Introduction To Corporate Finance
Chapter Outline

- Financial Markets and the Corporation
- Corporation
- The Agency Problem and Control of the Corporation
- The Goal of Financial Management
- Forms of Business Organization
- Corporate Finance and the Financial Manager
activities of the firm?
How will we manage the everyday financial
for the investment?
Where will we get the long-term financing to pay
on?
What long-term investments should the firm take
using finance
Some important questions that are answered

Corporate Finance
Financial Management Decisions

- How do we manage the day-to-day finances of the firm?
- Working capital management
- Should we use debt or equity?
- How should we pay for our assets?
- Capital structure
- Business take on?
- What long-term investments or projects should the firm undertake?
Limited Liability Company •
S-Corp •
Corporation –
Limited •
General •
Partnership –
Sole Proprietorship •

Three major forms in the United States •

Forms of Business Organization
Advantages

- Income taxed once as personal income
- Single owner keeps all the profits
- Least regulated
- Easiest to start

Disadvantages

- Difficult to sell
- Unlimited liability
- Owner's personal wealth
- Equity capital limited to limited life of owner
- Ownership interest
Disadvantages:

- Partnership
  - Limited liability
  - Limited partnership
  - Difficult to transfer
  - Wishes to sell when one partner dies or partnership dissolves

Advantages:

- Personal income
  - Income taxed once as
  - Relatively easy to start
  - More capital available
  - Two or more owners
- Easier to raise capital
- Lower personal rate on interest and dividends
- Taxed at the corporate rate
- Double taxation of income
- Separation of ownership and management

**Advantages**

Corporation
Everything to maximize owner wealth?

Does this mean we should do anything and

stock?

- Maximize the current value of the company's
- Maximize market share?
- Minimize costs?
- Maximize profit?

What should be the goal of a corporation?

Goal Of Financial Management
Management goals and agency costs

- Conflict of interest between principal and agent

Agency problem

- In the company
  
  - Stockholders (principals) hire managers (agents) to run the company
  
  - Principal hires an agent to represent their interests

Agency relationship

The Agency Problem
NASDAQ
NYSE

- Listed vs. over-the-counter securities
- Dealer vs. auction markets
- Primary vs. secondary markets
- Cash flows to the firm

Financial Markets
Cash Flows between the Firm and the Financial Markets (Figure 1.2)
Introduction to Valuation: The Time Value of Money

(Formulas)
Chapter 5

The Time Value of Money
The primary goal of management is to maximize the value of a firm's stock. Stock values depend, in part, on the timing of cash flows. Investors expect to receive income expected soon is valued more highly than income expected far in the future. This shows how the timing of cash flows affects asset values and rates of return.
points in time to a common basis. Must put dollars received at different equivalent to a dollar in hand today. We to be received in the future is not receiving inflows during t=0 n. A dollar making an investment at t=0, and then in finance. Most financial decisions involve probably the most basic fundamental one.

The time value of money concepts is

Importance—Continued
Symbols and Naming Conventions

- Present Value Interest Factor (PVIF)
- Future Value Interest Factor (FVIF)
- Time Period (t)
- Interest Rate (r)
- Future Value (FV)
- Present Value (PV)
...years.

Would you have at the end of 1 year, 2 years, ... t years.

Interest compounded annually. How much...

Example: You have $1,000 and deposited in a bank savings account that paid 5%...

Grow in t periods at a specified rate, r. Beginning lump sum or present value will...

Is defined as the value to which a...

Future Value or Compound Value
The term (1 + r)^t is called the future value interest factor and often abbreviated FVIF(t).

\[
FV_t = C \times (1 + r)^t
\]

For t periods:

Future value of C dollars invested at r percent per period

\[
FV_t = C \times (1 + r)^t
\]

T = number of periods
r = Interest rate, rate of return, or discount rate per period
C = cash amount

Symbols:

\[
FV_t = \text{Future value, what future cash flows are worth in the future today}
\]

\[
PV = \text{Present value, what future cash flows are worth today}
\]
\[ \text{At 12\%, the simple interest is } \frac{\text{1.2} \times \$5000}{\text{per year}} = \$960.00 \text{ per year.} \]

\[ \text{After 6 years, this is } 6 \times \$960 = \$5760.00 \]

\[ \text{Difference between compound and simple interest is thus } \$3600 - \$5760 = \$9860.135 \]

\[ \text{Future Value by the Future Value Interest Factor:} \]

\[ \text{A.} \text{ Multiply the } \$5000 \text{ by the future value interest factor:} \]

\[ 1.9738227 \times \$5000 \]

\[ \text{Future Value} \]

Deposit $5000 today in an account paying 12%. How much will you have in 6 years? How much is simple interest? How much is compound interest?
and how much is the compound interest? How much is simple interest have today? How much is simple interest rate 200 years ago. How much would you have invested $500 for you at 6% interest had invested $5 for you at your ancestors.

Example: Suppose one of your ancestors starts to add up as the horizon grows. The effect of compounding is not great.
Should pay for this opportunity?
earn 6% on his investment, what is the most he can receive $3,000 in 5 years from now. If he can
Example: Jim has been given an opportunity to
today, would grow to equal future sum.
future is the amount which, if it were on hand
The present value of a sum due t years in the
Present Value or Discount Value
\[ PV = \frac{FV}{(1 + r)^t} \]

The basic present equation giving the relationship between present and future value is:

Often abbreviated PVIF \((t, r)\) or PVIF\((t, r)\).

The term \((1 / (1 + r))^t\) is called the present value interest factor and is

\[ PV = \frac{C}{(1 + r)^t} \]

Percent per period:

Present value of \(C\) dollars to be received in \(t\) periods at \(r\)
Reach age 65? In order to accumulate $1 million by the time you reach age 65, you must invest today more on that later. How much must you invest today? The stock market has averaged over the last six decades, but on your money (about what the typical common are currently $1,000 or so, and can earn 10 percent per cent) being a millionaire? No problem! Suppose you
Figure out where to get $15,0001
complications, but stay tuned - right now you need to
Of course, we've ignored taxes and other

\[ PV = \frac{FV}{(1 + r)^n} \]

\[ FV = PV \times (1 + r)^n \]

the present value: 
Set this up as a future value equation and solve for

\[ t = 65 - 21 = 44 \text{ years} \]

\[ FV = PV \times (1 + 10\%)^n \]

Once again, we first define the variables:
make use of both the \( y \) and the \( 1/x \) keys

If you are using formulas, you will want to

\[
1 - \frac{1}{y} (\frac{\Delta / \Delta P}{\Delta P}) = \frac{1 - (1 + \frac{\Delta P}{\Delta P})}{1} 
\]

Rearrange the basic \( P \) equation and solve for

Interest rate is in an investment

Often we will want to know what the implied discount rate
\[ CF \text{ I/Y} = 3.714\% \]

\[ FV = 1200 \] (you receive 1200 in 5 years)

\[ PV = -1000 \] (you pay 1000 today)

\[ N = 5 \]

- Calculator - the sign convention matters!

\[ 1 - \left( \frac{1200}{1000} \right)^{1/5} = 0.3714 = 3.714\% \]

What is the implied rate of interest?

$1200 in 5 years if you invest $1000 today.

You are looking at an investment that will pay...

Discount Rate - Example
You can use the financial keys on the calculator as well, just remember the sign

\[
(1 + \frac{\ln(1 + i)}{\ln(1 + p)}) = 1 - \frac{FV}{PVA} \quad (\text{Remember your logs})
\]

Start with basic equation and solve for \( t \)

---

Finding the Number of Periods
How long will it be before you have enough money to pay cash for the car? You want to purchase a new car and you are willing to pay $20,000. If you can invest at 10% per year and you currently have $15,000, will that be enough?

\[
1 = \frac{20,000}{15,000} \left(1.1 \right)^t
\]

- \[ t = \log \left( \frac{20,000}{15,000} \right) / \log(1.1) \approx 3.02 \text{ years} \]
Withdrawing any money?

same amount in them if you do not
will it be until the two accounts have the
compounded monthly. How many years
and $1, 300 in an account which earns 6%
which earns 8.4% compounded monthly
which earns 8.4% compounded account

Example
Discontinued Cash Flow Valuation

(Formulas)
Chapter 6
Overview

- In chapter 5, we covered the basics of the TVM.
- For many years in the future, cash inflows occur at the beginning and then cash outflows. For example, cash flow for a mortgage would have multiple cash flows that only deal with single cash flows.
- In this chapter, we finish this chapter. You can find out how to calculate your own credit card student loan payments. Also, you can find out how long it will take to pay off a credit card balance, if you just pay the minimum payment.
Future Value calculated by compounding each cash flow separately.

Future Value calculated by compounding forward one period at a time.
Present Value Calculated by Discounting Back One Period at a Time

Time (years)    Present Value
0  5  4  3  2  1  0

5% (6%) 6.1051 5.7940 5.4027 4.9707 4.4519 3.8897

Total present value = $4,451.90

Present Value Calculated by Discounting Each Cash Flow Separately

Time (years)    Present Value
0  5  4  3  2  1  0

6% 7.4621 6.1672 4.9879 3.9520 3.1704 2.4883

Total present value = $4,343.73
The formulas above are the basis of many of the calculations.

\[ PV = \frac{C}{r} \]

Perpetuity Present Value

\[ FV = C \times \left( \frac{1}{r} \right) \]

Annuity Future Value

\[ PV = C \times \left( \frac{1}{1 + \left( \frac{r}{100} \right)^t} \right) \]

Annuity Present Value

Annuities and Perpetuities -- Basic Formulas
$ = \frac{15,300/44.955}{1.01}$

\[ C \times 44.955 = \frac{1.01}{1 - \frac{150048}{101}} \times C \]

\[ \text{Periods: } \text{today's loan amount} \]

\[ \text{rate is } 1\% \text{ per month} \]

\[ \text{What will you pay in annual payment?} \]

\[ \text{With } 10\% \text{ down payment, the bank will loan you the rest at } 12\% \text{ per year} \]

\[ \text{Example: Finding C} \]

Examples: Annuity Present Value
Example: Finding $t$

A. A long time:

Suppose you owe $2000 on a VISA card, and the interest rate is 2% per month. If you make the minimum monthly payments of $50, how long will it take you to pay it off?

\[ t = \text{months or about } \text{years} \]

\[ 1.02^t = 5.0 \]

\[ 0.80 = 1 - 1/1.02 \]

\[ \frac{1}{1.02} \times 50 \times 2000 = 60 \]

\[ \text{t = } \frac{60}{1.02} \]

A long time.
Withdrawn, nor do you want to run short of money. (Note: Ignore taxes, and keep in mind that you don’t want any funds to be left in the account after the third year.)

Do you need to have in the account today?

