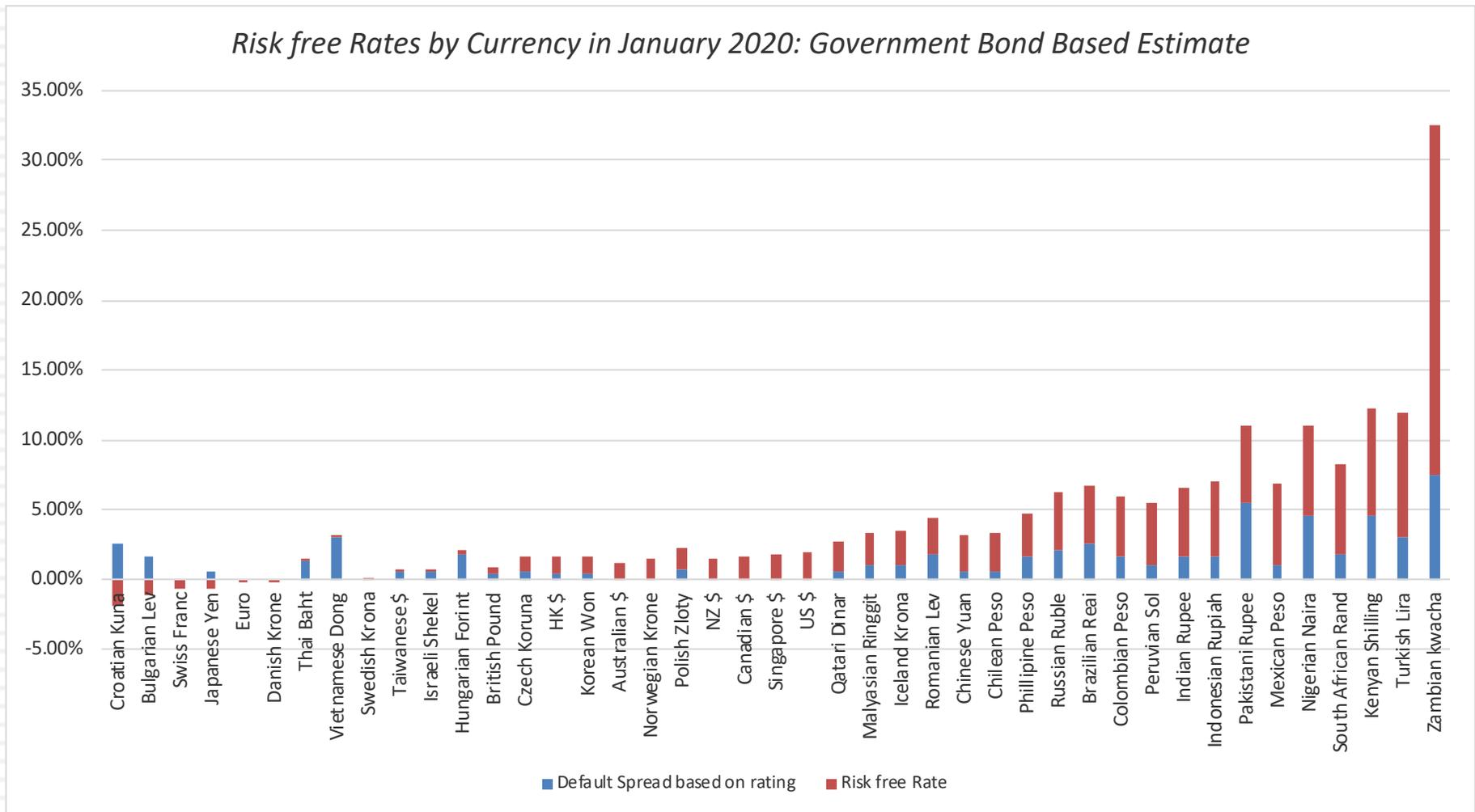


# Risk free Rates in January 2020



# Measurement of the equity risk premium

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- The equity risk premium is the premium that investors demand for investing in an average risk investment, relative to the riskfree rate.
- As a general proposition, this premium should be
  - greater than zero
  - increase with the risk aversion of the investors in that market
  - increase with the riskiness of the “average” risk investment

# What is your risk premium?

- Assume that stocks are the only risky assets and that you are offered two investment options:
  - a riskless investment (say a Government Security), on which you can make 3%
  - a mutual fund of all stocks, on which the returns are uncertain
- How much of an expected return would you demand to shift your money from the riskless asset to the mutual fund?
  - a. Less than 3%
  - b. Between 3% - 5%
  - c. Between 5% - 7%
  - d. Between 7% -9%
  - e. Between 9%- 11%
  - f. More than 11%

# Risk Aversion and Risk Premiums

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- If this were the entire market, the risk premium would be a weighted average of the risk premiums demanded by each and every investor.
- The weights will be determined by the wealth that each investor brings to the market. Thus, Warren Buffett's risk aversion counts more towards determining the "equilibrium" premium than yours' and mine.
- As investors become more risk averse, you would expect the "equilibrium" premium to increase.

