Historical ERP: A Historical Snapshot

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2021	8.49%	6.71%	6.69%	5.13%
Std Error	2.05%	2.17%		
1972-2021	8.04%	5.47%	6.70%	4.47%
Std Error	2.44%	2.76%		
2012-2021	16.47%	14.39%	15.89%	14.00%
Std Error	3.88%	4.59%		

Historical premium for the US

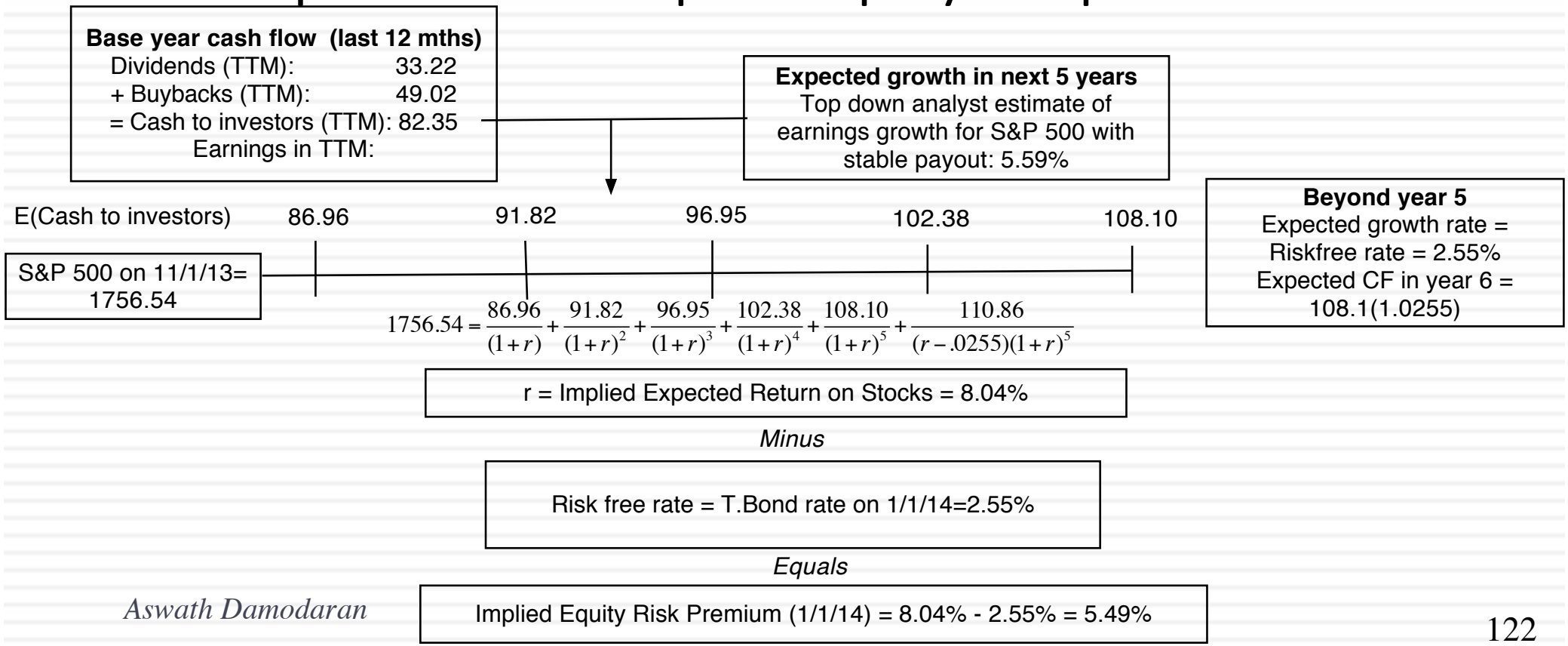
- If you are going to use a historical risk premium, make it
  - Long term (because of the standard error)
  - Consistent with your choice of risk free rate
  - A "compounded" average
- No matter which estimate you use, recognize that it is backward looking, is noisy and may reflect selection bias.

3. A Forward Looking ERP

- For a start: If you know the price paid for an asset and have estimates of the expected cash flows on the asset, you can estimate the IRR of these cash flows. If you paid the price, this is your expected return.
- Stock Price & Risk: If you assume that stocks are correctly priced in the aggregate and you can estimate the expected cashflows from buying stocks, you can estimate the expected rate of return on stocks by finding that discount rate that makes the present value equal to the price paid.
- Implied ERP: Subtracting out the riskfree rate should yield an implied equity risk premium. This implied equity premium is a forward-looking number and can be updated as often as you want.

Implied ERP in November 2013: Watch what I pay, not what I say..

- If you can observe what investors are willing to pay for stocks, you can back out an expected return from that price and an implied equity risk premium.



The bottom line on Equity Risk Premiums in November 2013

- Mature Markets: In November 2013, the number that we chose to use as the equity risk premium for all mature markets was 5.5%. This was set equal to the implied premium at that point in time and it was much higher than the historical risk premium of 4.20% prevailing then (1928-2012 period).

