE LEARNING 3 Answers

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## Asset Valuation

§ Value of a share =

§ Problem: When you buy the share, you don't know what future dividends or prices will be.

§ One way to value a stock:

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### ACTIVE LEARNING 4

#### Show-of-hands survey

You have a brokerage account with Merrill Lynch. Your broker calls you with a hot tip about a stock: new information suggests that the company will be highly profitable.

Should you buy stock in the company?

- A. Yes
- B. No
- C. Not until you read the prospectus.
- D. What's a prospectus?

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## The Efficient Markets Hypothesis

§ **Efficient Markets Hypothesis (EMH):**

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### Implications of EMH

1. Stock market is **informationally efficient**:
  
2. Stock prices follow a **random walk**:
  
- 3.

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### Index Funds vs. Managed Funds

- § An **index fund** is
  
- § An actively managed mutual fund aims to buy only the best stocks.
  
- § Actively managed funds have higher expenses than index funds.
  
- § EMH implies that

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### Index Funds vs. Managed Funds

	2001-2006 annualized return	2006 expense ratio
S&P 500 (index fund)	6.2%	.351
Managed large cap funds	5.9	1.020
S&P MidCap 400 (index fund)	10.9	.535
Managed mid cap funds	8.1	1.458
S&P SmallCap 600 (index fund)	12.5	.550
Managed mid cap funds	10.3	1.272

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### Market Irrationality

- § Many believe that stock price movements are partly psychological:
  - § J.M. Keynes: stock prices driven by “animal spirits,” “waves of pessimism and optimism”
  - § Alan Greenspan: 1990s stock market boom due to “irrational exuberance”

#### § Bubbles

- § The importance of departures from rational pricing is not known.

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### CONCLUSION

- § This chapter has introduced some of the basic tools people use when they make financial decisions.
- § The efficient markets hypothesis teaches that a stock price should reflect the company’s expected future profitability.
- § Fluctuations in the stock market have important macroeconomic implications, which we will study later in this course.

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