Local Currency Government Bond Rates – January 2017

Currency	*Govt Bond Rate 12/31/16*	*Currency*	*Govt Bond Rate 12/31/16*
Australian $	2.76%	Malyasian Ringgit	4.24%
Brazilian Reai	11.37%	Mexican Peso	7.63%
British Pound	1.35%	Nigerian Naira	15.97%
Bulgarian Lev	2.04%	Norwegian Krone	1.61%
Canadian $	1.70%	NZ $	3.25%
Chilean Peso	4.12%	Pakistani Rupee	8.03%
Chinese Yuan	3.25%	Peruvian Sol	6.43%
Colombian Peso	6.76%	Phillipine Peso	4.75%
Croatian Kuna	3.13%	Polish Zloty	3.67%
Czech Koruna	0.49%	Romanian Leu	3.44%
Danish Krone	0.42%	Russian Ruble	8.38%
Euro	0.29%	Singapore $	2.45%
HK $	1.69%	South African Rand	8.80%
Hungarian Forint	3.41%	Swedish Krona	0.62%
Iceland Krona	5.06%	Swiss Franc	-0.19%
Indian Rupee	6.40%	Taiwanese $	1.17%
Indonesian Rupiah	7.60%	Thai Baht	2.70%
Israeli Shekel	2.06%	Turkish Lira	11.00%
Japanese Yen	0.06%	US $	2.45%
Kenyan Shilling	14.02%	Venezuelan Bolivar	20.43%
Korean Won	2.08%	Vietnamese Dong	6.10%

Approach 1: Default spread from Government Bonds

BONDS: HIGH YIELD & EMERGING MARKET

Jan 06	Red date	Coupon	Ratings S*	Ratings M*	Ratings F*	Bid price	Bid yield	Day's chge yield	Mth's chge yield	Spread vs US
High Yield US$										
Navient Corporation	03/20	8.00	BB-	Ba3	BB	110.96	4.35	-0.03	-0.45	3.13
High Yield Euro										
Kazkommerts Intl BV	02/17	6.88	B	Caa1	B	97.50	-	0.00	0.00	-
Emerging US$										
Mexico	09/16	11.40	BBB+	A3	BBB+	106.80	1.49	0.03	0.01	0.44
Brazil	01/18	8.00	BB	Ba2	BB	103.06	4.86	0.10	0.08	3.64
Peru	03/19	7.13	BBB+	A3	BBB+	111.23	1.95	-0.02	0.00	0.74
Peru	03/19	7.13	BBB+	A3	BBB+	114.01	2.60	0.00	0.20	0.84
Colombia	07/21	4.38	BBB	Baa2	BBB	105.12	3.17	0.00	-0.19	1.25
Brazil	01/22	12.50	BB	Ba2	BB	104.47	11.34	-0.06	1.24	9.42
Turkey	09/22	6.25	-	Ba1	BBB-	104.33	5.43	0.01	-0.16	3.51
Poland	03/23	3.00	BBB+	A2	A-	98.18	3.36	0.01	-0.01	1.43
Russia	05/26	4.75	-	-	BBB-	102.92	4.41	-0.02	-0.12	2.00
Turkey	10/26	4.88	-	Ba1	BBB-	92.99	5.91	-0.02	-0.08	3.50
Emerging Euro										
Brazil	02/15	7.38	BBB-	Baa2	BBB	111.75	0.73	0.00	0.00	0.09
Mexico	02/20	5.50	BBB+	A3	BBB+	113.56	1.04	0.01	-0.31	-0.18
Mexico	04/23	2.75	BBB+	A3	BBB+	105.55	1.81	0.01	-0.21	-0.12
Bulgaria	03/27	2.63	BB+	Baa2	BBB-	104.20	2.16	0.01	-0.20	-0.25

Data provided by SIX Financial Information & Tullett Prebon Information. US $ denominated bonds NY close; all other London close. *S - Standard & Poor's, M - Moody's, F - Fitch.

