# The Anatomy of a Crisis: Implied ERP from September 12, 2008 to January 1, 2009

Implied Equity Risk Premium - 9/12- 12/31/08

*Aswath Damodaran*

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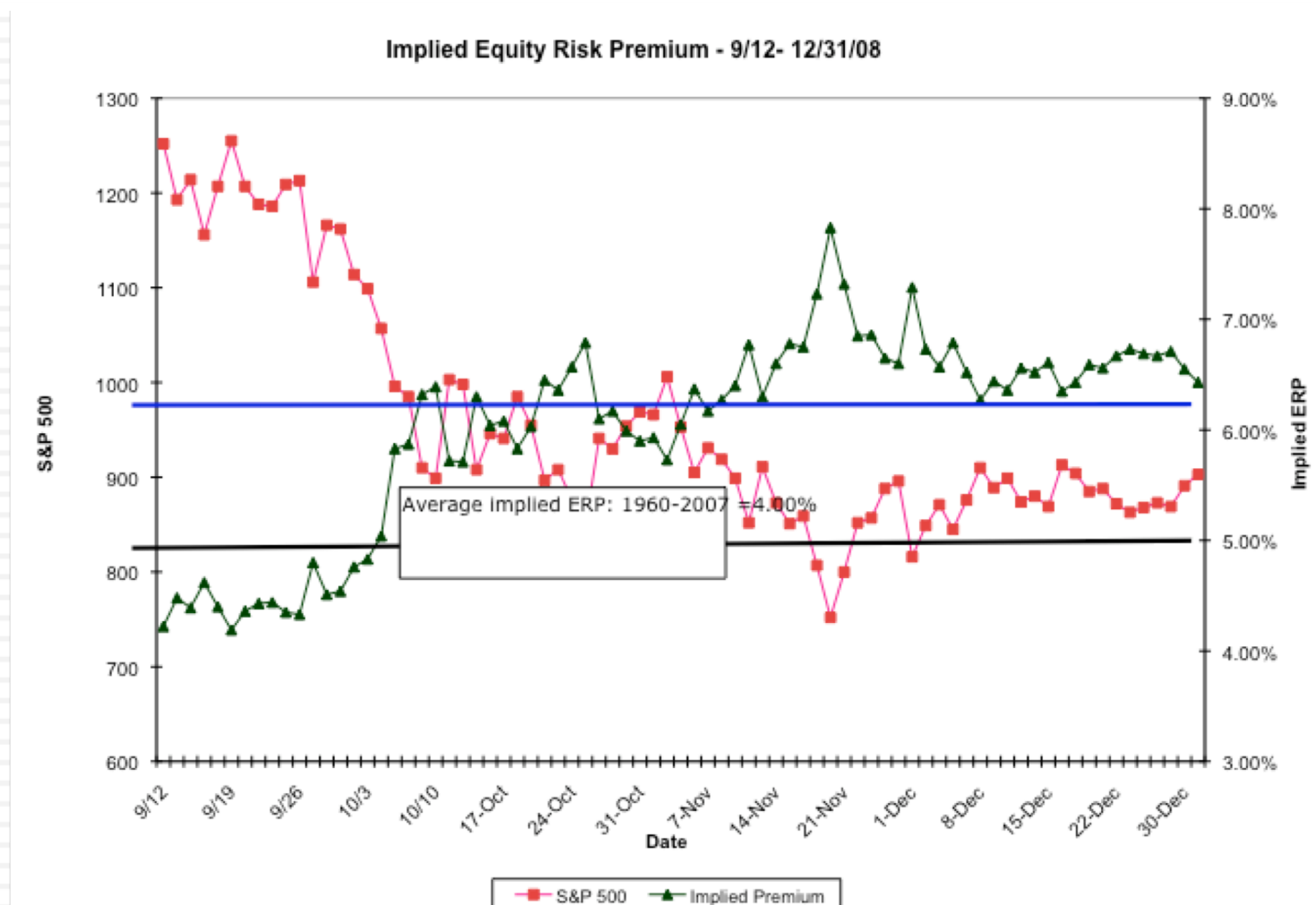
# An Updated Implied ERP



**Base year cash flow (last 12 mths)**
Dividends (TTM): 52.25
+ Buybacks (TTM): 84.40
= Cash to investors (TTM): **136.65**

**Expected cashflow growth in next 5 years**
Cash flow growth = Top down analyst estimate of earnings growth for S&P 500 = 4.12%

| | Last 12 months | 1 | 2 | 3 | 4 | 5 | Terminal Year |
|---|---|---|---|---|---|---|---|
| Expected Earnings | 148.34 | 154.46 | 160.83 | 167.46 | 174.37 | 181.56 | 186.43 |
| Expected Dividends + Buybacks = | 136.65 | $142.28 | $148.15 | $154.26 | $160.62 | $167.25 | 171.73 |

Earnings and Cash flows grow @2.68% (set equal to risk free rate) a year forever.