# Risk Premiums do change..

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- Go back to the previous example. Assume now that you are making the same choice but that you are making it in the aftermath of a stock market crash (it has dropped 25% in the last month). Would you change your answer?
  - a. I would demand a larger premium
  - b. I would demand a smaller premium
  - c. I would demand the same premium

# Estimating Risk Premiums in Practice

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- Survey investors on their desired risk premiums and use the average premium from these surveys.
- Assume that the actual premium delivered over long time periods is equal to the expected premium - i.e., use historical data
- Estimate the implied premium in today's asset prices.

# 1. The Survey Approach

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- Surveying all investors in a market place is impractical.
- However, you can survey a few individuals and use these results. In practice, this translates into surveys of the following:

<i>Group Surveyed</i>	<i>Survey done by</i>	<i>Estimated ERP</i>	<i>Notes</i>
Individual Investors	Securities Industries Association	8.3% (2004)	One year premium
Institutional Investors	Merrill Lynch	4.8% (2013)	Monrthly updates
CFOs	Campbell Harvey & Graham	4.48% (2012)	5-8% response rate
Analysts	Pablo Fernandez	5.0% (2011)	Lowest standard deviation
Academics	Pablo Fernandez	5.7% (2011)	Higher for emerging markets

- The limitations of this approach are:
  - There are no constraints on reasonability (the survey could produce negative risk premiums or risk premiums of 50%)
  - The survey results are more reflective of the past than the future.
  - They tend to be short term; even the longest surveys do not go beyond one year.

## 2. The Historical Premium Approach

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- This is the default approach used by most to arrive at the premium to use in the model
- In most cases, this approach does the following
  - ▣ Defines a time period for the estimation (1928-Present, last 50 years...)
  - ▣ Calculates average returns on a stock index during the period
  - ▣ Calculates average returns on a riskless security over the period
  - ▣ Calculates the difference between the two averages and uses it as a premium looking forward.
- The limitations of this approach are:
  - ▣ it assumes that the risk aversion of investors has not changed in a systematic way across time. (The risk aversion may change from year to year, but it reverts back to historical averages)
  - ▣ it assumes that the riskiness of the “risky” portfolio (stock index) has not changed in a systematic way across time.

# Historical ERP: A Historical Snapshot

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2019	8.18%	6.43%	6.35%	4.83%
Std Error	2.08%	2.20%		
1970-2019	7.26%	4.50%	5.93%	3.52%
Std Error	2.38%	2.73%		
2010-2019	13.51%	9.67%	12.93%	9.31%
Std Error	3.85%	4.87%		

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.