Suppose you can place your money in a savings account yielding 8% compounded annually. How much do you need to place in this savings account to meet your tuition payments.

Suppose you need $20,000 each year for the next three years to make your tuition payments.

Annuity Present Value
$ = \frac{20,000 \times (1 - (1 + 0.08)^{-10})}{0.08} = \frac{20,000 \times 2.577097}{0.08} = 200,000 \times 2.577097 = 515,419.49$

Here's a shortcut method for solving the problem using the annuity present value factor:

$P_v = \frac{20,000}{0.08 + \frac{20,000}{1.08} + \frac{20,000}{1.08^2} + \frac{20,000}{1.08^3}}$

Here we know the periodic cash flows are $20,000

Annuity Present Value - Solution
Becoming a millionaire just got easier! Let's calculate:

\[ C = \$1,000,000 + \frac{\$1,522.64}{0.1/12} \]

\[ \$1,000,000 = C \times [1.10^{12} - 1]/0.10 \]

Set this up as a FV problem:

must they be?

year, and deposits will continue throughout age 65. How large

to accumulate the million. If the first deposit is made in one

Suppose she would rather invest smaller amounts annually

now, rather than plunking down \$15,091 in one chunk,

for 44 years,

and letting it earn interest (at 10%, compounded annually)

accumulates \$1 million by age 65 by investing \$15,091 today

Previously we determined that a 21-year-old could

Example: Annuity Future Value
In the previous example we found that, if one begins saving at age 21, accumulating $1 million by age 65 requires saving only $1,532.24 per year. Unfortunately, most people don’t start saving for retirement that early in life. (Many don’t start at all!) Suppose Bill just turned 40 and has decided it’s time to get serious about saving. Assuming that he wishes to accumulate $1 million by age 65, he can earn 10% compounded annually, and will begin making equal annual deposits in one year, how much must each deposit be?
Moral of the story: Putting off saving for retirement makes it a lot more difficult.

\[ C = \frac{FV}{1 + r} \]

\[ C = \frac{1,000,000}{1.10^{25}} = 1,000,000 \]

\[ \text{Then:} \]

\[ FV = \frac{1,000,000}{1.10^{25}} \]

\[ FV = 1,000,000 \]

\[ t = 65 - 40 = 25 \]

\[ r = 10\% \]

Set this up as a FV problem.
The best deal? Take the 5% APR.

\[ C = \frac{323.57}{510.999} = 0.6326 \]

\[ \{ \frac{0.6326}{1 - \text{PVF}(0.06/12)} \} x \]

5% APR

\[ \frac{10.999}{C} = x \]

60 month loan

\[ \frac{C}{323.57} \]

\[ \{ \frac{10.999}{C - \text{PVF}(0.06/12)} \} x \]

Bank: PV = $10,999. 600 = $10,999. 600 = $10,999. 36 = 36

Assuming no down payment and 60 month loan.

Example: Cheap Financing or Rebates

Financing or $500 rebate. Loans should you choose the 5% APR. TF Banks are making 10% car.
\[ P_V = \frac{C/1}{r} = \frac{1000}{0.06} = \$16,666.67 \]

Calculate:

This is called a perpetuity; in this case, the \( P_V \) is easy to find.

Now suppose the cash flow was $1000 per year forever.

\[ \frac{\$4,212.364}{1000 \times 4.212362} = \frac{\$1000 \times (1 - 0.7472696)}{1 \times 0.06} = \frac{P_V}{1000} = \frac{1}{0.06} \]

Today, of this set of cash flows?

5 years. Our opportunity rate is 6%. What is the value?

Suppose we expect to receive $1000 at the end of the next

Example: Perpetuity Calculations
perpetual bond?

is the difference in value between the 50-year bond and the

value of the one described above, but with a life of 50 years. What

One more question: Assume you are offered a bond identical

would pay for the bond today? forever. If your opportunity rate is 10%, what is the most you

issuer of the bond promises to pay the holder $100 per year

you are considering the purchase of a perpetual bond. The

Here's an example related to the question above. Suppose

value?

How can an infinite number of cash payments have a finite

Here's a question for you:

value (as long as the discount rate is greater than 0).

The present value of a perpetual cash flow stream has a finite
\[ 1',000 - 991.48 = 8.52 \] (i)

Value today of payments 5\textsuperscript{t} through infinity must be otherwise identical 50-year bond has a PV of $991.48, the
Since the perpetual bond has a PV of $1',000 and the

(also an infinite stream)
So what is the present value of payments 5\textsuperscript{t} through infinity

\[ 100 \times 9.9148 = 991.48 \] $1

Using Table A.3, the value of the 50-year bond equals
The value today of the perpetual bond = $100/1.10 = $1',000.

Distant future become infinitesimally small. Value is because the present value of the cash flows in the
An infinite number of cash payments has a finite present

\[ P = C \cdot r \]

1. \( P \) = Present value, or what future cash flows are worth in the future.

\[ F = P \cdot (1 + r)^t \]

2. \( F \) = Future value, or what cash flows are worth today.

\[ FV = C \cdot \frac{(1 + r)^n - 1}{r} \]

3. \( FV \) = Future value, or what cash flows are worth today.

\[ FV = C \cdot \left( \frac{1}{1 + r} \right)^n \]

4. \( FV \) = Future value, or what cash flows are worth today.

\[ P = C \cdot \frac{1}{(1 + r)^n} \]

5. \( P \) = Present value, or what future cash flows are worth in the future.

\[ P = C \cdot \frac{1}{(1 + r)^n} \]

6. \( P \) = Present value, or what future cash flows are worth in the future.

**Symbols:**
- \( P \) = Present value
- \( F \) = Future value
- \( C \) = Cash amount
- \( t \) = Number of time periods
- \( r \) = Interest rate, rate of return, or discount rate per period

**Summary of Annuity and Perpetuity Calculations:**

- Perpetuity: A stream of cash flows that continues indefinitely.
- Annuity: A stream of cash flows that continues for a fixed period of time.
gives an effective rate of 10.38% quarterly. 10% compounded quarterly effects, e.g., 10% compounded annually basis, that reflects compounding an annual basis. Effective annual interest rate (E.A.R) is a rate on

10% compounded quarterly. Considering any compounding effects, such as

Stated or quoted interest rate is a rate before

Rates
Rates versus Stated or Quoted
Comparing Rates: Effective Annual
<table>
<thead>
<tr>
<th>Year</th>
<th>Beginning Balance</th>
<th>Ending Balance</th>
<th>Paid Interest</th>
<th>Principal Paid</th>
<th>Total Paid</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$5,000.00</td>
<td>$4,164.54</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$4,164.54</td>
<td>$3,253.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$3,253.88</td>
<td>$2,611.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>$2,611.27</td>
<td>$1,799.32</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>$1,799.32</td>
<td>$1,427.31</td>
<td>$1,061.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$6,000.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Bond Valuation
Interest Rates and
Chapter 7
Bond Valuation

- The Bond Indenture
- Features of a Bond
- Yield to Call
- Bond Pricing Theorems
- Bond Rates and Yields
- The Bond Pricing Equation
- Bond Definition

Bond Valuation
Factors Affecting Required Return

Term Structure of Interest Rates

The Fisher Effect

Inflation and Interest Rates

Bond Quotations

Bond Valuation-Continued
(Borrowers),

- Item is subject to legal action on behalf of the Lenders
- Contractual obligations, an Issuer who fails to keep

Default - since the above mentioned promises are

- Make regular coupon payments ever period until the
- Bond maturity, and
- Pay the face/maturity value of the Bond when it

Bond Features

The Issuer promises to:

- Investor receives a legal claim on future cash flows of
- Investors to the Issuer. In return for his/her money, the

Governmental body. A Bond represents a loan made by
- Bond - evidence of debt issued by a Corporation or a
\[ \text{Bond Value} = \text{Present Value of the Coupons} + \text{Present Value of the Face Value} \]

- \( R \) = the market's required return, YTM
- \( t \) = number of periods until the bond matures
- \( F \) = the promised face value

Where: \( C \) = the promised coupon payment

\[ C \times \left[ \frac{1}{1 + \frac{R}{1}} + \frac{F}{1 + \frac{R}{1}} \right] \]
3. The value of each bond = $148.64 + 851.36 = $1,000

2. Calculate the present value of the coupon payments:

   \[ \frac{100 \times \left(1 - \frac{1}{1.10^{20}}\right)}{0.10} = \frac{100 \times 0.5136}{0.10} = \frac{51.36}{0.10} = 513.6 \]

1. Calculate the present value of the face value:

   \[ \frac{1,000 \times (1/1.10^{20})}{0.10} = \frac{1,000 \times 0.14864}{0.10} = 148.64 \]

The market's required return on similar bonds is 10%.
The bonds mature in 20 years.
The promised annual coupon is $100.

Barthart Inc. bonds have a $1,000 face value.
Assume you have the following information:

Valuing a bond
3. The value of each bond = $103.66 + 7.4694 = $850.60

2. Calculate the present value of the coupon payments

\[ \frac{100}{1.1} + \frac{100}{1.1^2} + \frac{100}{1.1^3} + \cdots + \frac{100}{1.1^{20}} = \frac{100}{0.1} \times \frac{1 - 1.1^{-20}}{0.1} = 1,103.36 \]

1. Calculate the present value of the face value

The market's required return on similar bonds is 12%
The bonds mature in 20 years
The promised annual coupon is $100
Bamhart Inc. bonds have a $1,000 face value
Assume you have the following information.

Example: A discount bond
Why do the bonds in this and the preceding example have prices
that are different from par?

3. The value of each bond = $22\text{4.55 + 98.181} = $1'963.36

$100 \times \left(\frac{1}{1.08}^{0.7}\right) = $100 \times 0.58181 = $98.181

2. Calculate the present value of the coupon payments

$1'000 \times \left[0.08\times \frac{1}{1.08^2}\right] = $1'000 \times 0.1465 = $22\text{14.55}

1. Calculate the present value of the face value

The market's required return on similar bonds is 8%.
The bonds mature in 20 years.
The promised annual coupon is $100.
Therefore, the bonds have a $1'000 face value.

Example: A premium bond

Assume you have the following information:
Yield be the same? Stay tuned.

Under what conditions will the coupon rate and current

Current yield = $ \frac{1}{7.5\%} = \frac{1}{0.075}

the current market price of the bond:

2. The current yield is the annual coupon divided by

\[
\text{Coupon rate} = \frac{\$70}{\text{Value}} \times 100\%
\]

1. The coupon rate (or just "coupon") is the annual

dollar coupon expressed as a percentage of the face

value of the bond to maturity (YTM)?

