IBM

Investment Decisions: Risk and Return

Prof. Ian Giddy
New York University
Investment: Risk and Return

- Equity risk and bond risk
- Risk in a portfolio context
- Risk and beta
- The required return on investments
A $1 Investment in Different Types of Portfolios: 1926-1996
Risk Types

The risk (variance) on any individual investment can be broken down into two sources. Some of the risk is specific to the firm, and is called firm-specific, whereas the rest of the risk is market wide and affects all investments.

The risk faced by a firm can be fall into the following categories –

- (1) Project-specific; an individual project may have higher or lower cash flows than expected.
- (2) Competitive Risk, which is that the earnings and cash flows on a project can be affected by the actions of competitors.
- (3) Industry-specific Risk, which covers factors that primarily impact the earnings and cash flows of a specific industry.
- (4) International Risk, arising from having some cash flows in currencies other than the one in which the earnings are measured and stock is priced
- (5) Market risk, which reflects the effect on earnings and cash flows of macro economic factors that essentially affect all companies.
Equity versus Bond Risk

Assets

Uncertain value of future cash flows

Liabilities

Debt
- Contractual int. & principal
- No upside
- Senior claims
- Control via restrictions

Equity
- Residual payments
- Upside and downside
- Residual claims
- Voting control rights
Frequency Distribution of Returns on Common Stocks, 1926-1996

Return (%)  

Number of Years
0  2  1  1  11  8  13  16  10  6  3

Copyright ©2004 Ian H. Giddy
Returns, Standard Deviations, and Frequency Distributions: 1926-1996

<table>
<thead>
<tr>
<th>Series</th>
<th>Average Annual Return</th>
<th>Standard Deviation</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Company Stocks</td>
<td>12.7%</td>
<td>20.3%</td>
<td></td>
</tr>
<tr>
<td>Small Company Stocks</td>
<td>17.7</td>
<td>34.1</td>
<td></td>
</tr>
<tr>
<td>Long-Term Corporate Bonds</td>
<td>6.0</td>
<td>8.7</td>
<td></td>
</tr>
<tr>
<td>Long-Term Government Bonds</td>
<td>5.4</td>
<td>9.2</td>
<td></td>
</tr>
<tr>
<td>U.S. Treasury Bills</td>
<td>3.8</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>3.2</td>
<td>4.5</td>
<td></td>
</tr>
</tbody>
</table>

Source: © Stocks, Bonds, Bills, and Inflation 1997 Yearbook™, Ibbotson Associates, Inc., Chicago (annually updates work by Roger G. Ibbotson and Rex A. Sinquefield). All rights reserved.
Volatility Data: Normally Distributed? Autocorrelated? Stable Over Time?

# Characteristics of the Data

<table>
<thead>
<tr>
<th>January 1988-September 1994</th>
<th>Daily % Price Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td>5.759</td>
</tr>
<tr>
<td><strong>Minimum/Maximum</strong></td>
<td>-1.965/3.793</td>
</tr>
<tr>
<td><strong>Count</strong></td>
<td>1740</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>0.0000</td>
</tr>
<tr>
<td><strong>Standard Deviation</strong></td>
<td>0.574</td>
</tr>
<tr>
<td><strong>Kurtosis</strong></td>
<td>4.251</td>
</tr>
<tr>
<td><strong>Skewness</strong></td>
<td>0.933</td>
</tr>
<tr>
<td><strong>Correlation to Normal Distribution</strong></td>
<td>0.976</td>
</tr>
<tr>
<td><strong>Autocorrelation</strong></td>
<td>Not significant</td>
</tr>
</tbody>
</table>
Volatility Projections: Pitfalls

S&P500 evolution and volatility estimates

Range of potential levels
(90% confidence)

Daily volatility

Cone = S&P500*1.39% * SQRT(time)
The Risk-Return Trade-Off

E(R)

CAPITAL ALLOCATION LINE

SLOPE IS THE RISK-RETURN TRADE-OFF

0% 20% 24% SD

5% 12% 14%

Copyright ©2004 Ian H. Giddy

Investment Decisions 16
The Risk-Return Trade-Off

If this is my indifference curve
then that’s the portfolio I would pick

E(R)

0%
5%
12%
14%
20%
26%

SD
Capital Allocation Possibilities: Treasuries or an Equity Fund?

