VALUATION

Goal: We wish to value some object.

- Project
- Division of a Firm
- Entire Firm
- Equity of the Firm

Inputs: Cash Flows

Cost of Capital (Discount Rate)

Multiples

WHAT DO WE DISCOUNT?

Cash Flows (Not Earnings):

For project, division, and entire firm:

Operating Earnings

+ Add Back Non-Cash Items (e.g. depreciation)

- Capital Expenditures
(including working capital)

= Operating Cash Flow

For Equity Valuation

A) Value Firm - Value Debt

B) Equity Cash Flow =

Operating Cash Flow - Interest Expense

Insert page 23 of “Get Off My Case” here.

Opportunity Cost of Capital = r (feel free to use 10% but have a better response than “r is always 10% in Finance I”).

$$Value_0 = \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_4}{(1+r)^4} + \ldots$$

Often have cash flow forecasts for a few years (say 1 through 5)

$$Value_0 = \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_4}{(1+r)^4} + \frac{CF_5}{(1+r)^5} + \frac{Value_5}{(1+r)^5}$$

Where$Value_5$ is the value at time five of the remaining cash flows from 6 on. This is often referred to as the "Terminal Value."

How do we estimate $Value_5$?

Get explicit cash flow forecasts for periods 6 and later.

Use assumptions about average growth in perpetuity formulas.

Use valuation multiples.

Given the forecasts of CF_1 through CF_5 we can forecast the average growth rate in cash flows, g. $CF_6 = CF_5 \times (1+g)$.

Given g and CF_6, we can use the value of a growing perpetuity:

$$Value_5 = \frac{CF_6}{r - g}$$

g does not have to be positive (e.g., a declining industry might have negative g).

Without explicit initial cash flow forecasts the perpetuity formulas can be used to estimate current value directly, having just an estimate of the initial the cash flow:

$$Value_0 = \frac{CF_1}{r - g}$$

Example: CF_1 = \$10 million, r = 10%, g=5%. Value of future cash flows = \$200 million. If the initial cost of the investment is \$150 million the Net Present Value is \$200 million - \$150 million = \$50 million.

Example: Declining industry g = -4% with CF_1 = $10 million and r = 10%.

$$Value_0 = \frac{\$10 million}{0.10 - (-0.04)} = \$71.4 million$$

Value can be estimated using valuation ratios, like price/earnings (P/E) ratios, price to cash flow ratios, or price to sales ratios. The most appropriate ratio is generally application specific. For example P/E ratios might not be very useful for start-up firms/industries with no earnings or negative earnings.

Let's say we find that similar firms to the one we are valuing are selling for a price to cash flow ratio of 20. If the cash flow of the firm is $10 million, the implied value is $200 million.

Discounted Cash Flow (DCF) versus Multiples.

It is often claimed that one approach makes fewer assumptions than another. It is not really true.

DCF: Requires: assumptions about r and g.
Implies: a certain multiple for a given r and g.

Multiple: Requires: assumptions that the comparable used for the multiple has the same expected growth, g, and the same risk (as reflected in r) as the entity being valued.
Implies: a set of combinations of r and g.

Example: A cash flow multiple of 20 is consistent with any r and g such that r-g = 5%, such as r = 10%, g = 5% or r = 0%, g = -5%.

Why might r be something other than 10%?

r reflects: a) the time value of money which is the market required compensation for tying up our money, and
b) compensation for bearing risk

In markets where the investors can diversify their portfolio, we split total risk (e.g., standard deviation) into two components:

