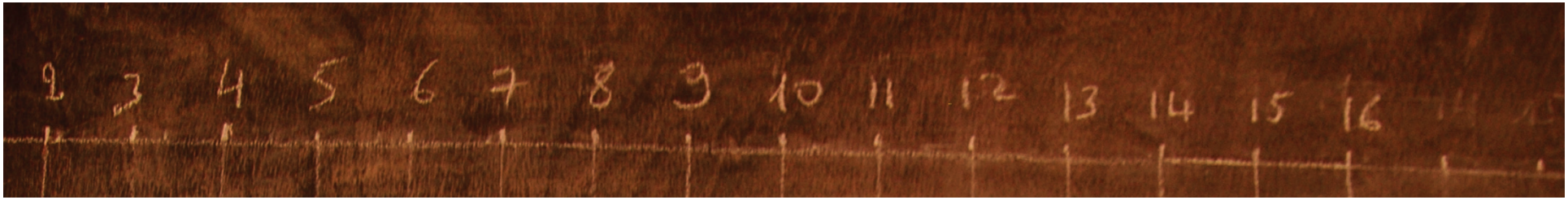


Understanding Risk II: The risk in stocks

Aswath Damodaran

WILEY

What is Risk?

- Risk, in traditional terms, is viewed as a ‘negative’. Webster’s dictionary, for instance, defines risk as “exposing to danger or hazard”. The Chinese symbols for risk, reproduced below, give a much better description of risk:

危機

- The first symbol is the symbol for “danger”, while the second is the symbol for “opportunity”, making risk a mix of danger and opportunity.

The risk in equities

- Price risk versus cash flow risk: When you buy stocks, your risk can come from
  - Variability in the stock price: Not only do you implicitly feel this risk (watching your holdings go up and down in value) but you are explicitly exposed, if you have to sell the stock.
  - Variability in cash flows: In the strictest measure, this can be variability in dividends. More generally, it can reflect variability in the underlying earnings/cashflows.
- Total risk versus downside risk: You can measure risk as deviation from expectations in both directions(better & worse than expected) or just worse than expected.
- Stand alone risk versus portfolio risk: You can measure risk in a stock, as a stand-alone investment or as risk added to a portfolio of stocks.

Equity Risk

- An equity investment in a business (private or public) entitles you to residual earnings and cash flows. In other words, you are not promised an interest rate but earn whatever is left over after you pay off other investors.
- Models that try to measure equity risk vary across investors. Broadly speaking, these risk and return models can be categorized as:
  - Theory based models that begin with an economic (and quantitative) definition of risk and derive risk measures based on that definition.
  - Alternative models that are based upon either intuitive or qualitative measures of risk.

I. Theory Based Models

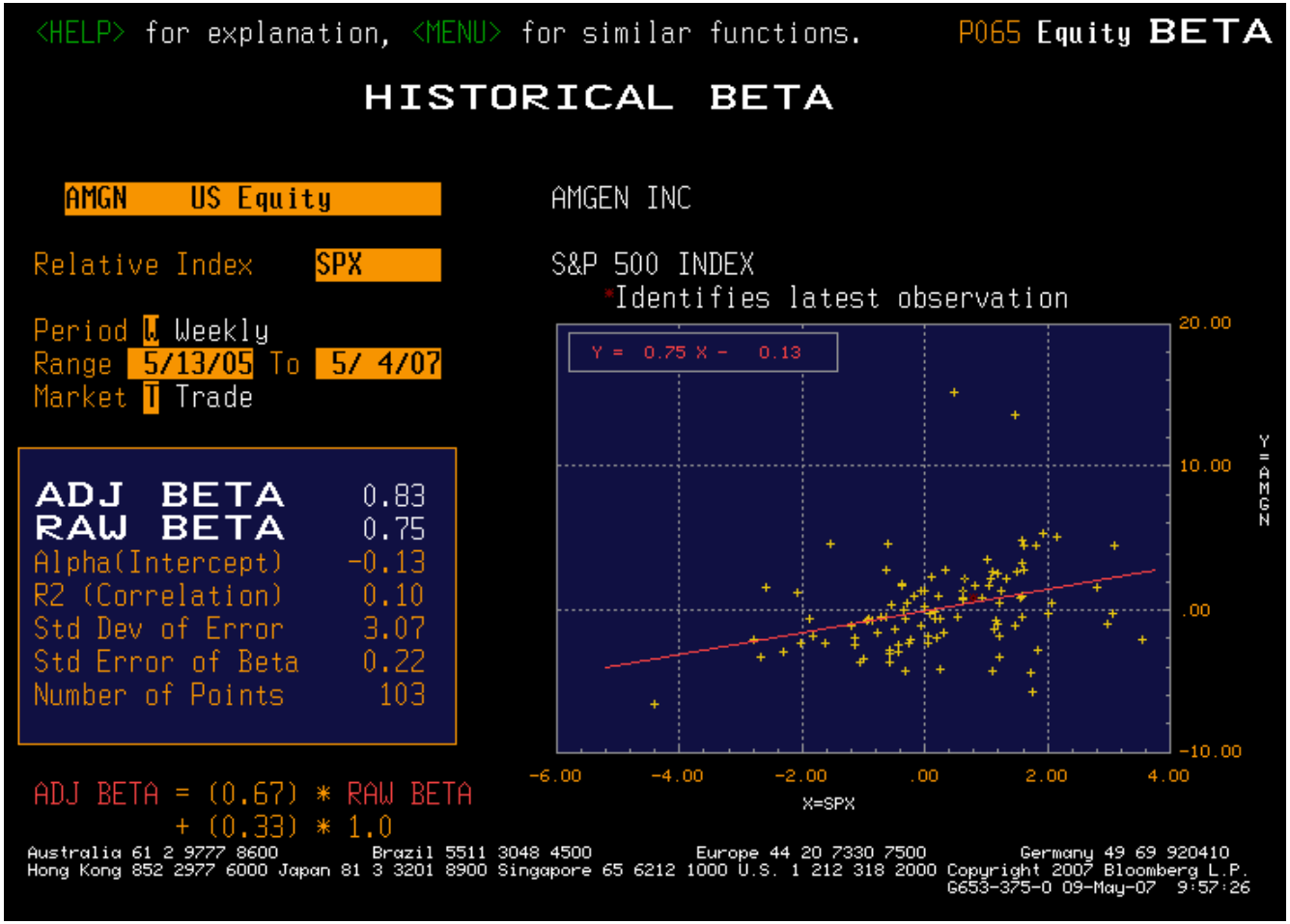
- Most theory based models begin by defining risk in terms of variance in actual returns around expected returns.
- They usually measure risk through the eyes of the marginal investor in equity (rather than the average investor). The marginal investor is an investor who owns a large portion of the equity and trades frequently.