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2012	7.65%	5.88%	5.74%	4.20%
	2.20%	2.33%		
1962-2012	5.93%	3.91%	4.60%	2.93%
	2.38%	2.66%		
2002-2012	7.06%	3.08%	5.38%	1.71%
	5.82%	8.11%		

- For emerging markets, we will use the melded default spread approach (where default spreads are scaled up to reflect additional equity risk) to come up with the additional risk premium that we will add to the mature market premium. Thus, markets in countries with lower sovereign ratings will have higher risk premiums that 5.5%.

Emerging Market ERP = 5.5% + Country Default Spread* $\left(\frac{\sigma_{\text{Equity}}}{\sigma_{\text{Country Bond}}}\right)$

What about equity risk premiums for other markets?

- Historical data for markets outside the United States is available for much shorter time periods. The problem is even greater in emerging markets.
- The historical premiums that emerge from this data reflects this data problem and there is much greater error associated with the estimates of the premiums.
- You could try to compute implied equity risk premiums but getting the inputs, especially for long term growth are difficult to do.

One solution: Bond default spreads as CRP – November 2013

- In November 2013, the equity risk premium for the US was 5.50% Using the default spread on the sovereign bond or based upon the sovereign rating and adding that spread to the mature market premium (4.20% for the US) gives you a total ERP for a country.

Country	Rating	Default Spread (Country Risk Premium)	US ERP	Total ERP for country
India	Baa3	2.25%	5.50%	7.75%
China	Aa3	0.80%	5.50%	6.30%
Brazil	Baa2	2.00%	5.50%	7.50%

- If you prefer CDS spreads:

Country	*Sovereign CDS Spread*	*US ERP*	*Total ERP for country*
India	4.20%	5.50%	9.70%
China	1.20%	5.50%	6.70%
Brazil	2.59%	5.50%	8.09%

Beyond the default spread? Equities are riskier than bonds

- While default risk spreads and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads. One approach to scaling up the premium is to look at the relative volatility of equities to bonds and to scale up the default spread to reflect this:

$$\text{Country Risk Premium} = \text{Country Default Spread} * \left(\frac{\sigma_{\text{Equity}}}{\sigma_{\text{Country Bond}}} \right)$$

- Brazil: The annualized standard deviation in the Brazilian equity index over the previous year is 21 percent, whereas the annualized standard deviation in the Brazilian C-bond is 14 percent.

Brazil's Equity Risk Premium = 5.50% + 2.00% (21%/14%) = 8.50%

- Using the same approach for China and India:
  - China's Equity Risk Premium = 5.50% + 0.80% (18%/10%) = 6.94%
  - India's Equity Risk Premium = 5.50% + 2.25% (24%/17%) = 9.10%

A Composite way of estimating ERP for countries

Step 1: Estimate an equity risk premium for a mature market. If your preference is for a forward looking, updated number, you can estimate an implied equity risk premium for the US (assuming that you buy into the contention that it is a mature market)

- My estimate: In November 2013, my estimate for the implied premium in the US was 5.5%. That will also be my estimate for a mature market ERP.

Step 2: Come up with a generic and measurable definition of a mature market.

- My estimate: Any AAA rated country is mature.

Step 3: Estimate the additional risk premium that you will charge for markets that are not mature. You have two choices:

- The default spread for the country, estimated based either on sovereign ratings or the CDS market.
- A scaled up default spread, where you adjust the default spread upwards for the additional risk in equity markets.

ERP : Nov 2013

Andorra	7.45%	1.95%
Austria	5.50%	0.00%
Belgium	6.70%	1.20%
Cyprus	22.00%	16.50%
Denmark	5.50%	0.00%
Finland	5.50%	0.00%
France	5.95%	0.45%
Germany	5.50%	0.00%
Greece	15.63%	10.13%
Iceland	8.88%	3.38%
Ireland	9.63%	4.13%
Italy	8.50%	3.00%
Liechtenstein	5.50%	0.00%
Luxembourg	5.50%	0.00%
Malta	7.45%	1.95%
Netherlands	5.50%	0.00%
Norway	5.50%	0.00%
Portugal	10.90%	5.40%
Spain	8.88%	3.38%
Sweden	5.50%	0.00%
Switzerland	5.50%	0.00%
Turkey	8.88%	3.38%
United Kingdom	5.95%	0.45%
Western Europe	**6.72%**	**1.22%**

Canada	5.50%	0.00%
United States of America	5.50%	0.00%
North America	**5.50%**	**0.00%**

Argentina	15.63%	10.13%
Belize	19.75%	14.25%
Bolivia	10.90%	5.40%
Brazil	8.50%	3.00%
Chile	6.70%	1.20%
Colombia	8.88%	3.38%
Costa Rica	8.88%	3.38%
Ecuador	17.50%	12.00%
El Salvador	10.90%	5.40%
Guatemala	9.63%	4.13%
Honduras	13.75%	8.25%
Mexico	8.05%	2.55%
Nicaragua	15.63%	10.13%
Panama	8.50%	3.00%
Paraguay	10.90%	5.40%
Peru	8.50%	3.00%
Suriname	10.90%	5.40%
Uruguay	8.88%	3.38%
Venezuela	12.25%	6.75%
Latin America	**9.44%**	**3.94%**