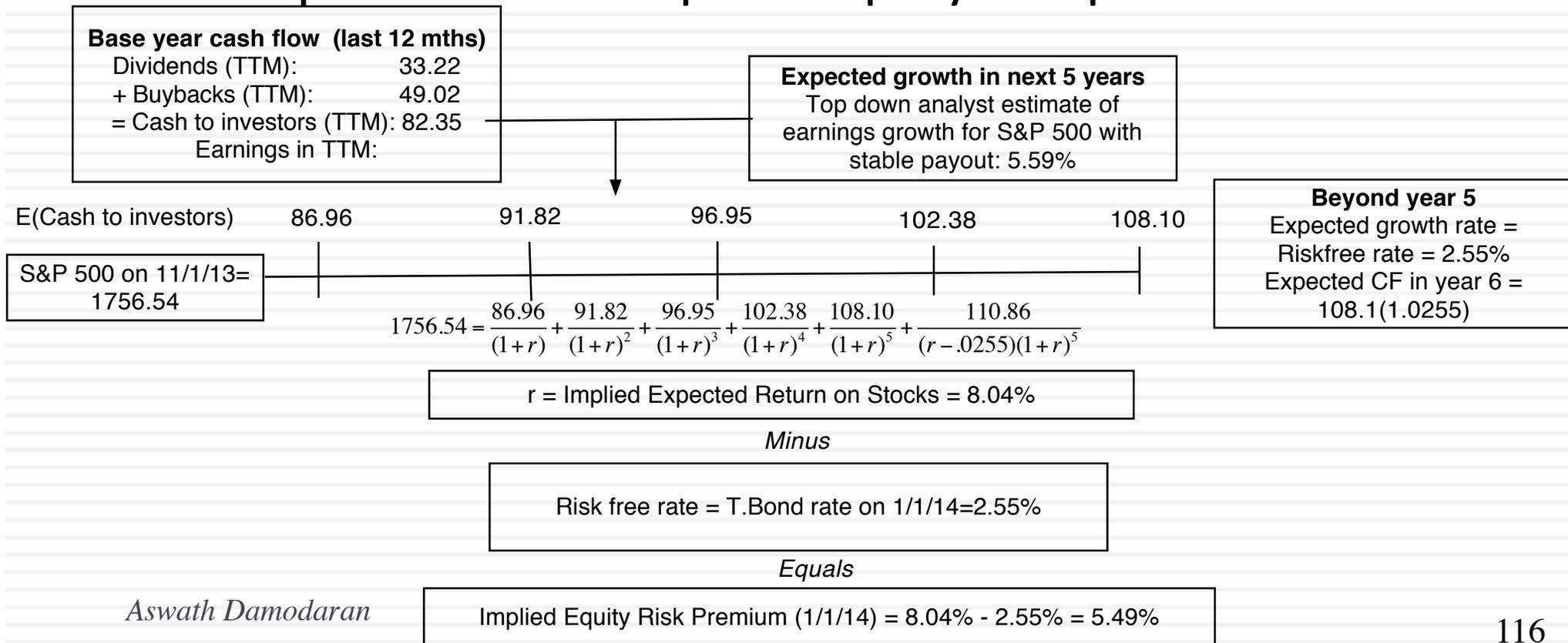
### 3. A Forward Looking ERP

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- 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%.

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

# What about equity risk premiums for other markets?

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- 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:

<i>Country</i>	<i>Sovereign CDS Spread</i>	<i>US ERP</i>	<i>Total ERP for country</i>
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.

$$\text{Brazil's Equity Risk Premium} = 5.50\% + 2.00\% (21\%/14\%) = 8.50\%$$

- 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%	Liechtenstein	5.50%	0.00%	Albania	12.25%	6.75%
Austria	5.50%	0.00%	Luxembourg	5.50%	0.00%	Armenia	10.23%	4.73%
Belgium	6.70%	1.20%	Malta	7.45%	1.95%	Azerbaijan	8.88%	3.38%
Cyprus	22.00%	16.50%	Netherlands	5.50%	0.00%	Belarus	15.63%	10.13%
Denmark	5.50%	0.00%	Norway	5.50%	0.00%	Bosnia	15.63%	10.13%
Finland	5.50%	0.00%	Portugal	10.90%	5.40%	Bulgaria	8.50%	3.00%
France	5.95%	0.45%	Spain	8.88%	3.38%	Croatia	9.63%	4.13%
Germany	5.50%	0.00%	Sweden	5.50%	0.00%	Czech Republic	6.93%	1.43%
Greece	15.63%	10.13%	Switzerland	5.50%	0.00%	Estonia	6.93%	1.43%
Iceland	8.88%	3.38%	Turkey	8.88%	3.38%	Georgia	10.90%	5.40%
Ireland	9.63%	4.13%	United Kingdom	5.95%	0.45%	Hungary	9.63%	4.13%
Italy	8.50%	3.00%	<b>Western Europe</b>	<b>6.72%</b>	<b>1.22%</b>	Kazakhstan	8.50%	3.00%
						Latvia	8.50%	3.00%

Canada	5.50%	0.00%
United States of America	5.50%	0.00%
<b>North America</b>	<b>5.50%</b>	<b>0.00%</b>

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%
<b>Africa</b>	<b>11.22%</b>	<b>5.82%</b>

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%
<b>E. Europe &amp; Russia</b>	<b>8.60%</b>	<b>3.10%</b>

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%
<b>Middle East</b>	<b>6.88%</b>	<b>1.38%</b>

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%
<b>Asia</b>	<b>7.27%</b>	<b>1.77%</b>

Australia	5.50%	0.00%
Cook Islands	12.25%	6.75%
New Zealand	5.50%	0.00%
<b>Australia &amp; NZ</b>	<b>5.50%</b>	<b>0.00%</b>

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%
<b>Latin America</b>	<b>9.44%</b>	<b>3.94%</b>

