THE INVESTMENT PRINCIPLE: RISK AND RETURN MODELS

““You cannot swing upon a rope that is attached only to your own belt.”

FIRST PRINCIPLES

- Maximize the value of the business (firm)
  - **The Investment Decision**
    Invest in assets that earn a return greater than the minimum acceptable hurdle rate
    - The **hurdle rate** should reflect the <u>riskiness</u> of the investment and the <u>mix of debt and equity</u> used to fund it.
    - The **return** should reflect the <u>magnitude</u> and the <u>timing</u> of the <u>cashflows</u> as well as <u>all side effects</u>.
  - **The Financing Decision**
    Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations
    - The **optimal mix** of debt and equity <u>maximizes firm value</u>
    - The **right kind** of debt <u>matches the tenor of your assets</u>
  - **The Dividend Decision**
    If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business
    - **How much cash** you can return depends upon current & potential <u>investment opportunities</u>
    - **How you choose** to return cash to the owners will depend on whether they <u>prefer dividends or buybacks</u>

THE NOTION OF A BENCHMARK

- Since financial resources are finite, **there is a hurdle that projects have to cross before being deemed acceptable**. This hurdle should be higher for riskier projects than for safer projects.
- A simple representation of the hurdle rate is as follows:
  - **Hurdle rate = Riskless Rate + Risk Premium**
- The two basic questions that every risk and return model in finance tries to answer are:
  - How do you **measure risk**?
  - How do you **translate this risk measure into a risk premium**?

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 or crisis, reproduced below, give a much better description of risk

危機

  - The first symbol is the **symbol for "danger**".
  - The second is the **symbol for "opportunity**", making risk a mix of danger and opportunity. You cannot have one, without the other.
- Risk is therefore neither good nor bad. It is just a fact of life. The question that businesses have to address is therefore not how to avoid risk but how best to incorporate it into their decision making.

A GOOD RISK AND RETURN MODEL SHOULD...

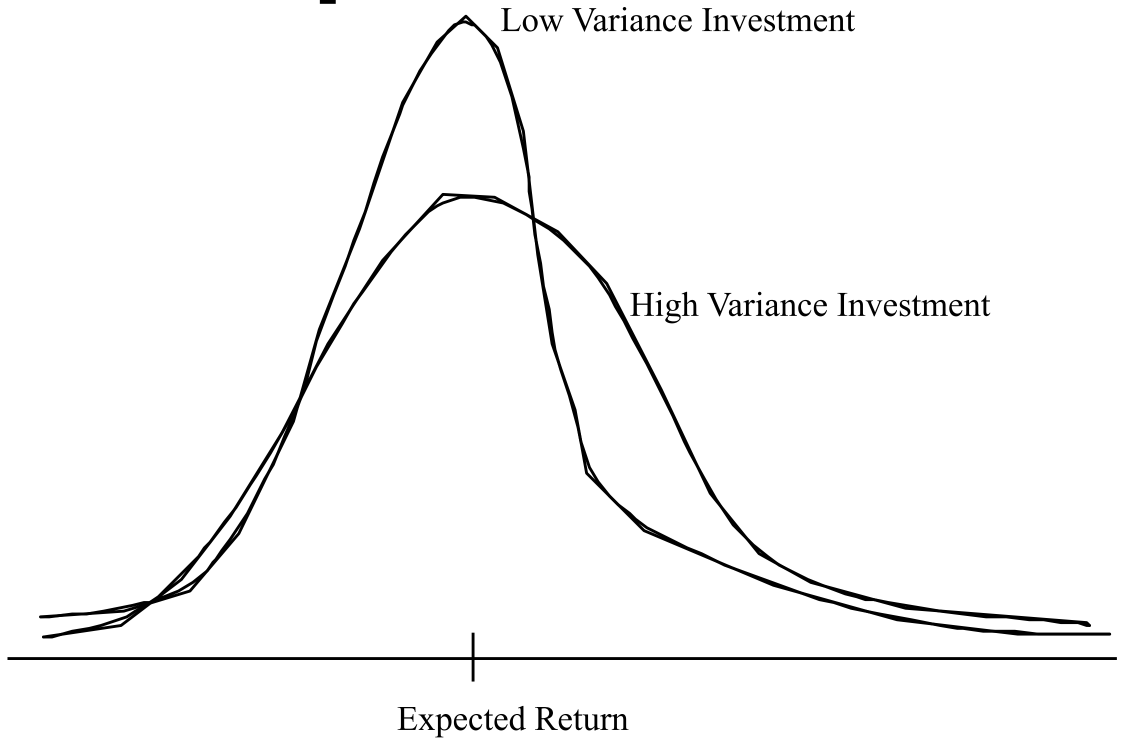
- It should come up with a **measure of risk that applies to all assets** and not be asset-specific.
- It should clearly delineate **what types of risk are rewarded and what are not**, and provide a rationale for the delineation.
- It should come up with **standardized risk measures**, i.e., an investor presented with a risk measure for an individual asset should be able to draw conclusions about whether the asset is above-average or below-average risk.
- It should **translate the measure of risk into a rate of return** that the investor should demand as compensation for bearing the risk.
- It **should work well not only at explaining past returns**, but also in predicting future expected returns.

