Michigan Technological University

Chapter 13

Risk, Cost of Capital, and Valuation

Xin Li, Ph.D.

Key Concepts and Skills

- Distinguish two type of risk
- Know how to determine a firm's cost of equity capital
- Understand the impact of beta in determining the firm's cost of equity capital
- Know how to determine the firm's overall cost of capital

Risk and Return

Risk and Return

- High risk, high return
- Low risk, low return

Expected Return and Variance Review

- **Expected return:** the return on a risky asset expected ***in the future***

$$\mathbf{E(r) = \sum_s p(s)r(s)}$$

  - 1 to S states: a state s is something that can happen
  - p(s) = probability of state s occurring
  - r(s) = return if state s occurs

→ Sum up over all the things that can happen :
(what you get if each thing happens) * (how likely it will happen)

'**Expected**' means average over a large number of **future possibilities**
→Return is drawn from a distribution
(or intuitively, from a set of possible scenarios)

Example

- Suppose we have a stock L
  - If the economy booms → Stock L will have 70% return
  - If the economy enters a recession → Stock L will have -20% return

- $E(r) = \sum_s p(s)r(s)$
  - Two states (s): boom and recession
  - p(s): assuming equal probability, p(boom) = p(recession) = 0.5
  - r(s): r(boom) = 70%, r(recession) = -20%

$\rightarrow E(r_L) = p(boom) * r(boom) + p(recession) * r(recession) = 0.5 * .70 + 0.5 * (-.20) = .25$

- Suppose that there is another stock U:

State	P(state)	R(state)	
		Stock L	Stock U
Recession	0.5	-20%	30%
Boom	0.5	70%	10%
	1.0	$E(r_L) = 25\%$	$E(r_U) = 20\%$

- Suppose the risk free rate is $r_f = 8\%$, we can find the ***(expected) risk premium***

Risk premium for stock L = $E(r_L) - r_f = 25\% - 8\% = 17\%$

Risk premium for stock U = $E(r_U) - r_f = 20\% - 8\% = 12\%$

Variance

- **Variance:**

$$\sigma^2(r) = \sum_s p(s)[r(s) - E(r)]^2$$

Weighted average of squared deviations from the mean

- **Standard deviation:**

$$\sigma = \sqrt{\sigma^2}$$

- Example:

State	P(state)	R(state)
1 = Recession	3%	-65%
2 = Slump	22%	-5%
3 = Normal	50%	15%
4 = Good	17%	25%
5 = Boom	8%	35%

- First, calculate mean return: $\mathbf{E(r)} = .115$
- Second, $\boldsymbol{\sigma^2(r)} = [(.03)(-.65 - .115)^2 + (.22)(-.05 - .115)^2 + (.50)(.15 - .115)^2 + (.17)(.25 - .115)^2 + (.08)(.35 - .115)^2] = \mathbf{.03168}$

$\sigma = [\mathbf{0.03168}]^{\mathbf{1/2}} = \mathbf{17.80\%}$

Portfolios

- **Portfolio:** a group of assets such as stocks and bonds held by an investor
- An asset's risk and return are important on how they affect the risk and return of the portfolio
- The **risk-return tradeoff** for a portfolio is measured by the expected return and standard deviation for the portfolio (just as with individual assets)

Portfolio weight

- **Portfolio weight:** the percentage of a portfolio's total value that is invested in a particular asset

$$Portfolio\ weight\ = \frac{value\ in\ asset}{total\ value\ of\ portfolio}$$

- Suppose you have $50 in asset A and $150 in asset B → the total portfolio worth is $200
  - Percentage of your portfolio in asset A = $50/$200 = 25% (portfolio weight in asset A)
  - Percentage of your portfolio in asset B = $150/$200 = 75% (portfolio weight in asset B)

Note: the portfolio weights have to add up to 100% (or 1)

Expected Portfolio Return

- **Step 1:** Find the expected return of the portfolio by finding the ***portfolio return in each state:***

	R(state)		Portfolio return
	Stock L	Stock U	Weights = (50:50)
Recession	-20%	30%	.5(-.20) + .5(.30) = .05
Boom	70%	10%	.5(.70) + .5(.10) = .40