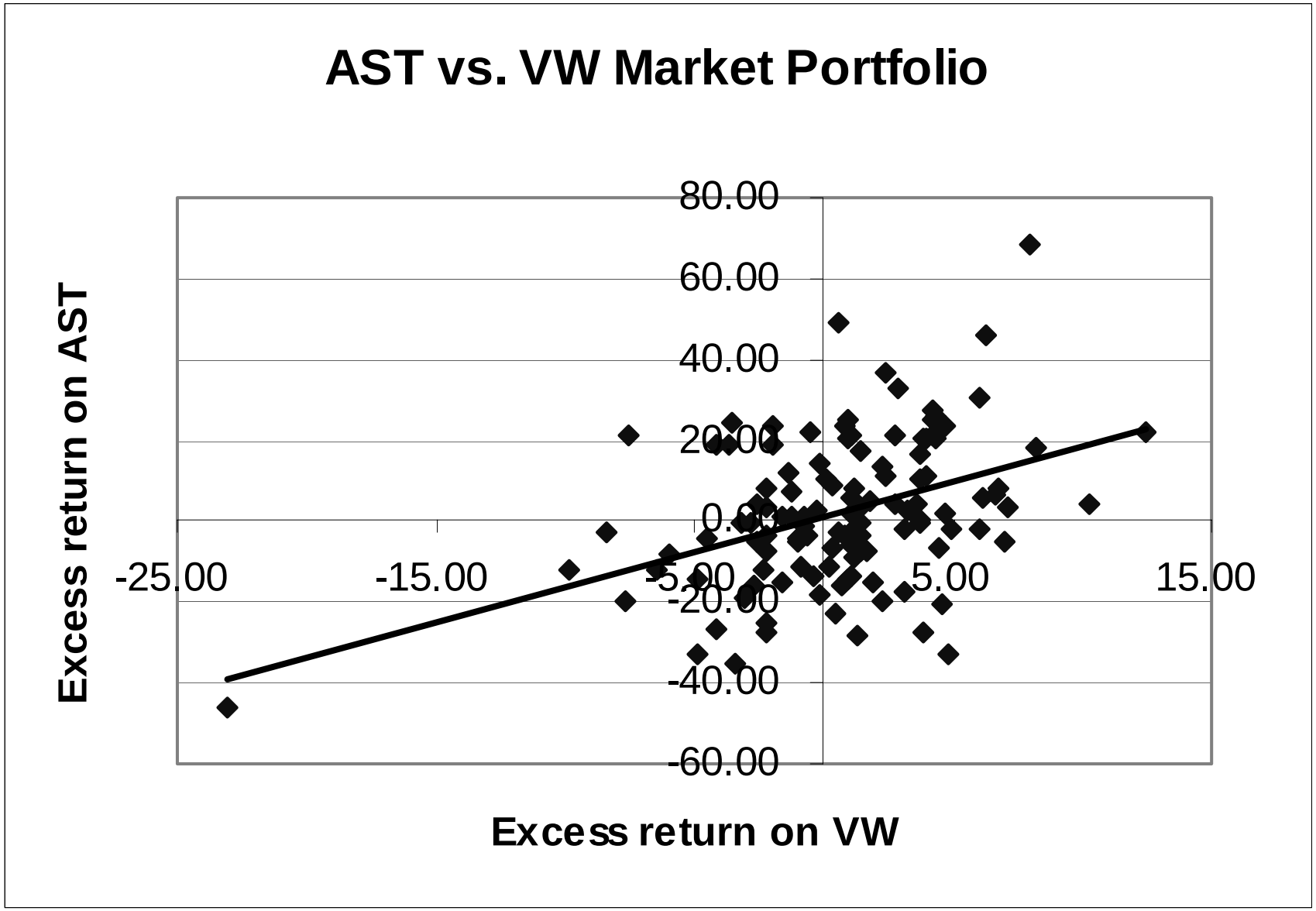
Systematic or Undiversifiable Risk
Idiosyncratic or Diversifiable Risk