THE CAPITAL ASSET PRICING MODEL

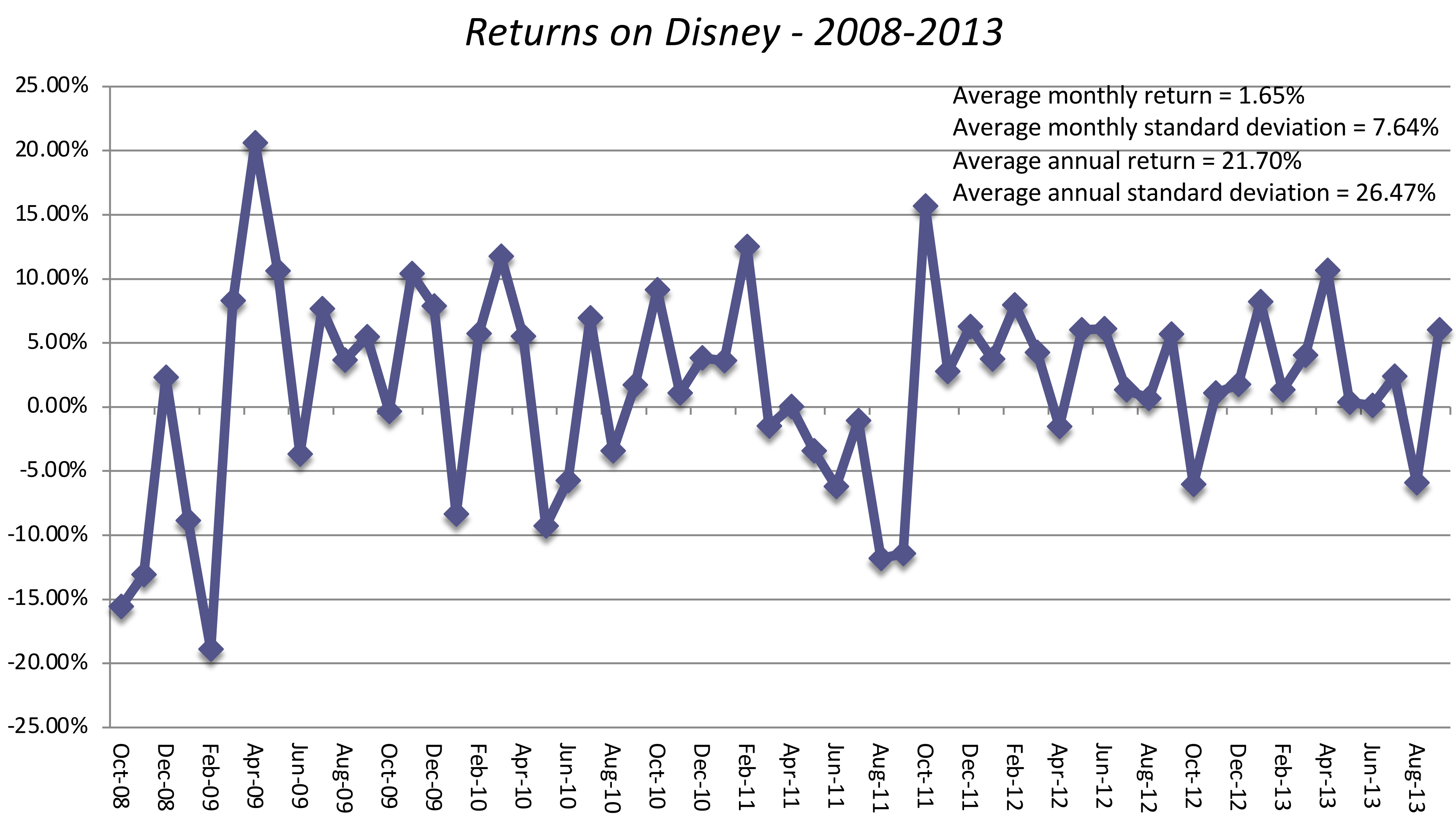
- Uses **variance of actual returns** around an expected return as a measure of risk.
- Specifies that a **portion of variance can be diversified away**, and that is only the non-diversifiable portion that is rewarded.
- Measures the **non-diversifiable risk with beta**, which is standardized around one.
- Translates **beta into expected return** -
  - Expected Return = Riskfree rate + Beta * Risk Premium
- Works **as well as the next best alternative** in most cases.