The Brazil Default Spread
Brazil 2018 Bond: 4.86%
US 2018 T.Bond: 1.22%
Spread: 3.64%

Approach 2: CDS Spreads – January 2017

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Country	CDS Spread	CDS Spread adj for US	Country	CDS Spread	CDS Spread adj for US	Country	CDS Spread	CDS Spread adj for US
Abu Dhabi	0.97%	0.59%	Hungary	1.67%	1.29%	Peru	1.73%	1.35%
Argentina	5.14%	4.76%	Iceland	1.10%	0.72%	Philippines	1.61%	1.23%
Australia	0.49%	0.11%	India	1.76%	1.38%	Poland	1.17%	0.79%
Austria	0.52%	0.14%	Indonesia	2.25%	1.87%	Portugal	3.42%	3.04%
Bahrain	3.17%	2.79%	Ireland	1.02%	0.64%	Qatar	1.17%	0.79%
Belgium	0.60%	0.22%	Israel	1.12%	0.74%	Romania	1.51%	1.13%
Brazil	3.59%	3.21%	Italy	2.22%	1.84%	Russia	2.46%	2.08%
Bulgaria	1.87%	1.49%	Japan	0.62%	0.24%	Saudi Arabia	1.45%	1.07%
Chile	1.29%	0.91%	Kazakhstan	2.13%	1.75%	Slovakia	0.85%	0.47%
China	1.65%	1.27%	Korea	0.67%	0.29%	Slovenia	1.52%	1.14%
Colombia	2.42%	2.04%	Latvia	1.02%	0.64%	South Africa	2.87%	2.49%
Costa Rica	3.40%	3.02%	Lebanon	5.57%	5.19%	Spain	1.25%	0.87%
Croatia	2.60%	2.22%	Lithuania	0.94%	0.56%	Sweden	0.40%	0.02%
Cyprus	2.67%	2.29%	Malaysia	1.94%	1.56%	Switzerland	0.50%	0.12%
Czech Republic	0.74%	0.36%	Mexico	2.20%	1.82%	Thailand	1.28%	0.90%
Denmark	0.41%	0.03%	Morocco	2.11%	1.73%	Tunisia	5.00%	4.62%
Egypt	4.76%	4.38%	Netherlands	0.51%	0.13%	Turkey	3.44%	3.06%
Estonia	0.81%	0.43%	New Zealand	0.50%	0.12%	Ukraine	7.64%	7.26%
Finland	0.45%	0.07%	Nigeria	5.76%	5.38%	United Kingdom	0.61%	0.23%
France	0.70%	0.32%	Norway	0.34%	0.00%	United States	0.38%	0.00%
Germany	0.44%	0.06%	Pakistan	4.18%	3.80%	Venezuela	30.82%	30.44%
Hong Kong	0.58%	0.20%	Panama	1.94%	1.56%	Vietnam	2.61%	2.23%

Approach 3: Typical Default Spreads: January 2017

S&P Sovereign Rating	Moody's Sovereign Rating	Default Spread
AAA	Aaa	0.00%
AA+	Aa1	0.46%
AA	Aa2	0.57%
AA-	Aa3	0.70%
A+	A1	0.81%
A	A2	0.98%
A-	A3	1.39%
BBB+	Baa1	1.84%
BBB	Baa2	2.20%
BBB-	Baa3	2.54%
BB+	Ba1	2.89%
BB	Ba2	3.47%
BB	Ba3	4.16%
B+	B1	5.20%
B	B2	6.36%
B-	B3	7.51%
CCC+	Caa1	8.66%
CCC	Caa2	10.40%
CCC-	Caa3	11.55%
CC+	Ca1	13.86%
CC	Ca2	15.25%
CC-	Ca3	16.50%
C+	C1	18.00%
C	C2	20.00%
C-	C3	25.00%

Getting to a risk free rate in a currency: Example

- The Brazilian government bond rate in nominal reais on January 1, 2017 was 11.37%. To get to a riskfree rate in nominal reais, we can use one of three approaches.
  - Approach 1: Government Bond spread
    - The 2018 Brazil bond, denominated in US dollars, has a spread of 3.64% over the US treasury bond rate.
    - Riskfree rate in $R = 11.37% - 3.64% = 7.73%
  - Approach 2: The CDS Spread
    - The CDS spread for Brazil, adjusted for the US CDS spread was 3.21%.
    - Riskfree rate in $R = 11.37% - 3.21% = 8.16%
  - Approach 3: The Rating based spread
    - Brazil has a Ba2 local currency rating from Moody's. The default spread for that rating is 3.47%
    - Riskfree rate in $R = 11.37% - 3.47% = 7.90%

Test 4: A Real Riskfree Rate

- In some cases, you may want a riskfree rate in real terms (in real terms) rather than nominal terms.
- To get a real riskfree rate, you would like a security with no default risk and a guaranteed real return. Treasury indexed securities offer this combination.
- In January 2017, the yield on a 10-year indexed treasury bond was 0.50%. Which of the following statements would you subscribe to?
  a. This (0.5%) is the real riskfree rate to use, if you are valuing US companies in real terms.
  b. This (0.5%) is the real riskfree rate to use, anywhere in the world

  Explain.