Face value of $1,000. What are its coupon rate, current yield,

annual coupon of $70, and its maturity in 10 years. It has a

Suppose a bond currently sells for $932.90. It pays an

Bond Rates and Yields
The yield to maturity is 8%.

\[ \frac{0.08}{2} \times \frac{1}{1 - t/(1 + i)} + \frac{1000}{1 + i} \times \frac{1}{1 - t/(1 + i)} = 77.00 \times \frac{1}{1 - t/(1 + i)} + \frac{1000}{1 + i} \times \frac{1}{1 - t/(1 + i)} + \frac{10}{1 + i} \times \frac{1}{1 - t/(1 + i)} + \frac{10}{1 + i} \times \frac{1}{1 - t/(1 + i)} + \frac{10}{1 + i} \times \frac{1}{1 - t/(1 + i)} = \frac{932.90}{1} = \]

The only way to find the YTM is trial and error.

Cash flows. It is the unknown R in:

\[ \text{price of the bond} = \text{present value of its future} \]

3. The yield to maturity (or "YTM") is the rate that makes the bond prices and yields (concluded)
Notice: bond prices and YTM's are inversely related.

Yield to maturity, YTM

$1,000 face value

20 years to maturity

Coupon = $100

Bond price sensitivity to YTM
Interest Rates:

4. Given two bonds identical but for coupon, the price of

3. Given two bonds identical but for maturity, the price of

2. When a bond's coupon rate is (greater than / equal to / less than)

1. Bond prices and market interest rates move in opposite

The following statements about bond pricing are always true.

Bond Pricing Theorems
Value of a Bond with a 10% Coupon Rate for Different Interest Rates and Maturities

<table>
<thead>
<tr>
<th>Interest Rate (%)</th>
<th>Time to Maturity (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>6%</td>
<td>30</td>
</tr>
<tr>
<td>7%</td>
<td>60</td>
</tr>
<tr>
<td>8%</td>
<td>90</td>
</tr>
<tr>
<td>9%</td>
<td>120</td>
</tr>
<tr>
<td>10%</td>
<td>150</td>
</tr>
</tbody>
</table>

Interest Rate Risk and Time to Maturity (Figure 7.2)
price for the annual coupon bond?

If the proper price for this semiannual coupon bond is $1,000, what would be the proper
semiannual coupon bond, all else equal?

Would you prefer to buy a 10-year, 10%
annual coupon bond or a 15-year, 10%

Example
Example

Yield to Call

Years for $1,050, what is its yield to call selling for $1,135.90 can be called in 4
A 10-year, 10% semiannual coupon bond

(YTC)?
$1,000 face value per bond.
The offer price will be 100% of the face value.

$92.50 per bond per year (9.25% of the
$1,000). Each bondholder will receive
$1,000. The denomination of the bonds is

The principal will be paid in 30 years.
The bonds were sold on 2/28/86.
The bonds will be $1.25 million worth

The company will issue $1.25 million worth

Explanations

Terms

Features of a May Department Stores Bond

Offer Price

Annual Coupon

Maturity

Date of Issue

Amount of Issue

100

9.25

3/1/16

2/28/86

$1.25 million
<table>
<thead>
<tr>
<th>Features of a May Department Stores Bond (concluded)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Default:</strong> The bonds have a low probability.</td>
</tr>
<tr>
<td><strong>Moody's Rating:</strong> A2</td>
</tr>
<tr>
<td><strong>Callable:</strong></td>
</tr>
<tr>
<td>- Before 2/28/93, the bonds are callable.</td>
</tr>
<tr>
<td>- After 2/28/93, the company can buy back the bonds for $1.64 per bond.</td>
</tr>
<tr>
<td><strong>Call Price:</strong></td>
</tr>
<tr>
<td>- $1.000 on 2/28/95.</td>
</tr>
<tr>
<td><strong>Call Provision:</strong></td>
</tr>
<tr>
<td>- None</td>
</tr>
<tr>
<td><strong>Yield:</strong></td>
</tr>
<tr>
<td>- None</td>
</tr>
<tr>
<td><strong>Coupon Payment Dates:</strong></td>
</tr>
<tr>
<td>- 3/1, 6/30, 9/30, 12/31</td>
</tr>
<tr>
<td><strong>Annual Payments:</strong></td>
</tr>
<tr>
<td>- None</td>
</tr>
<tr>
<td><strong>Explanations:</strong></td>
</tr>
<tr>
<td>- The bonds are debentures.</td>
</tr>
<tr>
<td>- The firm will make annual payments toward the sinking fund.</td>
</tr>
<tr>
<td>- The sinking fund will begin to be funded July 1, 1997.</td>
</tr>
</tbody>
</table>
Details of the protective covenants
Call provisions
Repayment arrangements
A description of the security (if any)
The total amount of bonds issued
The basic terms of the bond issue

The Indenture Includes

(Residual to hire a trustee?)

interest, what do you think would happen if an Issuer
trustee is hired by the Issuer to protect the bondholders,
Issuer, the bondholders, and the trustee. The

The bond Indenture is a three-party contract between the

The bond Indenture
How much did the price change from the previous day?

What is the quoted price?

How many bonds trade that day?

What is the current yield? How is it computed?

When does the bond mature?

What is the current rate? If the bond has a $1000 face value, what is the coupon payment each year?

What company are we looking at?

$177 6 3/8 4 6 809 + 1/4

Highlighted quote in Figure 7.3

Bond Quotations
What is the yield based on the ask price?

What is the ask price?

What does this mean?

How much did the price change from the previous day?

What is the bid price?

What does this mean?

When does the bond mature?

What is the coupon rate on the bond?

- 8 Nov 21
- 125.05
- 125.11
- 46.586

Highly cited quote in Figure 7.4.
Adjustment for expected inflation

The ex ante nominal rate of interest includes:

- Real rate of interest – change in purchasing power
- Nominal rate of interest – quoted rate of
- Purchasing power

Inflation and Interest Rates
\[ h + r = R - \]

\[ \text{Approximation} \]

\[ h = \text{expected inflation rate} \]

\[ r = \text{real rate} \]

\[ R = \text{nominal rate} \]

\[ (1 + h)(1 + r) = (1 + R) \]

where

between real rates, nominal rates and inflation

The Fisher Effect defines the relationship

The Fisher Effect
and the approximation.

Because the real return and expected inflation are relatively high, there is significant difference between the actual Fishers Effect.

Because the real return and expected inflation are relatively high, there is significant difference between the actual Fishers Effect.

Approximation: \( R = 10\% + 8\% = 18\% \)

\( R = (1.1)^{1.1} = 1.188\% = 18.8\% \)

Example:

If we require a 10% real return and we expect inflation to be 8%, what is the nominal rate?
Term Structure of Interest Rates

Yield curve - Graphical representation of the relationship between yield and time to maturity, etc.

1. It is important to recognize that we pull out the effect of default risk, different maturities, etc.

2. Term structure is the relationship between yields and term structure.
Figure 7.6 – Upward Sloping Yield Curve
Figure 7.6 - Downward-Sloping Yield Curve
Factors Affecting Required Return

- Required returns flows to the bondholders will affect the
- Anything else that affects the risk of the cash
- Required returns frequent trading will generally have lower
- Liquidity premium – bonds that have more
- Versus taxable
- Taxability premium – remember municipal
- Default risk premium – remember bond
- Ratings
Features of Common Stock
- Estimate Stock Price
- Using the Stock Price Multiples to
- Corporate Value Model
- Non-Constant Growth Case
- Constant Growth Case
- Zero Growth Case
- Common Stock Valuation

Chapter 8
Stock Valuation
\[
\ldots + \frac{\varepsilon(t + 1)}{d^1} + \frac{\varepsilon(t + 1)}{d^2} + \frac{\varepsilon(t + 1)}{d^3} + \frac{\varepsilon(t + 1)}{d^4} = 0
\]

Continuing to substitute, we obtain
\[
\frac{\varepsilon(t + 1)}{d^2} + \frac{\varepsilon(t + 1)}{d^3} + \frac{\varepsilon(t + 1)}{d^4} = 0
\]

Substituting for \(p^1\) gives
\[
\frac{\varepsilon(t + 1)}{d^2} + \frac{\varepsilon(t + 1)}{d^3} + \frac{\varepsilon(t + 1)}{d^4} = 0
\]

For common stocks, this implies the following:

**Intuitive cash flows.**

The value of any financial asset equals the present value of all of its cash flows. The fundamental theory of valuation:

In 1938, John Burt Williams postulated what has become the fundamental theory of valuation:

Given no change in the variables, what will the stock be worth in one year?

Question: $p_0 = \frac{1}{1.10} = 0.90$

Answer: 10%, what should the stock sell for today?

Question: Cooper Inc. common stock currently pays a $1.00 dividend. Which is expected to remain constant forever. If the required return on Cooper stock is 10%, what should the stock sell for today?

Answer: If all future dividends are the same, the present value of the dividend stream constitutes a perpetuity.

The present value of a perpetuity is equal to the dividend divided by the required rate of return.

Future dividends: According to the fundamental theory of value, the value of a financial asset at any point in time equals the present value of all future dividends.
From this stock, pull another way, there is no reason to expect capital gains income.

Growth stock will never change.

In other words, in the absence of any changes in expected cash flows (and given a constant discount rate), the price of a no-growth stock is constant. The price of a no-growth stock is the present value of the dividends.

\[ P_1 = \frac{D_1}{r} = \frac{1}{r} \]

Since the dividend is constant, \[ D_2 = D_1 \] and \[ P_0 = \frac{D_1}{r} \]

One year from now, the value of the stock, \[ P_1 \], must be equal to the present value of all remaining future dividends.

Answer: Common Stock Valuation: The Zero Growth Case (concluded)
Increase by 5% annually. What should the stock sell for today?

Now assume that $D_t = 0.01, r = 10\%$, but dividends are expected to

\[
\frac{p_0}{D_t} = \frac{r - g}{g + r} + \frac{r(1 + g)}{g + r} D_t + \frac{r(1 + g)}{g + r} D_t^2 + \frac{r(1 + g)}{g + r} D_t^3 + \cdots
\]

constant, we can apply the growing perpetuity model:

As long as the rate of change from one period to the next, \( r \), is

different than the one preceding it?

In reality, investors generally expect the firm (and the dividends it

Common Stock Valuation: The Constant Growth Case
Why does a lower growth rate result in a lower value? Stay tuned.

\[
\frac{10 \cdot 0.3}{1 + 14.2\%} = \frac{9}{1.142} = \frac{7.9}{1}
\]

Answer: 

Question: What would the value of the stock be if the growth rate were only 3%?

\[
\frac{10 \cdot 0.06}{1 + 1.10} = \frac{9}{1.16} = \frac{7.7}{1}
\]

Answer: 
The equilibrium value of this constant-growth stock is

Common Stock Valuation: The Constant-Growth Case (Concluded)
Answer: Here is five steps to follow:

1. Valued
2. Rate. How should stocks such as these be
3. Mature, dividends are then
4. Expected to grow rapidly. As product
5. High-tech industries), dividends are low
6. For many firms (especially those in new or
7. The Nonconstant Growth Case
8. Common Stock Valuation
Steps 2 & 4.

