



# ESTIMATING THE RISK FREE RATE

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# Ingredients for a risk free investment

2

- For an investment to be risk free, you have to know your expected return with certainty.
- Thus, an investment can be risk free only if
  - The entity making the cash flow has no default risk
  - There is not reinvestment risk
- Consequently, even if you have a default free entity, the risk free rate will vary, depending on the time period of your cash flow.
- In valuation & corporate finance, we assume that since the cash flows extend over long periods, it is a better approximation to use a long term (ten-year), default free rate as the risk free rate.

# The risk free rate when there is a default free entity (perhaps)

3

## Risk free rates on 2/20/13

Australian \$: 3.55%

Canadian \$: 2.02%

Danish Krona: 1.81%

Euro: 1.65%

Yen: 0.75%

NZ \$: 3.92%

Swedish Krone: 2.02%

Swiss Franc: 0.77%

British £: 2.18%

US \$: 2.01%

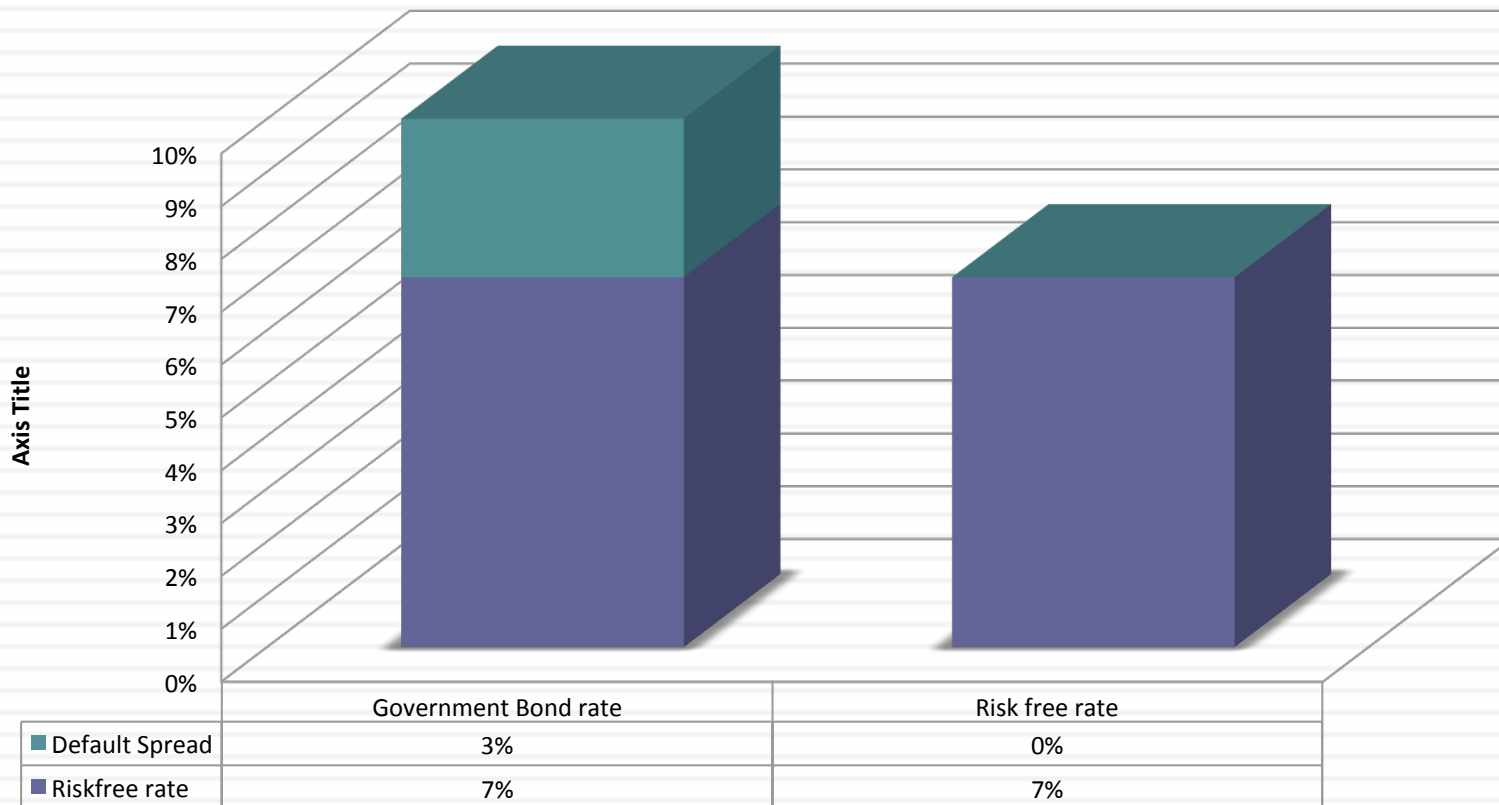
BONDS - BENCHMARK GOVERNMENT								
Feb 15	Red	Bid	Bid	Day	Wk	Month	Year	
	Date	Coupon	Price	Yield	chg	chg	chg	chg
				yield	yield	yield	yield	
Australia	10/14	4.50	102.75	2.80	-0.02	0.05	0.02	-0.71
	04/23	5.50	116.54	3.55	-0.03	0.08	0.10	-0.53
Austria	10/14	3.40	105.26	0.23	-0.04	-0.02	0.02	-0.60
	11/22	3.40	112.10	2.02	-0.01	0.05	0.12	-0.91
Belgium	03/15	3.50	106.38	0.44	-0.05	-0.02	0.12	-1.05
	06/23	2.25	97.78	2.50	-0.02	0.02	0.29	-1.14
Canada	02/15	1.00	99.75	1.13	-0.01	-0.02	-0.06	0.07
	06/22	2.75	106.17	2.02	-0.01	0.03	0.07	0.00
Denmark	11/16	2.50	107.43	0.49	-0.05	0.02	0.18	0.20
	11/23	1.50	96.98	1.81	-0.02	0.06	0.19	-0.07
Finland	09/14	3.13	104.65	0.15	-0.03	-0.01	0.01	-0.34
	09/22	1.63	98.06	1.85	-0.02	0.04	0.10	-0.50
France	04/15	3.50	106.79	0.36	-0.04	0.00	0.16	-0.42
	05/18	1.00	99.04	1.19	-0.01	0.06	0.28	-0.71
	10/22	2.25	99.65	2.29	-0.01	0.03	0.14	-0.76