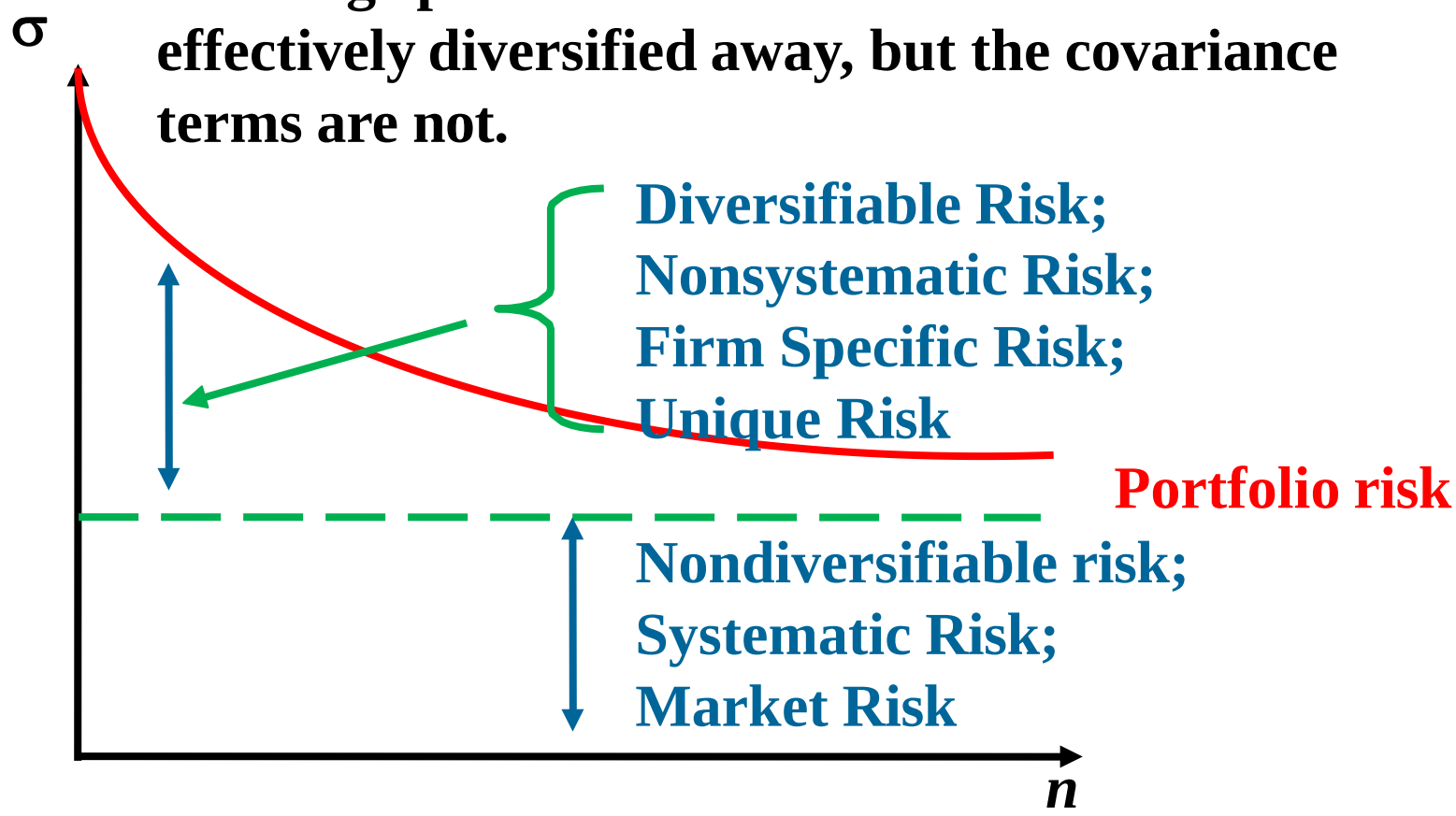
- **Step 2: Get expected portfolio return:**

$E(R_P) = \sum_s pr(s)R_p(s) =$ Probability of state * portfolio return in state

$= \Pr(recession) * .05 + \Pr(Boom) * .40 =$ .5 (.05) + .5(.40) = .225

Portfolio Risk and Number of Stocks

In a large portfolio the variance terms are effectively diversified away, but the covariance terms are not.



Total Risk, Systematic Risk, and Unsystematic Risk

Close to zero for S&P 500

Total Risk = Systematic Risk + Unsystematic Risk

- The **standard deviation** of returns is a measure of **total risk**

- For ***well-diversified*** *portfolios* (like the S&P 500), *unsystematic risk is very small*.
- Consequently, the **total risk** for a diversified portfolio is essentially equivalent to its **systematic risk**
- In large portfolios, all the firm-specific risk is diversified away and all we are left with is **market risk**

Systematic vs. Unsystematic risk

- **Systematic risk** → Common risk that most stocks are exposed to.

Since it is common, you cannot get rid of it! (cannot diversify away the risk)

- **Unsystematic risk** → Individual risk, or firm-specific risk that affects a few stocks

Since it affects only a few stocks, you can get rid of it by holding a portfolio of stocks (can diversify away the risk)