Expected Return

\[ E(r_s) = 17\% \]

\[ r_f = 7\% \]

\[ \sigma_s = 27\% \]

Risk

THE EQUITY FUND

TREASURIES
Capital Allocation Possibilities: Treasuries or an Equity Fund?

ONE PORTFOLIO:
30% Bills, 70% Fund
E(R) = .3X7 + .7X17 = 14%
SD = .7X27 = 18.9%

C.A.L.
SLOPE = 0.37
If $E(r_s)=15\%, \sigma_s=22\%, r_f=7\%$

Allocate your money between t-bills ($y$) and a stock fund ($1-y$). Then:

$r_p = yr_s + (1-y)r_f$

$E(r_p) = r_f + y[E(r_s - r_f]$

$= 7 + y[15 - 7] = 7 + y8$

$\sigma_p = y\sigma_s = y22$
We Can Buy Some T-bills and Some of the Risky Fund...

Expected Return

\[ E(r_S) = 15\% \]

\[ r_f = 7\% \]

\[ \sigma_S = 22\% \]

Risk
...Or Buy Two Risky Assets
Measuring Portfolio Return...

To compute the return of a portfolio: use the weighted average of the returns of all assets in the portfolio, with the weight given each asset calculated as
(value of asset)/(value of portfolio).

The portfolio return $E(R_p)$ is:

$$E(R_p) = (w_1k_1) + (w_2k_2) + \ldots + (w_nk_n) = \sum w_j k_j$$

where $w_j =$ weight of asset $j$, $k_j =$ return on asset $j$
The variance of a 2-asset portfolio is:

\[ \sigma_P^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2w_A w_B \rho_{AB} \sigma_A \sigma_B \]

where \( w_A \) and \( w_B \) are the weights of A and B in the portfolio.
## Case Study: A Portfolio

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
<th>E(R)</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPU</td>
<td>0</td>
<td>0.1267</td>
<td>0.1715</td>
</tr>
<tr>
<td>Teledyne</td>
<td>0.25</td>
<td>0.1396</td>
<td>0.2893</td>
</tr>
<tr>
<td>Kodak</td>
<td>0.25</td>
<td>0.1402</td>
<td>0.3082</td>
</tr>
<tr>
<td>Thai Fund</td>
<td>0</td>
<td>0.2075</td>
<td>0.3278</td>
</tr>
<tr>
<td>Merck</td>
<td>0</td>
<td>0.1781</td>
<td>0.341</td>
</tr>
<tr>
<td>ATT</td>
<td>0.5</td>
<td>0.1126</td>
<td>0.1606</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Portfolio Return Computation

<table>
<thead>
<tr>
<th>ASSET</th>
<th>RETURN</th>
<th>WEIGHT</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 GPU</td>
<td>12.67%</td>
<td>0.00%</td>
<td>0.0000</td>
</tr>
<tr>
<td>2 Teledyne</td>
<td>13.96%</td>
<td>25.00%</td>
<td>0.0349</td>
</tr>
<tr>
<td>3 Kodak</td>
<td>14.02%</td>
<td>25.00%</td>
<td>0.0351</td>
</tr>
<tr>
<td>4 Thai Fund</td>
<td>20.75%</td>
<td>0.00%</td>
<td>0.0000</td>
</tr>
<tr>
<td>5 Merck</td>
<td>17.81%</td>
<td>0.00%</td>
<td>0.0000</td>
</tr>
<tr>
<td>6 ATT</td>
<td>11.26%</td>
<td>50.00%</td>
<td>0.0563</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Portfolio return</td>
<td></td>
<td>12.63%</td>
<td></td>
</tr>
</tbody>
</table>
## Portfolio Risk Computation

### Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>STD DEV</th>
<th>GPU</th>
<th>Teledyne</th>
<th>Kodak</th>
<th>Thai Fund</th>
<th>Merck</th>
<th>ATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPU</td>
<td>0.1715</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teledyne</td>
<td>0.2893</td>
<td>0.44</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kodak</td>
<td>0.3082</td>
<td>0.17</td>
<td>0.65</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thai Fund</td>
<td>0.3278</td>
<td>0.22</td>
<td>0.44</td>
<td>0.24</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Merck</td>
<td>0.341</td>
<td>0.35</td>
<td>0.15</td>
<td>0.13</td>
<td>0.03</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ATT</td>
<td>0.1606</td>
<td>0.68</td>
<td>0.4</td>
<td>0.43</td>
<td>0.23</td>
<td>0.6327</td>
<td>1</td>
</tr>
</tbody>
</table>

**Portfolio Variance**

3.48%

**Portfolio Std Deviation**

18.66%
Summary: Portfolio Diversification Benefits

- Expected return is a weighted average
- Risk is less, because of diversification
- In general, the lower the correlation between asset returns, the greater the potential diversification of risk
- Only in the case of perfect negative correlation can risk be reduced to zero
- The amount of risk reduction achieved through diversification is also dependent upon the proportions in which the assets are combined
Measuring Your Portfolio’s Risk: riskgrades.com
Extending Concepts to All Securities

- The optimal combinations result in lowest level of risk for a given return
- The optimal trade-off is described as the “efficient frontier”
- These portfolios are dominant
To Find the Risk-Return Possibilities, Vary the Proportions
The Minimum-Variance Frontier of Risky Assets

"Efficient frontier"

Global minimum-variance portfolio

Individual assets
## Given Return, Find Lowest-Risk Compositions

<table>
<thead>
<tr>
<th>OPTIMAL PORTFOLIOS</th>
<th>Given Return</th>
<th>Best Std. Dev.</th>
<th>Composition</th>
<th>GPU</th>
<th>Teledyne</th>
<th>Kodak</th>
<th>Thai Fund</th>
<th>Merck</th>
<th>ATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL ATT</td>
<td>0.1126</td>
<td>0.1606</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>0.115</td>
<td>0.1548</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td></td>
<td>0.12</td>
<td>0.1494</td>
<td>33%</td>
<td>0%</td>
<td>5%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>0.125</td>
<td>0.1475</td>
<td>36%</td>
<td>0%</td>
<td>6%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>52%</td>
</tr>
<tr>
<td>MIN RISK</td>
<td>0.1283</td>
<td>0.1471</td>
<td>38%</td>
<td>0%</td>
<td>6%</td>
<td>9%</td>
<td>0%</td>
<td>0%</td>
<td>47%</td>
</tr>
<tr>
<td></td>
<td>0.13</td>
<td>0.1472</td>
<td>39%</td>
<td>0%</td>
<td>7%</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
<td>44%</td>
</tr>
<tr>
<td></td>
<td>0.14</td>
<td>0.1509</td>
<td>44%</td>
<td>0%</td>
<td>9%</td>
<td>16%</td>
<td>5%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>0.1572</td>
<td>50%</td>
<td>0%</td>
<td>12%</td>
<td>20%</td>
<td>11%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.16</td>
<td>0.168</td>
<td>43%</td>
<td>0%</td>
<td>11%</td>
<td>28%</td>
<td>18%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.17</td>
<td>0.184</td>
<td>30%</td>
<td>0%</td>
<td>9%</td>
<td>37%</td>
<td>24%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.18</td>
<td>0.2045</td>
<td>17%</td>
<td>0%</td>
<td>7%</td>
<td>46%</td>
<td>30%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.19</td>
<td>0.2282</td>
<td>4%</td>
<td>0%</td>
<td>5%</td>
<td>55%</td>
<td>36%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>MAX RETU</td>
<td>0.2075</td>
<td>0.3278</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>ORIGINAL</td>
<td>12.63%</td>
<td>18.66%</td>
<td>0%</td>
<td>25%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td></td>
</tr>
</tbody>
</table>
Plotting the Efficient Frontier
The Efficient Frontier of Risky Assets with the Optimal CAL
Optimal Overall Portfolio

