

## II. Equity Risk Premiums

### The ubiquitous historical risk premium

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- The historical premium is the premium that stocks have historically earned over riskless securities.
- While the users of historical risk premiums act as if it is a fact (rather than an estimate), it is sensitive to
  - ▣ How far back you go in history...
  - ▣ Whether you use T.bill rates or T.Bond rates
  - ▣ Whether you use geometric or arithmetic averages.
- For instance, looking at the US:

	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%		

# The perils of trusting the past.....

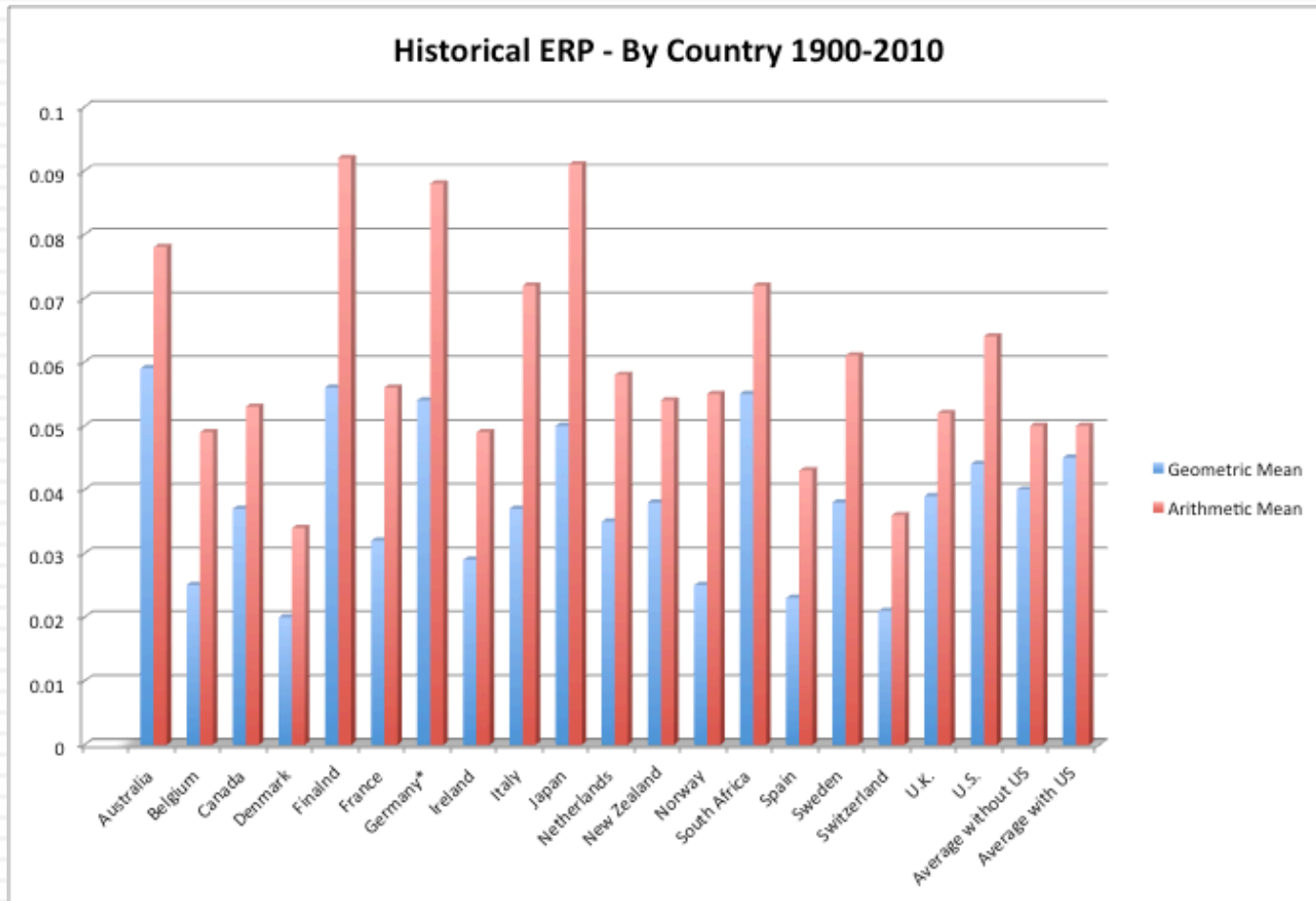
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- Noisy estimates: Even with long time periods of history, the risk premium that you derive will have substantial standard error. For instance, if you go back to 1928 (about 80 years of history) and you assume a standard deviation of 20% in annual stock returns, you arrive at a standard error of greater than 2%:

$$\text{Standard Error in Premium} = 20\%/\sqrt{80} = 2.26\%$$

- Survivorship Bias: Using historical data from the U.S. equity markets over the twentieth century does create a sampling bias. After all, the US economy and equity markets were among the most successful of the global economies that you could have invested in early in the century.