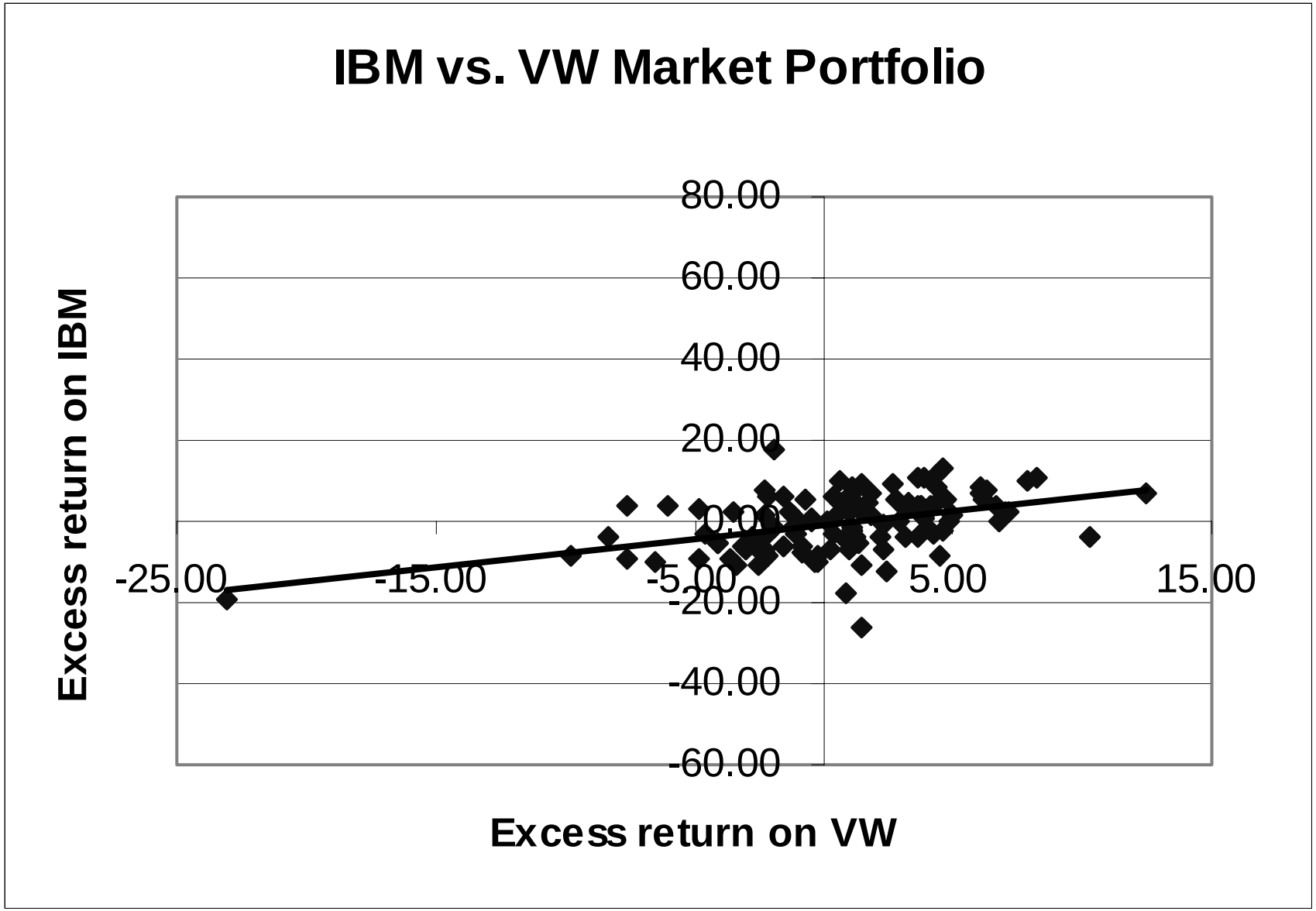
Investors can easily avoid the second type of risk through diversification. Investors can't easily avoid the first since almost all investments have exposure to systematic risk.