- Indifference curve
- CAL
- Opportunity set
- E(r)
- Optimal complete portfolio

Copyright ©2004 Ian H. Giddy
## Finding the Optimal Portfolio: Computations

Given the Risk-Free rate is: **5.00%**

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Return</th>
<th>Std. Dev.</th>
<th>Risk Premium</th>
<th>Ratio RP/SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPU</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.26%</td>
<td>0.1606</td>
<td>6.26%</td>
<td>0.390</td>
</tr>
<tr>
<td></td>
<td>11.50%</td>
<td>0.1548</td>
<td>6.50%</td>
<td>0.420</td>
</tr>
<tr>
<td></td>
<td>12.00%</td>
<td>0.1494</td>
<td>7.00%</td>
<td>0.469</td>
</tr>
<tr>
<td></td>
<td>12.50%</td>
<td>0.1475</td>
<td>7.50%</td>
<td>0.508</td>
</tr>
<tr>
<td>MIN RISK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.83%</td>
<td>0.1471</td>
<td>7.83%</td>
<td>0.532</td>
</tr>
<tr>
<td></td>
<td>13.00%</td>
<td>0.1472</td>
<td>8.00%</td>
<td>0.543</td>
</tr>
<tr>
<td></td>
<td>14.00%</td>
<td>0.1509</td>
<td>9.00%</td>
<td>0.596</td>
</tr>
<tr>
<td></td>
<td>15.00%</td>
<td>0.1572</td>
<td>10.00%</td>
<td>0.636</td>
</tr>
<tr>
<td></td>
<td>16.00%</td>
<td>0.168</td>
<td>11.00%</td>
<td><strong>0.655</strong></td>
</tr>
<tr>
<td></td>
<td>17.00%</td>
<td>0.184</td>
<td>12.00%</td>
<td>0.652</td>
</tr>
<tr>
<td></td>
<td>18.00%</td>
<td>0.2045</td>
<td>13.00%</td>
<td>0.636</td>
</tr>
<tr>
<td></td>
<td>19.00%</td>
<td>0.2282</td>
<td>14.00%</td>
<td>0.613</td>
</tr>
<tr>
<td>THAI</td>
<td>20.75%</td>
<td>0.3278</td>
<td>15.75%</td>
<td>0.480</td>
</tr>
</tbody>
</table>

![Graph showing optimal portfolio computation](image)

That's the one!
Optimal Overall Portfolio

E(r)

Indifference curve

Optimal complete portfolio (one example)

OPTIMAL RISKY PORTFOLIO

CAL

Opportunity set

σ
The Capital Asset Pricing Model

CAPM Says:

- All investors will choose to hold the market portfolio, ie all assets, in proportion to their market values.
- This market portfolio is the optimal risky portfolio.
- The part of a stock’s risk that is diversifiable does not matter to investors.
CAPM Says:

- The total risk of a financial asset is made up of two components.
  - A. Diversifiable (unsystematic) risk
  - B. Nondiversifiable (systematic) risk
- The only relevant risk is nondiversifiable risk.
The Equation for the CAPM

\[ r_j = R_F + \beta_j (r_m - R_F) \]

where:

- \( r_j \) = Required return on asset j;
- \( R_F \) = Risk-free rate of return
- \( \beta_j \) = Beta Coefficient for asset j;
- \( r_m \) = Market return