S&P 500 on 1/1/19= **2506.85**

$$2506.85 = \frac{142.28}{(1+r)} + \frac{148.15}{(1+r)^2} + \frac{154.26}{(1+r)^3} + \frac{160.62}{(1+r)^4} + \frac{167.25}{(1+r)^5} + \frac{167.25\,(1.0268)}{(r-.0268)(1+r)^5}$$

The last term in this equation is the expected index level at the end of year 5 (capturing price appreciaiton)

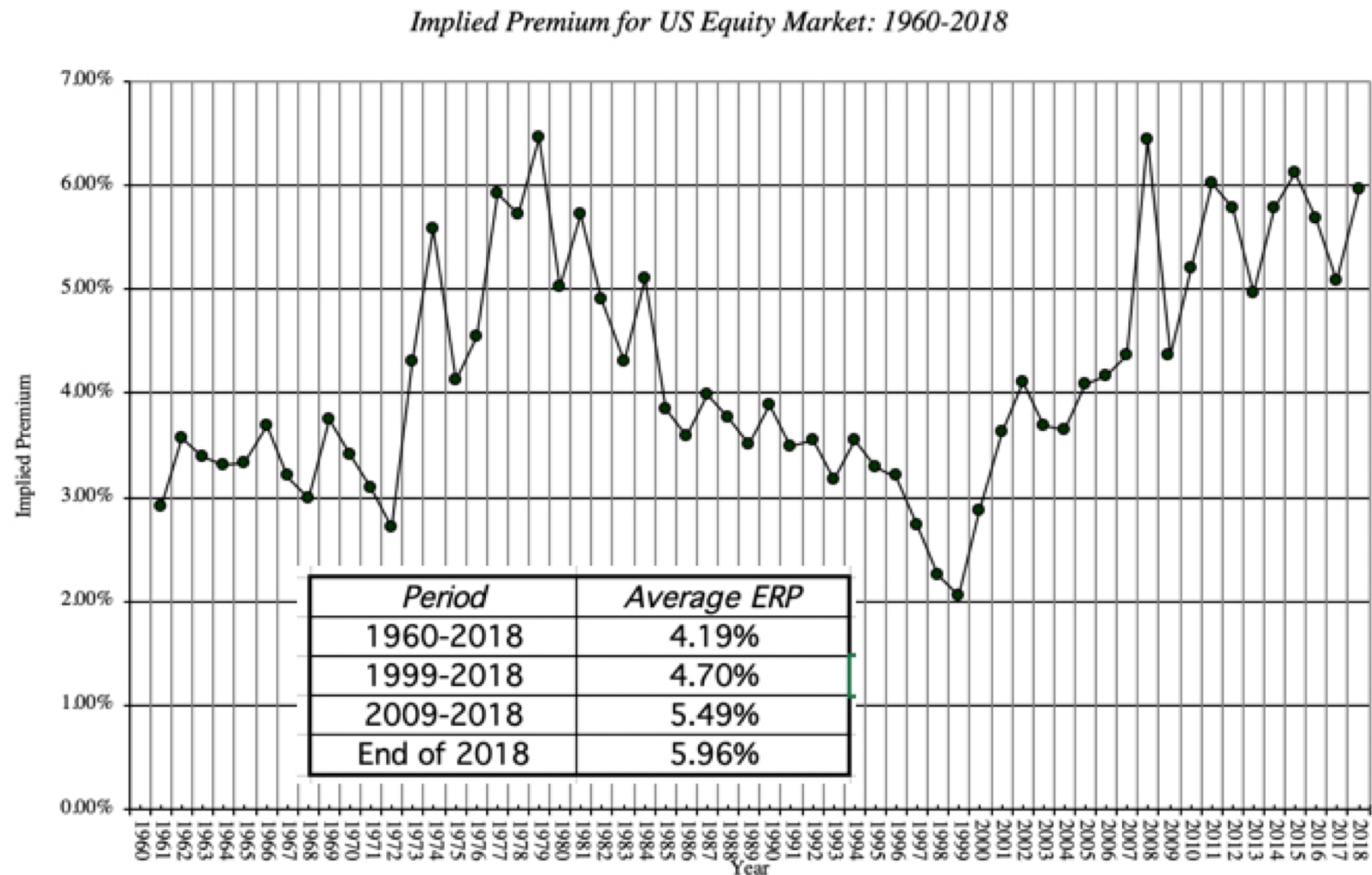**Solve for r**

r = Implied Expected Return on Stocks = 8.64%

*Minus*

Risk free rate = T.Bond rate on 1/1/19= 2.68%

*Equals*

Implied Equity Risk Premium (1/1/19) = 8.64% - 2.68% = **5.96%**

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# Implied Premiums in the US: 1960-2018



Implied Premium for US Equity Market: 1960-2018

| Period | Average ERP |
|--------|-------------|
| 1960-2018 | 4.19% |
| 1999-2018 | 4.70% |
| 2009-2018 | 5.49% |
| End of 2018 | 5.96% |

# A Composite way of estimating ERP for countries



ERP Estimation Procedure - January 1, 2019

**Step 1: Mature Market Premium**

Estimate the implied equity risk premium for S&P 500

On January 1, 2019, ERP for S&P 500 was roughly 5.96%

*Monthly*

**Step 2: Assess country risk**

Check the sovereign local currency rating for the country, with Moody's.