	04/41	4.50	122.97	3.24	-0.01	0.02	0.06	-0.36
Germany	03/15	0.25	100.13	0.19	-0.01	0.01	0.05	-0.04
	02/18	0.50	99.21	0.66	-0.04	0.03	0.04	-0.22
	02/23	1.50	98.60	1.65	-0.03	0.04	0.09	-0.24
	07/44	2.50	101.34	2.44	-0.02	0.05	0.02	-0.07
Greece	02/23	2.00	52.83	10.89	0.07	-0.02	-0.83	-22.24
	02/33	2.00	41.83	10.26	0.05	-0.05	-0.49	-
Ireland	10/17	5.50	111.70	2.78	0.11	-0.05	-0.32	-2.75
	10/20	5.00	108.95	3.64	-0.06	-0.41	-0.65	-3.18
Italy	03/15	2.50	101.26	1.87	-0.03	-0.13	0.43	-1.22
	11/17	3.50	101.53	3.17	-0.01	-0.12	0.31	-1.20
	11/22	5.50	109.17	4.38	-0.02	-0.21	0.17	-1.20
	09/40	5.00	100.60	5.02	-0.06	-0.14	0.07	-0.96
Japan	02/15	0.10	100.11	0.04	0.01	0.01	-0.04	-0.08
	12/17	0.20	100.27	0.14	0.00	0.00	-0.03	-0.19
	12/22	0.80	100.46	0.75	0.01	-0.02	-0.07	-0.22
	12/32	1.70	99.32	1.75	-0.02	-0.05	-0.05	-0.01
Netherlands	01/15	2.75	104.72	0.26	-0.01	0.00	0.14	-0.15
	01/23	3.75	116.16	1.94	-0.03	0.05	0.20	-0.45
New Zealand	04/15	6.00	106.57	2.83	0.08	0.14	0.30	0.21
	04/23	5.50	113.15	3.92	0.07	0.16	0.39	-0.06
Norway	05/17	4.25	109.69	1.85	-0.11	-0.06	0.25	0.11
	05/23	2.00	94.90	2.57	-0.08	-0.03	0.25	0.11
Portugal	10/14	3.60	100.30	3.40	-0.03	-0.10	-0.12	-10.81
	10/23	4.95	90.07	6.25	-0.07	-0.39	-0.07	-5.87
Spain	03/15	2.75	100.49	2.51	-0.03	-0.32	-0.02	-0.29
	01/23	5.40	101.50	5.20	-0.02	-0.22	0.16	-0.06
Sweden	08/15	4.50	108.28	1.09	-0.05	0.08	0.17	-0.05
	06/22	3.50	112.45	2.02	-0.11	0.05	0.24	0.16
Switzerland	06/15	3.75	108.55	0.04	-0.01	-0.01	0.12	0.01
	02/23	4.00	130.90	0.77	-0.04	0.00	0.11	-0.02
UK	03/14	2.25	102.05	0.29	-0.02	0.01	-0.11	-0.11
	09/17	1.00	100.16	0.97	-0.05	0.01	-0.02	0.00
	09/22	1.75	96.35	2.18	-0.06	0.05	0.13	0.08
	12/42	4.50	119.86	3.43	-0.03	0.08	0.18	0.18
US	01/15	0.25	99.97	0.27	-0.01	0.02	0.02	-0.02
	01/18	0.88	100.04	0.87	-0.04	0.04	0.10	0.06
	02/23	2.00	99.92	2.01	-0.01	0.06	0.15	0.08
	02/43	3.13	98.91	3.18	-0.04	0.02	0.14	0.11