TECHNOLOGY
SOFTWARE - INFRASTRUCTURE
MSFT +0.38%
ORCL +1.43%
ADBE -0.42%
PANW -0.28%
SNPS +1.72%
GPN
FLT
CONSUMER ELECTRONICS
AAPL +1.04%
SEMICONDUCTORS
NVDA +0.75%
AVGO +2.36%
AMD +1.36%
QCOM +1.39%
INTC -6.55%
MU +3.14%
ADI +0.35%
TXN +0.11%
MCHP +0.53
ON
SOFTWARE - APPLICATIO
CRM +0.99%
INTU +0.64%
UBER +1.88%
CDNS +1.75%
ROP +0.22
NOW +0.76%
PTC
TYL
INFORMATION
ACN -0.38%
IBM +1.02%
FI +0.21
FIS
IT
BR
CTSH
CDW
SEMICOND
AMAT
LRCX +1.82%
KLAC +1.47
COMMU
CSCO -0.60%
MSI +0.29
HPE
COMPUT
ANET +3.11%
APH +1.46%
TEL
SCIENTIFIC
COMMUNICATION SERVICES
INTERNET CONTENT & INFORMATION
GOOG -0.21%
META +1.91%
TELECOM SERVICES
TMUS 0.00%
VZ +0.42%
CMCSA -0.57%
T -0.03%
ENTERTAINMENT
NFLX +1.97%
DIS -0.35%
CONSUMER CYCLICAL
INTERNET RETAIL
AMZN +1.05%
AUTO MANUFAC
TSLA +0.91%
F
GM
HOME IMPROVE
HD -0.34%
LOW -0.85
RESTAURANTS
SBUX +0.55%
MCD -0.14%
CMG -0.50
YUM -0.14
TRAVEL SE
BKNG +2.08
ABNB +0.45
RCL
SPECIALT
ORLY +0.61
TSCO
ULTA
AZO -0.15
BBY
APPAREL
TJX -0.63
LULU -0.18
ROST -0.47
FOOTW
NKE -0.06%
RESIDE
DHI
LEN
LODGIN
MAR
HLT
RESOR
PACKA
CONSUMER DEFENSIV
DISCOUNT STORES
WMT +0.15%
COST -0.96%
TGT -0.02%
DG
HOUSEHOLD
PG -2.53%
CL
EL
BEVERAGES -
KO +0.22%
PEP -0.68%
KDP
TOBA
PM -0.47%
MO -0.89%
PACKAGE
KHC
K
GIS
CONFECTI
MDLZ
BEVER
FARM
KR
SYY
HEALTHCARE
DRUG MANUFACTURERS - GENERAL
LLY +1.68%
JNJ -1.30%
ABBV -1.41%
MRK -0.08%
AMGN -0.26%
BMY -1.16
PFE -0.40%
GILD -0.65%
BIIB
HEALTHCARE PLANS
UNH +0.93%
ELV +0.80%
CI +0.23
HUM
CVS +0.79
CNC
DIAGNOSTICS & RESEARCH
TMO +1.03%
DHR +0.27%
IQV
IDXX +1.68
A
LH
MTD
MEDICAL INSTR
ISRG +1.16%
BDX +0.90%
MEDICAL
MCK +1.07
MEDICAL
HCA
MEDICAL DEVICES
ABT -0.13%
SYK +0.88%
BSX +1.27%
EW
MDT +0.20%
STE
BIOTECHNOLO
REGN +0.46%
VRTX +0.50%
ZTS +0.14%
INDUSTRIALS
SPECIALTY INDUSTR
GE +5.84%
ETN +2.13%
ITW +0.16
EMR +0.42
CMI -0.89
IR
ROK
XYL
AME
PH +1.87
OTIS
IEX
AEROSPACE &
RTX -1.20%
BA -0.21%
LMT -0.81%
NOC -1.62
TDG
GD -0.39%
LHX
HWM
FARM & HEAV
CAT +1.71%
DE +0.14%
PCAR
BUILDING
TT
JCI
CARR
CONGLO
HON -0.19%
RAILROADS
UNP +0.23%
CSX
NSC +0.90
STAFFING
ADP -0.73%
SPECI
INDUS
LUV
J
URI
ODFL
WASTE M
WM +0.07%
RSG
INTEGRATED F
UPS +1.29%
FDX
REAL ESTATE
REIT - SPECIALTY
AMT -0.70
EQIX +0.36%
DLR
WY
CCI
REIT - IN
PLD +0.39
PSA
EXR
SPG
O
WELL +0.20
ENERGY
OIL & GAS INTEGRATED
XOM +0.17%
CVX +0.60%
OIL & GAS E&
COP +0.45%
EOG +0.25
OIL & GAS RE
MPC +2.32
PSX +1.48
PXD +0.08
HES +0.47
OIL &
SLB +0.23%
OXY +0.71
KMI
UTILITIES
UTILITIES - REGUL
NEE -0.47%
SO -0.28
DUK -0.27
SRE
CEG
AEP -0.61
XEL
EIX
D
ES
FE
EXC
ED
BASIC MATERIALS
SPECIALTY C
LIN +0.49%
SHW +0.35
APD +0.06
NUE
FCX
LYB
IFF
ECL +0.21
DD
FINANCIAL
CREDIT SERVICES
V +0.13%
MA +0.44%
AXP +0.62%
PYPL +0.71
DFS
BANKS - DIVERSIFI
JPM -0.32%
BAC +0.42%
WFC -0.30%
C
INSURANCE - DIVERSIFI
BRK-B +0.32%
FINANCIAL DATA & STO
SPGI 0.00%
CME -0.70%
MCO +0.57
ICE
ASSET MANAGE
BX +0.14%
BK
BLK +0.19%
INSURANC
PGR +0.17%
CB -0.50
TRV
ALL
L
BANKS - REGIO
USB
TFC
PNC
RF
INSURANCE BR
MMC +0.28
AJG
CAPITAL MARK
MS +0.42%
SCHW +0.11
GS
RJF
MET +0.36
AFL +0.15
PRU +0.43
EG

- Stock performance on Nov 14, 2023

Systematic Risk Principle

- **There is reward for bearing risk**
- Because you don't have to bear risk!
  - You can always just save your money and earn interest, or buy T-bills (which we refer to as risk-free)
  - You invest even if there is more risk, for the opportunity of high returns

- **There is no reward for bearing risk unnecessarily**

Some risk can be eliminated *for free* via diversification, you will not be compensated for putting all your eggs in one basket (or your unsound investment choice)

→ Unsystematic risk can be diversified away!

- The expected return on a risky asset depends **only** on that asset's **systematic risk**

Measuring Systematic Risk

- **Why do we need to measure systematic risk?**

As investors, we want to be correctly (fairly) compensated for the risk we are taking

- **How do we measure systematic risk?**
- The risk-premium on individual securities is a function of the individual security's contribution to the risk of the **market portfolio**
  - This is a well-diversified portfolio that everyone could hold
  - The only risk that matters is systematic risk
  - We call this contribution to the market risk ***β***

Beta coefficient β

- **Beta coefficient :** the amount of <u>systematic risk</u> present in a particular risky asset relative to that in an average risky asset (relative to the market portfolio)

- Measuring beta: beta is measured in units of market risk

$$\beta_A = \frac{Cov(R_A, R_M)}{\sigma_M^2}$$

- **Covariance** is a statistical measure of how the ***deviations*** of <u>two</u> variables move relative to each other.
- ***β* is a scaled covariance** (scaled by market variance $\boldsymbol{\sigma_M^2}$)
  - Therefore, an individual security's risk-premium is a function of the covariance of returns with the assets that make up the market portfolio

What Does Beta Tell Us?