Country	*TRP*	*CRP*
Angola	10.90%	5.40%
Benin	13.75%	8.25%
Botswana	7.15%	1.65%
Burkina Faso	13.75%	8.25%
Cameroon	13.75%	8.25%
Cape Verde	12.25%	6.75%
Egypt	17.50%	12.00%
Gabon	10.90%	5.40%
Ghana	12.25%	6.75%
Kenya	12.25%	6.75%
Morocco	9.63%	4.13%
Mozambique	12.25%	6.75%
Namibia	8.88%	3.38%
Nigeria	10.90%	5.40%
Rwanda	13.75%	8.25%
Senegal	12.25%	6.75%
South Africa	8.05%	2.55%
Tunisia	10.23%	4.73%
Uganda	12.25%	6.75%
Zambia	12.25%	6.75%
Africa	**11.22%**	**5.82%**

Albania	12.25%	6.75%
Armenia	10.23%	4.73%
Azerbaijan	8.88%	3.38%
Belarus	15.63%	10.13%
Bosnia	15.63%	10.13%
Bulgaria	8.50%	3.00%
Croatia	9.63%	4.13%
Czech Republic	6.93%	1.43%
Estonia	6.93%	1.43%
Georgia	10.90%	5.40%
Hungary	9.63%	4.13%
Kazakhstan	8.50%	3.00%
Latvia	8.50%	3.00%
Lithuania	8.05%	2.55%
Macedonia	10.90%	5.40%
Moldova	15.63%	10.13%
Montenegro	10.90%	5.40%
Poland	7.15%	1.65%
Romania	8.88%	3.38%
Russia	8.05%	2.55%
Serbia	10.90%	5.40%
Slovakia	7.15%	1.65%
Slovenia	9.63%	4.13%
Ukraine	15.63%	10.13%
E. Europe & Russia	**8.60%**	**3.10%**

Bangladesh	10.90%	5.40%
Cambodia	13.75%	8.25%
China	6.94%	1.44%
Fiji	12.25%	6.75%
Hong Kong	5.95%	0.45%
India	9.10%	3.60%
Indonesia	8.88%	3.38%
Japan	6.70%	1.20%
Korea	6.70%	1.20%
Macao	6.70%	1.20%
Malaysia	7.45%	1.95%
Mauritius	8.05%	2.55%
Mongolia	12.25%	6.75%
Pakistan	17.50%	12.00%
Papua NG	12.25%	6.75%
Philippines	9.63%	4.13%
Singapore	5.50%	0.00%
Sri Lanka	12.25%	6.75%
Taiwan	6.70%	1.20%
Thailand	8.05%	2.55%
Vietnam	13.75%	8.25%
Asia	**7.27%**	**1.77%**

Bahrain	8.05%	2.55%
Israel	6.93%	1.43%
Jordan	12.25%	6.75%
Kuwait	6.40%	0.90%
Lebanon	12.25%	6.75%
Oman	6.93%	1.43%
Qatar	6.40%	0.90%
Saudi Arabia	6.70%	1.20%
United Arab Emirates	6.40%	0.90%
Middle East	**6.88%**	**1.38%**

Australia	5.50%	0.00%
Cook Islands	12.25%	6.75%
New Zealand	5.50%	0.00%
Australia & NZ	**5.50%**	**0.00%**

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

Aswath Damodaran

Estimating ERP for Disney: November 2013

- Incorporation: The conventional practice on equity risk premiums is to estimate an ERP based upon where a company is incorporated. Thus, the cost of equity for Disney would be computed based on the US equity risk premium, because it is a US company, and the Brazilian ERP would be used for Vale, because it is a Brazilian company.
- Operations: The more sensible practice on equity risk premium is to estimate an ERP based upon where a company operates. For Disney in 2013:

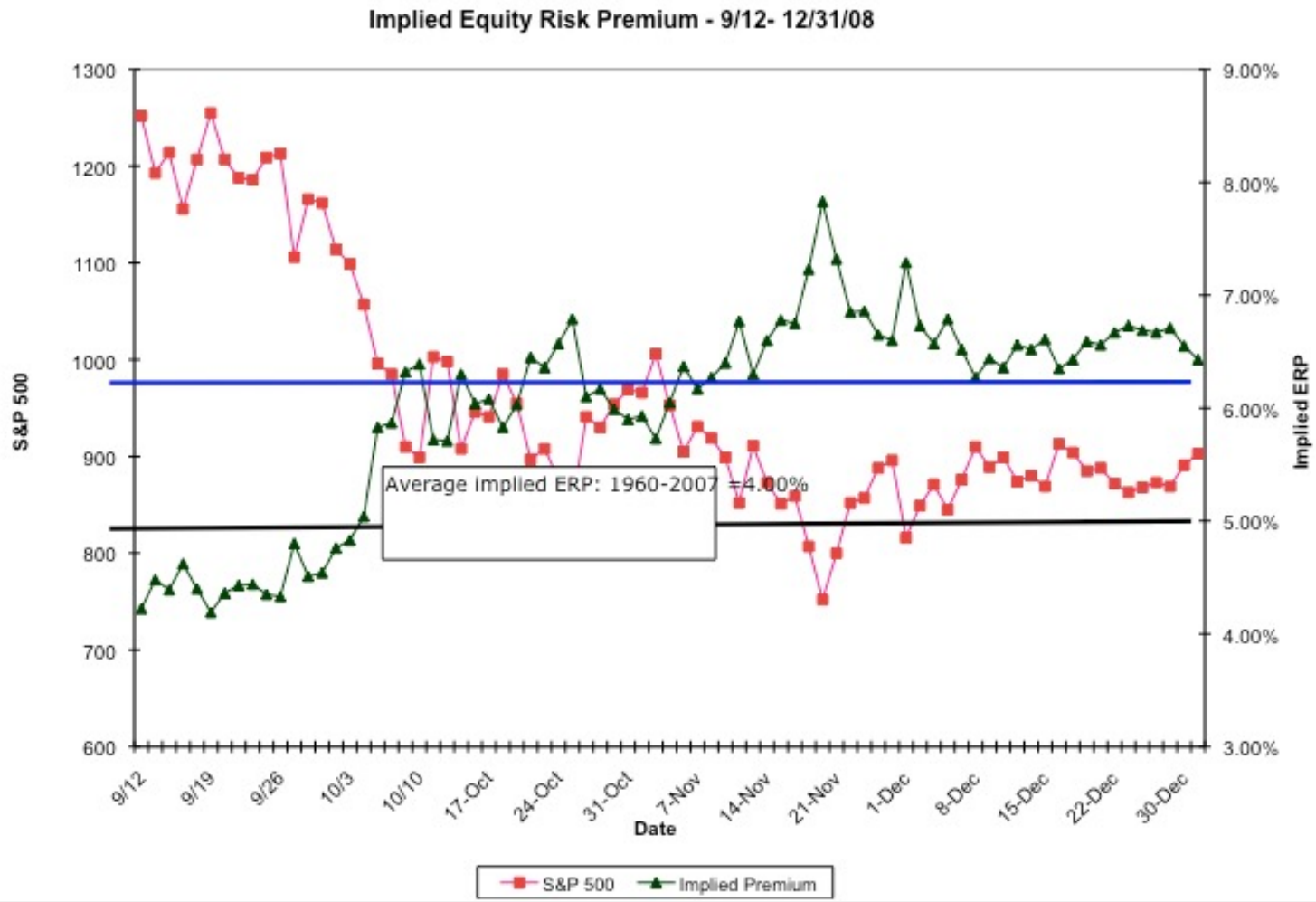
Region/ Country	*Proportion of Disney's Revenues*	*ERP*
US& Canada	82.01%	5.50%
Europe	11.64%	6.72%
Asia-Pacific	6.02%	7.27%
Latin America	0.33%	9.44%
Disney	**100.00%**	**5.76%**

ERP for Companies: November 2013

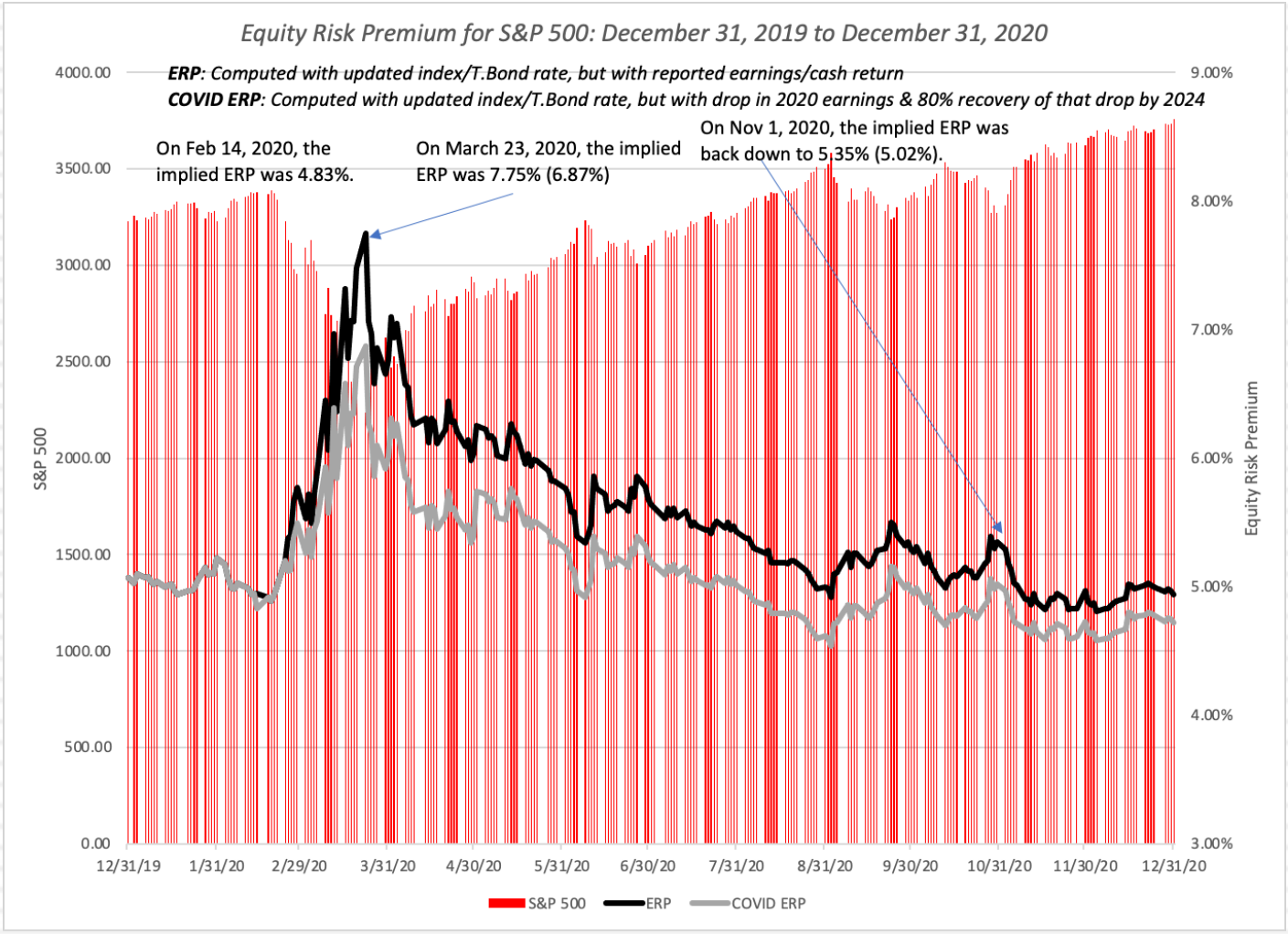
In November 2013, the mature market premium used was 5.5%