If rating not available on Moody's, check on S&P & convert into Moody's equivalent

**Step 3: Convert country risk measure into an additional country risk premium for equity**

if sovereign rating is AAA

If sovereign rating is less than AAA, get a default spread for the country, using one of
1. Spread on sovereign bond in US$
2. CDS spread
3. Ratings table

Relative Equity Market Volatility = Std dev of emerging market equity index/ Std dev of emerging market bond index

In January 2019= 1.23

If there is no sovereign rating, get a country risk score from PRS.

Estimate an ERP based on PRS score

**Step 4: Estimate an ERP for country**

ERP for country = US ERP

ERP for country = US ERP + Default Spread * Relative Equity Market Volatility

ERP for country = PRS-based ERP

*Every six months (in January and July)*

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**ERP : Jan 2019**

### Western Europe

| Country | ERP | CRP | Country | ERP | CRP |
|---|---|---|---|---|---|
| Andorra | 8.60% | 2.64% | Italy | 9.02% | 3.06% |
| Austria | 6.51% | 0.55% | Jersey (States of) | 6.80% | 0.84% |
| Belgium | 6.80% | 0.84% | Liechtenstein | 5.96% | 0.00% |
| Cyprus | 10.13% | 4.17% | Luxembourg | 5.96% | 0.00% |
| Denmark | 5.96% | 0.00% | Malta | 7.63% | 1.67% |
| Finland | 6.51% | 0.55% | Netherlands | 5.96% | 0.00% |
| France | 6.65% | 0.69% | Norway | 5.96% | 0.00% |
| Germany | 5.96% | 0.00% | Portugal | 9.02% | 3.06% |
| Greece | 14.99% | 9.03% | Spain | 8.18% | 2.22% |
| Guernsey (States of) | 6.80% | 0.84% | Sweden | 5.96% | 0.00% |
| Iceland | 7.63% | 1.67% | Switzerland | 5.96% | 0.00% |
| Ireland | 7.14% | 1.18% | Turkey | 10.96% | 5.00% |
| Isle of Man | 6.65% | 0.69% | United Kingdom | 6.65% | 0.69% |
| | | | **Western Europe** | **7.11%** | **1.15%** |

### North America

| | ERP | CRP |
|---|---|---|
| Canada | 5.96% | 0.00% |
| United States | 5.96% | 0.00% |
| **North America** | **5.96%** | **0.00%** |

| | ERP | CRP |
|---|---|---|
| **Caribbean** | **13.61%** | **7.65%** |

### Central and South America

| Country | ERP | CRP |
|---|---|---|
| Argentina | 13.60% | 7.64% |
| Belize | 14.99% | 9.03% |
| Bolivia | 10.96% | 5.00% |
| Brazil | 10.13% | 4.17% |
| Chile | 6.94% | 0.98% |
| Colombia | 8.60% | 2.64% |
| Costa Rica | 12.21% | 6.25% |
| Ecuador | 14.99% | 9.03% |
| El Salvador | 16.37% | 10.41% |
| Guatemala | 9.43% | 3.47% |
| Honduras | 12.21% | 6.25% |
| Mexico | 7.63% | 1.67% |
| Nicaragua | 13.60% | 7.64% |
| Panama | 8.60% | 2.64% |
| Paraguay | 9.43% | 3.47% |
| Peru | 7.63% | 1.67% |
| Suriname | 13.60% | 7.64% |
| Uruguay | 8.60% | 2.64% |
| Venezuela | 28.10% | 22.14% |
| **Central and South America** | **10.61%** | **4.65%** |

### Africa

| Country | ERP | CRP |
|---|---|---|
| Angola | 14.99% | 9.03% |
| Benin | 12.21% | 6.25% |
| Botswana | 7.14% | 1.18% |
| Burkina Faso | 13.60% | 7.64% |
| Cameroon | 13.60% | 7.64% |
| Cape Verde | 13.60% | 7.64% |
| Congo (DR) | 14.99% | 9.03% |
| Congo (Rep) | 18.46% | 12.50% |
| Côte d'Ivoire | 10.96% | 5.00% |
| Egypt | 14.99% | 9.03% |
| Ethiopia | 12.21% | 6.25% |
| Gabon | 16.37% | 10.41% |
| Ghana | 14.99% | 9.03% |
| Kenya | 13.60% | 7.64% |
| Morocco | 9.43% | 3.47% |
| Mozambique | 19.83% | 13.87% |
| Namibia | 9.43% | 3.47% |
| Nigeria | 13.60% | 7.64% |
| Rwanda | 13.60% | 7.64% |
| Senegal | 10.96% | 5.00% |
| South Africa | 9.02% | 3.06% |
| Swaziland | 13.60% | 7.64% |
| Tanzania | 12.21% | 6.25% |
| Tunisia | 13.60% | 7.64% |
| Uganda | 13.60% | 7.64% |
| Zambia | 16.37% | 10.41% |
| **Africa** | **12.63%** | **6.67%** |