London close. Source: ThomsonReuters  
 Yields: Local market standard Annualised yield basis. Yields shown for Italy exclude withholding tax at 12.5 per cent payable by non residents.

Financial Times  
 Benchmark Government Bonds  
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# If there is no default free entity, you have to estimate a “risk free” rate

### Government Bond Rates & Risk Free Rates



# The starting point: The Government Bond Rate in the local currency

On 2/20/13, the ten year Brazilian \$R bond was yielding 9.71%

Website: <http://www.tradingeconomics.com/country-list/government-bond-10y>

	Country	Current	Last Week	Weekly Chg	Last Month	Monthly Chg	Last Year
Kenya	13.5	13.5	0	13.5	0	17.1	-3.6
Pakistan	11.67	11.67	0	11.65	0.02	12.61	-0.94
Nigeria	10.94	11.13	-0.19	11.33	-0.39	16.28	-5.34
Greece	10.81	10.63	0.17	11.47	-0.66	37.71	-26.9
Venezuela	10.05	10.05	0	10.05	0	12.24	-2.18
Vietnam	9.73	9.73	0	9.84	-0.11	11.89	-2.16
<b>Brazil</b>	<b>9.71</b>	9.55	0.16	9.18	0.53	11.03	-1.32
India	7.84	7.91	-0.07	8.05	-0.21	8.2	-0.36
Turkey	6.77	6.7	0.07	6.55	0.22	9.7	-2.93
Peru	6.76	6.76	0	6.76	0	6.76	0
Russia	6.59	6.6	-0.01	6.85	-0.26	7.98	-1.39
Portugal	6.56	6.17	0.39	7	-0.44	12.24	-5.68
Hungary	6.55	6.46	0.09	6.23	0.32	8.8	-2.25
Iceland	6.5	6.48	0.03	6.8	-0.29	6.75	-0.24
South Africa	6.42	6.53	-0.11	6.39	0.03	7.89	-1.47
Romania	5.86	5.8	0.06	6.9	-1.04	7.38	-1.52
Chile	5.69	5.63	0.06	5.51	0.18	5.21	0.48
Spain	5.36	5.02	0.34	5.26	0.1	5.28	0.08
Indonesia	5.23	5.34	-0.11	5.17	0.06	5.1	0.13
Colombia	5.02	5.08	-0.06	5.55	-0.53	7.33	-2.31
Mexico	5.01	5.03	-0.02	5.29	-0.28	6.32	-1.31
Slovenia	4.87	4.87	0	5.03	-0.16		0
Croatia	4.57	4.3	0.27	4.95	-0.38	7.25	-2.68
Italy	4.56	4.31	0.24	4.5	0.06	5.62	-1.06
Slovakia	4.31	4.31	0	4.31	0	4.31	0
Lithuania	4.2	4.05	0.15	4.05	0.15	5.7	-1.5
Philippines	4.17	4.17	0	4.47	-0.3		0
Israel	4.07	4.09	-0.02	3.62	0.45	4.52	-0.45
Poland	3.96	3.85	0.11	3.62	0.34	5.58	-1.63
Ireland	3.85	4.11	-0.26	4.53	-0.68	6.85	-3
New Zealand	3.76	3.71	0.05	3.54	0.22	4	-0.24
China	3.61	3.6	0.01	3.6	0.01	3.43	0.18
Thailand	3.59	3.69	-0.1	3.54	0.05	3.28	0.31