Aswath Damodaran

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

# 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:

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

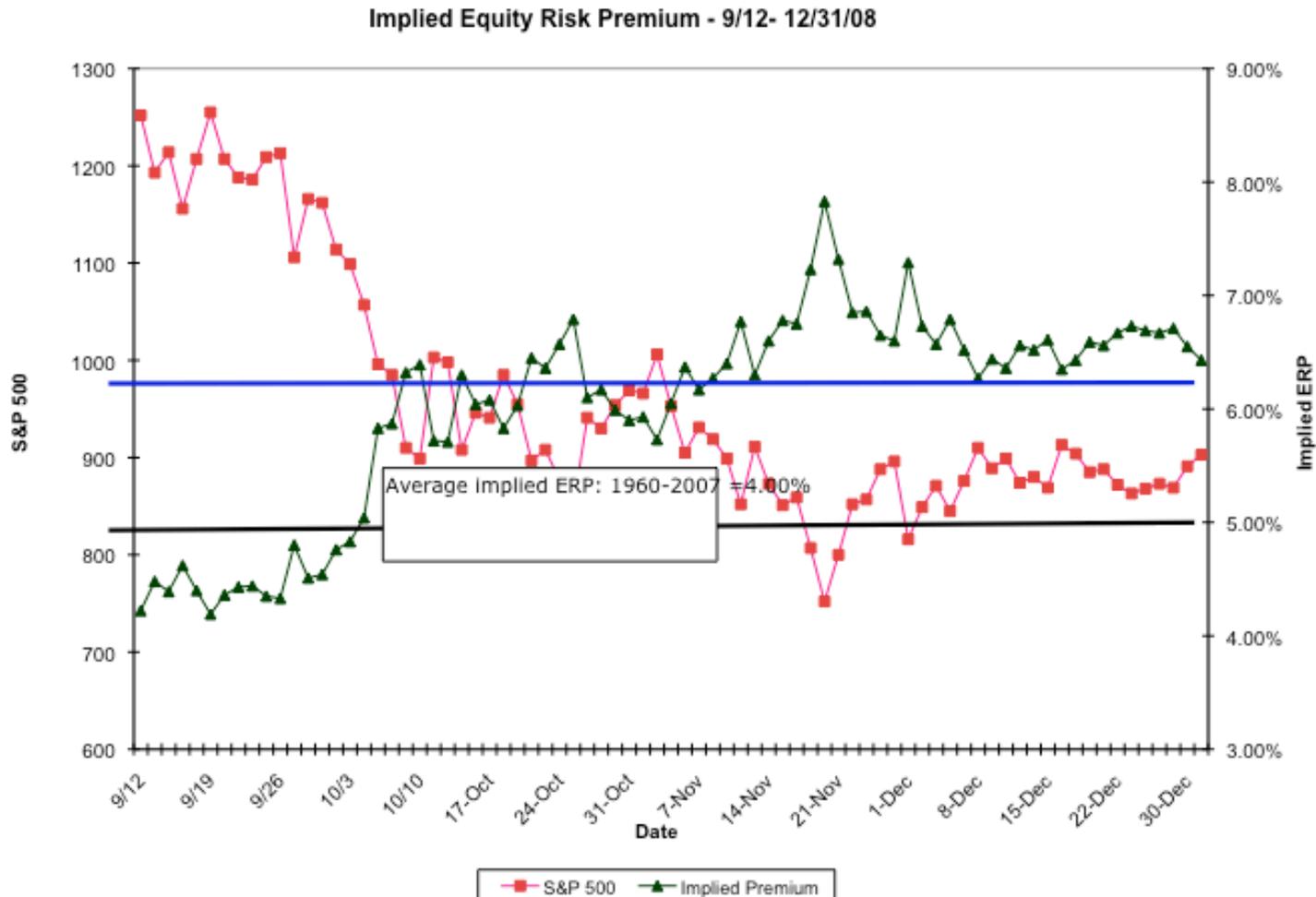
# ERP for Companies: November 2013

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

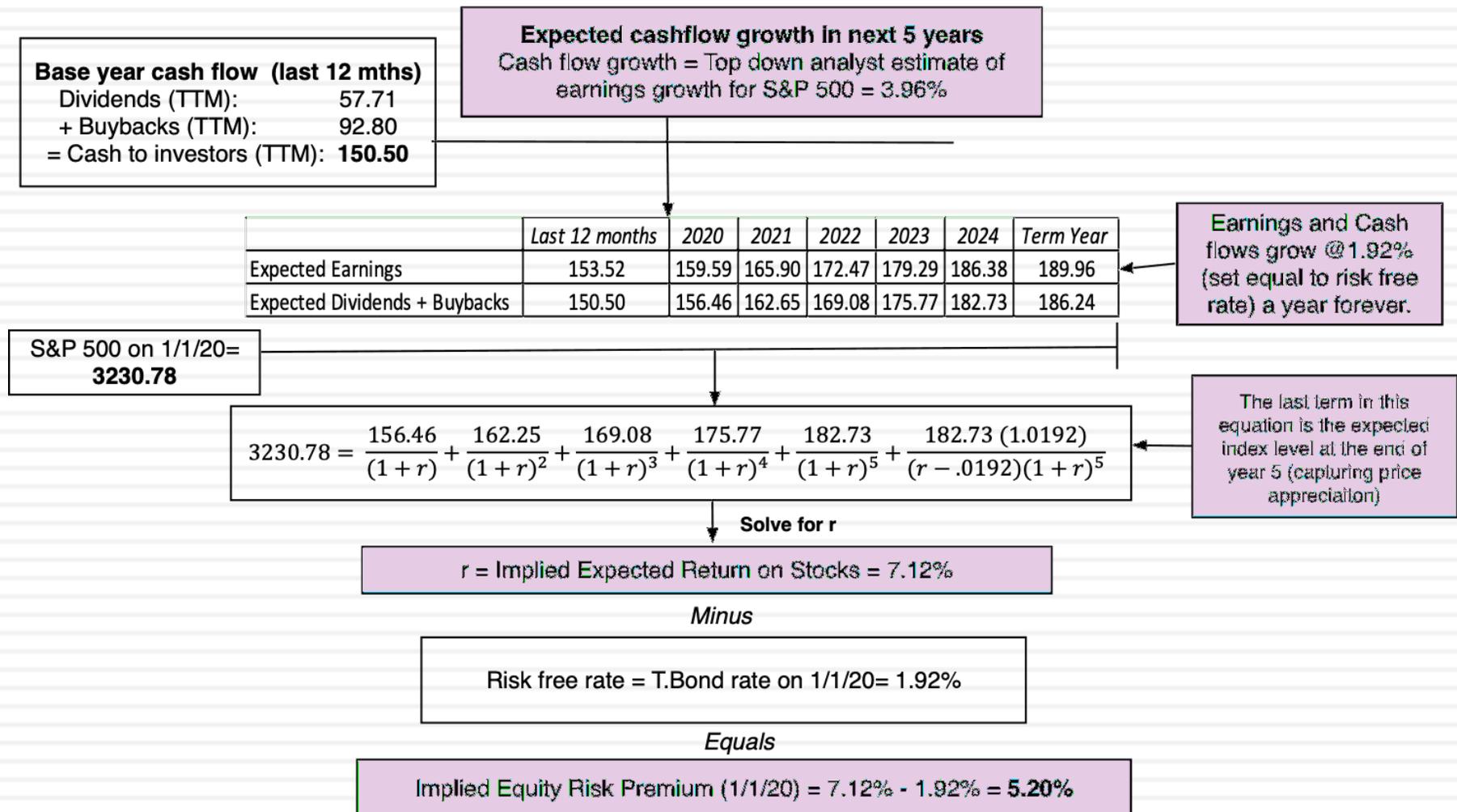
<i>Company</i>	<i>Region/ Country</i>	<i>Weight</i>	<i>ERP</i>
Bookscape	United States	100%	5.50%
Vale	US & Canada	4.90%	5.50%
	Brazil	16.90%	8.50%
	Rest of Latin America	1.70%	10.09%
	China	37.00%	6.94%
	Japan	10.30%	6.70%
	Rest of Asia	8.50%	8.61%
	Europe	17.20%	6.72%
	Rest of World	3.50%	10.06%
	Company	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