### Eastern Europe & Russia

| Country | ERP | CRP |
|---|---|---|
| Albania | 12.21% | 6.25% |
| Armenia | 12.21% | 6.25% |
| Azerbaijan | 10.13% | 4.17% |
| Belarus | 14.99% | 9.03% |
| Bosnia and Herzegovina | 14.99% | 9.03% |
| Bulgaria | 8.60% | 2.64% |
| Croatia | 10.13% | 4.17% |
| Czech Republic | 6.94% | 0.98% |
| Estonia | 6.94% | 0.98% |
| Georgia | 10.13% | 4.17% |
| Hungary | 9.02% | 3.06% |
| Kazakhstan | 9.02% | 3.06% |
| Kyrgyzstan | 13.60% | 7.64% |
| Latvia | 7.63% | 1.67% |
| Lithuania | 7.63% | 1.67% |
| Macedonia | 10.96% | 5.00% |
| Moldova | 14.99% | 9.03% |
| Montenegro | 12.21% | 6.25% |
| Poland | 7.14% | 1.18% |
| Romania | 9.02% | 3.06% |
| Russia | 9.43% | 3.47% |
| Serbia | 10.96% | 5.00% |
| Slovakia | 7.14% | 1.18% |
| Slovenia | 8.18% | 2.22% |
| Tajikistan | 9.43% | 3.47% |
| Ukraine | 18.46% | 12.50% |
| **Eastern Europe & Russia** | **9.24%** | **3.28%** |

### Middle East

| Country | ERP | CRP |
|---|---|---|
| Abu Dhabi | 6.65% | 0.69% |
| Bahrain | 13.60% | 7.64% |
| Iraq | 16.37% | 10.41% |
| Israel | 6.94% | 0.98% |
| Jordan | 12.21% | 6.25% |
| Kuwait | 6.65% | 0.69% |
| Lebanon | 14.99% | 9.03% |
| Oman | 9.02% | 3.06% |
| Qatar | 6.80% | 0.84% |
| Ras Al Khaimah (Emirate of) | 7.14% | 1.18% |
| Saudi Arabia | 6.94% | 0.98% |
| Sharjah | 7.63% | 1.67% |
| United Arab Emirates | 6.65% | 0.69% |
| **Middle East** | **7.96%** | **2.00%** |

### Africa (PRS table)

| Country | PRS | ERP | CRP | Country | PRS | ERP | CRP |
|---|---|---|---|---|---|---|---|
| Algeria | 65 | 13.60% | 7.64% | Malawi | 61 | 16.37% | 10.41% |
| Brunei | 80.5 | 6.94% | 0.98% | Mali | 61.3 | 16.37% | 10.41% |
| Gambia | 63.3 | 14.99% | 9.03% | Myanmar | 62 | 16.37% | 10.41% |
| Guinea | 54.3 | 22.61% | 16.65% | Niger | 54.5 | 22.61% | 16.65% |
| Guinea-Bissau | 62 | 16.37% | 10.41% | Sierra Leone | 54.8 | 22.61% | 16.65% |
| Guyana | 66.5 | 12.21% | 6.25% | Somalia | 53.5 | 22.61% | 16.65% |
| Haiti | 60 | 18.46% | 12.50% | Sudan | 38.8 | 28.10% | 22.14% |
| Iran | 69.3 | 10.13% | 4.17% | Syria | 51.8 | 22.61% | 16.65% |
| Korea, D.P.R. | 53 | 22.61% | 16.65% | Togo | 61 | 16.37% | 10.41% |
| Liberia | 53.5 | 22.61% | 16.65% | Yemen, Republic | 48 | 28.10% | 22.14% |
| Libya | 66.5 | 12.21% | 6.25% | Zimbabwe | 59.3 | 18.46% | 12.50% |
| Madagascar | 64 | 14.99% | 9.03% | | | | |

### Asia

| Country | ERP | CRP |
|---|---|---|
| Bangladesh | 10.96% | 5.00% |
| Cambodia | 13.60% | 7.64% |
| China | 6.94% | 0.98% |
| Fiji | 10.96% | 5.00% |
| Hong Kong | 6.65% | 0.69% |
| India | 8.60% | 2.64% |
| Indonesia | 8.60% | 2.64% |
| Japan | 6.94% | 0.98% |
| Korea | 6.65% | 0.69% |
| Macao | 6.80% | 0.84% |
| Malaysia | 7.63% | 1.67% |
| Maldives | 13.60% | 7.64% |
| Mauritius | 8.18% | 2.22% |
| Mongolia | 14.99% | 9.03% |
| Pakistan | 14.99% | 9.03% |
| Papua New Guinea | 13.60% | 7.64% |
| Philippines | 8.60% | 2.64% |
| Singapore | 5.96% | 0.00% |
| Solomon Islands | 14.99% | 9.03% |
| Sri Lanka | 12.21% | 6.25% |
| Taiwan | 8.18% | 2.22% |
| Thailand | 8.18% | 2.22% |
| Vietnam | 10.96% | 5.00% |
| **Asia** | **7.43%** | **1.47%** |

