

Lecture 15: Final Topics on CAPM

- Final topics on estimating and using beta:
 - the market risk premium
 - putting it all together
- Final topics on CAPM:
 - Examples of firm and market risk
 - Shorting Stocks and other assets
- Reading:
 - Same as for Lecture 14

The Market Risk Premium

(BM pp. 156 – 160)

- We now have an estimate of 1.24 for β_{IBM} .
- To calculate the discount rate, we need the market **risk premium**, $(r_m - r_f)$.
 - Historically, from 1926 – 1997, stocks returned an average of **9.2%** per year more than T-Bills.
 - Up to mid-1990's, the average was about **8.5%**.
 - Could recent high returns indicate a **drop** in the risk premium?

Putting it all together

- Suppose we decide on $(r_m - r_f) = 8.5\%$.
- To calculate the discount rate, we now plug numbers into the CAPM:

$$\begin{aligned}r_{\text{IBM}} &= r_f + \beta_{\text{IBM}} (r_m - r_f) \\ &= 5.8\% + 1.24 \times 8.5\% \\ &= 16.34\%\end{aligned}$$

Risk free rate appropriate
to period, e.g. 5yr
Treasury rate

- **Note:** Do sensitivity analysis!

Risk as Evaluated In the CAPM: Two Types of Garbage

- Risk can be thought of as garbage:
 - People are paid to take it away, i.e. to hold it.
- Here we have two types of garbage.
 - Type 1 (Biodegradable): Costs nothing to eliminate.
 - Type 2 (Toxic Chemicals): Cannot be eliminated.
- Question: What are the equilibrium prices for the removal of type 1 and type 2 garbage? Answer:
 - $P_1 = 0$ (type 1 garbage costs nothing to remove)
 - $P_2 > 0$ (type 2 garbage is costly to remove)

Two Types of Risk

- **Type 1 (Firm specific, or idiosyncratic, risk):**
 - Diversification removes firm specific risk from portfolios at no cost.
 - No extra return is earned by holding firm specific risk.
- **Type 2 (Market risk):**
 - Cannot be eliminated from all portfolios.
 - Thus investors must be paid extra return to hold risk
 - How much? CAPM:

$$(r_i - r_f) = \beta_i (r_m - r_f)$$

Example: Firm-specific vs. Market risk (reader, p. 114)

- You are to purchase 100 shares of stock. All stocks sell for the same price, so pick any firms.
- Firm-specific risk: Separate coin flip **for each firm:**
 - If firm gets heads, it's worth 1;
 - if firm gets tails, it's worth 0.
 - What benefit do you expect from diversification?
- Market risk: **Single coin flip for all firms:**
 - If heads, *every share* in the economy is worth 1; if tails, 0.
 - So this example has market risk, but no firm-specific risk
 - What benefits do you expect from diversification?


Negative Portfolio Weights

- In all our formulae, there are **no** restrictions on the sign or size of any of the w_i .
 - Except, of course, that they must add up to one.
- Negative weight on risk-free asset = **borrowing**.
 - If you use the borrowed funds to purchase additional stock (i.e. more value than your wealth), this is called buying the stock **on margin**.
- A negative weight on a *risky* asset is called **shorting** the security.

Example: Shorting a Security

- On January 1, 1995 you short 100 shares of HAL Inc. What have you done?
- That morning you call your broker, find that HAL Inc. is selling for \$50 a share, and place your order.
- Since you do not own the stock, the broker must **lend** you 100 shares of HAL Inc.
- You sell the stock and collect \$5,000.
 - Selling borrowed stock is not like selling the car you borrowed from a friend...
 - You must repurchase the stock at a later date so that you can return the borrowed shares.

Shorting example: Transaction details

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- With the \$5,000, you can purchase securities.
 - E.g. government bonds, yielding 10% for the year.
 - You must leave these with the broker as collateral (to guarantee that you will return the stock at some future date).
 - If the stock price rises, broker will request additional collateral
 - What if the stock pays a dividend of \$1/share on Dec 31?
 - The original owner wants the dividend.
 - So does the new owner (to whom you just sold the stock)
 - The firm only pays the dividend once....
 - You must send broker a \$100 check for the amount of the dividend

Unwinding the Short Position

- On January 1, 1996 you "unwind" the position:
 - First, you sell the bonds, say for \$5,500 in cash.
 - Second, you repurchase the stock in the market. If HAL share price is \$51, the 100 shares cost you \$5,100.
 - Third, you return the shares to the broker.
- The net result was a profit of $5,500 - 5,100 - 100 = \$300$
 - You made a profit because the return on the stock was lower than the return on the bonds.
 - Going short is a “bet against” a particular stock (or at least a bet it will not go rise by much).


Shorting as a negative investment

- Compare the cash flows from shorting HAL vs. those from buying (“going **long**”) 100 shares:

	Initial purchase/sale	Dividend	Unwinding
Buying 100 shares	– \$5,000	+\$100	+\$5,100
Shorting 100 shares	+\$5,000	– \$100	– \$5,100

- Shorting 100 shares is exactly equivalent to buying “–100” shares.