Malaysia	3.47	3.52	-0.06	3.5	-0.03	3.46	0.01
Australia	3.46	3.49	-0.03	3.28	0.18	4.1	-0.65
Latvia	3.35	3.34	0	3.34	0	6.25	-2.91
South Korea	3.06	3.1	-0.04	3.15	-0.09	3.82	-0.76
Bulgaria	3	2.97	0.03	3.43	-0.43	5.36	-2.36
Qatar	2.8	2.8	0	2.62	0.18		0

# Approach 1: Estimating Default Spreads from \$ or Euro denominated bonds

Comparing the Brazilian \$ denominated bond rate to the US treasury bond rate gives you a measure of the default spread for Brazil's sovereign \$ debt. Since Brazil's local currency rating = foreign currency rating, you may be able to get away with this spread.

## BONDS - HIGH YIELD & EMERGING MARKET

Feb 15	Red date	Coupon	Ratings			Bid price	Bid yield	Day's chge yield	Mth's chge yield	Spread vs US
			S*	M*	F*					
<b>High Yield US\$</b>										
HSBK Europe	05/13	7.75	BB	Ba3	BB-	101.00	3.31	-0.03	0.22	3.21
Kazkommerts Int Bertin	04/14	7.88	B+	Caa1	B	99.95	7.91	-0.10	0.36	7.65
	10/16	10.25	BB	B1	-	112.90	6.22	-0.33	-0.86	5.63
<b>High Yield Euro</b>										
Royal Carib Crs	01/14	5.63	BB	Ba1	-	103.00	2.34	-0.02	0.68	2.26
Kazkommerts Int	02/17	6.88	B+	Caa1	B	94.34	8.61	0.00	0.53	8.21
<b>Emerging US\$</b>										
Bulgaria	01/15	8.25	BBB	Baa2	BBB-	113.00	1.30	0.08	-0.29	1.03
Peru	02/15	9.88	BBB	Baa2	BBB	117.11	1.03	-0.12	-0.09	0.76
Brazil	03/15	7.88	BBB	Baa2	BBB	113.82	1.03	-0.06	-0.14	0.76
Mexico	09/16	11.38	BBB	Baa1	BBB	136.76	0.88	-0.02	-0.17	0.47
Philippines	01/19	9.88	BB+	Ba1	BB+	141.00	2.38	0.03	0.17	1.52
<b>Brazil</b>	<b>01/20</b>	<b>12.75</b>	<b>BBB</b>	<b>Baa2</b>	<b>BBB</b>	<b>167.77</b>	<b>2.14</b>	<b>0.02</b>	<b>0.08</b>	<b>0.74</b>
Colombia	02/20	11.75	BBB-	Baa3	BBB-	156.70	2.79	0.03	0.36	1.40
Russia	03/30	7.50	BBB	Baa1	BBB	124.35	3.06	0.13	0.27	2.19
Mexico	08/31	8.30	BBB	Baa1	BBB	154.22	4.09	0.04	0.23	2.06
Indonesia	02/37	6.63	BB+	Baa3	BBB-	126.50	4.76	-0.03	0.24	1.59
<b>Emerging Euro</b>										
Brazil	02/15	7.38	BBB	Baa2	BBB	112.13	1.07	-0.05	0.55	0.89
Poland	02/16	3.63	A-	A2	A-	107.09	1.17	-0.05	0.19	0.91
Turkey	03/16	5.00	NR	Ba1	BBB-	108.31	2.13	-0.05	-0.02	1.87
Mexico	02/20	5.50	BBB	Baa1	BBB	119.09	2.49	0.01	0.09	1.50