- $\boldsymbol{\beta = 1}$ implies the asset has the **same systematic risk** as the overall market
- $\boldsymbol{\beta > 1}$ implies the asset has **more systematic risk** than the overall market

  Asset goes up or down *more* than the overall market
- $\boldsymbol{\beta < 1}$ implies the asset has **less systematic risk** than the overall market

  Asset goes up or down *less* than the overall market

- Always ask: is this asset more sensitive than average to economic conditions?

  If yes, $\beta > 1$

  If no, $\beta < 1$

Zero and Negative Betas

- $\boldsymbol{\beta < 0}$ is really valuable because it pays off when almost everything else (the diversified portfolio) goes down
  - $\beta < 0$ is like insurance
  - These are quite rare; to satisfy demand for these assets, we create them

  Short positions & put options

- $\boldsymbol{\beta = 0}$ implies the asset has **no systematic risk**
  - Asset is riskless; it always pays what you expect it to
  - Thus, the *risk-free asset* (R_F) has a beta of zero

  T-Bills and T-Bonds

Total vs. Systematic Risk

- Consider the following information:

	Standard Deviation	Beta
Security P	20%	1.25
Security L	30%	0.95

- Which security has more total risk?

  Security L

- Which security has more systematic risk?

  Security P

- Which security should have the higher expected return?

  Security P

More about Beta

- Many sites provide corporate betas
  - Yahoo Finance provides beta, plus a lot of other information under its Statistics link

- In Yahoo Finance
  - Enter a ticker symbol and get a basic quote
  - Click on Statistics

Portfolio Betas

- Consider the following four securities:

Security	Weight	Beta
C	.133	2.685
KO	.2	0.195
INTC	.267	2.161
BP	.4	2.434

What is the portfolio beta?

.133(2.685) + .2(.195) + .267(2.161) + .4(2.434)
= 1.947

Which security has the highest systematic risk?

C

Which security has the lowest systematic risk?

KO

Is the systematic risk of the portfolio more or less than the market?

more

CAPM Model Beta and the Risk Premium

- Remember that the risk-premium is the ***extra*** return you anticipate receiving for bearing risk
  - If we let $\mathbf{R_F}$ be the risk-free rate: **risk premium = $\mathbf{E[R_i] - R_F}$**
- The higher the ß, the greater the risk premium should be

- **Is there a way for us to compare assets** based on their expected return, taking into account how risky they are?
  - YES! The trick is to focus on the **reward-to-risk ratio**:

$$\frac{\textbf{Reward}}{\textbf{Risk}} = \frac{\textbf{Risk Premium}}{\textbf{Risk}} = \frac{E[R_i] - R_F}{\beta_i}$$

Market Equilibrium

- The fundamental conclusion is that in equilibrium **the ratio of risk-premium to beta is the SAME for every asset**.
- For example, for two assets A and B, equilibrium requires:

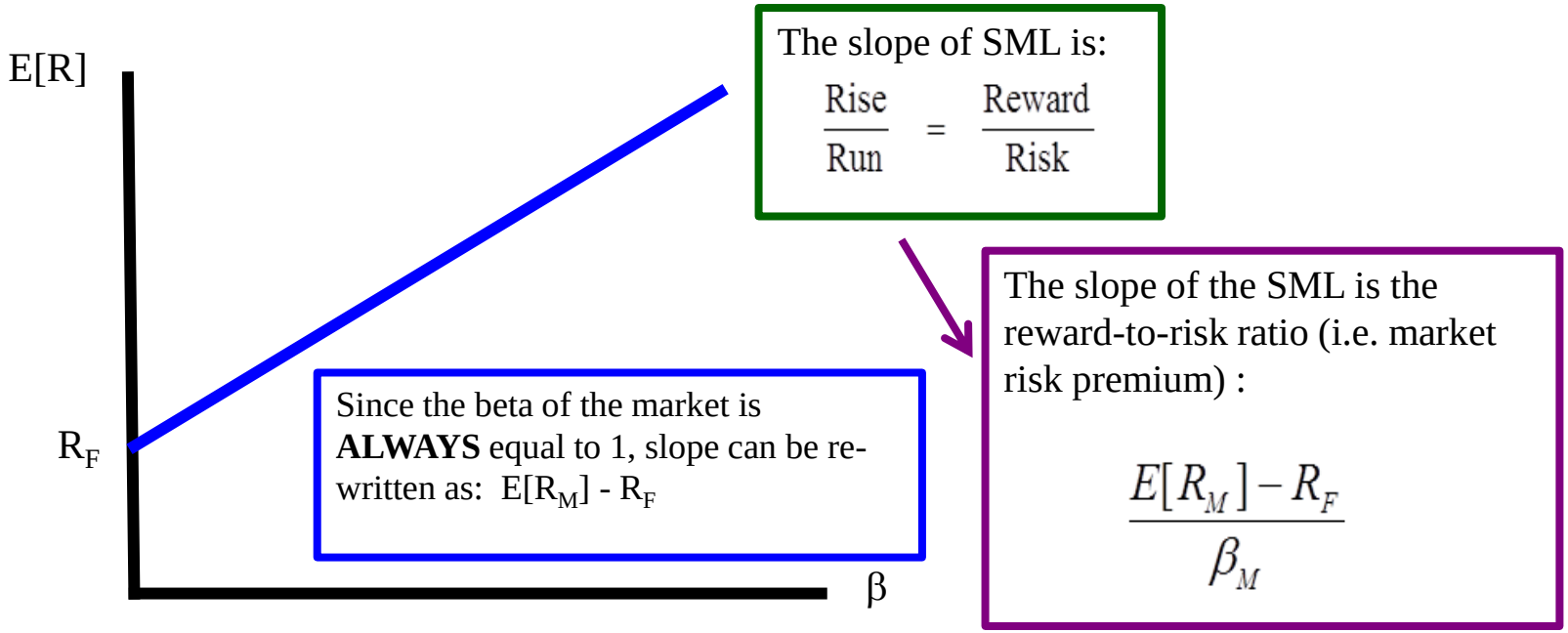
$$\frac{E[R_A]-R_F}{\beta_A} = \frac{E[R_B]-R_F}{\beta_B}$$