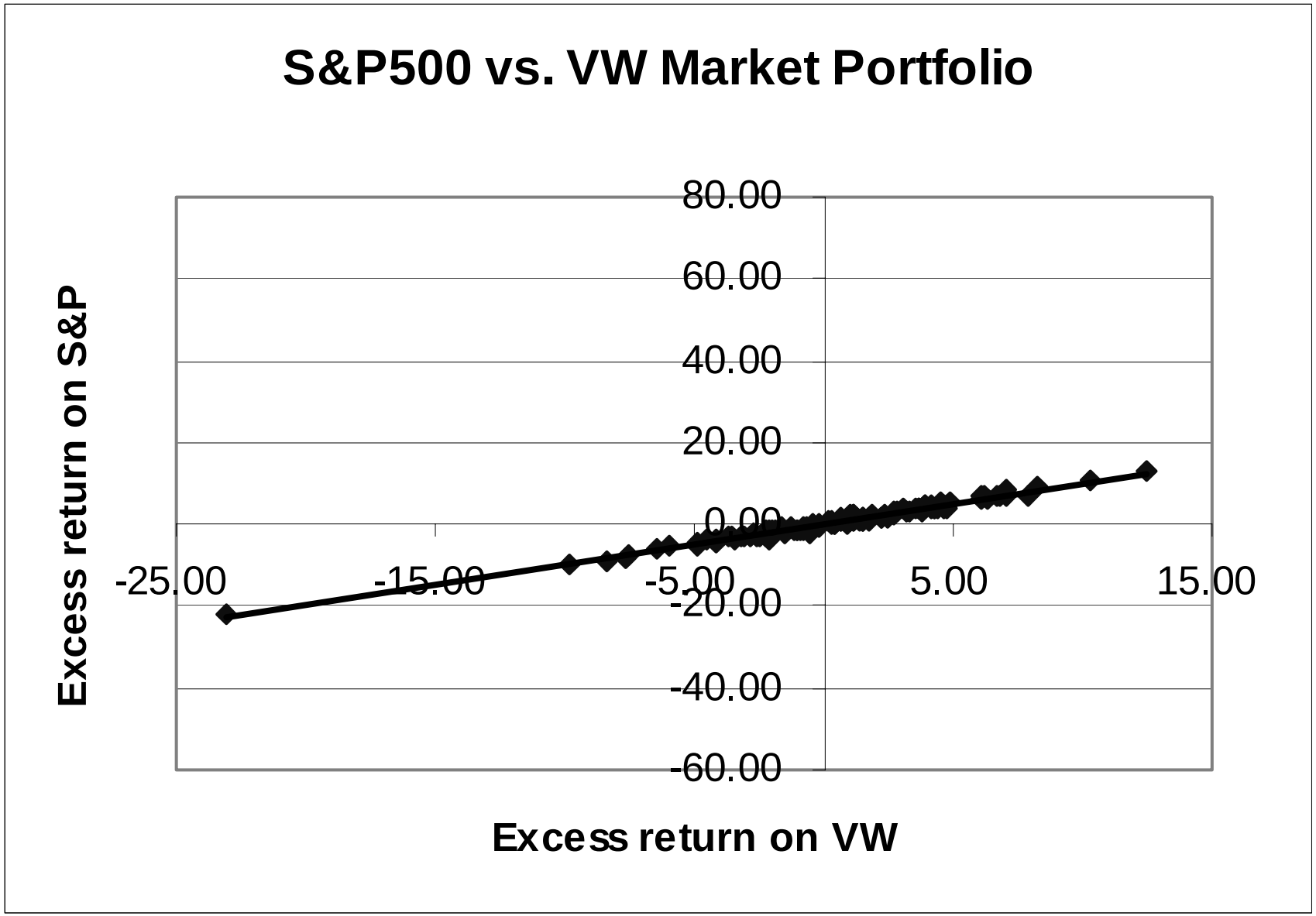
How do we measure systematic risk?

Most commonly it is measured by the sensitivity of the project's/asset's value to movements in an aggregate market portfolio of assets.

This sensitivity is called the beta of the asset, β.


AST vs. VW Market Portfolio
Excess return on AST
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
-60.00
-25.00
-15.00
-5.00
5.00
15.00
Excess return on VW


IBM vs. VW Market Portfolio
Excess return on IBM
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
-60.00
-25.00
-15.00
-5.00
5.00
15.00
Excess return on VW


S&P500 vs. VW Market Portfolio
Excess return on S&P
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
-60.00
-25.00
-15.00
-5.00
5.00
15.00
Excess return on VW

What is the relation between r and β?

The Capital Asset Pricing Model (CAPM) implies:

$$r = r_f + \beta[r_m - r_f]$$

where r_f is the return on an asset with no risk and r_m is the expected return on the aggregate market portfolio.

The first term represents compensation for the pure time value of money. The second term is the compensation for risk.

We want the r (and therefore the β) appropriate for the asset being valued. How do we get it for assets that don't exist yet.

Common to look for existing assets that are observable and have the same risk (e.g., firms investing in the same type of assets). These are called comparable assets - remember that we needed comparables for multiple valuation.

Once we choose comparable set of firms the risk of their securities will tell us the risk of the underlying assets. Assume there is only debt and equity in the capital structure with β_{Debt} and β_{Equity}.

$$\beta_{Assets} = w\ \beta_{Debt} + (1 - w)\ \beta_{Equity}$$

where w is the fraction of debt in the capital structure. The weighted average cost of capital is the r determined by β_{Assets} and should be used to value operating cash flows. If we are valuing equity cash flows only then we use the cost of equity determined by β_{Equity}.