US \$ denominated bonds NY close; all other London close. \*S - Standard & Poor's, M - Moody's, F - Fitch.  
Source: ThomsonReuters

FT screwed up on these. Should have compared to German Euro bond rate, not US.

# Approach 2: Using a CDS spread

7

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N	Name (10Y CDS)	Spd (Ask)	Change	#SD	Historical Range			3 Months				
					Low	Avg	Now	High	Avg	+/-	3M Chg	
101)	Americas											
102)	United States	65.58	-4.02	-4.02	-0.9	57.3			74.1	64.5	+1.1	+2.9
103)	Brazil	158.71	-0.50	-0.50	-0.1	141.6			161.1	149.5	+9.2	+14.7
104)	Colombia	139.22	-1.75	-1.75	-0.4	130.8			148.4	138.4	+0.8	-1.7
105)	Mexico	139.93	-1.40	-1.40	-0.3	132.7			149.7	140.1	-0.2	-2.9
106)	Argentina	2002.16	-15.9	-15.91	--	1268.6			3542.9	1794.7	+207.5	+353.5
107)	Venezuela	624.23	-15.5	-15.58	-0.3	614.8			798.9	690.1	-65.8	-157.4
108)	Chile	96.83	-0.04	-0.04	--	90.4			108.9	99.2	-2.4	-5.5
109)	Peru	137.49	-1.49	-1.49	-0.4	129.0			147.5	138.9	-1.4	-4.7
110)	Panama	134.63	-0.83	-0.83	-0.2	130.2			145.9	137.1	-2.5	-2.9
111)	Costa Rica	317.88	-4.67	-4.67	-0.2	313.8			404.9	382.1	-64.2	-70.2
112)	EMEA											
113)	United Kingdom	86.01	-0.75	-0.75	-0.1	63.6			87.6	75.5	+10.5	+23.5
114)	France	141.99	-1.44	-1.44	-0.4	133.8			148.7	141.2	+0.8	+8.2
115)	Germany	86.18	+0.71	+0.71	+0.1	70.7			89.3	78.9	+7.3	+12.3
116)	Italy	306.81	-2.59	-2.59	-0.1	264.2			353.3	297.8	+9.0	-26.9
117)	Spain	325.89	+1.22	+1.22	--	282.4			388.6	323.6	+2.2	-37.9
118)	Portugal	454.30	-1.49	-1.49	--	446.5			660.7	512.5	-58.3	-140.3
119)	Sweden	44.66	+0.45	+0.45	+0.3	38.5			45.9	42.3	+2.4	-1.4
120)	Netherlands	95.35	-1.55	-1.55	-0.3	75.3			97.7	83.4	+12.0	+18.5
121)	Switzerland	71.40	+0.19	+0.19	--	58.0			79.9	68.2	+3.2	+11.0
122)	Greece	80.14	-0.10	-0.10	--	80.1			85.7	81.9	-1.8	-4.9
123)	Russia	202.05	-0.53	-0.53	--	175.7			218.8	195.3	+6.8	-11.9

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000  
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2013 Bloomberg Finance L.P.  
SN 636136 EST GHT-5:00 G556-352-0 11-Feb-2013 10:13:49

CDS spreads are in basis points. On 2/20/13 Brazil's CDS spread was 1.59%.