Company	*Region/ Country*	*Weight*	*ERP*
Bookscape	United States	100%	5.50%
Vale	US & Canada	4.90%	5.50%
	Brazil	16.90%	8.50%
	Rest of Latin America	1.70%	10.09%
	China	37.00%	6.94%
	Japan	10.30%	6.70%
	Rest of Asia	8.50%	8.61%
	Europe	17.20%	6.72%
	Rest of World	3.50%	10.06%
	Company	100.00%	7.38%
Tata Motors	India	23.90%	9.10%
	China	23.60%	6.94%
	UK	11.90%	5.95%
	United States	10.00%	5.50%
	Mainland Europe	11.70%	6.85%
	Rest of World	18.90%	6.98%
	Company	100.00%	7.19%
Baidu	China	100%	6.94%
Deutsche Bank	Germany	35.93%	5.50%
	North America	24.72%	5.50%
	Rest of Europe	28.67%	7.02%
	Asia-Pacific	10.68%	7.27%
	South America	0.00%	9.44%
	Company	100.00%	6.12%

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



And in 2020.. COVID effects



An Updated Implied ERP

In 2021, earnings recovered almost entirely from the 2020 collapse and dividends & buybacks surged as well.

Base year cash flow (last 12 mths)
Dividends (TTM): 59.20
+ Buybacks (TTM): 88.05
= Cash to investors (TTM): **147.24**

Expected earnings/cashflow growth in next 5 years
Analysts were on target in 2021, with estimated earnings of 206.38 for the year. They were projecting compunded annual growth rate of 6.47% a year for next five years.

Modified Payout
This computation assumes that the payout ratio stays constant over time. If you assume that it changes to a sustainable level (given stable growth & ROE), the implied ERP = 4.90%

Actual numbers | Forecasted numbers

	2019	2020	*LTM*	*2021E*	1	2	3	4	5
Expected Earnings	157.18	139.76	190.34	206.38	219.74	233.96	249.11	265.23	282.40
Cash payout as % of earnings	146.31	118.66	77.36%	77.36%	77.36%	77.36%	77.36%	77.36%	77.36%
Dividends + Buybacks =	93.08%	84.90%	147.24	159.65	$169.99	$180.99	$192.71	$205.18	$218.46

Earnings and Cash flows grow @1.51% (set equal to risk free rate) a year forever.

S&P 500 on 1/1/22= **4766.18**

$$4766.18 = \frac{169.99}{(1+r)} + \frac{180.99}{(1+r)^2} + \frac{192.71}{(1+r)^3} + \frac{205.18}{(1+r)^4} + \frac{218.46}{(1+r)^5} + \frac{218.46\,(1.0151)}{(r-.0151)(1+r)^5}$$

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

Solve for r

You can solve for this r either iteratively or using the solver function in Excel