1. THE MEAN-VARIANCE FRAMEWORK

- The variance on any investment measures the disparity between actual and expected returns.



HOW RISKY IS DISNEY? A LOOK AT THE PAST…

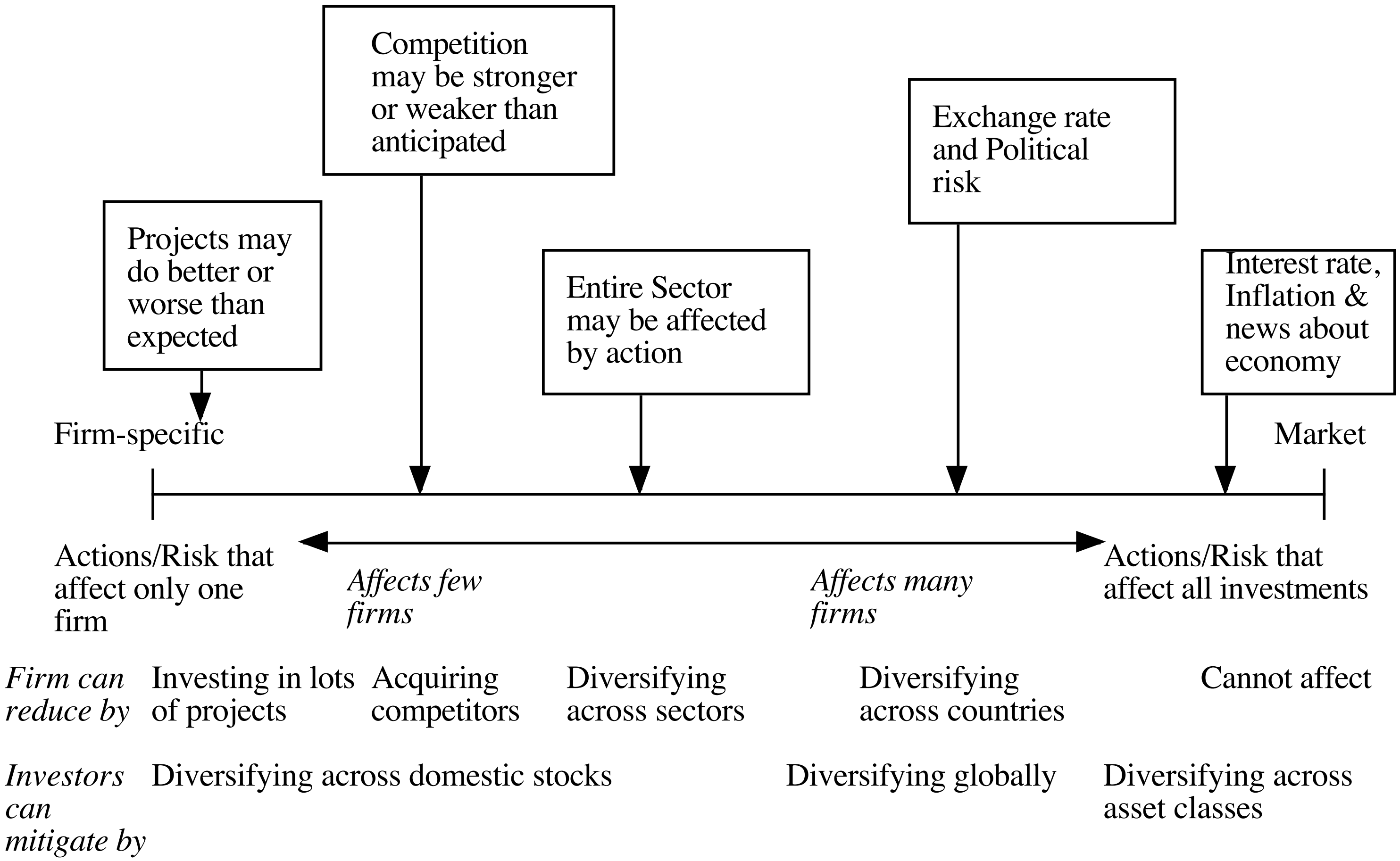


DO YOU LIVE IN A MEAN-VARIANCE WORLD?

- Assume that you had to pick between two investments. They have the same expected return of 15% and the same standard deviation of 25%; however, investment A offers a very small possibility that you could quadruple your money, while investment B's highest possible payoff is a 60% return. Would you
  - be indifferent between the two investments, since they have the same expected return and standard deviation?
  - prefer investment A, because of the possibility of a high payoff?
  - prefer investment B, because it is safer?
- Would your answer change if you were not told that there is a small possibility that you could lose 100% of your money on investment A but that your worst-case scenario with investment B is -50%?

2. THE IMPORTANCE OF DIVERSIFICATION: RISK TYPES

Figure 3.5: A Break Down of Risk



WHY DIVERSIFICATION REDUCES/ELIMINATES FIRM SPECIFIC RISK

- Firm-specific risk can be reduced, if not eliminated, by increasing the number of investments in your portfolio (i.e., by being diversified). Market-wide risk cannot. This can be justified on either economic or statistical grounds.
- On economic grounds, diversifying and holding a larger portfolio eliminates firm-specific risk for two reasons-
  - Each investment is a much smaller percentage of the portfolio, muting the effect (positive or negative) on the overall portfolio.
  - Firm-specific actions can be either positive or negative. In a large portfolio, it is argued, these effects will average out to zero. (For every firm, where something bad happens, there will be some other firm, where something good happens.)

THE ROLE OF THE MARGINAL INVESTOR

- The marginal investor in a firm is the investor who is most likely to be the buyer or seller on the next trade and to influence the stock price.
  - Generally speaking, the marginal investor in a stock has to own a lot of stock and also trade that stock on a regular basis.
  - Since trading is required, the largest investor may not be the marginal investor, especially if he or she is a founder/manager of the firm (Larry Ellison at Oracle, Mark Zuckerberg at Facebook…)
- In risk and return models in finance, we start with the marginal investor is well diversified.