The term \([\beta_j(r_m - R_F)]\) is called the risk premium and \((r_m - R_F)\) is called the market risk premium.
The Capital Asset Pricing Model

- Uses variance as a measure of risk
- Specifies that only that portion of variance that is not diversifiable is rewarded.
- Measures the non-diversifiable risk with \textit{beta}, which is standardized around one.
- Translates beta into expected return:

\[ \text{Expected Return} = \text{Riskfree rate} + \text{Beta} \times \text{Risk Premium} \]
## Beta Coefficients for Selected Companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exxon-Mobil</td>
<td>0.33</td>
</tr>
<tr>
<td>AT&amp;T</td>
<td>0.84</td>
</tr>
<tr>
<td>IBM</td>
<td>1.47</td>
</tr>
<tr>
<td>Wal-Mart</td>
<td>0.91</td>
</tr>
<tr>
<td>GM</td>
<td>1.19</td>
</tr>
<tr>
<td>Microsoft</td>
<td>1.75</td>
</tr>
<tr>
<td>Harley-Davidson</td>
<td>1.33</td>
</tr>
<tr>
<td>AOL</td>
<td>2.68</td>
</tr>
</tbody>
</table>

Source: biz.yahoo.com
## Statistics at a Glance -- NYSE:IBM

### Price and Volume
- **52-Week Low:** $54.01 on 10-Oct-2002
- **Recent Price:** $64.19
- **52-Week High:** $124.00 on 10-Jan-2002
- **Beta:** 1.47
- **Daily Volume (3-month avg):** 9.20M
- **Daily Volume (10-day avg):** 7.36M

### Stock Performance
- **52-Week Change:** -32.4%
- **52-Week Change relative to S&P 500:** -14.1%

### Share-Related Items
- **Market Capitalization:** $142.38B
- **Shares Outstanding:** 1.69B
- **Float:** 1.67B

### Dividends & Splits
- **Annual Dividend (indicated):** $0.60
- **Dividend Yield:** 0.71%
- **Last Split factor 2 on 27-May-1999**

### Per-Share Data
- **Book Value (mrq):** $13.07
- **Earnings (tm):** $3.30
- **Earnings (mrq):** $0.99
- **Sales (tm):** $46.21
- **Cash (mrq):** $3.09

### Valuation Ratios
- **Price/Book (mrq):** 6.44
- **Price/Earnings (tm):** 25.53
- **Price/Sales (tm):** 1.62

### Income Statements
- **Sales (tm):** $80.3B
- **EBITDA (tm):** $11.1B
- **Income available to common (tm):** $5.76B

### Profitability
- **Profit Margin (tm):** 7.2%
- **Operating Margin (tm):** 7.4%

### Fiscal Year
- **Fiscal Year Ends:** 30-Sep
- **Most recent quarter:** 30-Sep-2002

### Management Effectiveness
- **Return on Assets (tm):** 6.78%
- **Return on Equity (tm):** 25.67%

### Financial Strength
- **Current Ratio (mrq):** 1.23
- **Debt/Equity (mrq):** 1.17
- **Total Cash (mrq):** $5.22B

### Short Interest
- **As of 9-Dec-2002**
  - **Shares Short:** 28.1M
  - **Percent of Float:** 1.7%
  - **Shares Short (Preliminary):** 30.2M
  - **Short Ratio:** 3.27
  - **Daily Volume:** 0.56M

---

*biz.yahoo.com*

**Enter symbol (IBM)**

**Click on “profile”**
Estimating Expected Returns

- IBM’s Beta = 1.47
- Riskfree Rate = 5.00% (Long term Government Bond rate)
- Risk Premium = 5.50% (Approximate historical premium)

Expected Return = 
5.00% + 1.47(5.50%) = 13.01%
From Cost of Equity to Cost of Capital

- The cost of capital is a composite cost to the firm of raising financing to fund its projects.
- It is the discount rate that will be applied to capital budgeting projects within the firm.
Cost of Debt, Based on Bond Yield and Tax Rate