r = Implied Expected Return on Stocks = 5.75%

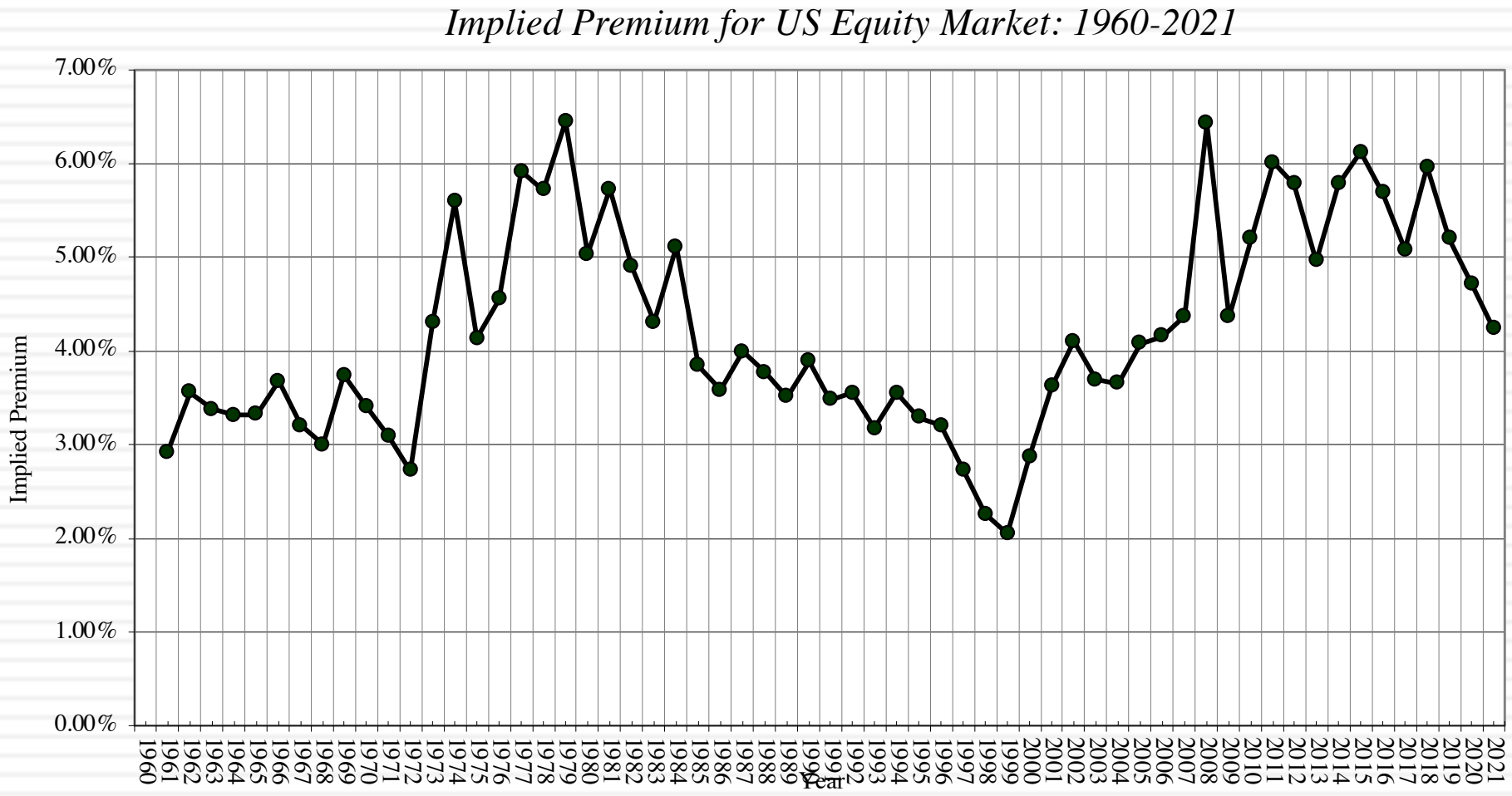
Minus

Risk free rate = T.Bond rate on 1/1/22= 1.51%

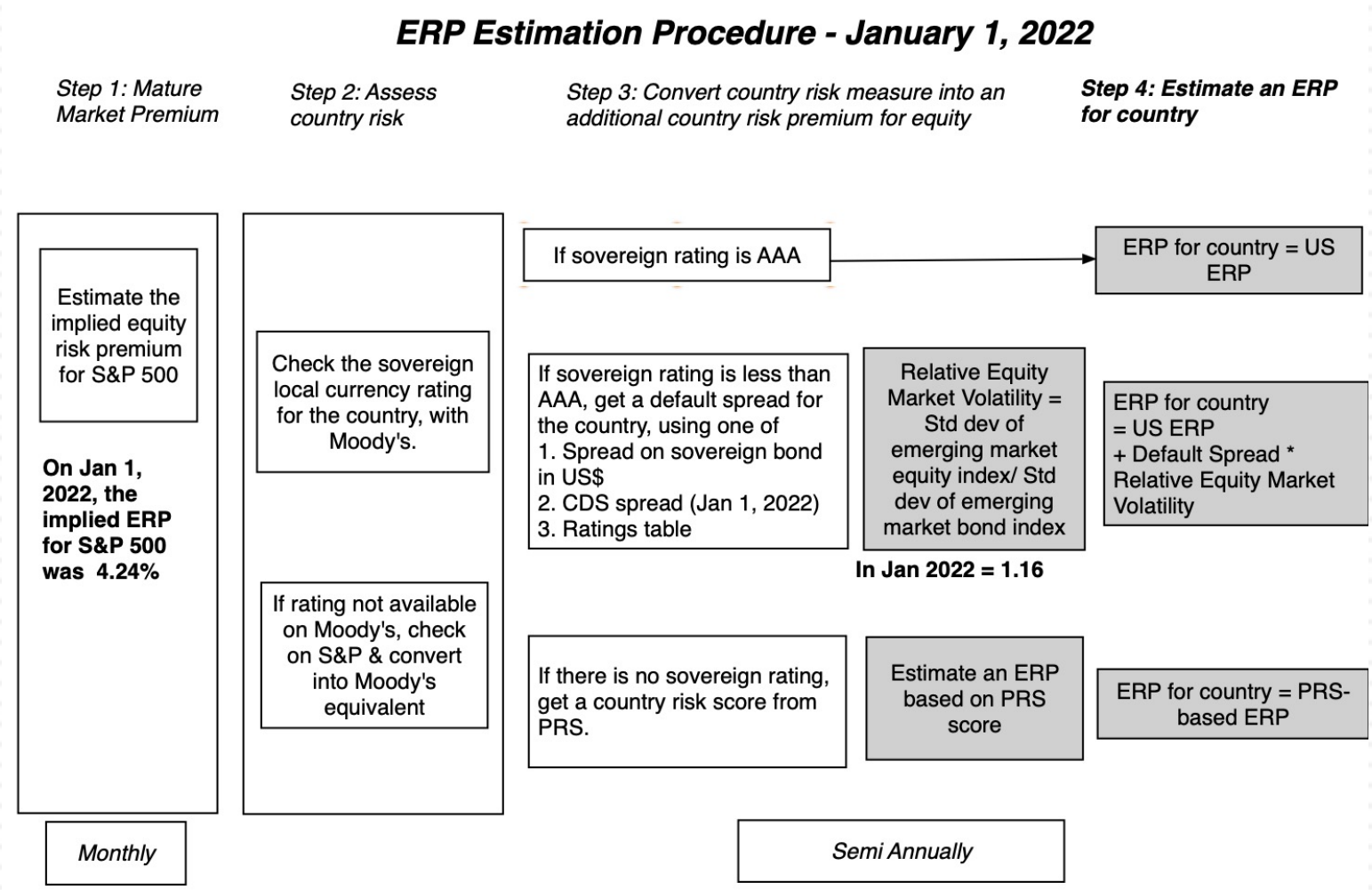
Equals

Implied Equity Risk Premium (1/1/22) = 5.75% - 1.51% = 4.24%

Implied Premiums in the US: 1960-2021



A Composite way of estimating ERP for countries



ERP : Jan 2022

Andorra	Baa2	1.88%	6.12%	Italy	Baa3	2.18%	6.42%
Austria	Aa1	0.39%	4.63%	Jersey	Aaa	0.00%	4.24%
Belgium	Aa3	0.60%	4.84%	Liechtenstein	Aaa	0.00%	4.24%
Cyprus	Ba1	2.47%	6.71%	Luxembourg	Aaa	0.00%	4.24%
Denmark	Aaa	0.00%	4.24%	Malta	A2	0.84%	5.08%
Finland	Aa1	0.39%	4.63%	Netherlands	Aaa	0.00%	4.24%
France	Aa2	0.49%	4.73%	Norway	Aaa	0.00%	4.24%
Germany	Aaa	0.00%	4.24%	Portugal	Baa2	1.88%	6.12%
Greece	Ba3	3.56%	7.80%	Spain	Baa1	1.58%	5.82%
Guernsey	Aa3	0.60%	4.84%	Sweden	Aaa	0.00%	4.24%
Iceland	A2	0.84%	5.08%	Switzerland	Aaa	0.00%	4.24%
Ireland	A2	0.84%	5.08%	Turkey	B2	5.44%	9.68%
Isle of Man	Aa3	0.60%	4.84%	UK	Aa3	0.60%	4.84%
				W. Europe		**0.83%**	**5.07%**

Albania	B1	4.45%	8.69%
Armenia	Ba3	3.56%	7.80%
Azerbaijan	Ba2	2.97%	7.21%
Belarus	B3	6.43%	10.67%
Bosnia and Herzegovina	B3	6.43%	10.67%