# Risk Premium for a Mature Market? Broadening the sample



# The simplest way of estimating an additional country risk premium: The country default spread

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- Default spread for country: In this approach, the country equity risk premium is set equal to the default spread for the country, estimated in one of three ways:
  - The default spread on a dollar denominated bond issued by the country. Brazil's 10 year \$ denominated bond at the start of 2013 was trading at an interest rate of 2.60%, a default spread of 0.84% over the US treasury bond rate of 1.76%.
  - The ten year CDS spread for Brazil of 1.42%
  - Brazil's sovereign local currency rating is Baa2. The default spread for a Baa2 rated sovereign is about 1.75%.
- This default spread is added on to the mature market premium to arrive at the total equity risk premium for Brazil, assuming a mature market premium of 5.80%.
  - Country Risk Premium for Brazil = 1.75%
  - Total ERP for Brazil = 5.80% + 1.75% = 7.55%

# An equity volatility based approach to estimating the country total ERP

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- This approach draws on the standard deviation of two equity markets, the emerging market in question and a base market (usually the US). The total equity risk premium for the emerging market is then written as:
  - Total equity risk premium = Risk Premium<sub>US</sub> \*  $\sigma_{\text{Country Equity}} / \sigma_{\text{US Equity}}$
- The country equity risk premium is based upon the volatility of the market in question relative to U.S market.
  - Assume that the equity risk premium for the US is 5.80%.
  - Assume that the standard deviation in the Bovespa (Brazilian equity) is 21% and that the standard deviation for the S&P 500 (US equity) is 18%.
  - Total Equity Risk Premium for Brazil = 5.80% (21%/18%) = 6.77%
  - Country equity risk premium for Brazil = 6.77% - 5.80% = 0.97%

# A melded approach to estimating the additional country risk premium

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- Country ratings measure default risk. While default risk premiums and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads.
- Another is to multiply the bond default spread by the relative volatility of stock and bond prices in that market. Using this approach for Brazil in January 2013, you would get:
  - Country Equity risk premium = Default spread on country bond\*  $\frac{\sigma_{\text{Country Equity}}}{\sigma_{\text{Country Bond}}}$ 
    - Standard Deviation in Bovespa (Equity) = 21%
    - Standard Deviation in Brazil government bond = 14%
    - Default spread on C-Bond = 1.75%
  - Brazil Country Risk Premium = 1.75% (21%/14%) = 2.63%
  - Brazil Total ERP = Mature Market Premium + CRP = 5.80% + 2.63% = 8.43%

# Country Risk Premiums July 2013

Andorra	1.95%	7.70%
Austria	0.00%	5.75%
Belgium	1.20%	6.95%
Cyprus	16.50%	22.25%
Denmark	0.00%	5.75%
Finland	0.00%	5.75%
France	0.45%	6.20%
Germany	0.00%	5.75%
Greece	10.13%	15.88%
Iceland	3.38%	9.13%
Ireland	4.13%	9.88%
Isle of Man	0.00%	5.75%
Italy	3.00%	8.75%
Liechtenstein	0.00%	5.75%
Luxembourg	0.00%	5.75%
Malta	1.95%	7.70%
Netherlands	0.00%	5.75%
Norway	0.00%	5.75%
Portugal	5.40%	11.15%
Spain	3.38%	9.13%
Sweden	0.00%	5.75%
Switzerland	0.00%	5.75%
Turkey	3.38%	9.13%
UK	0.45%	6.20%
<b>W. Europe</b>	<b>1.22%</b>	<b>6.97%</b>
Angola	5.40%	11.15%
Benin	8.25%	14.00%
Botswana	1.65%	7.40%
Burkina Faso	8.25%	14.00%
Cameroon	8.25%	14.00%
Cape Verde	6.75%	12.50%
Egypt	12.00%	17.75%
Gabon	5.40%	11.15%
Ghana	6.75%	12.50%
Kenya	6.75%	12.50%
Morocco	4.13%	9.88%
Mozambique	6.75%	12.50%
Namibia	3.38%	9.13%
Nigeria	5.40%	11.15%
Rwanda	8.25%	14.00%
Senegal	6.75%	12.50%
South Africa	2.55%	8.30%
Tunisia	4.73%	10.48%
Zambia	6.75%	12.50%
<b>Africa</b>	<b>5.90%</b>	<b>11.65%</b>