- One available asset is the **market portfolio**; this implies:

$$\frac{E[R_A]-R_F}{\beta_A} = \frac{E[R_B]-R_F}{\beta_B} = \frac{E[R_M]-R_F}{\beta_M}$$

The Security Market Line

- The **Security Market Line (SML)** illustrates the relationship between an individual security's expected return and its risk.



The SML Equation

- Re-arranging, we can find **the equilibrium condition** that must hold for any asset *i* from slope (price of risk) relation:

$$\frac{E[R_i] - R_F}{\beta_i} = E[R_M] - R_F$$

Reward/risk for asset i equals reward/risk for the market

- This yields **equation of SML**:

$$\mathbf{E[R_i] = R_F + \beta_i\{E[R_M] - R_F\}}$$

- This is the famous **Capital Asset Pricing Model (CAPM)**
- The slope of the SML = $E[R_M] - R_F$ = the ***market price of risk***

The Capital Asset Pricing Model (CAPM)

- The CAPM defines the relationship between risk and return

$$E[R_i] = R_F + \beta_i\{E[R_M] - R_F\}$$

- If we **know** an asset's systematic risk (β_i), we can use the CAPM to **determine** its expected return.

Discussion:

- Note that the CAPM is called a *pricing* equation, but the answer from the equation is an **interest rate**:
  - $\mathbf{E[R_i] = R_F + \beta_i\{E[R_M] - R_F\}}$

- Why this is an *Asset Pricing* Model?

This is a *Pricing* Model?

- The CAPM tells us the correct **discount rate** to use in evaluating expected cash flows
  - Recall the value of anything in finance is the PV of all expected future cash flows.
  - Therefore, *if you know the right discount rate, you know the right price*

Summary: Factors Affecting Expected Returns

$$E[R_i] = R_F + \beta_i\{E[R_M] - R_F\}$$

- Pure time value of money

  Measured by the risk-free rate: R_F

- Reward for bearing systematic risk (price per unit of risk)

  Measured by the market risk premium: $E[R_M] - R_F$

- Amount of systematic risk (# of units of risk)

  Measured by beta: β_i

Sample CAPM Calculations: Stock X and Stock Y

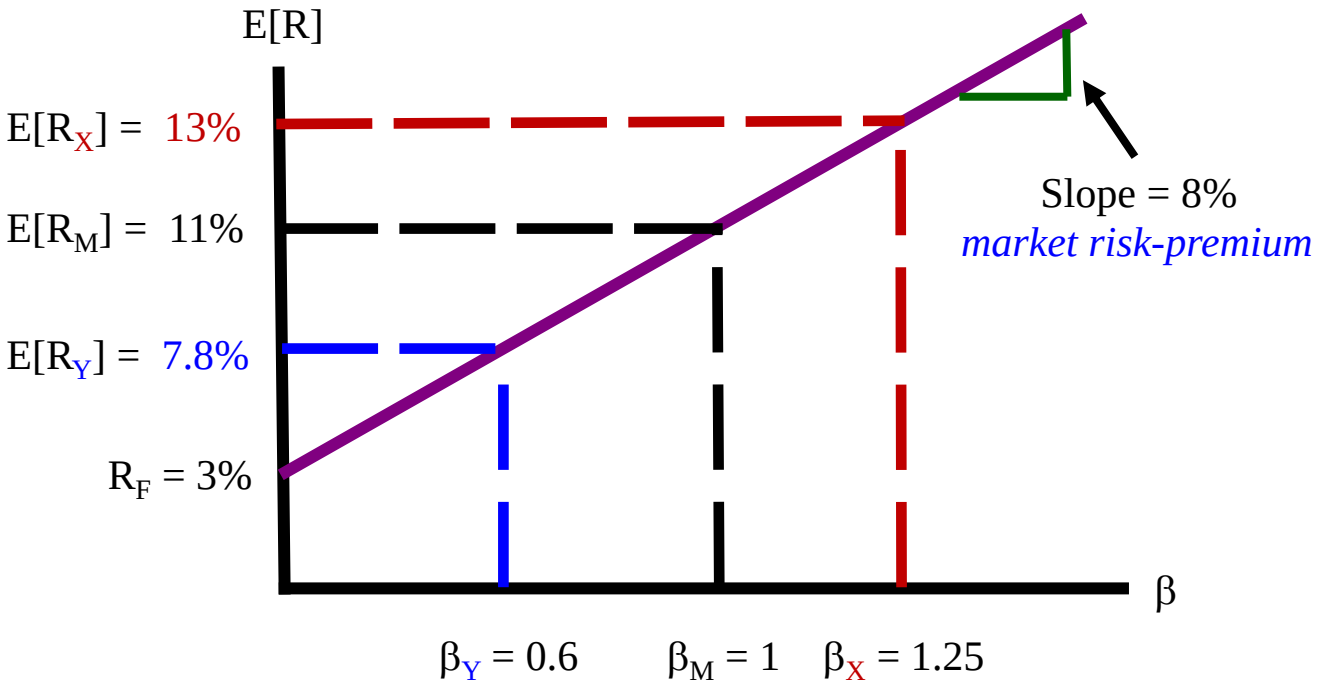
- We expect the following rates of return: $R_F = 3\%$ $E[R_M] = 11\%$
- We estimate beta for each stock: $\beta_X = \mathbf{1.25}$ $\beta_Y = \mathbf{.6}$
- $\beta_X = \mathbf{1.25}$ (units of market risk):