A. The Capital Asset Pricing Model

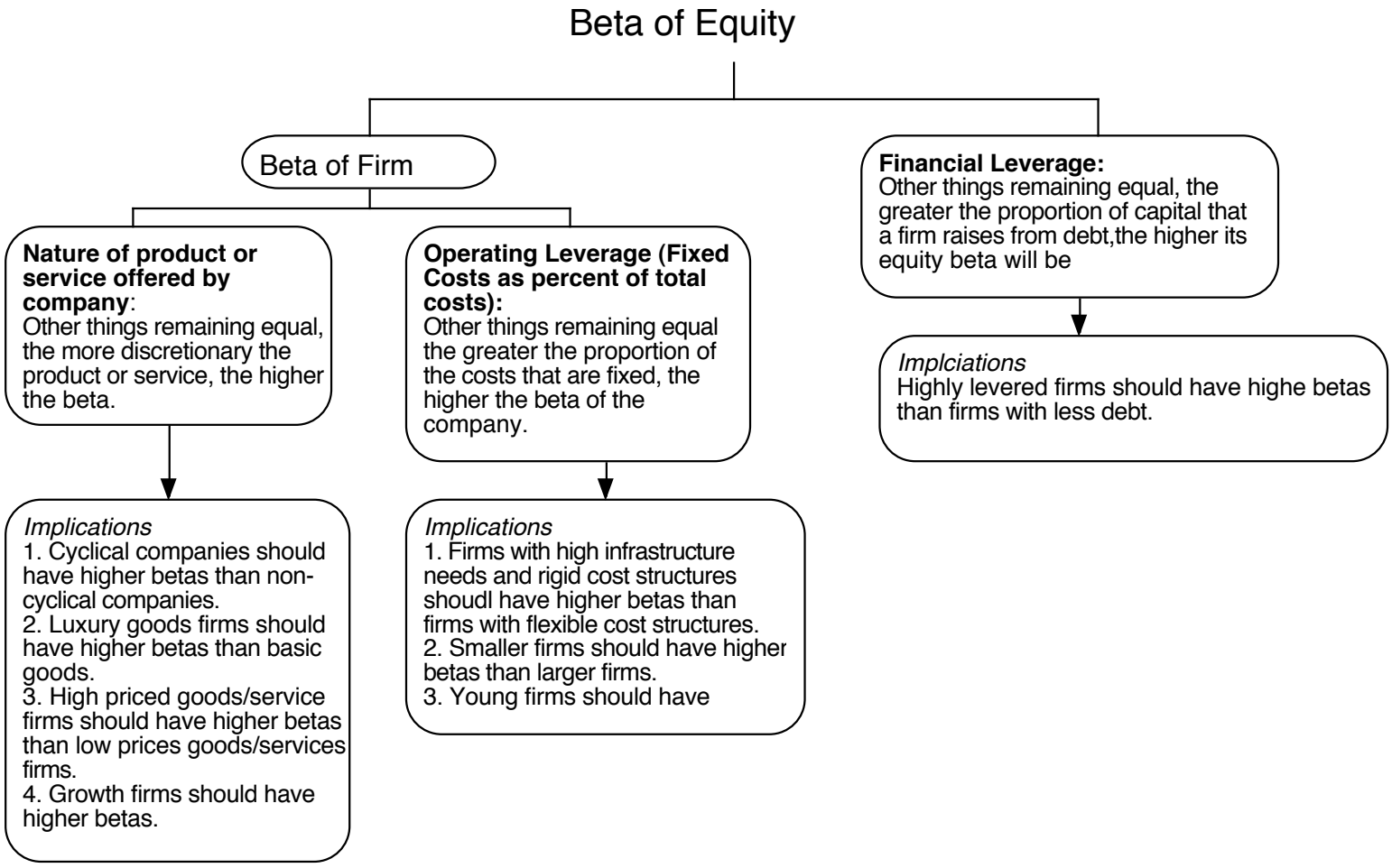
- The capital asset pricing model is the oldest and still the most widely used model for risk in the investment world.
- It is derived in four steps:
  - Uses variance as a measure of risk
  - Specifies that a portion of variance can be diversified away, and that is only the non-diversifiable portion that is rewarded.
  - Measures the non-diversifiable risk with beta, which is standardized around one.
  - Translates beta into expected return -