### Australia & New Zealand

| | ERP | CRP |
|---|---|---|
| Australia | 5.96% | 0.00% |
| Cook Islands | 12.21% | 6.25% |
| New Zealand | 5.96% | 0.00% |
| **Australia & New Zealand** | **5.96%** | **0.00%** |

*Black #: Total ERP*
*Red #: Country risk premium*
*Regional #: GDP weighted average*

# Application Test: Estimating a Market Risk Premium

- For your company, get the geographical breakdown of revenues in the most recent year. Based upon this revenue breakdown and the most recent country risk premiums, estimate the equity risk premium that you would use for your company.

- This computation was based entirely on revenues. With your company, what concerns would you have about your estimate being too high or too low?

*Aswath Damodaran*

# Estimating Beta

- The standard procedure for estimating betas is to regress stock returns ($R_j$) against market returns ($R_m$):

$$R_j = a + b\, R_m$$

where a is the intercept and b is the slope of the regression.

- The slope of the regression corresponds to the beta of the stock, and measures the riskiness of the stock.

- The R squared ($R^2$) of the regression provides an estimate of the proportion of the risk (variance) of a firm that can be attributed to market risk.  The balance ($1 - R^2$) can be attributed to firm specific risk.

*Aswath Damodaran*

# Estimating Performance

□ The intercept of the regression provides a simple measure of performance during the period of the regression, relative to the capital asset pricing model.

$R_j$     = $R_f$ + b ($R_m$ - $R_f$)

          = $R_f$ (1-b) + b $R_m$          ........... Capital Asset Pricing Model

$R_j$     = a          + b $R_m$          ........... Regression Equation

□ If

a > $R_f$ (1-b) .... Stock did better than expected during regression period

a = $R_f$ (1-b) .... Stock did as well as expected during regression period

a < $R_f$ (1-b) .... Stock did worse than expected during regression period

□ The difference between the intercept and Rf (1-b) is Jensen's alpha. If it is positive, your stock did perform better than expected during the period of the regression.

*Aswath Damodaran*

# Setting up for the Estimation

- ☐ **Decide on an estimation period**
  - ❏ Services use periods ranging from 2 to 5 years for the regression
  - ❏ Longer estimation period provides more data, but firms change.
  - ❏ Shorter periods can be affected more easily by significant firm-specific event that occurred during the period
- ❏ **Decide on a return interval - daily, weekly, monthly**
  - ❏ Shorter intervals yield more observations, but suffer from more noise.
  - ❏ Noise is created by stocks not trading and biases all betas towards one.
- ☐ **Estimate returns (including dividends) on stock**
  - ❏ Return = $(\text{Price}_{End} - \text{Price}_{Beginning} + \text{Dividends}_{Period}) / \text{Price}_{Beginning}$
  - ❏ Included dividends only in ex-dividend month
- ☐ **Choose a market index, and estimate returns (inclusive of dividends) on the index for each interval for the period.**

*Aswath Damodaran*

# Choosing the Parameters: Disney

□ Period used: 5 years

□ Return Interval = Monthly

□ Market Index: S&P 500 Index.

□ For instance, to calculate returns on Disney in December 2009,

- Price for Disney at end of November 2009 = $ 30.22
- Price for Disney at end of December 2009 = $ 32.25
- Dividends during month = $0.35 (It was an ex-dividend month)
- Return =($32.25 - $30.22 + $ 0.35)/$30.22= 7.88%

□ To estimate returns on the index in the same month

- Index level at end of November 2009 = 1095.63
- Index level at end of December 2009 = 1115.10
- Dividends on index in December 2009 = 1.683
- Return =(1115.1 – 1095.63+1.683)/ 1095.63 = 1.78%