Canada	0.00%	5.75%
United States	0.00%	5.75%
<b>North America</b>	<b>0.00%</b>	<b>5.75%</b>

Argentina	10.13%	15.88%
Belize	14.25%	20.00%
Bolivia	5.40%	11.15%
Brazil	3.00%	8.75%
Chile	1.20%	6.95%
Colombia	3.38%	9.13%
Costa Rica	3.38%	9.13%
Ecuador	12.00%	17.75%
El Salvador	5.40%	11.15%
Guatemala	4.13%	9.88%
Honduras	8.25%	14.00%
Mexico	2.55%	8.30%
Nicaragua	10.13%	15.88%
Panama	3.00%	8.75%
Paraguay	5.40%	11.15%
Peru	3.00%	8.75%
Suriname	5.40%	11.15%
Uruguay	3.38%	9.13%
Venezuela	6.75%	12.50%
<b>Latin America</b>	<b>3.94%</b>	<b>9.69%</b>

Albania	6.75%	12.50%
Armenia	4.73%	10.48%
Azerbaijan	3.38%	9.13%
Belarus	10.13%	15.88%
Bosnia	10.13%	15.88%
Bulgaria	3.00%	8.75%
Croatia	4.13%	9.88%
Czech Republic	1.43%	7.18%
Estonia	1.43%	7.18%
Georgia	5.40%	11.15%
Hungary	4.13%	9.88%
Kazakhstan	3.00%	8.75%
Latvia	3.00%	8.75%
Lithuania	2.55%	8.30%
Macedonia	5.40%	11.15%
Moldova	10.13%	15.88%
Montenegro	5.40%	11.15%
Poland	1.65%	7.40%
Romania	3.38%	9.13%
Russia	2.55%	8.30%
Serbia	5.40%	11.15%
Slovakia	1.65%	7.40%
Slovenia	4.13%	9.88%
Uganda	6.75%	12.50%
Ukraine	10.13%	15.88%
<b>E. Europe/Russia</b>	<b>3.13%</b>	<b>8.88%</b>
Bahrain	2.55%	8.30%
Israel	1.43%	7.18%
Jordan	6.75%	12.50%
Kuwait	0.90%	6.65%
Lebanon	6.75%	12.50%
Oman	1.43%	7.18%
Qatar	0.90%	6.65%
Saudi Arabia	1.20%	6.95%
UAE	0.90%	6.65%
<b>Middle East</b>	<b>1.38%</b>	<b>7.13%</b>

Bangladesh	5.40%	11.15%
Cambodia	8.25%	14.00%
China	1.20%	6.95%
Fiji	6.75%	12.50%
Hong Kong	0.45%	6.20%
India	3.38%	9.13%
Indonesia	3.38%	9.13%
Japan	1.20%	6.95%
Korea	1.20%	6.95%
Macao	1.20%	6.95%
Malaysia	1.95%	7.70%
Mauritius	2.55%	8.30%
Mongolia	6.75%	12.50%
Pakistan	12.00%	17.75%
Papua NG	6.75%	12.50%
Philippines	4.13%	9.88%
Singapore	0.00%	5.75%
Sri Lanka	6.75%	12.50%
Taiwan	1.20%	6.95%
Thailand	2.55%	8.30%
Vietnam	8.25%	14.00%
<b>Asia</b>	<b>1.77%</b>	<b>7.52%</b>

Australia	0.00%	5.75%
Cook Islands	6.75%	12.50%
New Zealand	0.00%	5.75%
<b>Australia &amp; NZ</b>	<b>0.00%</b>	<b>5.75%</b>