    Expected Return = Riskfree rate + Beta * Risk Premium

The beta for a company: The standard regression



Betas and Economic Fundamentals



Myths about beta

- Beta is a measure of overall risk: It is not. It measures only exposure to macro or market risk. Thus, volatile investments can have low betas, if the bulk of their risk is specific to the investment.
- Beta is a statistical measure: While betas might be estimated from regressions, they are determined by three fundamental decisions that a firm makes: the business it is in, its fixed cost structure and its financial leverage.
- Beta is a fact: It is not. It is an estimate and a single regression beta can have a very high standard error.
- Beta measures investment quality: It does not. It measures investment risk. Thus, you can have a great investment with a low beta, an average beta or a high beta.

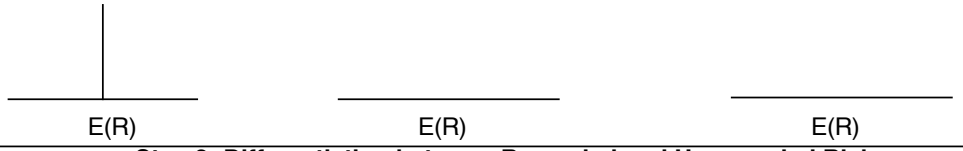
Limitations of the CAPM

1. The model makes unrealistic assumptions
2. The parameters of the model cannot be estimated precisely
   - Definition of a market index
   - Firm may have changed during the 'estimation' period'
3. The model does not work well
   - If the model is right, there should be
     a linear relationship between returns and betas
     the only variable that should explain returns is betas
   - The reality is that
     the relationship between betas and returns is weak
     Other variables (size, price/book value) seem to explain differences in returns better.

B. Alternatives to the CAPM

Step 1: Defining Risk

The risk in an investment can be measured by the variance in actual returns around an expected return



Step 2: Differentiating between Rewarded and Unrewarded Risk

Risk that is specific to investment (Firm Specific)
Can be diversified away in a diversified portfolio
1. each investment is a small proportion of portfolio
2. risk averages out across investments in portfolio

Risk that affects all investments (Market Risk)
Cannot be diversified away since most assets are affected by it.

The marginal investor is assumed to hold a "diversified" portfolio. Thus, only market risk will be rewarded and priced.

Step 3: Measuring Market Risk

The CAPM	**The APM**	**Multi-Factor Models**	**Proxy Models**
If there is 1. no private information 2. no transactions cost the optimal diversified portfolio includes every traded asset. Everyone will hold this market portfolio **Market Risk = Risk added by any investment to the market portfolio:**	If there are no arbitrage opportunities then the market risk of any asset must be captured by betas relative to factors that affect all investments. **Market Risk = Risk exposures of any asset to market factors**	Since market risk affects most or all investments, it must come from macro economic factors. **Market Risk = Risk exposures of any asset to macro economic factors.**	In an efficient market, differences in returns across long periods must be due to market risk differences. Looking for variables correlated with returns should then give us proxies for this risk. **Market Risk = Captured by the Proxy Variable(s)**
Beta of asset relative to Market portfolio (from a regression)	Betas of asset relative to unspecified market factors (from a factor analysis)	Betas of assets relative to specified macro economic factors (from a regression)	Equation relating returns to proxy variables (from a regression)