Step 5. To find value of the stock today, add

calculated in step 4.

Step 4. Find present value of the stock price
approaches the "steady state" rate.

Step 3. Find price of the stock when the firm
calculated in step 2.

Step 2. Find present value of the dividends
growth periods.

Step 1. Find the value of dividends during initial

Continued

The Nonconstant Growth Case -
<table>
<thead>
<tr>
<th>Time</th>
<th>Dividend</th>
<th>Row 1</th>
<th>Growth (in %)</th>
<th>Year 1 Growth</th>
<th>Year 2 Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.00</td>
<td>$5.00</td>
<td>$6.534</td>
<td>$6.926</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Required return is 12%. What is the stock’s value?

Years, the 8% for the next year, and then 6% indefinitely. The
dividend is projected to grow at 10% for the next two.

Suppose a stock has just paid a $5 per share dividend. The
\[ \frac{996.55}{5 + 1.12 + \frac{6.05}{1.12^2 + 6.534/1.12^2 + 1115.434/1.12^2}} = p_0 \]

The value today of the stock is thus:

\[ \frac{12}{1 + 0.09} = \frac{115.434}{(1 + 0.09)(1 + 0.09)} = p_3 \]

At time 3, the value of the stock will be:
By what percentage does \( P^1 \) exceed \( P^0 \)?

\[
\frac{100}{P^0} \times \frac{P^1}{P^0} - 1 = \frac{137.8126}{1.05} - 1 = 0.05
\]

What will the price be in a year?

\[
\frac{100}{P^0} \times \frac{P^1}{P^0} - 1 = \frac{131.25}{1.05} - 1 = 0.05
\]

### Then the price today is

If the dividend is \$0.50, then the projected dividend is \$0.50. The dividend is

### Suppose a stock has just paid a \$5 per share dividend. The dividend is

\[
\frac{P^1}{P^0} = \frac{131.25}{100} = 1.3125
\]
\[
\text{Dividend yield} + \text{(capital gain yield)} = \frac{5.25}{66.25} + 0.05 = 0.0792 + 0.05 = 0.1292
\]

If the stock sells today for $66.25, what is the required return?

The dividend is projected to grow at 5% per year indefinitely.

Suppose a stock has just paid a $5 per share dividend.

Find the required return.
Corporate value model

- Also called the free cash flow method. Suggests the value of the entire firm equals the present value of the firm’s free cash flows.

- Remember, free cash flow is the firm’s after-tax operating income less the net capital investment
  - $FCF = NOPAT - Net capital investment$
\[ p_0 = \frac{\text{MV of common stock}}{\# \text{ of shares}} \]

(Valueline).

Shares outstanding to get intrinsic stock price.

Divide MV of common stock by the number of common stock. Get MV of common stock.

\[ \text{MV of preferred} = \text{MV of } \text{firm} - \text{MV of debt and preferred stock} \]

Subtract MV of firm's debt and preferred stock to find py of firm's future FCFs.

Find the market value (MV) of the firm.

Applying the corporate value model.
at the point that growth becomes constant.

Terminal value (TV) represents value of firm constant rate.
some point free cash flow will grow at a

Similar to dividend growth model, assumes at
dividends are hard to forecast.
of firms that don't pay dividends, or when

often preferred to the dividend growth

Corporate value model

Issues regarding the
model to find the firm’s intrinsic value. Given the long-run GFCF = 6%, and WACC of 10%, use the corporate value.
$37,696 = \frac{\text{Market Value of Equity}}{\text{No. of Shares}}$

$376.94 \text{ Million} = \frac{\$416.94 \text{ Million}}{\text{FV of Debt}}$

$\text{Market Value of Equity} = \text{Market Value of Firm} - \text{Market Value of Debt}$

The firm's intrinsic value per share?

If the firm has 10 million shares of stock, what is the firm's $40 million in debt and...
Sometimes managers have bonuses tied to quarterly earnings. Sometimes changes in cash flows affect the current stock price. This would suggest changes in future earnings are a signal of future earnings changes in quarterly earnings. Sometimes managers focus on quarterly earnings? If most of a stock's value is due to long-term cash flows, why do so many
Estimate its stock price.

1. Estimate the average P/E ratio of comparable firms. This is the P/E multiple.

2. Multiply this average P/E ratio by the earnings per share (EPS) of the company to estimate the stock price.

Example:

Value stocks.

Per share plus the dividends per share (D) to per share plus cash flow per share (C), which is the earnings per share divided by the P/E multiple (price per earnings per share) OR the P/CF multiple (price per cash flow per share) divided by the earnings per share (the price).

Analysts often use the P/E multiples to estimate the stock price.
Calculate the average entity ratio for a sample of comparable firms. For example:

- Customers, Eyeballs, etc.
- Pick a measure, such as EBITDA, Sales,
- Plus the value of debt.
- stock multiplied by the price per share
- the market value of equity (# shares of

The entity value (V) is:

Using Entity Multiples
price per share
Divide by the number of shares to get the value of equity.
Subtract the firm's debt to get the total.
The result is the total value of the firm.

V/Customer Ratio
Multiply the firm's # of customers by the multiple.

V/Sales
Multiply the firm's sales by the V/Sales multiple.

For example,
Find the entity value of the firm in question.

Using Entity Multiples (Continued)
High Performers?

How should be compared to the low, average, or be 20, but the range could be from 10 to 50. For example, the average P/E ratio might comparable firms often has a wide range. The average ratio for the sample of it is often hard to find comparable firms.

Problems with Market Multiple Methods
desired
issue to maintain proportional ownership.
Free pre-emptive right – first shot at new stock
during liquidation
Share pro rata proportionally in remaining assets
Share pro rata proportionally in declared dividends
Other Rights
Classes of stock
Proxy Voting
Voting Rights

Features of Common Stock
Distributed dividends are not deductible expense. Therefore, they are not tax deductible.

The taxation of dividends received by individuals depends on the holding period.

Dividends received by corporations have a minimum 70% exclusion from taxable income.

Dividends and taxes not declaring dividends

Consequently, a firm cannot go bankrupt for dividends. A dividend has been declared by the Board until a.

Characteristics
Voting rights

Preferred stock generally does not carry

paid before common dividends can be paid

any missed preferred dividends have to be

Most preferred dividends are cumulative i.e.

Identifiably
dividends can be deferred

Dividends are not a liability of the firm and

stockholders
dividends can be paid to common

Stated dividends that must be paid before

Dividends

Features of Preferred Stock
Stock Market

- Dealers vs. Brokers
- New York Stock Exchange (NYSE)
  - Largest stock market in the world
  - Members
    - Own seats on the exchange
    - Commission brokers
    - Specialists
    - Floor brokers
    - Floor traders
- Operations
- Floor activity
Large portion of technology stocks

Level 3 - view and update quotes, dealers only

Level 2 - view quotes, brokers x dealers

Level 1 - median quotes, registered representatives

Three levels of information

Electronic Communications Networks

Multiple market makers

Not a physical exchange - computer-based

NASDAQ
Monday, March 28, 1994

New York Stock Exchange Composite Transactions

Sample Stock Quotation from The Wall Street Journal
\[ p^{1.9} = (1 + 0.06)^{1.9} \times 30.29 \times 1.06^{1.9} \]
\[ p = (1 + 0.06)^3 \times 30.29 \]

If the constant growth model holds, the price of the stock will grow at 9 percent per year, so

\[ p = D_1 \times (1 + 0.09) \]
\[ p = \frac{D_1}{r - g} = \frac{0.00(1.05)(1.09)}{0.13 - 0.09} = 30.29 \]

According to the constant growth model, price? What will the price be in 3 years? In 15 years?

6 percent per year indefinitely. If investors require a 13 percent return on Megacapital stock, what is the current price?

The dividends are expected to grow at a constant rate. Megacapital Inc. just paid a dividend of $2.00 per share on
share price?

The current market price of any financial asset is the present value of the future cash flows, discounted at the appropriate required return. In this case, we know that the required return on this stock is 14%, which is the current yield of 7% per year. Therefore, if the company will begin paying a $2.00 dividend and the dividends will be paid on the stock over the next 5 years, Harry's Hat Shop is a young start-up company. No
2. And, \( p_0^p = \frac{1}{1.14} \times 1.49 \times 5.194 = \$14.84 \).

1.e., \( p_0^6 = \$2.00 \times 1.14 - 0.7 \) = \( \$ 

2. By the constant-growth model, \( D_0^r \) = \( p_0^6 \).

Therefore, the answer requires two steps:

1. Perpetuity is a deferred cash flow stream.

Second, since the first cash flow is at time 6, the perpetuity begins, they are a growing perpetuity.

First, because they are expected to grow at a constant rate

Two important features:

This share of stock represents a stream of cash flows with
Investment Criteria and Other Net Present Value
Chapter 9
Investment Criteria
Net Present Value and Other

- The Profitability Index
- The Internal Rate of Return
- The Average Accounting Return
- The Discounted Payback Method
- The Payback Method
- Net Present Value
- Capital Budgeting Process
Capital budgeting eliminates the others. Perform the same function, so that acceptance of one mutually exclusive projects are those that projects does not eliminate other projects from further acceptance of independent mutually exclusive. The acceptance of independent equipment capital budgeting projects can be either independent or assets. The two major fixed asset classes are plant and forms, the most common such investments are for fixed objectives of wealth maximization. For manufacturing selecting long-term investments consistent with the capital budgeting is the process of evaluating and
If NPV is greater or equal to zero, take the project.

- Value (NPV) = Present Value (PV) of CF's - Asset's Cost = Net Present Cost.

- Compare the PV of cash flows with the asset's.

- Find the present value (PV) of cash flows.

- Discounting the cash flows.

- Determine the cost of capital to be used in flows.

- Estimate the risk involved in the projected cash flows.

- Estimate the cash flows for a given projects.

**Six Steps**

Capital Budgeting Process Involves
Draw a time line and compute the NPV of project X.

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenues $</th>
<th>Expenses $</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1,000</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>$1,000</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Annual cash revenues and expenses are as follows:

Required return = 10%

Initial outlay = $1,100

Assume you have the following information on Project X:

NPV Illustrated
NPV Illustrated (concluded)
Moral of the story: Invest only in projects with positive NPVs.

Thus, "good" projects are those which increase firm value - or, additional investments are "good" if the present value of the cash flows it is expected to generate exceeds their cost.

The market value of the firm is based on the present value of the cash flows that will be used to produce and sell a good or a service.

A "firm" is created when shareholders supply the funds to acquire assets that will produce and sell a good.