Bulgaria	Baa1	1.58%	5.82%
Croatia	Ba1	2.47%	6.71%
Czech Republic	Aa3	0.60%	4.84%
Estonia	A1	0.70%	4.94%
Georgia	Ba2	2.97%	7.21%
Hungary	Baa2	1.88%	6.12%
Kazakhstan	Baa2	1.88%	6.12%
Kyrgyzstan	B2	5.44%	9.68%
Latvia	A3	1.19%	5.43%
Lithuania	A2	0.84%	5.08%
Macedonia	Ba3	3.56%	7.80%
Moldova	B3	6.43%	10.67%
Montenegro	B1	4.45%	8.69%
Poland	A2	0.84%	5.08%
Romania	Baa3	2.18%	6.42%
Russia	Baa3	2.18%	6.42%
Serbia	Ba2	2.97%	7.21%
Slovakia	A2	0.84%	5.08%
Slovenia	A3	1.19%	5.43%
Tajikistan	B3	6.43%	10.67%
Ukraine	B3	6.43%	10.67%
Uzbekistan	B1	4.45%	8.69%
E. Europe & Russia		**2.11%**	**6.35%**

Country	*PRS*	*CRP*	*ERP*
Algeria	62.25	6.43%	10.67%
Brunei	79	0.84%	5.08%
Gambia	65.75	5.44%	9.68%
Guinea	57.5	8.90%	13.14%
Guinea-Bissau	62.75	6.43%	10.67%
Guyana	66.25	4.45%	8.69%
Haiti	56.25	9.89%	14.13%
Iran	63.75	6.43%	10.67%
Korea, D.P.R.	51.5	11.87%	16.11%
Liberia	59	8.90%	13.14%
Libya	66.25	4.45%	8.69%
Madagascar	63.5	6.43%	10.67%
Malawi	59.75	8.90%	13.14%
Myanmar	53	11.87%	16.11%
Sierra Leone	57	9.89%	14.13%
Somalia	51.5	11.87%	16.11%
Sudan	36.25	20.34%	24.58%
Syria	45.5	20.34%	24.58%
Yemen	52.75	11.87%	16.11%
Zimbabwe	61	7.41%	11.65%