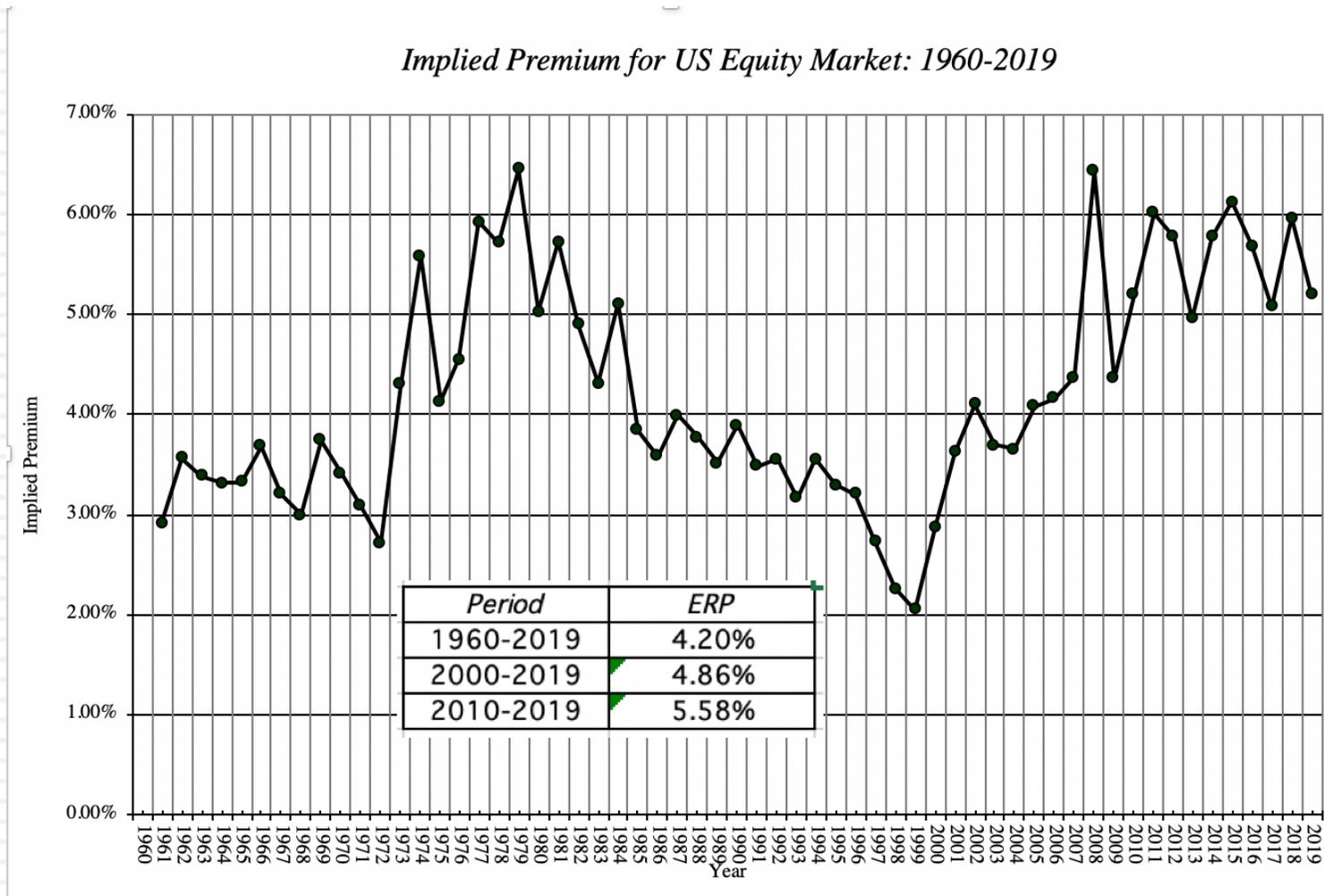
125



# An Updated Implied ERP

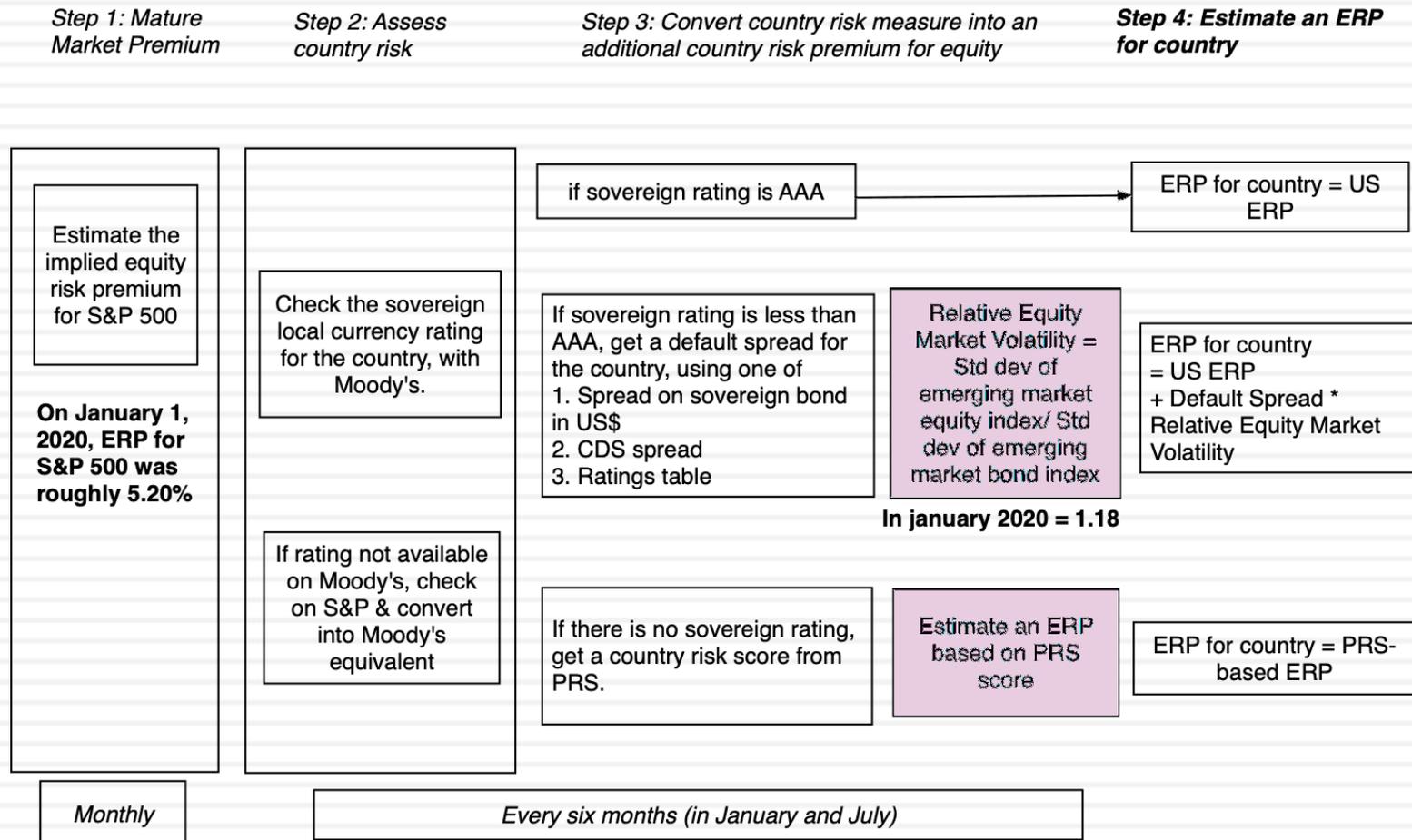


# Implied Premiums in the US: 1960-2019



# A Composite way of estimating ERP for countries

## ERP Estimation Procedure - January 1, 2020



# ERP : Jan 2020

Andorra (Principality of)	7.08%	1.88%	Italy	7.37%	2.17%
Austria	5.59%	0.39%	Jersey (States of)	5.89%	0.69%
Belgium	5.80%	0.60%	Liechtenstein	5.20%	0.00%
Cyprus	8.16%	2.96%	Luxembourg	5.20%	0.00%
Denmark	5.20%	0.00%	Malta	6.04%	0.84%
Finland	5.59%	0.39%	Netherlands	5.20%	0.00%
France	5.69%	0.49%	Norway	5.20%	0.00%
Germany	5.20%	0.00%	Portugal	7.37%	2.17%
Greece	9.64%	4.44%	Spain	6.77%	1.57%
Guernsey (States of)	6.77%	1.57%	Sweden	5.20%	0.00%
Iceland	6.04%	0.84%	Switzerland	5.20%	0.00%
Ireland	6.04%	0.84%	Turkey	9.64%	4.44%
Isle of Man	5.69%	0.49%	United Kingdom	5.69%	0.49%
			<b>Western Europe</b>	<b>6.01%</b>	<b>0.81%</b>

Canada	5.20%	0.00%
United States	5.20%	0.00%
<b>North America</b>	<b>5.20%</b>	<b>0.00%</b>

Caribbean	10.62%	5.42%
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Argentina	14.08%	8.88%
Belize	11.62%	6.42%