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

# From Country Equity Risk Premiums to Corporate Equity Risk premiums

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- Approach 1: Assume that every company in the country is equally exposed to country risk. In this case,
  - ▣  $E(\text{Return}) = \text{Riskfree Rate} + \text{CRP} + \text{Beta} (\text{Mature ERP})$
  - ▣ Implicitly, this is what you are assuming when you use the local Government's dollar borrowing rate as your riskfree rate.
- Approach 2: Assume that a company's exposure to country risk is similar to its exposure to other market risk.
  - ▣  $E(\text{Return}) = \text{Riskfree Rate} + \text{Beta} (\text{Mature ERP} + \text{CRP})$
- Approach 3: Treat country risk as a separate risk factor and allow firms to have different exposures to country risk (perhaps based upon the proportion of their revenues come from non-domestic sales)
  - ▣  $E(\text{Return}) = \text{Riskfree Rate} + \beta (\text{Mature ERP}) + \lambda (\text{CRP})$

Mature ERP = Mature market Equity Risk Premium

CRP = Additional country risk premium



# Approaches 1 & 2: Estimating country risk premium exposure

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- Location based CRP: The standard approach in valuation is to attach a country risk premium to a company based upon its country of incorporation. Thus, if you are an Indian company, you are assumed to be exposed to the Indian country risk premium. A developed market company is assumed to be unexposed to emerging market risk.
- Operation-based CRP: There is a more reasonable modified version. The country risk premium for a company can be computed as a weighted average of the country risk premiums of the countries that it does business in, with the weights based upon revenues or operating income. If a company is exposed to risk in dozens of countries, you can take a weighted average of the risk premiums by region.

# Operation based CRP: Single versus Multiple Emerging Markets

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- Single emerging market: Embraer, in 2004, reported that it derived 3% of its revenues in Brazil and the balance from mature markets. The mature market ERP in 2004 was 5% and Brazil's CRP was 7.89%.

	Revenues	Total ERP	CRP
US and other mature markets	97%	5.00%	0.00%
Brazil	3%	12.89%	8%
<b>Embraer</b>		<b>5.24%</b>	<b>0.24%</b>

- Multiple emerging markets: Ambev, the Brazilian-based beverage company, reported revenues from the following countries during 2011.

	Revenues	%	Total ERP	CRP
Argentina	19	9.31%	15.00%	9.00%
Bolivia	4	1.96%	10.88%	4.88%
Brazil	130	63.73%	8.63%	2.63%
Canada	23	11.27%	6.00%	0.00%
Chile	7	3.43%	7.05%	1.05%
Ecuador	6	2.94%	12.75%	6.75%
Paraguay	3	1.47%	12.00%	6.00%
Peru	12	5.88%	9.00%	3.00%
<b>Ambev</b>	<b>204</b>		<b>9.11%</b>	<b>3.11%</b>

# Extending to a multinational: Regional breakdown Coca Cola's revenue breakdown and ERP in 2012

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<i>Region</i>	<i>Revenues</i>	<i>Total ERP</i>	<i>CRP</i>
Western Europe	19%	6.67%	0.67%
Eastern Europe & Russia	5%	8.60%	2.60%
Asia	15%	7.63%	1.63%
Latin America	15%	9.42%	3.42%
Australia	4%	6.00%	0.00%
Africa	4%	9.82%	3.82%
North America	40%	6.00%	0.00%
Coca Cola	100%	7.14%	1.14%

Things to watch out for

1. Aggregation across regions. For instance, the Pacific region often includes Australia & NZ with Asia
2. Obscure aggregations including Eurasia and Oceania

# Two problems with these approaches..

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- Focus just on revenues: To the extent that revenues are the only variable that you consider, when weighting risk exposure across markets, you may be missing other exposures to country risk. For instance, an emerging market company that gets the bulk of its revenues outside the country (in a developed market) may still have all of its production facilities in the emerging market.
- Exposure not adjusted or based upon beta: To the extent that the country risk premium is multiplied by a beta, we are assuming that beta in addition to measuring exposure to all other macro economic risk also measures exposure to country risk.

## Approach 3: Estimate a lambda for country risk

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- Source of revenues: Other things remaining equal, a company should be more exposed to risk in a country if it generates more of its revenues from that country.
- Manufacturing facilities: Other things remaining equal, a firm that has all of its production facilities in a “risky country” should be more exposed to country risk than one which has production facilities spread over multiple countries. The problem will be accentuated for companies that cannot move their production facilities (mining and petroleum companies, for instance).
- Use of risk management products: Companies can use both options/futures markets and insurance to hedge some or a significant portion of country risk.