Canada	Aaa	0.00%	4.24%
United States	Aaa	0.00%	4.24%
North America		**0.00%**	**4.24%**

Caribbean	NA	6.83%	11.07%

Argentina	Ca	11.87%	16.11%
Belize	Caa3	9.89%	14.13%
Bolivia	B2	5.44%	9.68%
Brazil	Ba2	2.97%	7.21%
Chile	A1	0.70%	4.94%
Colombia	Baa2	1.88%	6.12%
Costa Rica	B2	5.44%	9.68%
Ecuador	Caa3	9.89%	14.13%
El Salvador	Caa1	7.41%	11.65%
Guatemala	Ba1	2.47%	6.71%
Honduras	B1	4.45%	8.69%
Mexico	Baa1	1.58%	5.82%
Nicaragua	B3	6.43%	10.67%
Panama	Baa2	1.88%	6.12%
Paraguay	Ba1	2.47%	6.71%
Peru	Baa1	1.58%	5.82%
Suriname	Caa3	9.89%	14.13%
Uruguay	Baa2	1.88%	6.12%
Venezuela	C	20.34%	24.58%
Latin America		**3.79%**	**8.03%**

Aswath Damodaran

Country	Rating	*CRP*	*ERP*
Angola	B3	5.53%	10.67%
Benin	B1	3.83%	8.69%
Botswana	A3	1.02%	5.43%
Burkina Faso	B2	4.68%	9.68%
Cameroon	B2	4.68%	9.68%
Cape Verde	B3	5.53%	10.67%
Congo (Democratic Republic of)	Caa1	6.38%	11.65%
Congo (Republic of)	Caa2	7.66%	13.14%
Côte d'Ivoire	Ba3	3.06%	7.80%
Egypt	B2	4.68%	9.68%
Ethiopia	Caa2	7.66%	13.14%
Gabon	Caa1	6.38%	11.65%
Ghana	B3	5.53%	10.67%
Kenya	B2	4.68%	9.68%
Mali	Caa1	6.38%	11.65%
Mauritius	Baa2	1.62%	6.12%
Morocco	Ba1	2.13%	6.71%
Mozambique	Caa2	7.66%	13.14%
Namibia	Ba3	3.06%	7.80%
Niger	B3	5.53%	10.67%
Nigeria	B2	4.68%	9.68%
Rwanda	B2	4.68%	9.68%
Senegal	Ba3	3.06%	7.80%
South Africa	Ba2	2.56%	7.21%
Swaziland	B3	5.53%	10.67%
Tanzania	B2	4.68%	9.68%
Togo	B3	5.53%	10.67%
Tunisia	Caa1	6.38%	11.65%
Uganda	B2	4.68%	9.68%
Zambia	Ca	10.21%	16.11%
Africa		**5.25%**	**9.49%**

Abu Dhabi	Aa2	0.49%	4.73%
Bahrain	B2	5.44%	9.68%
Iraq	Caa1	7.41%	11.65%
Israel	A1	0.70%	4.94%
Jordan	B1	4.45%	8.69%
Kuwait	A1	0.70%	4.94%
Lebanon	C	20.34%	24.58%
Oman	Ba3	3.56%	7.80%
Qatar	Aa3	0.60%	4.84%
Ras Al Khaimah	A3	1.19%	5.43%
Saudi Arabia	A1	0.70%	4.94%
Sharjah	Baa3	2.18%	6.42%
United Arab Emirates	Aa2	0.49%	4.73%
Middle East		**1.60%**	**5.84%**

Bangladesh	Ba3	3.56%	7.80%
Cambodia	B2	5.44%	9.68%
China	A1	0.70%	4.94%
Fiji	B1	4.45%	8.69%
Hong Kong	Aa3	0.60%	4.84%
India	Baa3	2.18%	6.42%
Indonesia	Baa2	1.88%	6.12%
Japan	A1	0.70%	4.94%
Korea	Aa2	0.49%	4.73%
Laos	Caa2	8.90%	13.14%
Macao	Aa3	0.60%	4.84%
Malaysia	A3	1.19%	5.43%
Maldives	Caa1	7.41%	11.65%
Mongolia	B3	6.43%	10.67%
Pakistan	B3	6.43%	10.67%
Papua New Guinea	B2	5.44%	9.68%
Philippines	Baa2	1.88%	6.12%
Singapore	Aaa	0.00%	4.24%
Solomon Islands	Caa1	7.41%	11.65%
Sri Lanka	Caa2	8.90%	13.14%
Taiwan	Aa3	0.60%	4.84%
Thailand	Baa1	1.58%	5.82%
Vietnam	Ba3	3.56%	7.80%
Asia		**1.04%**	**5.28%**

Australia	Aaa	0.00%	4.24%
Cook Islands	B1	4.45%	8.69%
New Zealand	Aaa	0.00%	4.24%
Australia & NZ		**0.00%**	**4.24%**

Blue: Moody's Rating
Red: Added Country Risk
Green #: Total ERP

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?

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.

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.

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 = $(Price_{End} - Price_{Beginning} + Dividends_{Period})/ Price_{Beginning}$
  - 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.