Look at it this way: why does the NPV Rule work? And what does "work" mean?

Underpinnings of the NPV Rule
Payback Method

Payback is the time it takes to break even in an accounting sense:

\[ \text{Payback} = \text{Number of Years to Completely Recovered Cost} + \left( \frac{\text{Cost - Total Amount Recovered}}{\text{Cash Flow in Last Year}} \right) \]
Advantages & Disadvantages of Payback Method

• Disadvantages
  • Liquidity Indicator
  • Risk Indicator
  • Returns Beyond Payback Period
  • Ignore Returns Beyond Payback Period
  • Ignore Time Value of Money
Initial outlay: $1,000

Payback Rule Illustrated
break even in an economic sense. Discounted payback is the time it takes to
flows after payback period. This method does consider time value of
money, but it still fails to consider cash
used. Discounted rather than raw cash flows are
It is similar to payback method except that
Discounted Payback Method
<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow (PV)</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1,820</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>$400</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>$700</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>$300</td>
<td></td>
</tr>
</tbody>
</table>

Initial Outlay = $1,400

Discounted Payback Illustrated
Needed information will usually be available.

Advantages
- Uses an arbitrary benchmark cut-off rate.
- Takes no account of the value of money.
- It uses net income, not cash flow.

Disadvantages
- AAR = Avg. Net Income/Avg. Investment

AAR
Average Accounting Return
Average net income = (105 + 30 + 0)/3 = $45

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales</th>
<th>Costs</th>
<th>Gross Profit</th>
<th>Depreciation</th>
<th>Earnings before taxes</th>
<th>Taxes (25%)</th>
<th>Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>1</td>
<td>$80</td>
<td>$80</td>
<td>$120</td>
<td>80</td>
<td>220</td>
<td>35</td>
<td>$140</td>
</tr>
<tr>
<td>2</td>
<td>$80</td>
<td>$80</td>
<td>$120</td>
<td>80</td>
<td>220</td>
<td>35</td>
<td>$140</td>
</tr>
<tr>
<td>3</td>
<td>$160</td>
<td>$40</td>
<td>$220</td>
<td>80</td>
<td>220</td>
<td>35</td>
<td>$140</td>
</tr>
</tbody>
</table>

Average net income: $45

Average accounting return: $45/3 = $15
\[
\text{Average Accounting Return (AAR)} = \frac{\text{Average Book Value}}{\text{Average Net Income}} \times 100\%
\]

\[
\text{AAR} = \frac{\$120}{\$45} = 37.5\%
\]

\[
\text{Average Accounting Return (AAR)} = \frac{\text{Average Net Income}}{\text{Average Book Value}} \times 100\%
\]

\[
\text{AAR} = \frac{\$120}{\$45} = 37.5\%
\]

\[
\text{Average Investment} = (\$240 + 160 + 80 + 0)/4 = \$120
\]

\[
\text{Initial Investment} = \$240
\]

\[
\text{Average Book Value} \text{ (continued)}
\]
**Exclusive Projects**

- May lead to incorrect decision in comparison of mutually
  disadvantage.
- May result in multiple answers.
- Rate of return.
- Easy to understand and communicate, it is a measure of decision.
- Closely related to NPV, often leading to the identical
  disadvantages.
- IRR is a discount rate that sets NPV to zero.
- Investment expected future cash flows to the initial cost of
- IRR is a discount rate that equates the present value of

**IRR**

**Internal Rate of Return**
\[
\frac{c(1+IRR)}{150} + \frac{c(1+IRR)^2}{100} + \frac{c(1+IRR)^3}{50} = 200
\]

\[
\frac{c(1+IRR)}{150} + \frac{c(1+IRR)^2}{100} + \frac{c(1+IRR)^3}{50} = 0
\]

Find the IRR such that \( NPV = 0 \)

\[
\begin{array}{c|c}
\text{Year} & \text{Cash Flow} \\
\hline
150 & 3 \\
100 & 2 \\
50 & 1 \\
\end{array}
\]

Initial outlay = $200

Internal Rate of Return Illustrated
IRR is just under 20% -- about 19.44%.

<table>
<thead>
<tr>
<th>Year</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>68</td>
<td>5%</td>
</tr>
<tr>
<td>41</td>
<td>10%</td>
</tr>
<tr>
<td>18</td>
<td>15%</td>
</tr>
<tr>
<td>2</td>
<td>20%</td>
</tr>
</tbody>
</table>

Discount Rates NPV

Trial and Error

Internal Rate of Return Illustrated (concluded)
Discount rate is much closer rate.

Which of those rates are closer to market

Reinvested at the discount rate.

Assumes that those cash flows can be
flows can be reinvested at IRR. NPY
IRR assumes that all intermediate cash

Reinvestment Assumption
For which the cash flows are as follows:

Assume you are considering a project.

Multiple Rates of Return
2. How many IRRs can there be?

1. What's going on here?

Two questions:

\[
\text{at 66.77%: N} \text{pV} = \text{NPV}
\]

\[
\text{at 42.86%: N} \text{pV} = \text{NPV}
\]

\[
\text{at 33.33%: N} \text{pV} = \text{NPV}
\]

\[
\text{at 25.00%: N} \text{pV} = \text{NPV}
\]

Which of the computed NPVs = 0:

What's the IRR? Find the rate at

Multiple Rates of Return (continued)
What's the Profitability Index (PI)?

\[
\begin{array}{ccc}
\text{Year} & 1 & 2 \\
\text{Cash Flows} & 600 & 1,000 \\
\end{array}
\]

Annual cash benefits:

Initial Outlay: \$1,100

Required Return = 10%

Following information on Project X:

Now let's go back to the initial example - we assumed the

Profitability Index Illustrated
Explain why?

This is a good project according to the PI rule. Can you explain why?

The PI = PV inflows/PV outlay = $1,280.99/1.100 = 1.1645.

($454.54 + 826.45) - 1,100 = $1,280.99 - 1,100 = $180.99.

Previously we found that the NVP of Project X is equal to:

Profitability Index Illustrated (concluded)
History
Capital Market
Some Lessons From
Chapter 12

History

Some Lessons From Capital Market

- Capital Market Efficiency
- Lesson
- The Variability of Returns: The Second
- Average Returns: The First Lessons
- The Historical Record
- Returns
This is called the risk-return trade-off.
The greater the potential reward, the greater the risk.
There is a reward for bearing risk.

Lesson from capital market history:

- Returns on non-financial assets in markets to help us determine the appropriate risk.
- We can examine returns in the financial markets.
Financial markets also provide us with information available so that they can invest in productive assets. Borrowers have better access to the capital that is compensate them for doing so that they can defer consumption and earn a return to savers have the ability to invest in financial assets so individuals to increase their utility. Financial markets allow companies, governments, and...

The Importance of Financial Markets
<table>
<thead>
<tr>
<th>Investment</th>
<th>Average Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation</td>
<td></td>
</tr>
<tr>
<td>U.S. Treasury Bills</td>
<td></td>
</tr>
<tr>
<td>Bonds</td>
<td></td>
</tr>
<tr>
<td>Long-term Government</td>
<td></td>
</tr>
<tr>
<td>Bonds</td>
<td></td>
</tr>
<tr>
<td>Small Stocks</td>
<td></td>
</tr>
<tr>
<td>Large Stocks</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td></td>
</tr>
<tr>
<td>3.1%</td>
<td></td>
</tr>
<tr>
<td>3.8%</td>
<td></td>
</tr>
<tr>
<td>5.8%</td>
<td></td>
</tr>
<tr>
<td>6.2%</td>
<td></td>
</tr>
<tr>
<td>17.5%</td>
<td></td>
</tr>
<tr>
<td>12.4%</td>
<td></td>
</tr>
</tbody>
</table>
Risk Premiuns

The risk premium is the return over and above the risk-free rate. Treasury bills are considered to be risk-free. The "extra" return earned for taking on risk.
<table>
<thead>
<tr>
<th>Investment</th>
<th>Risk Premium</th>
<th>Average Return</th>
<th>Average Annual Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Treasury Bills</td>
<td>0.0%</td>
<td>3.8%</td>
<td></td>
</tr>
<tr>
<td>Government Bonds</td>
<td>2.0%</td>
<td>5.8%</td>
<td></td>
</tr>
<tr>
<td>Long-Term Bonds</td>
<td>2.4%</td>
<td>6.2%</td>
<td></td>
</tr>
<tr>
<td>Long-Term Corporate Bonds</td>
<td>13.7%</td>
<td>17.5%</td>
<td></td>
</tr>
<tr>
<td>Small Stocks</td>
<td>8.6%</td>
<td>12.4%</td>
<td></td>
</tr>
</tbody>
</table>

Table 12.3 Average Annual Returns and Risk Premiaums
Variance
Standard deviation = square root of the

\( \sqrt{ \frac{\text{sum of squared deviations from the mean}}{\text{number of observations} - 1}} \)

Historical Variance = sum of squared uncertainties

The greater the volatility of asset returns, the greater the volatility of asset returns

Variance and standard deviation measure the variance and standard deviation
Variance = 0.0045 / (n-1) = 0.0015

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Totals</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0045</td>
<td>0.00</td>
<td>0.42</td>
<td>47</td>
<td>4</td>
</tr>
<tr>
<td>002025</td>
<td>0.00</td>
<td>0.05</td>
<td>40</td>
<td>3</td>
</tr>
<tr>
<td>0.002025</td>
<td>0.05</td>
<td>2</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>0.002025</td>
<td>0.05</td>
<td>1</td>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

Example - Variance and Standard Deviation

<table>
<thead>
<tr>
<th>Year</th>
<th>Variance</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 12.11: Illustration of the Normal Distribution. The probabilities are based on historical returns and standard deviation for a portfolio of large-cap common stocks.
stock market

Investors cannot earn a positive return in the

**Efficient markets do not imply that**

can earn "abnormal," or "excess," returns.

If this is true, then you should not be able to

- priced

Stock prices are in equilibrium or are "fairly"

---

Efficient Capital Markets
the new price and subsequently corrects.

**Overreaction:** The price overreacts to the new information; it overestimates the price.

**Delayed Reaction:** The price partially adjusts to the new information; it decreases to correct.

**Efficient Market Reaction:** The price instantaneously adjusts to and fully reflects the new information; there is no tendency for subsequent increases and decreases to occur.