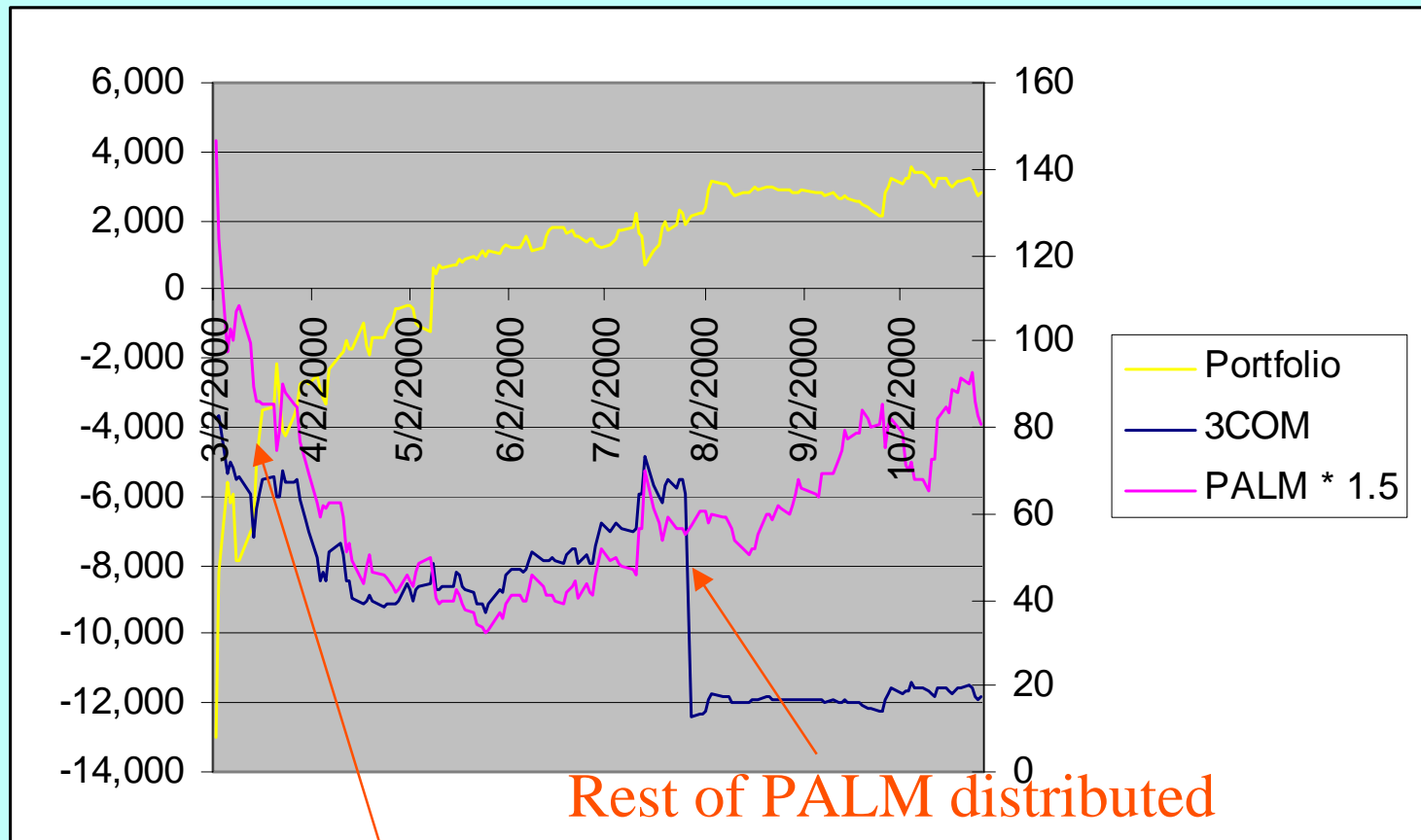
Example 2: Palm vs. 3COM

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- At the beginning of March, 2000, 3COM (symbol COMS) spun off part of Palm, Inc. (symbol PALM), retaining the rest.
 - On July 27, 2000, 3COM distributed the remaining shares in PALM to its shareholders.
 - For each 3COM share owned, you received 1.483 shares of PALM.

Palm vs. 3COM

- On the morning of March 29, I was quoted the following prices by Charles Schwab:
 - COMS: $\$67 \frac{3}{16} = \67.19
 - PALM: $\$55 \frac{3}{16} = \55.19
- Take the price of PALM, and multiply it by 1.5:
 - $1.5 \times 55.19 = \$82.78$
- What's odd?
 - This is \$15.59 more than the price of one 3COM share
 - A 3COM share is equivalent to
 - » 1.5 PALM shares
 - » PLUS the rest of 3COM's operations
- What to do about it?
 - **ARBITRAGE**: Buy 3COM; short (1.5x as many) PALM.

Palm vs. 3COM



I tried to form portfolio here

Rest of PALM distributed