No default free entity: Choices with riskfree rates….

- Estimate a range for the riskfree rate in local terms:
  - Approach 1: Subtract default spread from local government bond rate:

    Government bond rate in local currency terms - Default spread for Government in local currency
  - Approach 2: Use forward rates and the riskless rate in an index currency (say Euros or dollars) to estimate the riskless rate in the local currency.
- Do the analysis in real terms (rather than nominal terms) using a real riskfree rate, which can be obtained in one of two ways –
  - from an inflation-indexed government bond, if one exists
  - set equal, approximately, to the long term real growth rate of the economy in which the valuation is being done.
- Do the analysis in a currency where you can get a riskfree rate, say US dollars or Euros.

Risk free Rate: Don't have or trust the government bond rate?

1. Build up approach: The risk free rate in any currency can be written as the sum of two variables:

Risk free rate = Expected Inflation in currency + Expected real interest rate

The expected real interest rate can be computed in one of two ways: from the US TIPs rate or set equal to real growth in the economy. Thus, if the expected inflation rate in a country is expected to be 15% and the TIPs rate is 1%, the risk free rate is 16%.

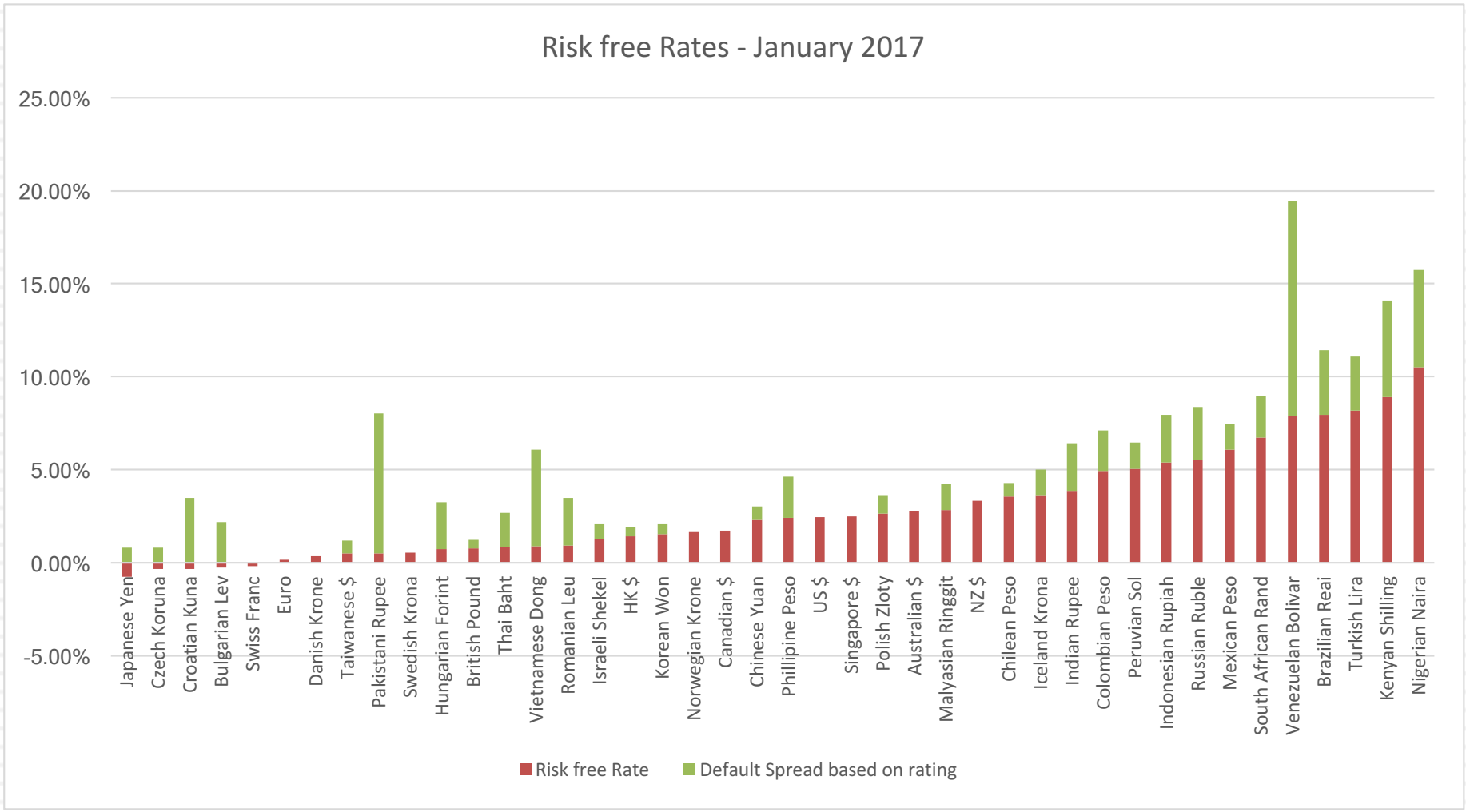
2. US $ rate & Differential Inflation: Alternatively, you can scale up the US $ risk free rate by the differential inflation between the US $ and the currency in question:

Risk free rate$_{Currency}$= $(1 + Riskfree\ rate_{US\ \$}) \frac{(1 + Expected\ Inflation_{Foreign\ Currency})}{(1 + Expected\ Inflation_{US\ \$})} - 1$

Thus, if the US $ risk free rate is 2.00%, the inflation rate in the foreign currency is 15% and the inflation rate in US $ is 1.5%, the foreign currency risk free rate is as follows:

Risk free rate = $(1.02)\frac{(1.15)}{(1.015)} - 1 = 15.57\%$

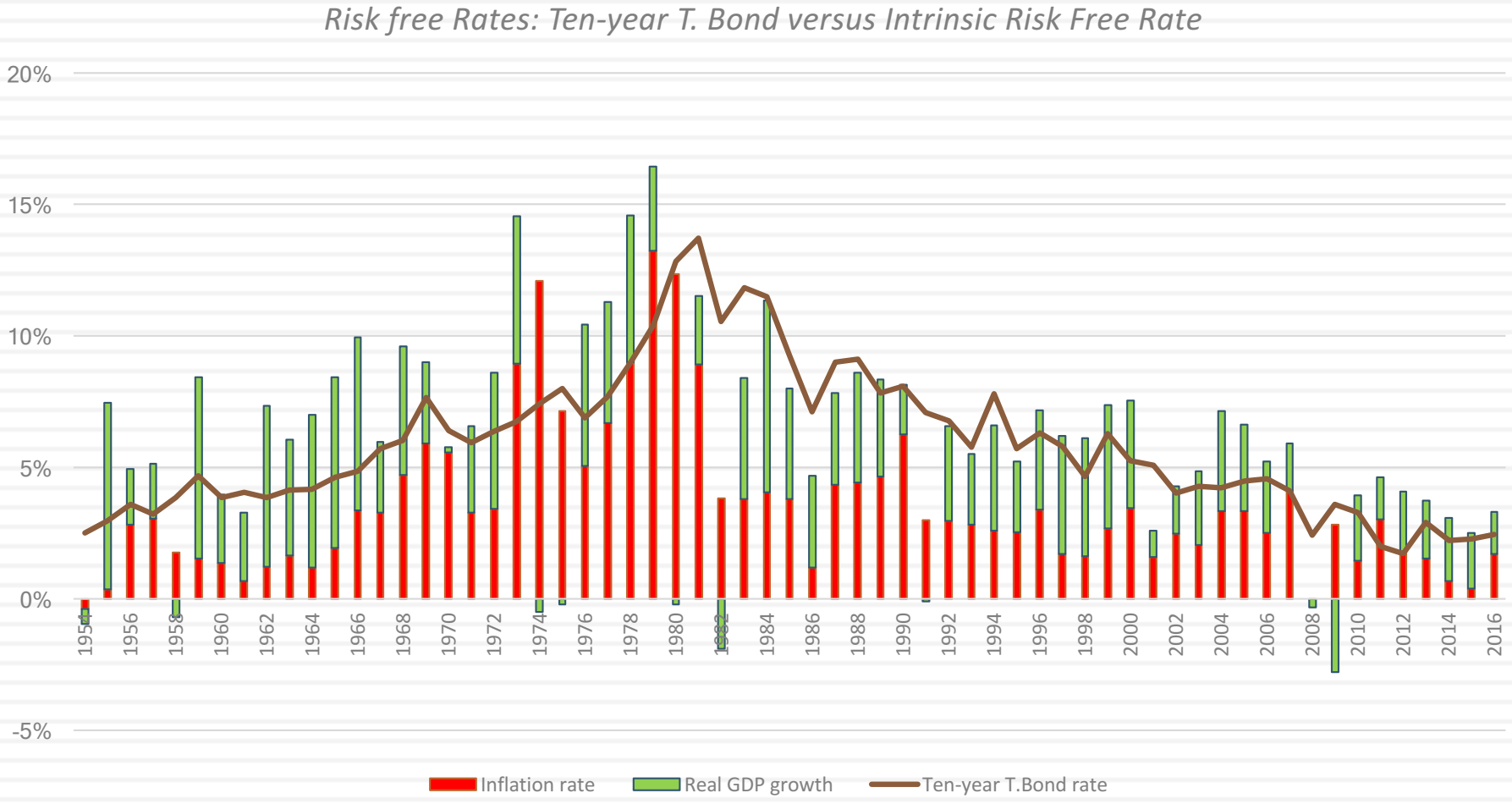
Why do risk free rates vary across currencies? January 2017 Risk free rates