---

**Diagram:**

- **Days Relative to Announcement Day:**
  - 8
  - 6
  - 4
  - 2
  - 0
  - +2
  - +4
  - +6
  - +8

- **Price ($):**
  - 220
  - 180
  - 140
  - 100
market will not be efficient.
If investors stop researching stocks, then the information
Therefore, prices should reflect all available public
on this information
information is analyzed and trades are made based
As new information comes to market, this research
There are many investors out there doing

What Makes Markets Efficient?
to put all your eggs in one basket
choices if you do not diversify – you still don’t want
Market efficiency will not protect you from wrong
excess returns
not a bias in prices that can be exploited to earn
that is appropriate for the risk undertaken and there is
They do mean that, on average, you will earn a return
money
Efficient markets do not mean that you can’t make

Common Misconceptions about EMH
Generally weak form efficient market evidence indicates that markets are abnormal returns imply that technical analysis will not lead to trading on market information. Investors cannot earn abnormal returns by trading on market information. If the market is weak form efficient, then price and volume prices reflect all past market information such.

Weak Form Efficiency
to abnormal returns

- Implies that fundamental analysis will not lead
  trading on public information
- Investors cannot earn abnormal returns by
  If the market is semi-strong form efficient, then
  annual reports, press releases, etc.
  information including trading information,
  Prices reflect all publicly available

Semi-Strong Form Efficiency
could earn abnormal returns

NOT Strong Form Efficient and that insiders
Empirical evidence indicates that markets are
Regardless of the information they possessed
Investors could not earn abnormal returns
If the market is Strong Form Efficient, then
and private
Prices reflect all information, including public

Strong Form Efficiency
Security Market Line
Return, Risk, and The
• The Security Market Line
• Capital Asset Pricing Model: CAPM
• Systematic Risk and Beta
• Diversification and Portfolio Risk
• Risk: Systematic and Unsystematic
• The Principle of Diversification
• Portfolio Expected Returns and Variances

Chapter 13
Market Line
Return, Risk, and the Security
How do we calculate these measures? Stay tuned.

Variance of returns - a measure of the dispersion of the possible returns in the future.

Expected return - weighted average of the distribution of possible returns in the future.

Consider the following proxies for return and risk:

And rational investors like returns and dislike risk.

understands the relationship between risk and return.

value-maximizing (financial decisions unless one
modern finance, it is not possible to make "good" (i.e.,

The quantification of risk and return is a crucial aspect of

Expected Returns and Variances: Basic Ideas
<table>
<thead>
<tr>
<th>Change in GNP</th>
<th>Probability of State</th>
<th>Return in State</th>
<th>Calculation of Expected Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5%</td>
<td>25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5%</td>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5%</td>
<td>25%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example: Calculating the Expected Return
Example: Calculating the Expected Return

\[
\text{Expected return} = \frac{1.25 + 2.50 + 8.75}{1.25} \times (p_1 x R_1)
\]
<table>
<thead>
<tr>
<th>Probability of State</th>
<th>Return in State</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>π_r</td>
</tr>
</tbody>
</table>

\[
\left[ \sum_{s} \left( \mathbb{E}(R)x^{s}d \right) \right] = \mathbb{E} = \mathbb{E}(R) \text{ and } A
\]

**Example: Calculating the Variance**
What is the standard deviation?

\[ \sigma = \sqrt{\text{Var}(R)} \]

\[
\begin{array}{ccc}
\text{Var}(R) & = & 0.02 \\
1.01 & 0.04 \\
0 & 0 \\
1.01 & 0.04 \\
\end{array}
\]

\[ p_x(R_i - E(R))^2 \]

Example: Calculating the Variance (concluded)
With individual securities state and computing the expected value as we finding the portfolio return in each possible
You can also find the expected return by

\[
(f \cdot R) \sum_{w=1}^{f} w = (d \cdot R) \cdot E
\]

The respective assets in the portfolio
the weighted average of the expected returns of
The expected return of a portfolio is the

Portfolio Expected Returns
formulas as for an individual asset
standard deviation using the same
individual asset
using the same formula as for an
Compute the expected portfolio return
\[ R_p = w_1 R_1 + w_2 R_2 + \cdots + w_m R_m \]

\text{Portfolio Variance}

\text{Portfolio Variance}
<table>
<thead>
<tr>
<th>State of the Economy</th>
<th>Probability of State</th>
<th>Return on Asset A</th>
<th>Return on Asset B</th>
<th>Return on Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bust</td>
<td>0.60</td>
<td>25%</td>
<td>0%</td>
<td>1.00</td>
</tr>
<tr>
<td>Boom</td>
<td>0.40</td>
<td>12.5%</td>
<td>5%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

Portfolio weights: put 50% in Asset A and 50% in Asset B.
\[ \text{Note: } E(R_p) = 0.50 \times E(R_1) + 0.50 \times E(R_2) = 9.5\% \]

\[ \text{BUT: } \text{VAR}(R_p) = 0.50 \times \text{VAR}(R_1) + 0.50 \times \text{VAR}(R_2) \]

\[ \sqrt{0.006} = 0.245 = 2.45\% \]

\[ \text{C. SD}(R_p) = 0.40 \times (0.125 - 0.095)^2 + 0.60 \times (0.075 - 0.095)^2 = 0.006 \]

\[ \text{B. VAR}(R_p) = 0.40 \times (0.125 - 0.095)^2 + 0.60 \times (0.075 - 0.095)^2 = 0.95 = 9.5\% \]

\[ \text{A. E}(R_p) = 0.40 \times (0.125) + 0.60 \times (0.075) = 0.095 \]

Example: Portfolio Expected Returns and Variances (continued)
New portfolio weights: put 3/7 in A and 4/7 in B.

Example: Portfolio Expected Returns and Variances (concluded)
Diversification

Diversification is the investment in several different asset classes or sectors.

For example, if you own 50 Internet assets, you are not diversified.

However, if you own 50 stocks that span 20 different industries, then you are diversified.

Diversification is not just holding a lot of in several different asset classes or portfolio diversification is the investment

Diversification
The Principle of Diversification

- Diversification can substantially reduce the variability of returns without an equivalent reduction in expected returns.
- This reduction in risk arises because worse than expected returns from one asset are offset by better than expected returns from another.
- However, there is a minimum level of risk that cannot be diversified away and that is the systematic portion.
GDP, Inflation, Interest rates, etc., includes such things as changes in market risk. Also known as non-diversifiable risk. Number of assets. Risk factors that affect a large systematic risk.
part shortages, etc.

- Includes such things as labor strikes,

- Asset-specific risk

- Also known as unique risk and

- Number of assets

- Risk factors that affect a limited

Unsystematic Risk
Equivalent to the systematic risk diversified portfolio is essentially uncorrelated; the total risk for a portfolio is very small.

For well-diversified portfolios, the measure of total risk is the standard deviation of returns, which is the unsystematic risk plus the systematic risk.

Total Risk = Systematic Risk + Unsystematic Risk
risk can be diversified away since
systematic risk depends only on that asset's
dependence on a risky asset

The expected return on a risky asset
unnecessarily

There is not a reward for bearing risk

There is a reward for bearing risk

Systematic Risk Principle
A beta > 1 implies the asset has more systematic risk than the overall market.
A beta < 1 implies the asset has less systematic risk than the overall market.
A beta = 1 implies the asset has the same systematic risk as the overall market.

What does beta tell us?

We use the beta coefficient to measure systematic risk.

How do we measure systematic risk?

Measuring Systematic Risk
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>1.05</td>
</tr>
<tr>
<td>GE</td>
<td>1.05</td>
</tr>
<tr>
<td>General Motors</td>
<td>1.25</td>
</tr>
<tr>
<td>American Electric Power</td>
<td>0.50</td>
</tr>
<tr>
<td>Exxon</td>
<td>0.40</td>
</tr>
<tr>
<td>Exxon Mobil</td>
<td>0.30</td>
</tr>
<tr>
<td>General Mills</td>
<td>0.06</td>
</tr>
<tr>
<td>Coca-Cola Bottling</td>
<td>0.45</td>
</tr>
</tbody>
</table>

Which security should have the higher expected return?

Which security has more systematic risk?

Which security has more total risk?

<table>
<thead>
<tr>
<th>Security</th>
<th>Beta</th>
<th>Standard Deviation</th>
<th>Expected Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security K</td>
<td>0.95</td>
<td>30%</td>
<td>0.25</td>
</tr>
<tr>
<td>Security C</td>
<td>0.25</td>
<td>20%</td>
<td></td>
</tr>
</tbody>
</table>

Consider the following information:

Total versus Systematic Risk
What is the portfolio betas?

2.434
4
2.161
26.7
2.195
2.685
Beta
Weight
Security
KO
INTC
KEI
2
.195
-133
26.7
Consider the previous example with the following four securities:

Example: Portfolio Betas
Asset A weighs: 0%, 25%, 50%, 75%, 100%, and 125%.

The risk-free rate is 7%.

Asset A has a beta (β) of 1.2 and an expected return of 18%.

From 0 to 125%,

- Let the proportion of funds invested in asset A range
- Calculate portfolio expected returns and portfolio betas
- Given the following information
- Assume you wish to hold a portfolio consisting of asset A

Example: Portfolio Expected Returns and Betas
<table>
<thead>
<tr>
<th>Beta</th>
<th>Expected Portfolio Return (%)</th>
<th>Risk-Free Asset (%)</th>
<th>Invested in Proposition</th>
<th>Invested in Proposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.50</td>
<td>20.75</td>
<td>25</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>1.20</td>
<td>18.00</td>
<td>0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>0.90</td>
<td>15.25</td>
<td>25</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>0.60</td>
<td>12.50</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>0.30</td>
<td>9.75</td>
<td>75</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>0.00</td>
<td>7.00</td>
<td>100</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Example: Portfolio Expected Returns and Betas (concluded)
This is true whether we are talking about expected return.

If we know an asset's systematic risk, we can use the CAPM to determine its return:

\[ E(R_A) = R_f + \beta_A (E(R_M) - R_f) \]

The relationship between risk and return defines the capital asset pricing model (CAPM) as the Capital Asset Pricing Model.
measured by beta

- Amount of systematic risk
- Premium

measured by the market risk

- Reward for bearing systematic risk

measured by the risk-free rate

- Pure time value of money

Factors Affecting Expected Return
### Expected Return

<table>
<thead>
<tr>
<th>Security</th>
<th>Beta</th>
<th>Expected Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEI</td>
<td>2.434</td>
<td>2.13 + 2.434(6.6) = 23.06%</td>
</tr>
<tr>
<td>INTC</td>
<td>2.161</td>
<td>2.13 + 2.161(6.6) = 20.71%</td>
</tr>
<tr>
<td>KO</td>
<td>0.195</td>
<td>2.13 + 0.195(6.6) = 3.81%</td>
</tr>
<tr>
<td>DECK</td>
<td>2.685</td>
<td>2.13 + 2.685(6.6) = 25.22%</td>
</tr>
</tbody>
</table>

Consider the betas for each of the assets.