IDENTIFYING THE MARGINAL INVESTOR IN YOUR FIRM…

Percent of Stock held by Institutions	*Percent of Stock held by Insiders*	*Marginal Investor*
High	Low	Institutional Investor
High	High	Institutional Investor, with insider influence
Low	High (held by founder/manager of firm)	Tough to tell; Could be insiders but only if they trade. If not, it could be individual investors.
Low	High (held by wealthy individual investor)	Wealthy individual investor, fairly diversified
Low	Low	Small individual investor with restricted diversification

GAUGING THE MARGINAL INVESTOR: DISNEY IN 2013

DIS US Equity | 25) Settings | 99) Feedback | Holdings: Current

Walt Disney Co/The | CUSIP 25468710

1) Current | 2) Historical | 3) Matrix | 4) Ownership | 5) Transactions | 6) Options

Search Name -- | 21) Save | 22) Delete | 3) Saved Search | 24) Refine Search

Text Search | Holder Group: All Holders | 20) Export

	Holder Name	Portfolio Name	Source	Opt	Amt Held	% Out	Latest Chg	File Dt
			All Sources	All				
1.	LAURENE POWELL JOBS TRU	n/a	PROXY		130,844,544	7.32	0	01/07/13
2.	BLACKROCK	n/a	ULT-AGG		93,837,994	5.25	-494,298	09/24/13
3.	VANGUARD GROUP INC	n/a	ULT-AGG		80,163,479	4.49	1,183,628	06/30/13
4.	STATE STREET CORP	n/a	ULT-AGG		77,799,514	4.35	2,893,171	09/24/13
5.	CAPITAL GROUP COMPANIES	n/a	ULT-AGG		62,014,410	3.47	36,689,294	06/30/13
6.	FMR LLC	n/a	ULT-AGG		59,453,225	3.33	-1,495,596	06/30/13
7.	SUN LIFE FINANCIAL INC	n/a	ULT-AGG		55,699,112	3.12	-1,422,694	06/30/13
8.	STATE FARM MUTUAL AUTO I	STATE FARM MUTUAL AU	13F		42,206,018	2.36	0	06/30/13
9.	LUCAS JR GEORGE W	n/a	Co File		37,076,679	2.08	0	02/06/13
10.	BANK OF NEW YORK MELLON	BANK OF NEW YORK MEL	13F		30,293,150	1.70	-127,337	06/30/13
11.	NORTHERN TRUST CORPORAT	NORTHERN TRUST CORP	13F		28,465,082	1.59	224,418	06/30/13
12.	T ROWE PRICE ASSOCIATES	T ROWE PRICE ASSOCIA	13F		25,834,722	1.45	-3,332,832	06/30/13
13.	WELLINGTON MANAGEMENT C	WELLINGTON MANAGEME	13F		24,292,691	1.36	-4,191,722	06/30/13
14.	JENNISON ASSOCIATES LLC	JENNISON ASSOCIATES	13F		16,644,863	0.93	2,408,938	06/30/13
15.	JP MORGAN	n/a	ULT-AGG		15,073,679	0.84	1,496,290	06/30/13
16.	NORGES BANK	NORGES BANK	13F		14,991,213	0.84	0	12/31/12
17.	DAVIS SELECTED ADVISERS L	DAVIS SELECTED ADVISE	13F		12,938,299	0.72	-2,546,616	06/30/13
18.	GEODE CAPITAL MANAGEMEN	GEODE CAPITAL MANAGE	13F		12,441,353	0.70	233,702	06/30/13

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EXTENDING THE ASSESSMENT OF THE INVESTOR BASE

- In all five of the publicly traded companies that we are looking at, institutions are big holders of the company's stock.