II. Alternative models of Equity Risk

- There are many who find theory based models of equity risk lacking because
  - They look at both upside and downside volatility (it is only the latter that investors don't like)
  - They are based upon market prices rather than fundamentals
  - They break risk down into diversifiable and non-diversifiable components, a break down that may have no relevance if you are only minimally diversified.
- The alternative models for equity risk can broadly be classified as
  - Models that are based upon accounting statements
  - Proxy models (where something else stands in for risk)
  - Market implied measures of risk
  - Risk adjusted earnings/ cash flows
  - Margin of Safety

a. Accounting based risk measures

- *Accounting Ratio:* You can use an accounting ratio as your measure of risk. Here are some choices:
  - Debt risk: If you start with the presumption that companies that are more indebted are riskier than firms that are not, you can use the debt ratio (debt as a percent of overall capital or as a percent of equity) as your risk measure.
  - Earnings risk: If you assume that companies with higher earnings are safer than companies with lower earnings, you can use an accounting measure of earnings (earnings as a percent of market capitalization or as a percent of book value of equity) as your risk measure.
- *Compute an accounting beta*: Look at changes in accounting earnings at a firm, relative to accounting earnings for the entire market. Firms that have more stable earnings than the rest of the market or whose earnings movements have nothing to do with the rest of the market will have low accounting betas.

b. Proxy Models

- Look at returns on individual stocks over long periods and search for characteristics shared by companies that earn high returns.
- This approach was kicked off by Fama and French, who found that **low price to book** and **small market cap** stocks earned higher returns than the rest of the market.
- In the years since, there have been additional three additional variables that seem to be correlated with returns:
  - **Earnings momentum**: Companies that have reported stronger than expected earnings growth in the past earn higher returns than the rest of the market.
  - **Price momentum**: Returns are higher for stocks that have outperformed markets in recent time periods and lower for stocks that have lagged.
  - **Liquidity**: Stocks that are less liquid (lower trading volume, higher bid-ask spreads) earn higher returns than more liquid stocks.

c. Market Implied risk measures

- If you can observe the price of a risky asset, and you can estimate the expected cash flows on that asset, you can back out the market's implied "required return" for that asset.
- With stocks, with we can used expected dividends or cash flows together with the stock price to get an expected return on the stock.
- Here is a simple example. Assume that you have a stable dividend paying stock that is trading at $20/share, is expected to pay a dividend of $1/share next year and grow at 3% in perpetuity. You can back out the cost of equity for this company:

  Value per share = 20 = 1/ (r - .03)

  Implied expected return = r = .08 = 8%
- This process becomes more complicated if you use cash flow based models and if there is growth, but the process remains the same.

d. Risk adjusted cash flows

- Risk adjusting the cash flows requires more than taking the expected cash flow across all scenarios, good and bad. You have to convert these expected cash flows into certainty equivalent cash flows.
- There are two practical approaches to computing certainty equivalent cash flows. .
  - In the first, you consider only those cash flows from a business that are "safe" and that you can count on, when you do valuation. If you do so, and you are correct in your assessment, you don't have to risk adjust the cash flows.
  - The second variant is an interesting twist on dividends and a throw back to Ben Graham. To the extent that companies are reluctant to cut dividends, once they initiate them, it can be argued that the dividends paid by a company reflects its view of how much of its earnings are certain.

e. Margin of Safety

- The "margin of safety" has a long history in value investing. While the term may have been in use prior to 1934, Graham and Dodd argued that investors should buy stocks that trade at significant discounts on value and developed screens that would yield these stocks.
- To put into practice the margin of safety (MOS), investors have to
  - Screen for companies that meets good company criteria: solid management, good product and sustainable competitive advantages.
  - Estimate intrinsic value. Value investors use a variety of approaches in this endeavor: some use discounted cash flow, some use relative valuation and some look at book value.
  - The third step in the process is to compare the price to the intrinsic value and that is where the MOS comes in: with a margin of safety of 40%, you would only buy an asset if its price was more than 40% below its intrinsic value.

Final thoughts about equity risk

1. Explicit versus implicit: There are plenty of analysts who steer away from discounted cash flow valuation and use relative valuation (multiples and comparable firms) because they are uncomfortable with measuring risk explicitly. The danger with implicit assumptions is that you can be lulled into a false sense of complacency, even as circumstances change.
2. Quantitative versus qualitative: Analysts who use conventional risk and return models are accused of being too number oriented and not looking at qualitative factors enough. Perhaps, but the true test of whether you can do valuation is whether you can take stories that you hear about companies and convert them into numbers for the future.
3. Simple versus complicated: Sometimes, less is more and you get your best assessments when you keep things simple.