One more test on riskfree rates…

- On January 1, 2017, the 10-year treasury bond rate in the United States was 2.45%, low by historic standards. Assume that you were valuing a company in US dollars then, but were wary about the risk free rate being too low. Which of the following should you do?
  a. Replace the current 10-year bond rate with a more reasonable normalized riskfree rate (the average 10-year bond rate over the last 30 years has been about 5-6%)
  b. Use the current 10-year bond rate as your riskfree rate but make sure that your other assumptions (about growth and inflation) are consistent with the riskfree rate
  c. Something else…

Some perspective on risk free rates



Negative Interest Rates?

- In 2016, there were at least three currencies (Swiss Franc, Japanese Yen, Euro) with negative interest rates. Using the fundamentals (inflation and real growth) approach, how would you explain negative interest rates?
- How negative can rates get? (Is there a bound?)
- Would you use these negative interest rates as risk free rates?
  - If no, why not and what would you do instead?
  - If yes, what else would you have to do in your valuation to be internally consistent?

Discount Rates: II

The Equity Risk Premium

The ubiquitous historical risk premium

- 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*
1928-2016	7.96%	6.24%	6.11%	4.62%
Std Error	2.13%	2.28%		
1967-2016	6.57%	4.37%	5.26%	3.42%
Std Error	2.42%	2.74%		
2007-2016	7.91%	3.62%	6.15%	2.30%
Std Error	6.06%	8.66%		

The perils of trusting the past…….

- 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%:

  Standard Error in Premium = 20%/√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 to 1900-2015

Country	Geometric ERP	Arithmetic ERP	Standard Error
Australia	5.00%	6.60%	1.70%
Austria	2.60%	21.50%	14.30%
Belgium	2.40%	4.50%	2.00%
Canada	3.30%	4.90%	1.70%
Denmark	2.30%	3.80%	1.70%
Finland	5.20%	8.80%	2.80%
France	3.00%	5.40%	2.10%
Germany	5.10%	9.10%	2.70%
Ireland	2.80%	4.80%	1.80%
Italy	3.10%	6.50%	2.70%
Japan	5.10%	9.10%	3.00%
Netherlands	3.30%	5.60%	2.10%
New Zealand	4.00%	5.50%	1.70%
Norway	2.30%	5.20%	2.60%
South Africa	5.40%	7.20%	1.80%
Spain	1.80%	3.80%	1.90%
Sweden	3.10%	5.40%	2.00%
Switzerland	2.10%	3.60%	1.60%
U.K.	3.60%	5.00%	1.60%
U.S.	4.30%	6.40%	1.90%
Europe	3.20%	4.50%	1.50%
World-ex U.S.	2.80%	3.90%	1.40%
World	3.20%	4.40%	1.40%

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

- 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. (In January 2017, that spread was 3.64% for the Brazilian $ bond)
  - The sovereign CDS spread for the country. In January 2017, the ten year CDS spread for Brazil, adjusted for the US CDS, was 3.21%.
  - The default spread based on the local currency rating for the country. Brazil's sovereign local currency rating is Ba2 and the default spread for a Ba2 rated sovereign was about 3.47% in January 2017.
- Add the default spread to a "mature" market premium: 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 5.69%.
  - Country Risk Premium for Brazil = 3.47%
  - Total ERP for Brazil = 5.69% + 3.47% = 9.16%