	Disney	*Deutsche Bank*	*Vale (preferred)*	*Tata Motors*	*Baidu (Class A)*
Institutions	70.2%	40.9%	71.2%	44%	70%
Individuals	21.3%	58.9%	27.8%	25%	20%
Insiders	7.5%	0.2%	1.0%	31%*	10%

Company	*Largest holder*	*Number of institutional investors in top ten holdings*
Disney	Laurene Jobs (7.3%)	8
Deutsche Bank	Blackrock (4.69%)	10
Vale Preferred	Aberdeen (7.40%)	8
Tata Motors	Tata Sons (26.07%)	7
Baidu (Class A)	Capital Group (12.46%)	10

3. THE LIMITING CASE: THE MARKET PORTFOLIO

- **The big assumptions & the follow up**: Assuming diversification costs nothing (in terms of transactions costs), and that all assets can be traded, the **limit of diversification is to hold a portfolio of every single asset in the economy (in proportion to market value).** This portfolio is called the market portfolio.
- The consequence: Individual investors will adjust for risk, by adjusting their allocations to this market portfolio and a riskless asset (such as a T-Bill):

Preferred risk level	*Allocation decision*
No risk	100% in T-Bills
Some risk	50% in T-Bills; 50% in Market Portfolio;
A little more risk	25% in T-Bills; 75% in Market Portfolio
Even more risk	100% in Market Portfolio
A risk hog..	Borrow money; Invest in market portfolio

4. THE RISK & EXPECTED RETURN OF AN INDIVIDUAL ASSET

- **The essence**: The risk of any asset is the risk that it adds to the market portfolio Statistically, this risk can be measured by how much an asset moves with the market (called the covariance)
- **The measure**: Beta is a standardized measure of this covariance, obtained by dividing the covariance of any asset with the market by the variance of the market. It is a measure of the non-diversifiable risk for any asset can be measured by the covariance of its returns with returns on a market index, which is defined to be the asset's beta.
- **The result**: The required return on an investment will be a linear function of its beta:
  - Expected Return = Riskfree Rate+ Beta * (Expected Return on the Market Portfolio - Riskfree Rate)

LIMITATIONS OF THE CAPM

1. The model **makes unrealistic assumptions**

2. The **parameters of the model cannot be estimated precisely**

   The market index used can be wrong.

   The 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

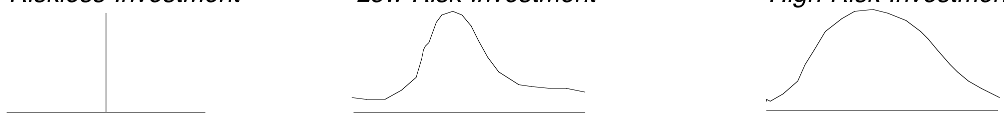
     - Other variables (size, price/book value) seem to explain differences in returns better.

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

Riskless Investment *Low Risk Investment* *High Risk Investment*



E(R) E(R) E(R)

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<u>market portfolio</u> **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)

Why the CAPM persists…

- The CAPM, notwithstanding its many critics and limitations, has **survived as the default model** for risk in equity valuation and corporate finance.
- The alternative models that have been presented as better models (APM, Multifactor model..) have made inroads in performance evaluation but not in prospective analysis because:
  - The alternative models (which are richer) **do a much better job than the CAPM in explaining past returns**, but their effectiveness drops off when it comes to estimating expected future returns (because the models tend to shift and change).
  - The alternative models are **more complicated and require more information** than the CAPM.
  - For most companies, the **expected returns you get with the the alternative models is not different enough** to be worth the extra trouble of estimating four additional betas.

APPLICATION TEST: WHO IS THE MARGINAL INVESTOR IN YOUR FIRM?

- You can get information on insider and institutional holdings in your firm from:
  - http://finance.yahoo.com/
  - Enter your company's symbol and choose profile.
- Looking at the breakdown of stockholders in your firm, consider whether the marginal investor is
  - An institutional investor
  - An individual investor
  - An insider
- Follow up by evaluating whether the marginal investor is likely to be diversified.
  - If yes, you are on safer ground using the risk and return models that assume that only non-diversifiable risk is rewarded.
  - If no, you will have to adapt your risk measure to bring in some or all o fthe company-specific risk that you were ignoring.