$$E[R_X] = .03 + \mathbf{1.25}(.11 - .03) = .13 = 13\%$$

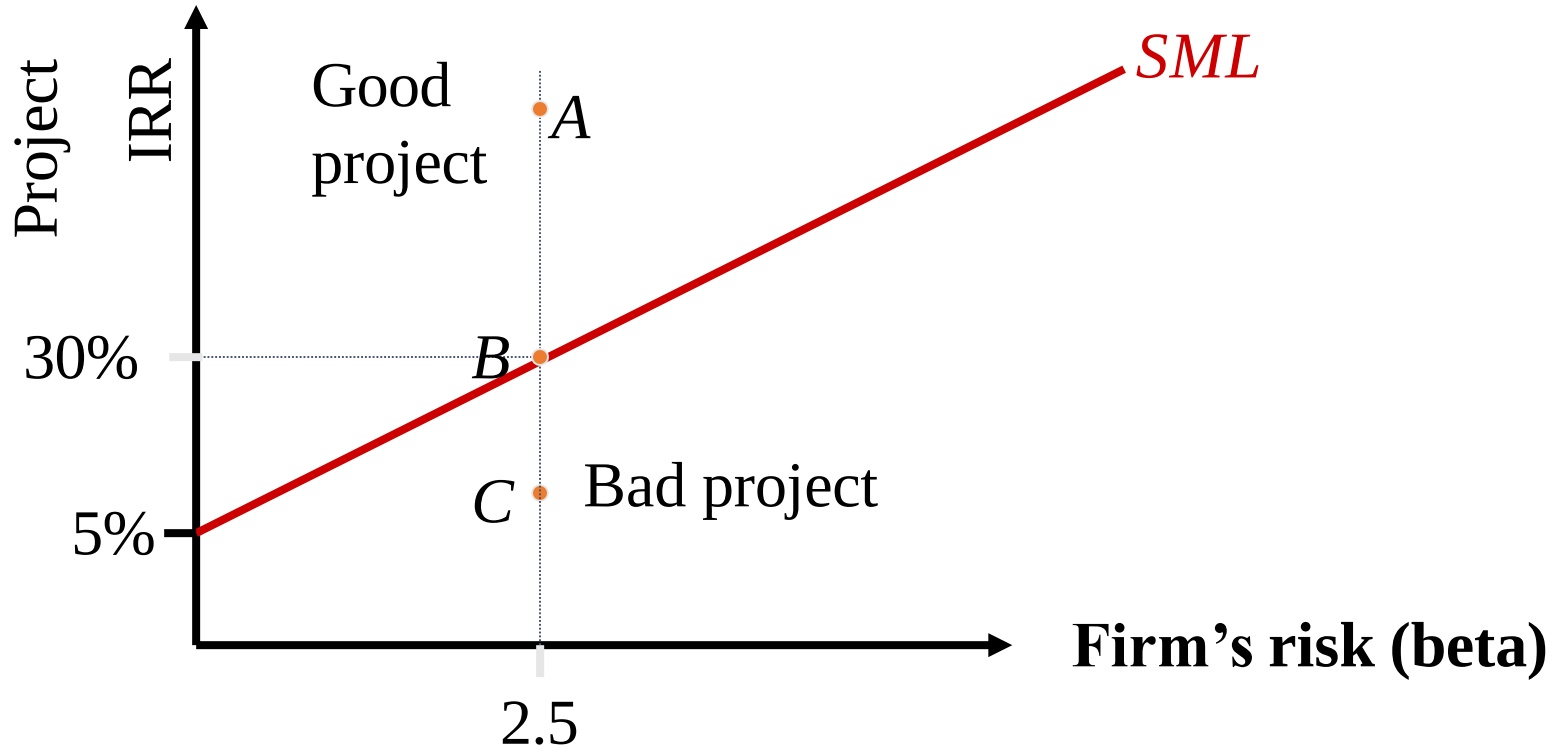
- $\beta_Y = \mathbf{0.60}$ (units of market risk):

$$E[R_Y] = .03 + \mathbf{0.6}(.11 - .03) = .078 = 7.8\%$$

Graph of Sample Calculations



Using the SML



- An all-equity firm should accept projects whose IRRs exceed the cost of equity capital and reject projects whose IRRs fall short of the cost of capital.