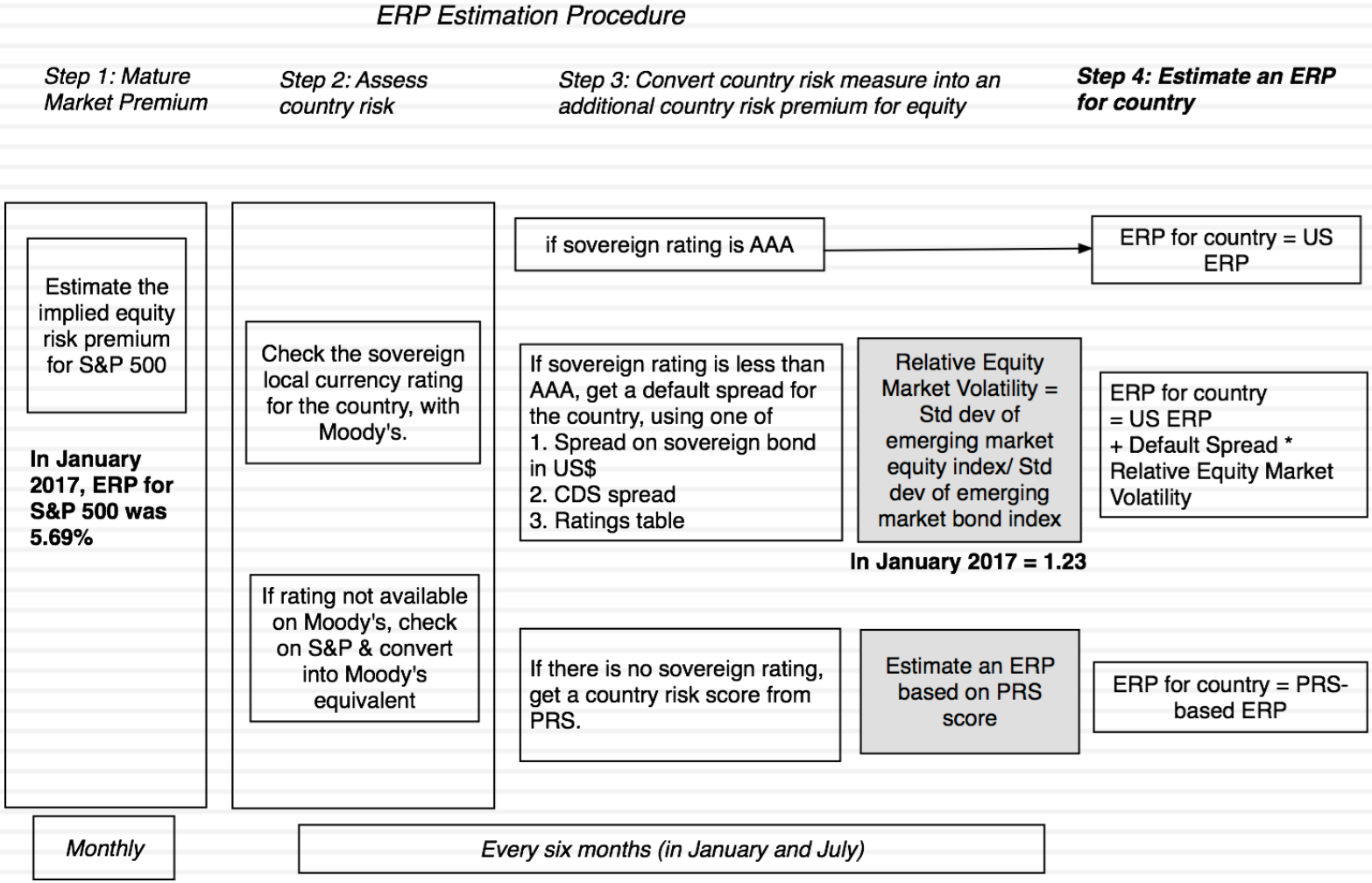
An equity volatility based approach to estimating the country total ERP

- 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$_{US}$ * $\sigma_{\text{Country Equity}}$ / $\sigma_{\text{US Equity}}$
- 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 5.69%.
  - Assume that the standard deviation in the Bovespa (Brazilian equity) is 30% and that the standard deviation for the S&P 500 (US equity) is 18%.
  - Total Equity Risk Premium for Brazil = 5.69% (30%/18%) = 9.48%
  - Country equity risk premium for Brazil = 9.48% - 5.69% = 3.79%

A melded approach to estimating the additional country risk premium

- 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 2016, you would get:
  - Country Equity risk premium = Default spread on country bond* $\sigma_{\text{Country Equity}} / \sigma_{\text{Country Bond}}$
    - Standard Deviation in Bovespa (Equity) = 30%
    - Standard Deviation in Brazil government bond = 20%
    - Default spread for Brazil= 3.47%
  - Brazil Country Risk Premium = 3.47% (30%/20%) = 5.21%
  - Brazil Total ERP = Mature Market Premium + CRP = 5.69% + 5.21% = 11.00%