# Disney's Historical Beta
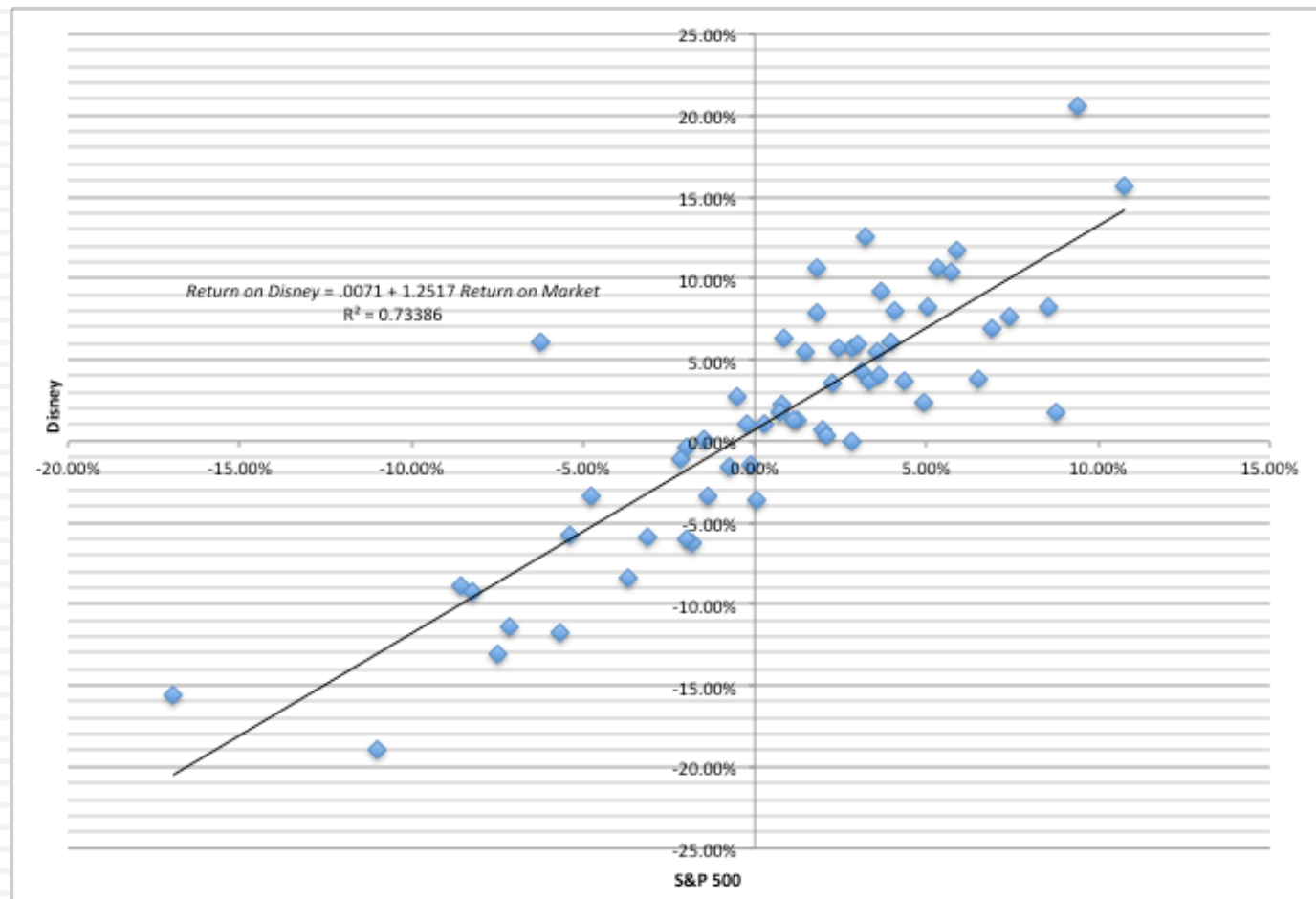


*Return on Disney = .0071 + 1.2517 Return on Market*            R² = 0.73386
(0.10)

# Analyzing Disney's Performance

- Intercept = 0.712%
    - This is an intercept based on monthly returns. Thus, it has to be compared to a monthly riskfree rate.
    - Between 2008 and 2013
        - Average Annualized T.Bill rate = 0.50%
        - Monthly Riskfree Rate = 0.5%/12 = 0.042%
        - Riskfree Rate (1-Beta) = 0.042% (1-1.252) =  -.0105%
- The Comparison is then between
    - Intercept    versus    Riskfree Rate (1 - Beta)
    - 0.712%        versus    0.0105%
    - Jensen's Alpha = 0.712% - (-0.0105)% = 0.723%
- Disney did 0.723% better than expected, per month, between October 2008 and September 2013
    - Annualized, Disney's annual excess return = $(1.00723)^{12} -1$ = 9.02%

# More on Jensen's Alpha

- □ If you did this analysis on every stock listed on an exchange, what would the average Jensen's alpha be across all stocks?

  a. Depend upon whether the market went up or down during the period

  b. Should be zero

  c. Should be greater than zero, because stocks tend to go up more often than down.

- □ Disney has a positive Jensen's alpha of 9.02% a year between 2008 and 2013. This can be viewed as a sign that management in the firm did a good job, managing the firm during the period.

  a. True

  b. False

- □ Disney has had a positive Jensen's alpha between 2008 and 2013. If you were an investor in early 2014, looking at the stock, you would view this as a sign that the stock will be a:

  a. Good investment for the future

  b. Bad investment for the future

  c. No information about the future

*Aswath Damodaran*

# Estimating Disney's Beta

- Slope of the Regression of 1.25 is the beta

- Regression parameters are always estimated with error. The error is captured in the standard error of the beta estimate, which in the case of Disney is 0.10.

- Assume that I asked you what Disney's true beta is, after this regression.

  - What is your best point estimate?

  - What range would you give me, with 67% confidence?

  - What range would you give me, with 95% confidence?