How to Find the Risk-Free Rate & Market Risk Premium

- Treasury securities are close proxies for the risk-free rate. https://www.wsj.com/
- The CAPM is a period model. The risk-free rate is:
  - One year treasury bill rates or
  - U.S treasury security whose "maturity" matches the maturity of a particular project
  - Recently, more popularly, the rate of 10-year treasury bond.
- Market premium
  - Use historical data. In US, it is within the range of 5%-6.5%.

Using an Industry Beta for a Firm

- It is frequently argued that one can **better** estimate a firm's beta by involving the whole industry.
  - If you believe that the operations of the firm are **similar** to the operations of the rest of the industry, you should use the industry beta.
  - If you believe that the operations of the firm are **fundamentally different** from the operations of the rest of the industry, you should use the firm's beta.
- Do not forget about adjustments for financial leverage.
  - Comparing two otherwise equivalent firms, the beta of the common stock of a levered firm is greater than the beta of the common stock of an unlevered firm.

Cost of Capital for a Firm

- The cost of capital includes
  - The cost of equity (common stock)
  - The cost of debt
  - The cost of preferred stock

  - WACC: The **weighted average cost of capital** (a blending of stock, debt and preferred stock)

Calculate the Cost of Debt

- Interest rate required on new debt issuance (i.e., **yield to maturity** on outstanding debt), i.e., R_B.

- The final cost of debt is adjusted for the tax deductibility of interest expense:
  - *Cost of debt* = $R_B \times (1 - T_C)$

  Where T_C is the corporate tax rate.

Calculate the Cost of Preferred Stock

- Preferred stock is a perpetuity, so its price is equal to the coupon paid divided by the current required return.
- Rearranging, the cost of preferred stock is:
  - R_P = Coupon / Price

The Weighted Average Cost of Capital (WACC): A Blending of Stock and Debt as Capital

- The Weighted Average Cost of Capital (WACC) is given by:

$$R_{WACC} = \frac{\text{Equity}}{\text{Equity + Debt}} \times R_{Equity} + \frac{\text{Debt}}{\text{Equity + Debt}} \times R_{Debt} \times (1 - T_C)$$

$$R_{WACC} = \frac{S}{S+B} \times R_S + \frac{B}{S+B} \times R_B \times (1 - T_C)$$

  - Because interest expense is tax-deductible, we multiply the last term by $\mathbf{(1 - T_C)}$.

WACC Example: International Paper

- First, we estimate the cost of equity and the cost of debt.
  - We estimate an equity beta to estimate the cost of equity.
  - We can often estimate the cost of debt by observing the YTM of the firm's debt.
- Second, we determine the WACC by **weighting** these two costs appropriately.

- The industry average beta is 0.82, the risk free rate is 2%, and the market risk premium is 7%.
- Thus, the cost of equity capital is:

$$R_S = R_F + \beta_i \times (R_M - R_F)$$

$$= 2\% + 0.82 \times 7\%$$

$$= 7.74\%$$

- The yield on the company's debt is 5%, and the firm has a 35% marginal tax rate.
- The debt to value ratio is 32%

$$R_{WACC} = \frac{S}{S+B} \times R_S + \frac{B}{S+B} \times R_B \times (1 - T_C)$$

$$= 0.68 \times 7.74\% + 0.32 \times 5\% \times (1 - 0.35)$$

$$= 6.30\%$$

- 6.30% is International's cost of capital (i.e., WACC).
- It should be used to discount any project where one believes that the project's risk is equal to the risk of the firm as a whole and the project has the same leverage as the firm as a whole.

Interest Rate and Economy Prediction

US Federal Reserve cuts interest rates by quarter point and signals potential for more

- Central bankers vote to lower target range for benchmark rate to 2 per cent to 2.25 per cent
- Reduction is first since 2008 financial crisis, and may be followed by another cut this year to insulate US economic expansion from slowing global growth

Bloomberg

Published: 2:58am, 1 Aug, 2019

The Fed's rate cuts at 3.7% unemployment are almost unprecedented

Quick Quiz

- How do we determine the cost of equity capital?
- How can we estimate a firm or project beta?
- How does leverage affect beta?
- How do we determine the weighted average cost of capital?

Michigan Technological University

Chapter 14

Efficient Capital Markets and Behavioral Challenges

Xin Li, Ph.D.

Key Concepts and Skills

- Understand the importance of capital market efficiency
- Be able to define the forms of efficiency
- Know the various empirical tests of market efficiency
- Understand the implications of efficiency for corporate finance managers

Why Does Market Efficiency Matter?

- **Link: Distribution of countries with largest stock markets worldwide by share of total world equity market value.**

14.2 A Description of Efficient Capital Markets

- An *efficient* capital market is one in which stock prices **fully** reflect **available** information.
- The EMH has implications for investors and firms.
  - Since information is reflected in security prices quickly, knowing information ***when it is released*** does an investor little good.
  - Firms should expect to receive the ***fair*** value for securities that they sell. Firms cannot profit from fooling investors in an efficient market.