A Template for Estimating the ERP



ERP : Jan 2017

Andorra	8.81%	3.12%	Jersey	6.26%	0.57%
Austria	6.26%	0.57%	Liechtenstein	5.69%	0.00%
Belgium	6.55%	0.86%	Luxembourg	5.69%	0.00%
Cyprus	12.09%	6.40%	Malta	7.40%	1.71%
Denmark	5.69%	0.00%	Netherlands	5.69%	0.00%
Finland	6.26%	0.57%	Norway	5.69%	0.00%
France	6.39%	0.70%	Portugal	9.24%	3.55%
Germany	5.69%	0.00%	Spain	8.40%	2.71%
Greece	19.89%	14.20%	Sweden	5.69%	0.00%
Guernsey	6.26%	0.57%	Switzerland	5.69%	0.00%
Iceland	7.40%	1.71%	Turkey	9.24%	3.55%
Ireland	7.40%	1.71%	UK	6.26%	0.57%
Isle of Man	6.26%	0.57%	**W.Europe**	**6.81%**	**1.12%**
Italy	8.40%	2.71%			

Albania	12.09%	6.40%
Armenia	12.09%	6.40%
Azerbaijan	9.24%	3.55%
Belarus	16.34%	10.65%
Bosnia and Her	14.93%	9.24%
Bulgaria	8.40%	2.71%
Croatia	9.96%	4.27%
Czech Republic	6.69%	1.00%
Estonia	6.69%	1.00%
Georgia	10.81%	5.12%
Hungary	8.81%	3.12%
Kazakhstan	8.81%	3.12%
Kyrgyzstan	13.51%	7.82%
Latvia	7.40%	1.71%
Lithuania	7.40%	1.71%
Macedonia	10.81%	5.12%
Moldova	14.93%	9.24%
Montenegro	12.09%	6.40%
Poland	6.90%	1.21%
Romania	8.81%	3.12%
Russia	9.24%	3.55%
Serbia	12.09%	6.40%
Slovakia	6.90%	1.21%
Slovenia	8.81%	3.12%
Ukraine	19.89%	14.20%
E.Europe	**9.09%**	**3.40%**

Country	ERP	CRP	Country	ERP	CRP
Algeria	13.72%	7.47%	Malawi	17.24%	10.99%
Brunei	9.75%	3.50%	Mali	13.90%	7.65%
Gambia	13.72%	7.47%	Myanmar	13.72%	7.47%
Guinea	20.00%	13.75%	Niger	17.24%	10.99%
Guinea-Bissau	12.48%	6.23%	Sierra Leone	16.61%	10.36%
Guyana	12.48%	6.23%	Somalia	20.00%	13.75%
Haiti	16.61%	10.36%	Sudan	20.00%	13.75%
Iran	11.22%	4.97%	Syria	20.00%	13.75%
Korea, D.P.R.	17.24%	10.99%	Tanzania	13.90%	7.65%
Liberia	17.24%	10.99%	Togo	13.72%	7.47%
Libya	20.00%	13.75%	Yemen, Republic	17.24%	10.99%
Madagascar	12.48%	6.23%	Zimbabwe	17.24%	10.99%

Canada	5.69%	0.00%
USA	5.69%	0.00%
North America	**5.69%**	**0.00%**

Caribbean	**13.81%**	**8.12%**

Argentina	14.93%	9.24%
Belize	18.48%	12.79%
Bolivia	10.81%	5.12%
Brazil	9.96%	4.27%
Chile	6.55%	0.86%
Colombia	8.40%	2.71%
Costa Rica	9.24%	3.55%
Ecuador	14.93%	9.24%
El Salvador	14.93%	9.24%
Guatemala	9.24%	3.55%
Honduras	13.51%	7.82%
Mexico	7.40%	1.71%
Nicaragua	13.51%	7.82%
Panama	8.40%	2.71%
Paraguay	9.24%	3.55%
Peru	7.40%	1.71%
Suriname	12.09%	6.40%
Uruguay	8.40%	2.71%
Venezuela	19.89%	14.20%
Latin America	**10.11%**	**4.42%**

Angola	12.09%	6.40%
Botswana	6.90%	1.21%
Burkina Faso	14.93%	9.24%
Cameroon	13.51%	7.82%
Cape Verde	13.51%	7.82%
Congo (DR)	14.93%	9.24%
Congo (Rep)	14.93%	9.24%
Côte d'Ivoire	10.81%	5.12%
Egypt	14.93%	9.24%
Ethiopia	12.09%	6.40%
Gabon	12.09%	6.40%
Ghana	14.93%	9.24%
Kenya	12.09%	6.40%
Morocco	9.24%	3.55%
Mozambique	19.89%	14.20%
Namibia	8.81%	3.12%
Nigeria	12.09%	6.40%
Rwanda	13.51%	7.82%
Senegal	12.09%	6.40%
South Africa	8.40%	2.71%
Tunisia	10.81%	5.12%
Uganda	13.51%	7.82%
Zambia	14.93%	9.24%
Africa	**11.98%**	**6.29%**