*Aswath Damodaran*

# The Dirty Secret of "Standard Error"

Distribution of Standard Errors: Beta Estimates for U.S. stocks



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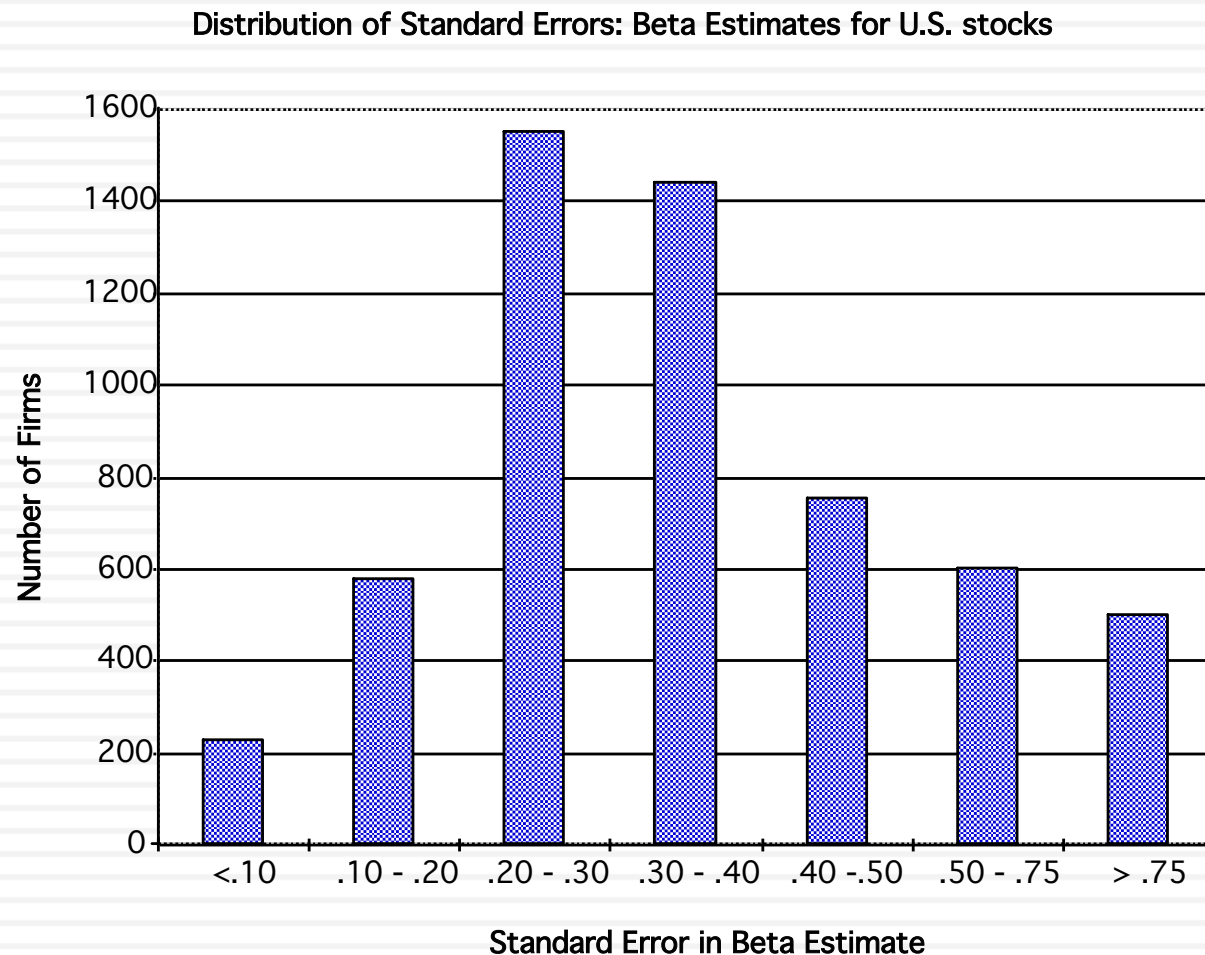
# Breaking down Disney's Risk

- R Squared = 73%
- This implies that
  - 73% of the risk at Disney comes from market sources
  - 27%, therefore, comes from firm-specific sources
- The firm-specific risk is diversifiable and will not be rewarded.
- The R-squared for companies, globally, has increased significantly since 2008. Why might this be happening?

- What are the implications for investors?

# The Relevance of R Squared

☐ You are a diversified investor trying to decide whether you should invest in Disney or Amgen. They both have betas of 1.25, but Disney has an R Squared of 73% while Amgen's R squared is only 25%. Which one would you invest in?

  ▪ Amgen, because it has the lower R squared

  ▪ Disney, because it has the higher R squared

  ▪ You would be indifferent

☐ Would your answer be different if you were an undiversified investor?