# Estimating Lambdas: The Revenue Approach

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- The easiest and most accessible data is on revenues. Most companies break their revenues down by region.

$$\lambda = \frac{\% \text{ of revenues domestically}_{\text{firm}}}{\% \text{ of revenues domestically}_{\text{average firm}}}$$

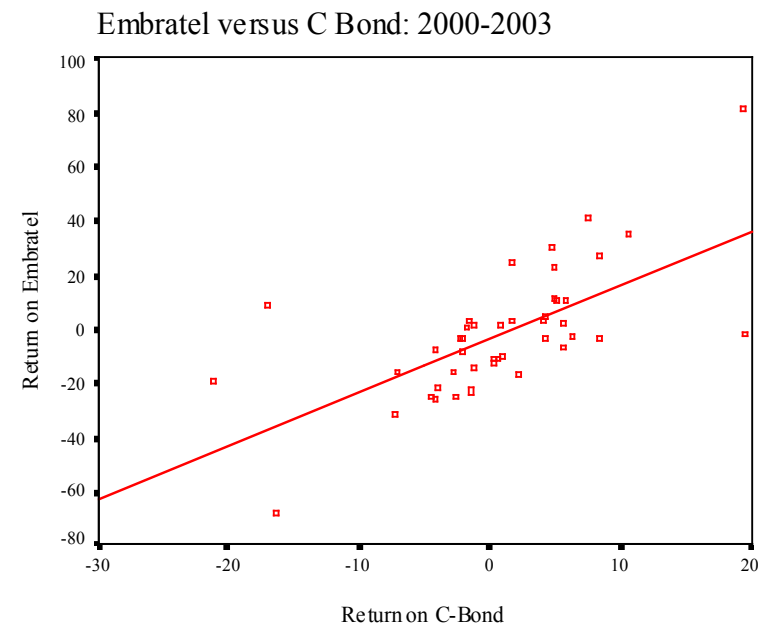
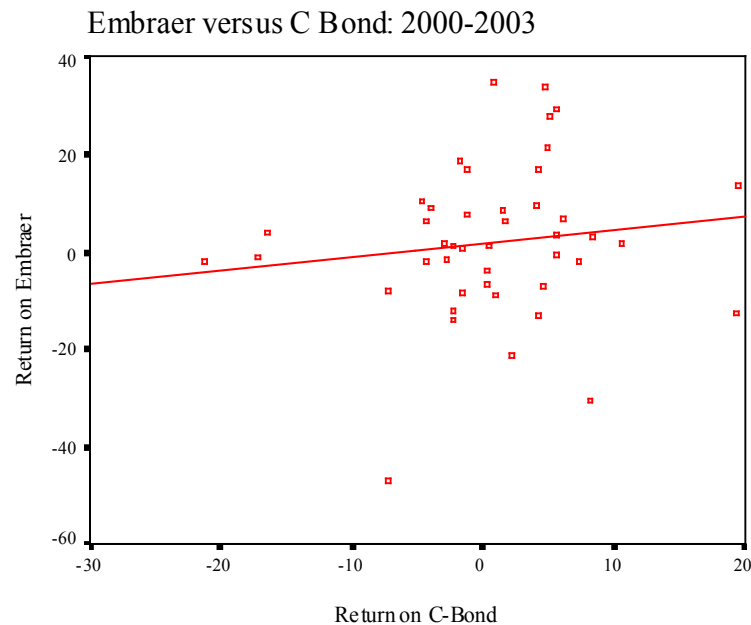
- Consider, for instance, Embraer and Embratel, both of which are incorporated and traded in Brazil. Embraer gets 3% of its revenues from Brazil whereas Embratel gets almost all of its revenues in Brazil. The average Brazilian company gets about 77% of its revenues in Brazil:
  - ▣  $\text{Lambda}_{\text{Embraer}} = 3\% / 77\% = .04$
  - ▣  $\text{Lambda}_{\text{Embratel}} = 100\% / 77\% = 1.30$
- Note that if the proportion of revenues of the average company gets in the market is assumed to be 100%, this approach collapses into the first one.,
- There are two implications
  - ▣ A company's risk exposure is determined by where it does business and not by where it is located
  - ▣ Firms might be able to actively manage their country risk exposure

# A richer lambda estimate: Use stock returns and country bond “returns”: Estimating a “lambda” for Embraer in 2004

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$$\text{Return}_{\text{Embraer}} = 0.0195 + \mathbf{0.2681} \text{Return}_{\text{C Bond}}$$

$$\text{Return}_{\text{Embratel}} = -0.0308 + \mathbf{2.0030} \text{Return}_{\text{C Bond}}$$