**Example - CAPM**
premium

Slope = \( E(R_m) - R_f \) = market risk

rewritten

ALWAYS equal to one; the slope can be

But since the beta for the market is

\( \frac{E(R_m)}{R_f} \)

risk ratio: \( E(R_m) - R_f \)

The slope of the SML is the Reward-to-

to-representation of market equilibrium

The security-market line (SML) is the

Security Market Line
The model for describing the risk associated with asset expected returns (E(R)) can be written:

\[ E(R) = R_f + \beta \times (E(R_m) - R_f) \]

The slope of the security market line is equal to the market risk premium, \( \beta \).
\[
\frac{\frac{\gamma^M}{\gamma}}{(E(R)^M - R)} = \frac{\gamma}{E(R)^V - R}
\]

Ratio for the market and they all must equal the reward-to-risk ratio, must have the same reward-to-risk ratio in equilibrium, all assets and portfolios.

Market Equilibrium
\[ R_f = \frac{1.12 - R_f}{0.05} = \frac{1.08 - R_f}{0.08} \]

What would the risk-free rate have to be for these assets to be correctly valued?

- For B, \( (0.08 - R_f)/0.05 = 0.80 \)

- For A, \( (1.2 - R_f)/0.40 = 0.80 \)

The risk-free rate is 5%.

Example:

- Asset B has an expected return of 8% and a beta of 0.80.
- Asset A has an expected return of 12% and a beta of 1.40.
Chapter 15

Cost of Capital
Cost of Capital

- Flotation Costs and the Weighted Average
- Divisional and Projected Costs of Capital
- The Weighted Average Cost of Capital
- The Costs of Debt and Preferred Stock
- The Cost of Equity
- The Cost of Capital: Some Preliminaries

Chapter 15
Cost of Capital
degrees of risk.
Investors could expect to earn if they invested in securities with comparable
Cost of Capital - The return the firm's
bidding projects
us determine our required return for capital
Knowing our cost of capital can also help
of our assets
indication of how the market views the risk
Our cost of capital provides us with an
the cost to the company
The return to an investor is the same as
depends on the risk of those assets
We know that the return earned on assets

Why Cost of Capital Is Important
Financing they have provided return to compensate our investors for the
We need to earn at least the required
or not to take the investment
NPV and make a decision about whether
Investment before we can compute the
We need to know the required return for an
the risk of the cash flows
appropriate discount rate and is based on
The required return is the same as the

Required Return
1. Calculate the value of each security as a proportion of the firm's market value.

2. Determine the required rate of return on each security.

3. Calculate a weighted average of these required returns.

Three Steps to Calculating Cost of Capital
Cost of Equity

- SWL or CAPM
- Dividend growth model

Determining the cost of equity

There are two major methods for

- Financial risk
- Business risk

Flows from the firm
equity investors given the risk of the cash

The cost of equity is the return required by
Start with the dividend growth model approach.

\[ S + \frac{D}{P} = \frac{\delta - \frac{\epsilon P}{1}}{1} = 0 \]

Formulas and rearrange to solve for \( \delta \).
Does not explicitly consider risk of cost of equity by 1% increase in 6% increase the rate - an increase in 9 of 1% increase the growth. Extremely sensitive to the estimated growth rate reasonably constant rate.

- Not applicable if dividends aren't growing at a dividend.
- Only applicable to companies currently paying dividends.

Advantages:
- Easy to understand and use.

Disadvantages:
- Of Dividend Growth Model

Advantages and Disadvantages
\[ R^E = R + \int P^E (E(R^M) - R) \]

- Systematic risk of asset, \( P \)
- Market risk premium, \( E(R^M) - R^f \)
- Risk-free rate, \( R^f \)
- Our cost of equity

Use the following information to compute

The SML Approach
Advantages and Disadvantages

Which is not always reliable

We are using the past to predict the future.

Time

Have to estimate beta, which also varies over

premium, which does vary over time

Have to estimate the expected market risk

Disadvantages

Estimate beta

Applicable to all companies, as long as we can

Explicitly adjusts for systematic risk

Advantages

of SML

Advantages and Disadvantages
19.55%  
Using DDM: \( R^e = \frac{[2(1.06)]}{15.65} + 0.06 \)

Using SML: \( R^e = 6\% + 1.5(9\%) = 19.5\% \)

...equity?

currently selling for $15.65. What is our cost of and our last dividend was $2. Our stock is and believes our dividends will grow at 6% per year believe our dividends will grow at 6% per year analysts' estimates to determine that the market value of the stock is in 6%. We have used the current risk-free rate is 6%. We have used and the market risk premium is expected to be 9% and Suppose our company has a beta of 1.5. The...

---

Example - Cost of Equity
The cost of debt is NOT the coupon rate. Issue new debt based on the bond rating we expect when we
We may also use estimates of current rates debt computing the yield-to-maturity on the existing
The required return is best estimated by bonds
We usually focus on the cost of long-term debt on company's debt
The cost of debt is the required return on our

Cost of Debt
Example: Cost of Debt
\[ R^p = \frac{D}{P_0} \]

For \( R^p \)

the perpetuity formula, rearrange and solve

Prefered stock is a perpetuity, so we take

Period forever

Dividends are expected to be paid every

dividend each period

Prefered stock generally pays a constant

Reminders

Cost of Preferred Stock
• $P = \frac{3}{25} = 12\%$

stock?

price is $25$, what is the cost of preferred
an annual dividend of $3$. If the current
Your company has preferred stock that has

Stock

Example: Cost of Preferred
The weighted average cost of capital is the required return on our assets, based on the market's perception of the risk of those assets. The weights are determined by how much of each type of financing we use.

This "average" cost of capital for the firm is an average of the weighted costs of all types of capital.

We can use the individual costs of capital to get our weighted average cost of capital.
\[ W^D = \frac{D}{L} \]  \( W^E = \frac{E}{L} \)

Weights

\[ V = D + E \]  \( V = \text{market value of the firm} \)

\[ V = \text{market value of the firm} = D + E \]

\[ V = \text{market value of the firm} = D + E \]

\[ \text{market value of debt} = \# \text{of outstanding bonds times bond price} \]

\[ \text{market value per share} = \# \text{of outstanding shares times share price} \]

\[ E = \text{market value of equity} = \# \text{of outstanding equity} \]

Notation

Capital Structure Weights
What are the capital structure weights?

Value of debt = $475 million.

Equity equal to $500 million and a market.

Suppose you have a market value of

Weights

Example: Capital Structure
WACC = \( WE^E + WD^D (1 - T) \)

- Is no tax impact on the cost of equity
- Dividends are not tax deductible, so there
- After-tax cost of debt = \( RD (1 - T) \)
- Debt
- This reduction in taxes reduces our cost of
- Interest expense reduces our tax liability
- Taxes on the various costs of capital
- Thus, we need to consider the effect of
- We are concerned with after-tax cash

Taxes and the WACC
Tax rate = 40%

15 years to maturity

Semiannual coupons

Coupon rate = 9%

Current quote = 110

Value

Outstanding debt (face

$1 billion in

Debt Information

Risk-free rate = 5%

9%

Market risk premium = 7.5%

Beta = 1.15

$80 per share

50 million shares

Equity Information

Extended Example - WACC - I
\[ RD(1-T) = 7.854(1-0.4) = 4.712\%
\]

What is the after-tax cost of debt?

\[ RD = 3.927(2) = 7.854\%
\]

\[ CPT I/Y = 3.9268\]

N = 30; \( PV = -1100; \) PMT = 45; \( FV = 1000; \)

What is the cost of debt?

\[ R_E = R_D + \frac{1 + R_D}{1 + R_E} = 15.35\%
\]

What is the cost of equity?

Extended Example - WACC - II
13.06%

\[ \text{WACC} = 0.7843 (15.35\%) + 0.2157 (4.172\%) = \]

What is the WACC?

\[ w_d = D/V = 1.1 / 5.1 = 0.2157 \]

\[ w_e = E/V = 4 / 5.1 = 0.7843 \]

\[ w = 4 + 1.1 = 5.1 \text{ billion} \]

\[ D = 1 \text{ billion (1.10)} = 1.1 \text{ billion} \]

\[ E = 50 \text{ million (80)} = 4 \text{ billion} \]

What are the capital structure weights?

Extended Example - WACC - III
**Example: Eastman Chemical's WACC**

- Eastman Chemical has 80 million shares of common stock outstanding. The book value per share is $19.10 and the market price premium is $62.375 per share. T-bills yield 5%, and the market risk premium is assumed to be 8.5%. The stock beta is 1.1.

<table>
<thead>
<tr>
<th>Coupon</th>
<th>Book Value</th>
<th>Market Value</th>
<th>Yield-to-Maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.375%</td>
<td>$499m</td>
<td>$521m</td>
<td>6.70%</td>
</tr>
<tr>
<td>7.250%</td>
<td>$495m</td>
<td>$543m</td>
<td>6.60%</td>
</tr>
<tr>
<td>7.625%</td>
<td>$200m</td>
<td>$226m</td>
<td>6.60%</td>
</tr>
</tbody>
</table>

- The firm has three debt issues outstanding.

- **Cost of equity (SML approach):**
  \[ R_e = 0.05 + 1.1 \times (0.05 + 0.0935) = 0.1435 \approx 14.4\% \]

- **Cost of debt:**
  \[ R_d = 0.05 + 0.6 \times 0.05 = 0.075 \approx 7.5\% \]

- **Capital structure weights:**
  - Equity weight: 1 - 0.1435 = 0.8565
  - Debt weight: 0.8565

- **Market value of equity:**
  \[ V_{equity} = 80 \text{ million} \times 32.375 = 2.59 \text{ billion} \]

- **Market value of debt:**
  \[ V_{debt} = 80 \text{ million} \times 62.375 = 4.99 \text{ billion} \]

- **WACC:**
  \[ \text{WACC} = \left( 0.1435 \times 4.99 \text{ billion} + 0.8565 \times 6.28 \text{ billion} \right) / (4.99 \text{ billion} + 6.28 \text{ billion}) = 0.15 \text{ or } 15\% \]
4. What is the firm's market value capital structure?

The firm's tax rate is 34 percent. If the firm's T-bills are yielding 7 percent, and the bonds are of par, the market risk premium is 8 percent, T-bills are yielding 7 percent, and the bonds have a beta of 1.0. The preferred stock sells for $35 per share and has a beta of 1.0, the preferred stock for semianual coupon bonds outstanding, and 10,000 $1,000 par, 9 percent preferred outstanding, and 1 million shares of 6 percent common stock outstanding, 1 million shares of 7 million shares of...
\[
\frac{1}{1.152} = \frac{1}{P/V} \\
\frac{1}{6.22'} = \frac{1}{E/V} \\
\frac{1}{2.26'} = \frac{1}{D/V} \\
\frac{1}{45} + \frac{1}{45} = \frac{1}{\Lambda} \\
\frac{1}{M/V} = \frac{1}{M/V} \\
\frac{1}{M/V} = \frac{1}{M/V} \\
\frac{1}{M/V} = \frac{1}{M/V} \\
\frac{1}{M/V} = \frac{1}{M/V}
\]
\[
WACC = 12.41\% \\
\frac{R_p}{R_p - R_f} + \frac{B_0}{B_0 - $1,000(\text{PVIFA}_{10\%, 40})} + \frac{R_f}{(1 - T_c)(1 - 34\%)}
\]

For projects as risky as the firm itself, the WACC is the appropriate discount rate.
Divisions also often require separate discount rates.