# Approach 3: Estimate a spread based upon a sovereign rating

8

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**GOVERNMENT BOND RATINGS**

Local-Currency Government Bond Ratings reflect the government's capacity and willingness to generate local-currency revenue to repay its local-currency bonds on a timely basis.

Foreign-Currency Government Bond Ratings reflect the government's capacity and willingness to mobilize foreign exchange to repay its foreign-currency denominated bonds on a timely basis.

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Ratings displayed are as of February 12, 2013. Please check the entity's page on Moodys.com for the most current rating information.

SOVEREIGNS	FOREIGN CURRENCY		LOCAL CURRENCY	
	RATING	OUTLOOK	RATING	OUTLOOK
Albania	B1	STA	B1	STA
Angola	Ba3	POS	Ba3	POS
Argentina	B3	NEG	B3	NEG
Armenia	Ba2	NEG	Ba2	NEG
Australia	Aaa	STA	Aaa	STA
Austria	Aaa	NEG	Aaa	NEG
Azerbaijan	Baa3	STA	Baa3	STA
Bahamas	Baa1	NEG	Baa1	NEG
Bahrain	Baa1	NEG	Baa1	NEG
Bangladesh	Ba3	STA	Ba3	STA
Barbados	Ba1	NEG	Ba1	NEG
Belarus	B3	NEG	B3	NEG
Belgium	Aa3	NEG	Aa3	NEG
Belize	Ca	NEG	Caa3	NEG
Bermuda	Aa2	STA	Aa2	STA
Bolivia	Ba3	STA	Ba3	STA
Bosnia and Herzegovina	B3	STA	B3	STA
Botswana	A2	STA	A2	STA
<b>Brazil</b>	Baa2	POS	<b>Baa2</b>	POS
Bulgaria	Baa2	STA	Baa2	STA



# Convert rating to default spread...

9

Brazil's Baa2  
rating -> 1.75%  
default spread

<i>Rating</i>	<i>Typical Default Spread</i>
Aaa/AAA	0.00%
Aa1/AA+	0.25%
Aa2/AA	0.50%
Aa3/AA-	0.70%
A1/A+	0.85%
A2/A	1.00%
A3A-	1.15%
Baa1/BBB+	1.50%
Baa2/BBB	1.75%
Baa3/BBB-	2.00%
Ba1/BB+	2.40%
Ba2/BB	2.75%
Ba3/BB-	3.25%
B1/B+	4.00%
B2/B	5.00%
B3/B-	6.00%
Caa1/CCC+	7.00%
Caa2/CCC	8.50%
Caa3/CCC-	10.00%

# Estimating a risk free rate in \$R on 2/20/13

10

- Approach 1: Government Bond spread
  - The 2020 Brazil bond, denominated in US dollars, has a spread of 0.74% over the US treasury bond rate.
  - Riskfree rate in \$R = 9.71% - 0.74% = 8.97%
- Approach 2: The CDS Spread
  - The CDS spread for Brazil on 2/20/13 was 1.59%.
  - Riskfree rate in \$R = 9.71% - 1.59% = 8.12%
- Approach 3: The Rating based spread
  - Brazil has a Baa local currency rating from Moody's. The default spread for that rating is 1.75%
  - Riskfree rate in \$R = 9.71% - 1.75% = 7.96%

# Desperation time?

11

- If your “government” has no dollar denominated bonds, no CDS spread but has a sovereign rating (Example: India): Use approach 3
- If your government has no sovereign rating, no CDS spread and no dollar denominated bonds, you can try to get a country risk score from a service like PRS and find a rated country with a similar score. Odds are, though, you will be better off doing your analysis in a different currency.