14.3 The Different Types of Efficiency

- Weak Form
  - Security prices reflect all historical information
- Semistrong Form
  - Security prices reflect all publicly available information
- Strong Form
  - Security prices reflect all information — public and private

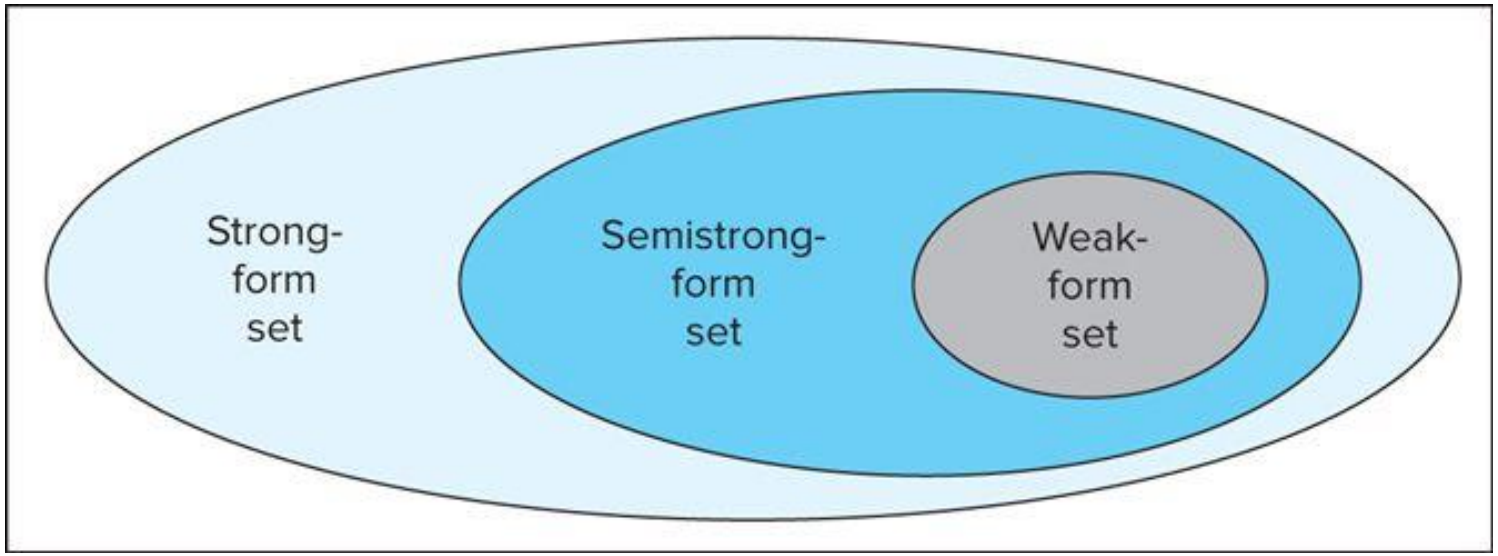
Discussion:

- If the weak form of the efficient market hypothesis is valid, must the strong form also hold? Conversely, does strong-form efficiency imply weak-form efficiency?

If the weak form of the efficient market hypothesis is valid, must the strong form also hold? Conversely, does strong-form efficiency imply weak-form efficiency?

Answer:

Strong-form EMH ⇒ Semistrong-form EMH ⇒ Weak-form EMH



- Link: What form of market efficiency does Martha Stewart inside trading case (2001) imply?
- "…Authorities said she used inside information of an FDA ruling against a key ImClone drug to sell shares ahead of the negative news …"

Martha Stewart

NEXT

PHOTO: DON EMMERT/AFP/GETTY IMAGES

Martha Stewart outside a courthouse (Getty)

The world's most famous homemaker, known for her ubiquitous brand that includes a TV show on PBS, magazine and line of home goods, was convicted in 2004 of conspiracy and obstruction of justice related to an investigation into her selling of shares of drugmaker ImClone Systems. Authorities said she used inside information of an FDA ruling against a key ImClone drug to sell shares ahead of the negative news and made false statements about it when asked. She served a five-month prison sentence, during which she famously lost in an annual Christmas decorating contest.

Weak Form Market Efficiency

- Security prices reflect all information found in past prices and volume.
- If the weak form of market efficiency holds, then **technical analysis** is of **no value**.
- Since stock prices only respond to ***new*** information, which by definition arrives randomly, stock prices are said to follow a random walk.

Semistrong Form Market Efficiency

- Security prices reflect all publicly available information.

- Publicly available information includes:
  - Historical price and volume information
  - **Published accounting statements**
  - **Information found in annual reports**

Strong Form Market Efficiency

- Security prices reflect all information—public and private.
- Strong form efficiency **incorporates** weak and semistrong form efficiency.

- Strong form efficiency says that *anything* pertinent to the stock and known to **at least one investor** is already incorporated into the security's price.

What the EMH Does and Does NOT Say

- Investors can throw darts to select stocks.
  - This is almost, but not quite, true.
  - An investor must still decide how risky a portfolio he wants based on risk aversion and expected return.

- Prices are random or uncaused.
  - Prices reflect information.
  - The price CHANGE is driven by *new* information, which by definition arrives randomly.
  - Therefore, financial managers **cannot** "time" stock and bond sales.

Efficient Market Hypothesis Video

14.8 Implications for Corporate Finance

- If information is reflected in security prices quickly, investors should only expect to obtain a normal rate of return.
  - Awareness of information when it is released does an investor ***little*** good.
  - **The price adjusts before the investor has time to act on it.**
- Firms should expect to receive the fair value for securities that they sell.
  - *Fair* means that the **price** they receive for the securities they issue **is the present value**.
  - Thus, valuable financing opportunities that arise from fooling investors are unavailable in efficient markets.

- The EMH has important implications for corporate finance:
  1. The price of a company's stock **cannot** be affected by a change in accounting.
  2. Financial managers **cannot "time"** issues of stocks and bonds using publicly available information.
  3. A firm can sell as many shares of stocks or bonds as it desires **without depressing prices**.
- There is **conflicting** empirical evidence on all three points.

Quick Quiz

- Define capital market efficiency.
- What are the three forms of efficiency?
- What does the evidence say regarding the efficiency of capital markets?
- What are the implications for corporate finance managers?