Divisions also require a discount rate for that project.

We need to determine the appropriate discount rate for that project.

If we are looking at a project that does not have the same risk as the firm, then the discount rate is not the same as the firm's WACC.

Using the WACC as our discount rate is not appropriate for projects that have the same risk as the firm's operations.

Capital Division and Project Costs of
<table>
<thead>
<tr>
<th>Project</th>
<th>Required Return (IRR)</th>
<th>WACC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>17%</td>
<td>20%</td>
</tr>
<tr>
<td>B</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

- Assume the WACC = 15%
- For all projects regardless of risk?

Example:

Using WACC for All Projects -
Often difficult to find pure play companies

Risk

The appropriate return for a project of that

Use that beta along with the CAPM to find

Take an average

Compute the beta for each company

are considering

Specialize in the product or service that we

Find one or more companies that

The Pure Play Approach
differential risk at all. Error rate should be lower than not considering and reject projects you should accept, but your you may still accept projects that you shouldn’t.

- Discount rate less than the WACC
- If the project has less risk than the firm, use a
- Discount rate greater than the WACC
- If the project has more risk than the firm, use a
- Overall

Consider the project’s risk relative to the firm

Subjective Approach
<table>
<thead>
<tr>
<th>WACC</th>
<th>Discount Rate</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>Low Risk</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>Low Risk</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>Very Low Risk</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>High Risk</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>High Risk</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>Very High Risk</td>
<td></td>
</tr>
</tbody>
</table>

Subjective Approach - Example
Long term issue securities in these percentages over the
Use the target weights because the firm will
Compute the weighted average flotation cost

Basic Approach
Should not just be ignored either
However, the cost of issuing new securities
not how the money is raised
The required return depends on the risk,

Flotation Costs
NPV becomes negative once we consider the cost of issuing new securities, the flotation costs.

The project would have a positive NPV of $40,105 without flotation costs.

\[
NPV = \frac{1.040,105 - 1.000,000}{(1 - 0.425)} = 4.281
\]

\[
PV = 1.040,105\times\frac{(1.25^3) + (0.625 \times 0.25)}{3}\% = 4.25\%
\]

What is the firm's target D/E ratio? The flotation cost for equity is 5% and the flotation cost for debt is 3%. WACC is 6%.

The project will generate after-tax cash flows of $250,000 per year for 7 years. The WACC is 15% and the company's cost of equity is 10%.

Example

NPV and Flotation Costs
Chapter 22

International Corporate Finance
Political Risk
Exchange Rate Risk
International Capital Budgeting
and the International Fischer Effect
Interest Rate Parity, Unbiased Forward Rates,
Purchasing Power Parity
Foreign Exchange Markets and Exchange Rates
Terminology

Chapter 22
International Corporate Finance
this may reduce the firm's cost of capital and consider the international capital markets and more financing opportunities when you • Have to consider the political risk associated with actions of foreign governments • Have to consider the effect of exchange rates when operating in more than one currency

Management

Considerations in International Financial Management

Domestic Financial Management and International Financial Management
(1/1.3170 = .7593)

The two numbers are reciprocals of each other.

- Takes to buy $1

The second number (.7593) is how many Euros it

dollars it takes to buy 1 Euro

The first number (1.3170) is how many U.S.

Euro 1.3170 .7593

Consider the following quote:

Most currency is quoted in terms of dollars

another

The price of one country's currency in terms of

Exchange Rates
• Cost = 1000 / 45.851 = $21.81

• Exchange rate = 45.851 Rupees per dollar

How much does it cost in U.S. dollars to buy a souvenir that costs 1000 Indian Rupees?

Suppose you are visiting Bombay and you want to buy a souvenir that costs 1000 Indian Rupees.

• Buy 10,000 (1.2488) = 12,488 Francs

• Exchange rate = 1.2488 Francs per dollar

Suppose you have $10,000. Based on the rates

Example: Exchange Rates
Foreign currency is selling at a discount if the forward rate is lower than the spot rate. The quoted exchange rate is also the forward contract rate. Forward rate—the exchange rate specified in the contract. Specified price, also called a forward contract. Currency at some future date and some agreed today to exchange.

Types of Transactions:

- Spot Rate—the exchange rate for an immediate trade.
- Exchange Currency Immediately.
In practice, for most goods, absolute PPP rarely holds.

- For locations
  - No difference in the commodity between
  - No barriers to trade (no taxes, tariffs, etc.)
  - Transaction costs are zero

Requirements for absolute PPP to hold

- The currency used to purchase it
- Price of an item is the same regardless of

Party

Absolute Purchasing Power
From here on out, we will focus on relative PPP many goods, we will focus on relative PPP because absolute PPP doesn't hold for

\[ E(S) = (S - \bar{S}) \]

Countries depend on relative inflation between

The basic result is that exchange rates changes in exchange rates provides information about what causes

Partly

Relative Purchasing Power
What is the expected exchange in one year?

Canadian dollar

Expect the U.S. dollar to depreciate relative to the Canadian dollar.

Do you expect the U.S. dollar to appreciate or depreciate relative to the Canadian dollar?

Suppose the Canadian spot exchange rate is $1.18 Canadian dollars per U.S. dollar.

Example: PPP
The T-bill rate

- The U.S. risk-free rate is assumed to be
- Foreign currency per U.S. dollar exchange rates are quoted in terms of
- Again, the formulas will assume that the
- Between countries, forward rates and nominal rates
- Examines the relationship between spot

Covered Interest Arbitrage
Profit = 1.16.67 - 100(1.1) = 66.67 risk free

210 Euro / (1.8 Euro / $) = $116.67 and repay loan back to dollars

In 1 year, receive 200(1.05) = 210 Euro and convert year

Buy $100(2 Euro/$) = 100 Euro and invest at 5% for 1 year

Borrow $100 at 10%

What is the arbitrage opportunity?

\[ R^e = 5\% \]
\[ E^1 = 1.8 \text{ Euro} / $ \]
\[ R^{us} = 10\% \]
\[ S^0 = 2 \text{ Euro} / $ \]

Consider the following information:

Arbitrage

Example: Covered Interest
\[
\left( R^u_s - \frac{c^p}{R^s} \right) + 1 = \frac{S^0}{P^s} \quad \text{Approx.}
\]
\[
\frac{\left( R^u_s + 1 \right)}{\left( \frac{c^p}{R^s} + 1 \right)} = \frac{S^0}{P^s} \quad \text{Exact}
\]

Forward rate should be

Interest rate parity defines what that

the arbitrage opportunity.

must be a forward rate that would prevent

Based on the previous example, there

Interest Rate Parity
The forward price would have to come up for trades to occur if the forward rate is consistently too low. If the forward rate is consistently too high, the future spot rate will equal the future exchange rate. This means that on average the forward rate will be unbiased.

Unbiased Forward Rates
\[ E(S')_1 S^0 = (R^F - R^{us})\]

\[ E(S')_1 S^0 = (R^F - R^{us}) \]

For one period,

Combining the formulas we get

\[ UFR: F'_1 = E(S')_1 \]

\[ IRP: F'_1 = S^0_1 (R^F - R^{us}) \]

\[ PPR: E(S')_1 S^0 = (R^F - R^{us}) \]

What we know so far

Uncovered Interest Parity
Return to the country with the higher real rate of return if it is not, investors will move their money across countries. The real rate of return must be constant. The International Fisher Effect tells us that:

\[ R_{s} - h_{s} = R_{f} - h_{f} \]

International Fisher Effect

Combining PPP and UIP we can get the International Fisher Effect.
Converting NPY to dollars using current spot rate
Discounting using foreign required return
Foreign required return
Use the IFE to convert domestic required return to
Estimate cash flows in foreign currency
Foreign Currency Approach
Discount using domestic required return
Convert future cash flows to dollars
Estimate future exchange rates using UIP
Estimate cash flows in foreign currency
Home Currency Approach

Approaches
Overseas Production: Alternative
Should the company make the investment?

8% The dollar required return is 15%.
US is 4% and the risk-free rate in Mexico is 9.08.
pesos per dollar. The risk-free rate in the current spot exchange rate is 9.08.
2.25 million pesos per year for 5 years.
pesos. The cash flows are expected to be in Mexico. The project will cost 9 million pesos.
Your company is looking at a new project.
NPV = -2,120,321 / 9.08 = -233,516

- Pesos

NPV = 6,879,679 - 9,000,000 = -2,120,321
PV of future cash flows = 6,879,679

- Required Return = 15% + 4% = 19%
Fisher Effect is 8% - 4% = 4%
Mexican inflation rate from the International

Foreign Currency Approach

Example to estimate the NPV using the
Use the same information as the previous

Foreign Currency Approach
Repartitioned Cash Flows
benefit from rates if they move in your favor
exchange rates if they move against you, but
• Use foreign currency options to lock in
  the exchange rate
• Enter into a forward agreement to guarantee
  manageable risk
  goods in the short-run at fixed prices
  companies have contracts to buy and sell
  exchange rates and the fact that
  Risk from day-to-day fluctuations in

Short Run Exposure
mitigate some of the problems
Borrowing in the foreign country may
in the currency
Try to match long-run inflows and outflows
More difficult to hedge
or governments
Could be due to changes in labor markets
Conditions
unanticipated changes in relative economic
Long-run fluctuations come from

Long-Run Exposure
Shareholders equity accumulated in a special account within exchange rates with currency gains and losses cash flows be converted at the prevailing current accounting regulations require that all would be significant volatility in EPS through directly to the income statement, there if gains and losses from this translation translated back to U.S. dollars for accounting income from foreign operations has to be converted back to dollars for purposes, even if foreign currency is not actually

Translation Exposure
exposure expensive and may actually increase. Hedging individual currencies could be
each currency separately to currency risk instead of just looking at
The firm needs to consider its net exposure with several different currencies manage the exchange rate risk associated
Large multinational firms may need to

Managing Exchange Rate Risk
Local financing can often reduce political risk. Developing the resource has already been done to others, especially if much of the ground work in others operations within the firm, the less valuable it is to the more dependent the business is on other the business. The extent of political risk depends on the nature of governments that require higher returns. Investment in countries that have unstable foreign country. Changes in value due to political actions in the