# Estimating a US Dollar Cost of Equity for Embraer - September 2004

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- Assume that the beta for Embraer is 1.07, and that the US \$ riskfree rate used is 4%. Also assume that the risk premium for the US is 5% and the country risk premium for Brazil is 7.89%. Finally, assume that Embraer gets 3% of its revenues in Brazil & the rest in the US.
- There are five estimates of \$ cost of equity for Embraer:
  - Approach 1: Constant exposure to CRP, Location CRP
    - $E(\text{Return}) = 4\% + 1.07 (5\%) + 7.89\% = 17.24\%$
  - Approach 2: Constant exposure to CRP, Operation CRP
    - $E(\text{Return}) = 4\% + 1.07 (5\%) + (0.03*7.89\% + 0.97*0\%) = 9.59\%$
  - Approach 3: Beta exposure to CRP, Location CRP
    - $E(\text{Return}) = 4\% + 1.07 (5\% + 7.89\%) = 17.79\%$
  - Approach 4: Beta exposure to CRP, Operation CRP
    - $E(\text{Return}) = 4\% + 1.07 (5\% + (0.03*7.89\% + 0.97*0\%)) = 9.60\%$
  - Approach 5: Lambda exposure to CRP
    - $E(\text{Return}) = 4\% + 1.07 (5\%) + 0.27(7.89\%) = 11.48\%$



# Valuing Emerging Market Companies with significant exposure in developed markets

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- The conventional practice in investment banking is to add the country equity risk premium on to the cost of equity for every emerging market company, notwithstanding its exposure to emerging market risk. Thus, in 2004, Embraer would have been valued with a cost of equity of 17-18% even though it gets only 3% of its revenues in Brazil. As an investor, which of the following consequences do you see from this approach?
  - a. Emerging market companies with substantial exposure in developed markets will be significantly over valued by equity research analysts.
  - b. Emerging market companies with substantial exposure in developed markets will be significantly under valued by equity research analysts.

Can you construct an investment strategy to take advantage of the misvaluation? What would need to happen for you to make money of this strategy?

# Implied Equity Premiums

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- Let's start with a general proposition. 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 what you have priced the asset to earn (as an expected return).
- 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. 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 (every minute of every day, if you are so inclined).

# Implied Equity Premiums: January 2008

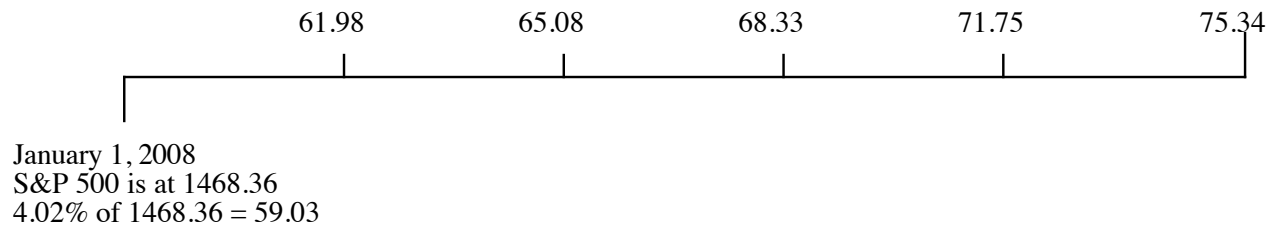
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- We can use the information in stock prices to back out how risk averse the market is and how much of a risk premium it is demanding.

Between 2001 and 2007 dividends and stock buybacks averaged 4.02% of the index each year.

Analysts expect earnings to grow 5% a year for the next 5 years. We will assume that dividends & buybacks will keep pace.. Last year's cashflow (59.03) growing at 5% a year

After year 5, we will assume that earnings on the index will grow at 4.02%, the same rate as the entire economy (= riskfree rate).



- If you pay the current level of the index, you can expect to make a return of 8.39% on stocks (which is obtained by solving for r in the following equation)

$$1468.36 = \frac{61.98}{(1+r)} + \frac{65.08}{(1+r)^2} + \frac{68.33}{(1+r)^3} + \frac{71.75}{(1+r)^4} + \frac{75.34}{(1+r)^5} + \frac{75.35(1.0402)}{(r - .0402)(1+r)^5}$$

- Implied Equity risk premium = Expected return on stocks - Treasury bond rate = 8.39% - 4.02% = 4.37%