Bolivia	8.75%	3.55%
Brazil	8.16%	2.96%
Chile	5.89%	0.69%
Colombia	7.08%	1.88%
Costa Rica	9.64%	4.44%
Ecuador	11.62%	6.42%
El Salvador	14.08%	8.88%
Guatemala	7.66%	2.46%
Honduras	9.64%	4.44%
Mexico	6.38%	1.18%
Nicaragua	10.63%	5.43%
Panama	6.77%	1.57%
Paraguay	7.66%	2.46%
Peru	6.38%	1.18%
Suriname	10.63%	5.43%
Uruguay	9.64%	4.44%
Venezuela	22.89%	17.69%
<b>Central and South America</b>	<b>8.48%</b>	<b>3.28%</b>

Country	ERP	CRP
Angola	11.62%	6.42%
Benin	10.63%	5.43%
Botswana	6.04%	0.84%
Burkina Faso	10.63%	5.43%
Cameroon	10.63%	5.43%
Cape Verde	10.63%	5.43%
Congo (Democratic Republic of)	12.59%	7.39%
Congo (Republic of)	14.08%	8.88%
Côte d'Ivoire	8.75%	3.55%
Egypt	10.63%	5.43%
Ethiopia	9.64%	4.44%
Gabon	12.59%	7.39%
Ghana	11.62%	6.42%
Kenya	10.63%	5.43%
Mali	11.62%	6.42%
Morocco	7.66%	2.46%
Mozambique	14.08%	8.88%
Namibia	8.16%	2.96%
Niger	11.62%	6.42%
Nigeria	10.63%	5.43%
Rwanda	10.63%	5.43%
Senegal	8.75%	3.55%
South Africa	7.37%	2.17%
Swaziland	10.63%	5.43%
Tanzania	9.64%	4.44%
Togo	11.62%	6.42%
Tunisia	10.63%	5.43%
Uganda	10.63%	5.43%
Zambia	14.08%	8.88%
<b>Africa</b>	<b>9.89%</b>	<b>4.69%</b>