*Aswath Damodaran*

# Beta Estimation: Using a Service (Bloomberg)
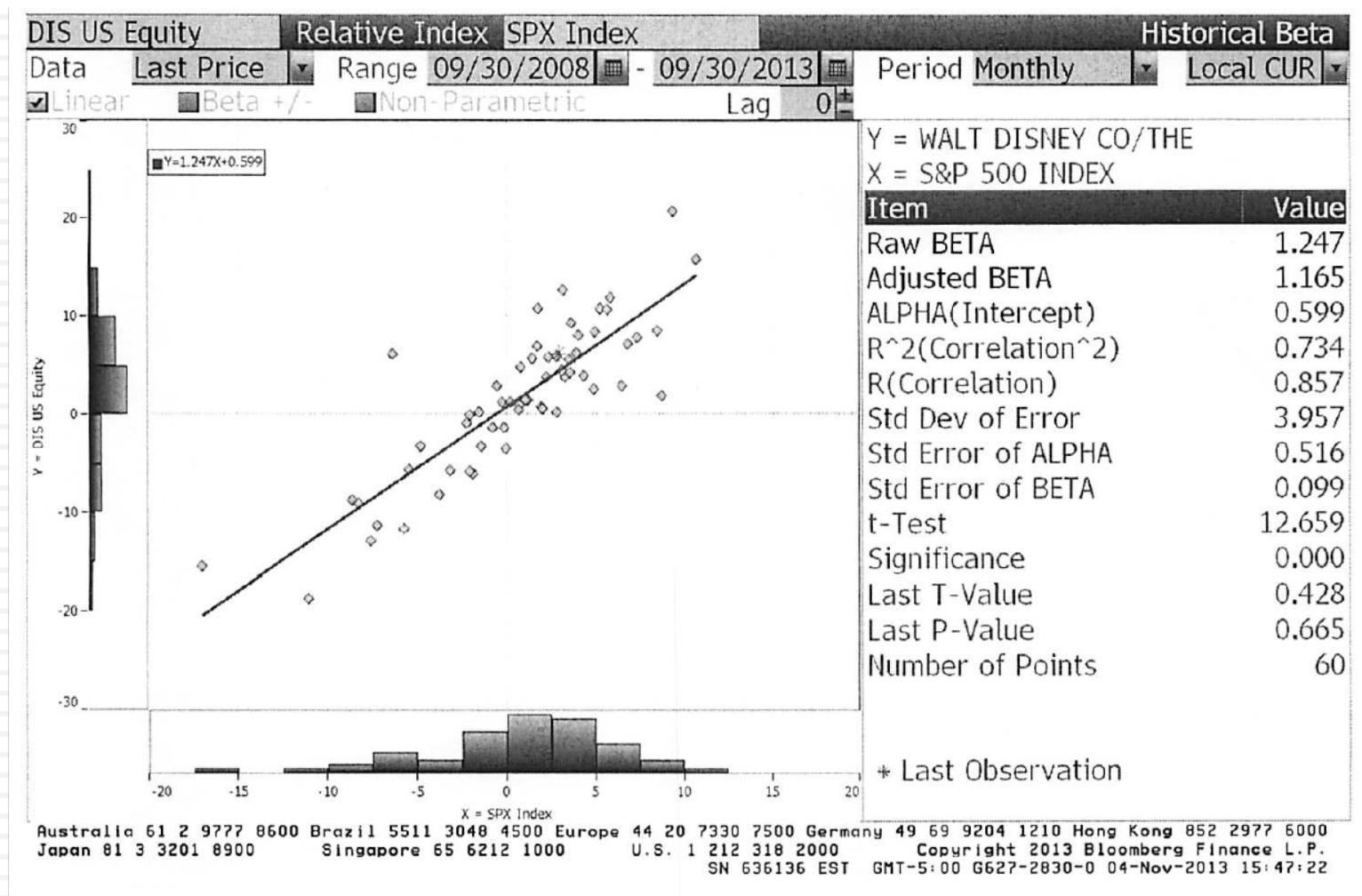
# Estimating Expected Returns for Disney in November 2013

- Inputs to the expected return calculation
  - Disney's Beta = 1.25
  - Riskfree Rate = 2.75% (U.S. ten-year T.Bond rate in November 2013)
  - Risk Premium = 5.76% (Based on Disney's operating exposure)

Expected Return =  Riskfree Rate + Beta (Risk Premium)

    =  2.75%       + 1.25 (5.76%) = 9.95%

*Aswath Damodaran*

# Use to a Potential Investor in Disney

- As a potential investor in Disney, what does this expected return of 9.95% tell you?

  - This is the return that I can expect to make in the long term on Disney, if the stock is correctly priced and the CAPM is the right model for risk,

  - This is the return that I need to make on Disney in the long term to break even on my investment in the stock

  - Both

- Assume now that you are an active investor and that your research suggests that an investment in Disney will yield 12.5% a year for the next 5 years. Based upon the expected return of 9.95%, you would

  - Buy the stock

  - Sell the stock

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# How managers use this expected return

- **Managers at Disney**
  - need to make at least 9.95% as a return for their equity investors to break even.
  - this is the hurdle rate for projects, when the investment is analyzed from an equity standpoint

- In other words, Disney's cost of equity is 9.95%.

- What is the cost of not delivering this cost of equity?