Bahrain	9.96%	4.27%
Iraq	14.94%	9.25%
Israel	6.69%	1.00%
Jordan	12.09%	6.40%
Kuwait	6.40%	0.71%
Lebanon	13.51%	7.82%
Oman	7.96%	2.27%
Qatar	6.40%	0.71%
Ras Al Khaimah	6.90%	1.21%
Saudi Arabia	6.69%	1.00%
Sharjah	7.40%	1.71%
United Arab Emirates	6.40%	0.71%
Middle East	**7.50%**	**1.81%**

Bangladesh	10.81%	5.12%
Cambodia	13.51%	7.82%
China	6.55%	0.86%
Fiji	12.09%	6.40%
Hong Kong	6.26%	0.57%
India	8.81%	3.12%
Indonesia	8.81%	3.12%
Japan	6.69%	1.00%
Korea	6.39%	0.70%
Macao	6.55%	0.86%
Malaysia	7.40%	1.71%
Mauritius	7.95%	2.26%
Mongolia	16.34%	10.65%
Pakistan	14.93%	9.24%
Papua New Guinea	13.51%	7.82%
Philippines	8.40%	2.71%
Singapore	5.69%	0.00%
Sri Lanka	12.09%	6.40%
Taiwan	6.55%	0.86%
Thailand	7.95%	2.26%
Vietnam	12.09%	6.40%
Asia	**7.12%**	**1.43%**

Australia	5.69%	0.00%
Cook Islands	12.09%	6.40%
New Zealand	5.69%	0.00%
Australia & NZ	**5.70%**	**0.01%**

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

From Country Equity Risk Premiums to Corporate Equity Risk premiums

- Approach 1: Assume that every company in the country is equally exposed to country risk. In this case,
  - E(Return) = Riskfree Rate + CRP + Beta (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(Return) = Riskfree Rate + Beta (Mature ERP+ 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(Return)=Riskfree Rate+ 🚲 (Mature ERP) + ✦ (CRP)

Mature ERP = Mature market Equity Risk Premium

CRP = Additional country risk premium

Approaches 1 & 2: Estimating country risk premium exposure

- 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

- 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%
Embraer		**5.24%**	**0.24%**

- 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%
Ambev	**204**		**9.11%**	**3.11%**

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

Region	*Revenues*	*Total ERP*	*CRP*
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..

- 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.

A Production-based ERP: Royal Dutch Shell in 2015

Country	*Oil & Gas Production*	*% of Total*	*ERP*
Denmark	17396	3.83%	6.20%
Italy	11179	2.46%	9.14%
Norway	14337	3.16%	6.20%
UK	20762	4.57%	6.81%
Rest of Europe	*874*	*0.19%*	*7.40%*
Brunei	823	0.18%	9.04%
Iraq	20009	4.40%	11.37%
Malaysia	22980	5.06%	8.05%
Oman	78404	17.26%	7.29%
Russia	22016	4.85%	10.06%
Rest of Asia & ME	*24480*	*5.39%*	*7.74%*
Oceania	*7858*	*1.73%*	*6.20%*
Gabon	12472	2.75%	11.76%
Nigeria	67832	14.93%	11.76%
Rest of Africa	6159	1.36%	12.17%
USA	104263	22.95%	6.20%
Canada	8599	1.89%	6.20%
Brazil	13307	2.93%	9.60%
Rest of Latin America	*576*	*0.13%*	*10.78%*
Royal Dutch Shell	**454326**	**100.00%**	**8.26%**

Approach 3: Estimate a lambda for country risk

- Country risk exposure is affected by where you get your revenues and where your production happens, but there are a host of other variables that also affect this exposure, including:
  - Use of risk management products: Companies can use both options/futures markets and insurance to hedge some or a significant portion of country risk.
  - Government "national" interests: There are sectors that are viewed as vital to the national interests, and governments often play a key role in these companies, either officially or unofficially. These sectors are more exposed to country risk.
- It is conceivable that there is a richer measure of country risk that incorporates all of the variables that drive country risk in one measure. That way my rationale when I devised "lambda" as my measure of country risk exposure.