Albania	9.64%	4.44%
Armenia	8.75%	3.55%
Azerbaijan	8.16%	2.96%
Belarus	11.62%	6.42%
Bosnia and Herzegovina	11.62%	6.42%
Bulgaria	7.08%	1.88%
Croatia	8.16%	2.96%
Czech Republic	5.80%	0.60%
Estonia	5.89%	0.69%
Georgia	8.16%	2.96%
Hungary	7.37%	2.17%
Kazakhstan	7.37%	2.17%
Kyrgyzstan	10.63%	5.43%
Latvia	6.38%	1.18%
Lithuania	6.38%	1.18%
Macedonia	8.75%	3.55%
Moldova	11.62%	6.42%
Montenegro	9.64%	4.44%
Poland	6.04%	0.84%
Romania	7.37%	2.17%
Russia	7.37%	2.17%
Serbia	8.75%	3.55%
Slovakia	6.04%	0.84%
Slovenia	6.77%	1.57%
Tajikistan	11.62%	6.42%
Ukraine	12.59%	7.39%
Uzbekistan	7.08%	1.88%
<b>Eastern Europe &amp; Russia</b>	<b>7.34%</b>	<b>2.14%</b>

Abu Dhabi	5.69%	0.49%
Bahrain	10.63%	5.43%
Iraq	12.59%	7.39%
Israel	5.89%	0.69%
Jordan	9.64%	4.44%
Kuwait	5.69%	0.49%
Lebanon	14.08%	8.88%
Oman	7.66%	2.46%
Qatar	5.80%	0.60%
Ras Al Khaimah	12.59%	7.39%
Saudi Arabia	5.89%	0.69%
Sharjah	6.38%	1.18%
United Arab Emirates	5.69%	0.49%
<b>Middle East</b>	<b>6.77%</b>	<b>1.57%</b>

Country	PRS Composite Risk Score	ERP	CRP
Algeria	63	11.62%	6.42%
Brunei	82.75	5.59%	0.39%
Gambia	63.75	11.62%	6.42%
Guinea	57	15.06%	9.86%
Guinea-Bissau	63.25	11.62%	6.42%
Guyana	63.75	11.62%	6.42%
Haiti	57.5	14.08%	8.88%
Iran	62.5	11.62%	6.42%
Korea, D.P.R.	50.5	17.03%	11.83%
Liberia	49.5	21.71%	16.51%
Libya	69.5	8.16%	2.96%
Madagascar	65.5	10.63%	5.43%
Malawi	63.5	11.62%	6.42%
Myanmar	64	11.62%	6.42%
Sierra Leone	57	15.06%	9.86%
Somalia	53	17.03%	11.83%
Sudan	39.75	21.71%	16.51%
Syria	53	17.03%	11.83%
Yemen, Republic	54.5	17.03%	11.83%
Zimbabwe	50.5	17.03%	11.83%

Bangladesh	8.75%	3.55%
Cambodia	10.63%	5.43%
China	5.89%	0.69%
Fiji	8.75%	3.55%
Hong Kong	5.69%	0.49%
India	7.08%	1.88%
Indonesia	7.08%	1.88%
Japan	5.89%	0.69%
Korea	5.69%	0.49%
Macao	5.80%	0.60%
Malaysia	6.38%	1.18%
Maldives	10.63%	5.43%
Mauritius	6.77%	1.57%
Mongolia	11.62%	6.42%
Pakistan	11.62%	6.42%
Papua New Guinea	10.63%	5.43%
Philippines	7.08%	1.88%
Singapore	5.20%	0.00%
Solomon Islands	11.62%	6.42%
Sri Lanka	10.63%	5.43%
Taiwan	5.80%	0.60%
Thailand	6.77%	1.57%
Vietnam	8.75%	3.55%
<b>Asia</b>	<b>6.21%</b>	<b>1.01%</b>

Australia	5.20%
Cook Islands	9.64%
New Zealand	5.20%
<b>Australia &amp; New Zealand</b>	<b>5.20%</b>

Aswath Damodaran

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