Source: bondsonline.com

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSIP</td>
<td>459200AL5</td>
</tr>
<tr>
<td>Listed?</td>
<td>Yes</td>
</tr>
<tr>
<td>Ratings</td>
<td>A1/A+</td>
</tr>
<tr>
<td>Industry</td>
<td>Industrial</td>
</tr>
<tr>
<td>Delivery</td>
<td>Reg. &amp; B. E.</td>
</tr>
<tr>
<td>Dated Date</td>
<td>06-15-1993</td>
</tr>
<tr>
<td>First Coupon</td>
<td>12-15-1993</td>
</tr>
<tr>
<td>Pay Frequency</td>
<td>Semi-Annual</td>
</tr>
<tr>
<td>Settlement Date</td>
<td>01-14-2003</td>
</tr>
<tr>
<td>Coupon</td>
<td>7.500</td>
</tr>
<tr>
<td>Maturity</td>
<td>06-15-2013</td>
</tr>
<tr>
<td>Quantity Available</td>
<td>394</td>
</tr>
<tr>
<td>Order Quantity</td>
<td>100</td>
</tr>
<tr>
<td>Minimum Price</td>
<td>120.555</td>
</tr>
<tr>
<td>Yld to Mat</td>
<td>4.950</td>
</tr>
<tr>
<td>Yld to Call</td>
<td></td>
</tr>
<tr>
<td>Current Yld</td>
<td>6.221</td>
</tr>
</tbody>
</table>

| Income Before Tax    | $2,404,000,000 |
| Income Tax Expense   | $710,000,000   |

29%
The Cost of Capital

**Choice**
- Equity
  - Retained earnings
  - New stock issues
  - Warrants

**Cost**
- Cost of equity
  - depends upon riskiness of the stock
- Will be affected by level of interest rates

**Cost of equity = riskless rate + beta * risk premium**

2. Debt
- Bank borrowing
- Bond issues

**Cost of debt = Borrowing rate \( (1 - \text{tax rate}) \)**

Debt + equity = Cost of capital = Weighted average of cost of equity and cost of debt; weights based upon market value.

**Cost of capital = \( k_d \frac{D}{D+E} + k_e \frac{E}{D+E} \)**
Estimating Market Value Weights

- Market Value of Equity should include the following:
  - Market Value of Shares outstanding
  - Market Value of Warrants outstanding
  - Market Value of Conversion Option in Convertible Bonds

- Market Value of Debt is more difficult to estimate because few firms have only publicly traded debt. There are two solutions:
  - Assume book value of debt is equal to market value
  - Estimate the market value of debt from the book value
Estimating Cost of Capital: IBM

- **Equity**
  - Cost of Equity = 13.01%
  - Market Value of Equity = $142 Billion
  - Equity/(Debt+Equity) = 70%

- **Debt**
  - After-tax Cost of debt = 4.95% (1-.29) = 3.51%
  - Market Value of Debt = $62 Billion
  - Debt/(Debt + Equity) = 30%

- **Cost of Capital** = 13.01%(.70)+3.51%(.30) = 10.16%
Choosing a Hurdle Rate

- Either the cost of equity or the cost of capital can be used as a hurdle rate, depending upon whether the returns measured are to equity investors or to all claimholders on the firm (capital).
- If returns are measured to equity investors, the appropriate hurdle rate is the cost of equity.
- If returns are measured to capital (or the firm), the appropriate hurdle rate is the cost of capital.
First Principles of Corporate Finance

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners’ funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders’ characteristics.
- Minimize unneeded financial risk.
Summary: Risk and Return

- Equity risk and bond risk
- Risk in a portfolio context
- Risk and beta
- The required return on investments
Contact

Prof. Ian Giddy
NYU Stern School of Business
44 West 4th Street
New York, NY 10012

Tel 212-998-0426; Fax 212-995-4233
ian.giddy@nyu.edu
www.giddy.org